

# Anno Domini 1945

## January

S	M	T	W	T	F	S
..	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31	...	...	...

## February

S	M	T	W	T	F	S
...	...	...	...	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	...	...	...

## March

S	M	T	W	T	F	S
...	...	...	...	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

## April

1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	...	...	...	...	...

## May

...	...	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31	...	...

## June

...	...	...	...	...	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

## July

1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31	...	...	...	...

## August

...	...	...	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	...

## September

...	...	...	...	...	...	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	...	...	...	...	...	...

## October

..	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31	...	...	...

## November

...	...	...	...	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	..

## December

..	...	...	...	...	...	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29

Domestic and Foreign Postage Rates

(Revised at time of going to press.)

Domestic mail matter includes parcels sent by the mails for local delivery, parcels sent by the mails from one place to another in the United States, or to or from, or between possessions of the U. S., and is divided into classes.

*The*

# BUSINESS YEAR BOOK

First Class includes parcels (with approved labels) except parcels of special order or postal order, except that there may be included in same single copies and full-rate 4th class rates of newspaper work and less matter.

First class mail matter, C. O. D., but cannot be

Terries and other first-class matter as described above, 1c for each ounce or fraction thereof.

Drop Letters mailed for delivery at the office where deposited and where carrier delivery service has not been established, 1c for each ounce or fraction thereof.

Postal Cards, Private Mailing of cards within payment stations, with postage paid, 1c for each card, plus one cent for each card.

SECOND CLASS (limited). Complete copies of newspapers or periodicals, entered as C. O. D. second class matter. When mailed by their publishers, 1c for each two ounces or fraction thereof, regardless of weight or distance, or Parcel Post rate if cheaper.

Second class matter may be registered but must be insured on return.

THIRD CLASS. Publications, post sheets, leaflets, and manuscript, except merchandise (including terminals) and all other matter listed in the list of second class, except that of this class 3 cents, 11c for extra postage, if desired, 20c additional, the fourth class (Parcel Post) rates apply.

Exception: Books, catalogs, cards, bulbs, etc., cuttings, signs, and plans up to 4 oz., 1c for 2 oz. or fraction thereof.

Special rates for bulk mailings. See Postmaster.

Third class matter may be registered on return or sent C. O. D.

For registry rates apply to your postmaster. Registered delivery on registered or insured items, if desired, 20c additional.

Return receipt on registered or insured articles, if desired 4c additional. Return receipts on registered or insured articles, showing address where delivered, 3c cents additional.

FOURTH CLASS (Parcel Post) must consist of eight ounces or less, including boxes, and other matter wholly in print, postpaid, with concrete proof sheets and necessary accompanying name, merchandise, etc., in original and factory packaging.

Maximum: 100 lbs. in length and 16 in. in diameter. Parcels over 24 in. in length and 16 in. in diameter, and fifth parcels, and less than 16 in. in length must be prepaid at 10c per ounce.

Weight limit: 70 lbs.

Fourth-class matter may be insured on return or sent C. O. D., up to a maximum of \$200 (not per parcel).

Any fraction of a cent resulting in the postage on a parcel must be rounded up. On parcels collected on credit, the postage is to be 1 cent per ounce (shown above when intended for local delivery) or 1 cent per parcel when for other than local delivery, provided stamps are not used (local and rural).

Fourth-class matter may be insured on return or sent C. O. D., up to a maximum of \$200 (not per parcel).

Any fraction of a cent resulting in the postage on a parcel must be rounded up. On parcels collected on credit, the postage is to be 1 cent per ounce (shown above when intended for local delivery) or 1 cent per parcel when for other than local delivery, provided stamps are not used (local and rural).

Library books, from non-profit agencies, if sent out or returned, within 1 year, or in the state.

For local postmaster for rates.

**INSURANCE RATES:** 3rd and 4th Class

From \$1.01 to \$25.00	5c
From \$25.01 to \$50.00	10c
From \$50.01 to \$100.00	15c
From \$100.01 to \$200.00	20c

Registered delivery, if desired, 20c additional. Return receipt, 4c additional.

**C. O. D. RATES:** 3rd or 4th Class

From \$1.01 to \$25.00	5c
From \$25.01 to \$50.00	10c
From \$50.01 to \$100.00	15c
From \$100.01 to \$200.00	20c

Registered delivery, if desired, 20c additional.



## A Personal Chronicle For One Year



1945

The  
BUSINESS  
YEAR BOOK

A Personal Chronicle  
For One Year

1942

## Domestic and Foreign Postage Rates

(Revised at time of going to Press.)

Domestic mail matter includes matter deposited in the mails for local delivery or for transmission from one place to another within the United States, or to, or from, or between the possessions of the U. S. and is divided into four classes.

**First Class** includes all letters and sealed parcels, except parcels sealed under special permission (with approved label). It also includes any open letter or parcel which contains writing except that there may be included in parcels, a single invoice and still retain 4th class rates.) Typewritten work and carbon copies are first class matter.

First class mail may be registered or sent C. O. D. but cannot be insured.

Letters and other first-class matter as described above, 3c for each ounce or fraction thereof.

**Drop Letters** mailed for delivery at the office where deposited and where carrier delivery service has not been established, 1c for each ounce or fraction thereof.

**Postal Cards, Private Mailing or Post Cards** within government size limits, written or printed, (get ruling on over and under sizes) 1c each.

**SECOND CLASS** (transient). Complete copies of newspapers or periodicals, entered at P. O. as second class matter. When mailed by other than publishers, 1c for each two ounces or fraction thereof, regardless of weight or distance, or Parcel Post rate if cheaper.

Second class matter may be registered but cannot be insured or sent C. O. D.

**THIRD CLASS** includes circulars, and other matter wholly in print, (except second class publications), proof sheets, corrected proof sheets and manuscript accompanying same, merchandise (including farm and factory products) and all other mailable matter not included in the first, or second, classes. Weight limit of this class: 8 ounces, 1½c for each 2 oz. or fraction thereof. Over 8 ounces the fourth class (Parcel Post) rates apply.

**Exception:** Books, catalogues, seeds, bulbs, roots, cuttings, scions, and plants (up to 8 oz.) 1c for 2 oz. or fraction thereof.

Special rates for bulk mailings. See your postmaster.

Third class matter may be registered or insured or sent C. O. D.

For registry rates apply to your postmaster.

Restricted delivery on registered or insured articles, if desired, 20c additional.

Return receipt on registered or insured articles, if desired 4c additional. Return receipt on registered or insured articles, showing address where delivered, 31 cents additional.

**FOURTH CLASS** (Parcel Post) must weigh in excess of eight ounces: includes books, circulars, and other matter wholly in print, proof sheets, corrected proof sheets and manuscript copy accompanying same, merchandise (including farm and factory products), and all other

**Size limit:** 100 inches in length and girth combined. **NOTE:**—Parcels over 84 inches in length and girth combined, and less than 10 lbs. in weight must be prepaid at 10 lb. rate.

**Weight limit:** 70 lbs.

Parcels containing fourth-class matter (parcel post) are mailable only at post offices, branch post offices and lettered, named or numbered stations.

Parcels must bear the return card of the sender otherwise they will not be accepted for mailing.

Fourth-class matter may be insured or sent C. O. D. up to a maximum of \$200 (per parcel).

Any fraction of a cent resulting in the total postage on a parcel must be counted as a full cent. On parcels collected on rural routes, the postage is to be 2 cents less per parcel than shown above when intended for local delivery, and 3c less per parcel when for other than local delivery, provided parcels are endorsed "Mailed on rural route."

Library books, from non-profit organizations, if sent out or returned, within 3 zones, or within the state.

See local postmaster for rates.

### INSURANCE RATES: 3rd and 4th Class Mail

From \$ .01 to \$ 5.00.....	30.10
From \$ 5.01 to \$ 25.00.....	.20
From \$ 25.01 to \$ 50.00.....	.30
From \$ 50.01 to \$ 100.00.....	.50
From \$ 101.01 to \$ 150.00.....	.60
From \$ 150.01 to \$ 200.00.....	.70

Restricted delivery, if desired, 20c additional.

Return receipt, 4c additional.

Return receipt, showing address where delivered, 31 cents additional.

### C. O. D. RATES: 3rd or 4th Class Mail

From \$ .01 to \$ 5.00.....	.24
From \$ 5.01 to \$ 25.00.....	.34
From \$ 25.01 to \$ 50.00.....	.44
From \$ 50.01 to \$ 100.00.....	.64
From \$ 100.01 to \$ 150.00.....	.80
From \$ 150.01 to \$ 200.00.....	.90

Restricted delivery, if desired, 20c additional.



## Distances and Mail Time from New York to Cities in United States

Cities in United States	Miles	Time (hours)	Cities in United States	Miles	Time (hours)
Albany, N. Y.	145	3	Louisville, Ky.	865	22
Atlanta, Ga.	876	26	Memphis, Tenn.	1,158	36
Baltimore, Md.	187	5	Milwaukee, Wis.	994	25
Birmingham, Ala.	990	31	Nashville, Tenn.	998	28
Bismarck, N. Dak.	1,753	49	New Orleans, La.	1,345	41
Boston, Mass.	232	6	Ogden, Utah.	2,397	61
Buffalo, N. Y.	396	10	Oklahoma City, Okla.	1,596	42
Charleston, S. Car.	736	21	Omaha, Neb.	1,397	35
Cheyenne, Wyo.	1,913	46	Philadelphia, Pa.	92	2
Chicago, Ill.	909	21	Pittsburgh, Pa.	441	11
Cincinnati, Ohio.	751	18	Portland, Me.	341	11
Cleveland, Ohio.	579	14	Portland, Ore.	3,162	80
Dallas, Tex.	1,739	45	Raleigh, N. Car.	500	16
Denver, Colo.	1,943	57	Reno, Nev.	2,936	74
Des Moines, Ia.	1,267	33	Richmond, Va.	343	10
Detroit, Mich.	648	15	St. Louis, Mo.	1,053	25
El Paso, Tex.	2,298	66	St. Paul, Minn.	1,307	32
Hartford, Conn.	112	4	San Antonio, Tex.	1,916	54
Helena, Mont.	2,438	69	San Francisco, Cal.	3,180	83
Indianapolis, Ind.	812	19	Savannah, Ga.	845	25
Jacksonville, Fla.	982	29	Seattle, Wash.	3,107	80
Kansas City, Mo.	1,331	37	Spokane, Wash.	2,787	69
Key West, Fla.	1,504	54	Toledo, Ohio.	701	17
Little Rock, Ark.	1,291	35	Tucson, Ariz.	2,611	76
Los Angeles, Cal.	3,111	85	Washington, D. C.	227	6

## Distances and Mail Time to Foreign Cities from New York City

By Postal Route to—	Statute Miles	Days	By Postal Route to—	Statute Miles	Days
Adelaide, Australia	11,843	32	Istanbul, Turkey	5,809	22
Alexandria, Egypt	6,135	17	Lima, Peru	3,807	14
Amsterdam, Netherlands	4,043	11	Lisbon, Portugal	5,342	12
Antwerp, Belgium	4,015	11	Liverpool, England	3,707	10
Athens, Greece	5,432	18	London, England	3,964	9
Bagdad, Mesopotamia	14,229	42	Madrid, Spain	4,851	13
Belgrade, Yugoslavia	5,217	13	Manila, Phillipine Islands	11,206	30
Berlin, Germany	4,597	12	Melbourne, Australia	11,253	31
Berne, Switzerland	4,349	12	Mexico City, Mexico	3,760	6
Bombay, British India	9,434	25	Natal, South Africa	11,974	30
Brussels, Belgium	4,137	11	Para, Brazil	3,392	15
Budapest, Hungary	4,965	13	Paris, France	3,946	10
Buenos Ayres, Argentina	6,914	18	Leningrad, Russia	5,639	18
Calcutta, British India	11,324	28	Quebec, Quebec	555	2
Cape Town, So. Africa	11,033	27	Rio de Janeiro, Brazil	5,493	13
Christiania, Norway	4,342	13	Rome, Italy	4,854	14
Colombo, Ceylon	9,932	30	St. John's, Newfoundland	628	3
Colon, Panama	2,273	7	Santiago, Chili	5,398	22
Copenhagen, Denmark	4,639	13	Shanghai, China	9,530	23
Dublin, Ireland	4,287	10	Singapore, Straits Set's	13,358	36
Glasgow, Scotland	3,656	10	Stockholm, Sweden	5,405	15
Havana, Cuba	1,560	3	Valparaiso, Chili	5,335	21
Hamburg, Germany	4,317	11	Vienna, Austria	4,795	14
Hong Kong, China	10,453	23	Vladivostok, Siberia	11,343	25
Honolulu, Hawaii	5,599	12	Yokohama, Japan	8,717	18

## Common Stains and How to Remove Them

Blood and meat juice. Use cold water; soap and cold water; or starch paste.  
Bluing. Use boiling water.  
Chocolate and cocoa. Use borax and cold water; bleach if necessary.

Coffee and tea. (Clear.)—Use boiling water; bleach if necessary. (With cream.)—Use cold water, then boiling water; bleach if necessary.

Cream and milk. Use cold water, then soap and cold water.

Egg. Use cold water.

Fruit and fruit juices. Use boiling water; bleach if necessary.

Grass. Use cold water; soap and cold water; alcohol; or a bleaching agent.

Grease and oils. Use French chalk, blotting paper or other absorbent; or warm water and soap; or gasoline, benzine, or carbon tetrachloride.

Iodine. Use warm water and soap; alcohol; or ammonia.

Ink. Try cold water; then use an acid or bleach if necessary.

Iron. Use oxalic acid; hydrochloric acid; salts of lemon; or lemon juice and salt.

Kerosene. Use warm water and soap.

Lampblack and soot. Use kerosene, benzine, chloroform, ether, gasoline, or carbon tetrachloride.

Medicine. Use alcohol.

Mildew. If fresh, use cold water; otherwise try to bleach with javelle water or potassium permanganate.

Paint and varnish. Use alcohol, carbon tetrachloride, chloroform, or turpentine.

Perspiration. Use soap and warm water; bleach in the sun or with javelle water or potassium permanganate.

Pitch, tar, and wheel grease. Rub with fat; then use soap and warm water; or benzine, gasoline, or carbon tetrachloride.

Scorch. Bleach in the sunshine or with javelle water.

Shoe polish. (Black.)—Use soap and water; or turpentine. (Tan.)—Use alcohol.

Syrup. Use water.

Stove polish. Use cold water and soap; or kerosene, benzine, or gasoline.

Vaseline. Use kerosene or turpentine.

Water. Steam or sponge the entire surface of water-spotted materials.

Wax. Scrape off as much as possible. Use French chalk, blotting paper or other absorbent, with a warm iron; or use benzine or gasoline. If color remains, use alcohol or bleach.

## ACTUAL TIME IN USE IN THE LARGEST CITIES OF THE WORLD WHEN IT IS 12:00 NOON, WASHINGTON

Athens	7:00 P. M.	Melbourne	next day... 3:00 A. M.
Auckland next day	3:00 A. M.	Milwaukee	11:00 A. M.
Berlin	6:00 P. M.	Minneapolis	11:00 A. M.
Bombay	10:30 P. M.	Natal	7:00 P. M.
Boston	12:00 noon	New Orleans	11:00 A. M.
Buffalo	12:00 noon	New York	12:00 noon
Cape Town	7:00 P. M.	Omaha	11:00 A. M.
Chicago	11:00 A. M.	Ottawa	12:00 noon
Cincinnati	11:00 A. M.	Panama	12:00 noon
Cleveland	12:00 noon	Paris	5:00 P. M.
Constantinople	7:00 P. M.	Philad'p'a	12:00 noon
Denver	10:00 A. M.	Pittsb'r'g	12:00 noon
Detroit	12:00 noon	Portland	9:00 A. M.
Galveston	11:00 A. M.	Quebec	12:00 noon
Halifax	1:00 P. M.	Rio de J'n'ro	2:00 P. M.
Hamburg	6:00 P. M.	Rome	6:00 P. M.
Havana	11:31 A. M.	Salt L. City	10:00 A. M.
Hong Kong		San Francisco	9:00 A. M.
next day	1:00 A. M.	St. Louis	11:00 A. M.
Honolulu	6:30 A. M.	Seattle	9:00 A. M.
Jerusalem	7:00 P. M.	Suez	7:00 P. M.
Kansas City	11:00 A. M.	Toledo	12:00 noon
Lisbon	4:24 P. M.	Vancouver	9:00 A. M.
Liverpool	5:00 P. M.	Vienna	6:00 P. M.
London	5:00 P. M.	Winnipeg	11:00 A. M.
Madrid	5:00 P. M.	Yokohama	
Manila next day	1:00 A. M.	next day	2:00 A. M.

## RATES OF INTEREST IN ALL THE STATES

States and Territories	Legal Rate	Special Contract Rate	States and Territories	Legal Rate	Special Contract Rate
Arkansas	6	10	Nevada	7	..
Arizona	6	12	N. Hamp.	6	6
California	7	..	N. Jersey	6	6
Colorado	8	..	N. Mexico	6	12
Conn.	6	6	New York	6	6
Delaware	6	6	N. Carolina	6	6
D. C.	6	10	N. Dakota	7	12
Florida	8	10	Ohio	6	8
Georgia	7	8	Oklahoma	6	12
Idaho	7	12	Oregon	6	10
Illinois	5	7	Penn.	6	6
Indiana	6	8	R. Island	6	..
Iowa	6	8	S. Carolina	7	8
Kansas	6	10	S. Dakota	7	12
Kentucky	6	6	Tennessee	6	6
Louisiana	5	8	Texas	6	10
Maine	6	..	Utah	8	12
Maryland	6	6	Vermont	6	6
Mass.	6	..	Virginia	6	6
Michigan	5	7	Wash.	6	12
Minnesota	6	10	W. Va.	6	6
Mississippi	6	10	Wisconsin	6	10
Missouri	6	8	Wyoming	8	12
Montana	8	..			



## Weights and Measures

### APOTHECARIES' WEIGHT

20 grains.....	1 scruple	8 drams.....	1 ounce
3 scruples.....	1 dram	12 ounces.....	1 pound
Ounce and pound are the same as in Troy Weight.			

### AVOIRDUPOIS WEIGHT

27 1/4 grains.....	1 dram	25 pounds.....	1 quarter
16 drams.....	1 ounce	4 quarters.....	1 cwt.
16 ounces.....	1 pound	2,000 lbs.....	1 short ton
2,240 pounds.....			1 long ton

### TROY WEIGHT

24 grains.....	1 pwt.
20 pwt.....	1 ounce
Used for weighing gold, silver and jewels.	

### CLOTH MEASURE

2 1/4 inches.....	1 nail	4 nails.....	1 quarter
4 quarters.....			1 yard

### CUBIC MEASURE

1.728 cubic inches.....	1 cubic foot
27 cubic feet.....	1 cubic yard
128 cubic feet.....	1 cord (wood)
40 cubic feet.....	1 ton (shipping)
2,150.42 cubic inches.....	1 standard bushel
231 cubic inches.....	1 U. S. standard gallon
1 cubic foot.....	about 4/5 of a bushel

### DRY MEASURE

2 pints.....	1 quart	4 pecks.....	1 bushel
8 quarts.....	1 peck	36 bushels.....	1 chaldron

### LIQUID MEASURE

4 gills.....	1 pint	4 quarts.....	1 gallon
2 pints.....	1 quart	31 1/2 gals.....	1 barrel
2 barrels.....			1 hogshead

### LONG MEASURE

12 inches.....	1 foot	40 rods.....	1 furlong
3 feet.....	1 yard	8 furlongs.....	1 sta. mile
5 1/2 yards.....	1 rod	3 miles.....	1 league

### MARINERS' MEASURE

6 feet = 1 fathom.....	120 fathoms = 1 cable length
7 1/2 cable lengths.....	1 mile
5,280 feet.....	1 statute mile
6,085 feet.....	1 nautical mile

### PAPER MEASURE

24 sheets, 1 quire.....	20 quires, 1 ream (480 sheets)
2 reams.....	1 bundle
5 bundles.....	1 bale

### SQUARE MEASURE

144 sq. in.....	1 sq. ft.	40 sq. rods.....	1 rood
9 sq. ft.....	1 sq. yard	4 rods.....	1 acre
30 1/4 sq. yds.....	1 sq. rod	640 acres.....	1 sq. mile

### SURVEYORS' MEASURE

7.92 inches.....	1 link
25 links.....	1 rod
4 rods.....	1 chain
10 sq. chains or 160 sq. rods.....	1 acre
640 acres.....	1 sq. mile
36 sq. miles (6 miles sq.).....	1 township

### TIME MEASURE

60 seconds = 1 minute.....	60 minutes = 1 hour
24 hours = 1 day.....	7 days = 1 week
28, 29, 30 or 31 days.....	1 calendar month
30 days = 1 month.....	in computing interest
365 days = 1 year.....	366 days = 1 leap year

### MISCELLANEOUS

3 inches = 1 palm.....	4 inches = 1 hand
6 inches = 1 span.....	18 inches = 1 cubit
21.8 inches.....	1 Bible cubit
2 1/2 cets.....	1 military pace

### METRIC EQUIVALENTS—Linear Measure

1 centimeter.....	0.3937 inch
1 inch.....	2.54 centimeters
1 decimeter.....	3.937 inches
1 foot.....	0.328 foot
1 meter.....	3.048 decimeters
1 meter.....	39.37 inches
1 yard.....	0.9144 meter
1 dekameter.....	1.9884 rods
1 rod.....	0.5029 dekameter
1 kilometer.....	0.62137 mile
1 mile.....	1.6093 kilometers

### Square Measure

1 square centimeter.....	0.1550 square inch
1 square inch.....	6.452 square centimeters
1 square decimeter.....	0.1076 square foot
1 square foot.....	9.2903 square decimeters
1 square meter.....	1.196 square yards
1 square yard.....	0.8361 square meter
1 acre.....	3.954 square rods
1 square rod.....	0.2529 acre
1 hectare.....	2.47 acres
1 acre.....	0.4047 hectare
1 square kilometer.....	0.386 square mile
1 square mile.....	2.59 square kilometers

### Measure of Volume

1 cubic centimeter.....	0.061 cubic inch
1 cubic inch.....	16.39 cubic centimeters
1 cubic decimeter.....	0.0353 cubic foot
1 cubic foot.....	28.317 cubic decimeters
1 cubic meter.....	1.308 cubic yards
1 cubic yard.....	0.7646 cubic meter
1 stere.....	0.2759 cord
1 cord.....	3.624 steres
1 liter = 0.908 quart dry.....	1.0567 quarts liquid
1 quart dry.....	1.101 liters
1 quart liquid.....	0.9463 liter
1 dekaliter = 2.6417 gallons.....	135 pecks
1 gallon.....	0.3785 dekaliter
1 peck.....	0.881 dekaliter
1 hektoliter.....	2.8375 bushels
1 bushel.....	0.3524 hektoliter

### Weights

1 gram.....	0.03527 ounce
1 ounce.....	28.35 grams
1 kilogram.....	2,204.6 pounds
1 pound.....	0.4536 kilogram
1 metric ton.....	1,102.3 English tons
1 English ton.....	0.9072 metric ton

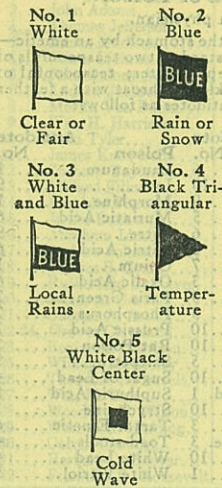
### APPROXIMATE METRIC EQUIVALENTS

1 decimeter.....	4 inches
1 liter.....	1.06 quarts liquid, 0.9 quart dry
1 meter.....	1.1 yards
1 kilometer.....	3/4 of a mile
1 hektoliter.....	2 1/2 bushels
1 hectare.....	2 1/2 acres
1 kilogram.....	2 1/5 pounds
1 stere, or cubic meter.....	1/4 of a cord
1 metric ton.....	2,200 pounds

### TEMPERATURES

Fahrenheit	
Milk.....	Freezes 30° above Zero
Water.....	Freezes 32° above Zero
Olive Oil.....	Freezes 36° above Zero
Wines.....	Freezes 20° above Zero
Vinegar.....	Freezes 28° above Zero
Alcohol.....	Boils at 173° above Zero
Water.....	Boils at 212° above Zero
Petroleum (average).....	Boils at 306° above Zero
Blood Heat.....	98.4° above Zero
Eggs Hatch.....	104° above Zero

## Explanation of Weather Bureau Flag Signals



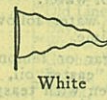
### STORM SIGNAL



### EASTERLY WINDS



### WESTERLY WINDS



No. 1, alone, indicates fair weather, stationary temperature.

No. 2, alone, indicates rain or snow, stationary temperature.

No. 3, alone, indicates local rain, stationary temperature.

No. 1, with No. 4 above it, indicates fair weather, warmer.

No. 1, with No. 4 below it, indicates fair weather, colder.

No. 2, with No. 4 above it, indicates warmer weather, rain or snow.

No. 2, with No. 4 below it, indicates colder weather, rain or snow.

No. 3, with No. 4 above it, indicates warmer weather with local rains.

No. 3, with No. 4 below it, indicates colder weather with local rains.

No. 1, with No. 5 above it, indicates fair weather, cold wave.

No. 2, with No. 5 above it, indicates wet weather, cold wave. Forecasts made at 10 A. M. and displayed between 12 and 1 P. M. forecast the weather for the following day until 8 P. M.

### WIND DIRECTION AND STORM SIGNALS

#### In use on the Coast and the Great Lake Ports

Cautionary against a wind velocity that will be dangerous to all classes of vessels, that is when a velocity of thirty miles per hour or over is expected.

The Red Pennant hoisted above Storm Signal indicates winds will be from the N. E. When Red Pennant is below Storm Signal it indicates winds from the S. E.

The White Pennant hoisted above Storm Signal indicates winds will be from the N. W. When White Pennant is below Storm Signal, it indicates winds from the S. W.

At night a Red Light will indicate Easterly winds, and a Red and White Light Westerly winds.

## Weather Wisdom

**Sunset Colors:** A gray, lowering sunset, or one where the sky is green or yellowish-green, indicates rain. A red sunrise with clouds lowering later in the morning, also indicates rain.

**Sky Color:** A deep blue color of the sky, even when seen through clouds, indicates fair weather; a glowing whiteness an approaching storm.

**Visibility:** Unusual clearness of the atmosphere, unusual brightness or twinkling of the stars indicate rain.

**Fogs:** Fogs indicate settled weather. A morning fog usually breaks away before noon.

**Frost:** The first frost and the last frost are usually preceded by a temperature very much above the mean.

**Halo (Sun Dogs):** By halo we mean the large circles, or part of circles, about the sun or moon. A halo occurring after fine weather indicates a storm.

**Corona:** By this term we mean the small colored circles frequently seen around the sun or moon. A corona growing smaller indicates rain; growing larger, fair weather.

**Rainbows:** A morning rainbow is regarded as a sign of rain; an evening rainbow of fair weather.





## Population of Principal Cities

Sixteenth (1940) U. S. Census \*Denotes State Capital. †Less than 0.1 of one percent.

Cities Over 37,000 and State Capitals		% Increase or Decrease		Cities Over 37,000 and State Capitals		% Increase or Decrease	
1930	1940			1930	1940		
Akron, Ohio	255,040	244,791	-4.0	*Dover, Del.	4,800	5,517	14.9
*Albany, N. Y.	127,412	130,577	2.5	Dubuque, Iowa	41,679	43,892	5.3
Alhambra, Calif.	29,472	38,935	32.1	Duluth, Minn.	101,463	101,065	-0.4
Allentown, Pa.	92,563	96,904	4.7	Durham, N. C.	52,037	60,195	15.7
Altoona, Pa.	82,054	80,214	-2.2	East Chicago, Ind.	54,784	54,637	-0.3
Amarillo, Tex.	43,132	51,686	19.8	East Cleveland, O.	39,667	39,495	-0.4
Anderson, Ind.	39,804	41,572	4.4	East Orange, N. J.	68,020	68,945	1.4
*Annapolis, Md.	12,531	13,069	4.3	East St. Louis, Ill.	74,347	75,609	1.7
Arlington, Mass.	36,094	40,013	10.9	Elgin, Ill.	35,929	38,333	6.7
Arlington, Va.	26,615	57,040	114.3	Elizabeth, N. J.	114,589	109,912	-4.1
Asheville, N. C.	50,193	51,310	2.2	Elmira, N. Y.	47,397	45,106	-4.8
*Atlanta, Ga.	270,366	302,288	11.8	El Paso, Tex.	102,421	96,810	-5.5
Atlantic City, N. J.	66,198	64,094	-3.2	Eric, Pa.	115,967	116,955	0.9
Augusta, Ga.	60,342	65,919	9.2	Evanston, Ill.	63,120	65,389	3.6
*Augusta, Me.	17,198	19,360	12.6	Evansville, Ind.	102,249	97,062	-5.1
Aurora, Ill.	46,589	47,170	1.2	Everett, Mass.	48,424	46,784	-3.4
*Austin, Tex.	53,120	87,930	65.5	Fall River, Mass.	115,274	115,428	0.1
Baltimore, Md.	804,874	859,100	6.7	Fitchburg, Mass.	40,692	41,824	2.8
*Baton Rouge, La.	30,729	34,719	13.0	Flint, Mich.	156,492	151,543	-3.2
Battle Creek, Mich.	43,573	43,453	-0.3	Fort Wayne, Ind.	114,946	118,410	3.0
Bay City, Mich.	47,355	47,956	1.3	Fort Worth, Tex.	163,447	177,662	8.7
Bayonne, N. J.	88,979	79,198	-11.0	*Frankfort, Ky.	11,626	11,492	-1.2
Beaumont, Tex.	57,332	59,061	2.3	Fresno, Calif.	52,513	60,685	15.6
Belvedere, Calif.	33,023	37,192	12.6	Galveston, Tex.	52,938	60,862	15.0
Berkeley, Calif.	82,109	85,547	4.2	Gary, Ind.	100,426	111,719	11.2
Berwyn, Ill.	47,027	48,451	3.0	Glendale, Calif.	62,736	62,582	-0.2
Bethlehem, Pa.	57,892	58,490	1.0	Gr. Rapids, Mich.	168,592	164,292	-2.6
Binghamton, N. Y.	76,662	78,309	2.1	Green Bay, Wis.	37,415	46,235	23.6
Birmingham, Ala.	259,678	267,583	3.0	Greensboro, N. C.	53,569	59,319	10.7
*Bismarck, N. Dak.	11,090	15,496	39.7	Hamilton, Ohio	52,176	50,592	-3.0
Bloomfield, N. J.	38,077	41,623	9.3	Hammond, Ind.	64,560	70,184	8.7
*Boise, Idaho	21,544	26,130	21.3	Hamtramck, Mich.	65,268	49,839	-11.4
*Boston, Mass.	781,186	770,816	-1.3	*Harrisburg, Pa.	80,339	83,893	4.4
Bridgeport, Conn.	146,716	147,121	0.3	*Hartford, Conn.	164,072	166,267	1.2
Brockton, Mass.	63,797	62,343	-2.3	Haverhill, Mass.	48,710	46,752	-4.0
Brookline, Mass.	47,490	49,786	4.8	Hazelton, Pa.	36,765	38,009	3.4
Buffalo, N. Y.	573,076	575,901	0.5	*Helena, Mont.	11,803	15,056	27.6
Butte, Mont.	39,532	37,081	-6.2	Highland Park, Mich.	52,959	50,810	-4.2
Cambridge, Mass.	113,643	110,879	-2.4	High Point, N. C.	36,745	38,495	4.8
Camden, N. J.	118,700	117,536	-1.0	Hoboken, N. J.	59,261	50,115	-15.4
Canton, Ohio	104,906	108,401	3.3	Holyoke, Mass.	56,537	53,750	-4.9
*Carson City, Nev.	1,596	2,478	55.3	Houston, Tex.	292,352	384,514	31.5
Cedar Rapids, Iowa	56,097	62,120	10.7	Huntington, W. Va.	75,572	78,836	4.3
Charleston, S. C.	62,265	71,275	14.5	*Indianapolis, Ind.	364,161	386,972	6.3
*Charleston, N. Va.	60,408	67,914	12.4	Irvington, N. J.	56,733	55,328	-2.5
Charlotte, N. C.	82,675	100,899	22.0	Jackson, Mich.	55,187	49,656	-10.0
Chattanooga, Tenn.	119,798	128,163	7.0	*Jackson, Miss.	48,282	62,107	28.6
Chelsea, Mass.	45,816	41,259	-9.9	Jacksonville, Fla.	129,549	173,065	33.6
Chester, Pa.	59,164	59,285	0.2	Jamestown, N. Y.	45,155	42,638	-5.6
*Cheyenne, Wyo.	17,361	22,474	29.5	*Jefferson City, Mo.	21,596	24,268	12.4
Chicago, Ill.	3,376,438	3,396,808	0.6	Jersey City, N. J.	316,715	301,173	-4.9
Chicopee, Mass.	43,930	41,664	-5.2	Johnstown, Pa.	66,993	66,668	-0.5
Cicero, Ill.	66,602	64,712	-2.8	Joliet, Ill.	42,993	42,365	-1.5
Cincinnati, Ohio	451,160	455,610	1.0	Joplin, Mo.	33,454	37,144	11.0
Cleveland, Ohio	900,429	878,336	-2.5	Kalamazoo, Mich.	54,786	54,097	-1.3
Cleveland Hts., O.	50,945	54,992	7.9	Kansas City, Kans.	121,857	121,458	-0.3
Clifton, N. J.	46,875	48,827	4.2	Kansas City, Mo.	399,746	399,178	-0.1
*Columbia, S. C.	51,581	62,396	21.0	Kearny, N. J.	40,716	39,467	-3.1
Columbus, Ga.	43,131	53,280	23.5	Kenosha, Wis.	50,262	48,765	-3.0
*Columbus, Ohio	290,564	306,087	5.3	Knoxville, Tenn.	105,802	111,580	5.5
*Concord, N. H.	25,228	27,171	7.7	La Crosse, Wis.	39,614	42,707	7.8
Corpus Christi, Tex.	27,741	57,301	106.6	Lakewood, Ohio	70,509	69,160	-1.9
Council Bluffs, Iowa	42,048	41,439	-1.4	Lancaster, Pa.	59,949	61,345	2.3
Covington, Ky.	65,252	62,018	-5.0	*Lansing, Mich.	78,397	78,753	0.5
Cranston, R. I.	42,911	47,085	9.7	Laredo, Tex.	32,618	39,274	20.4
Cumberland, Md.	37,747	39,483	4.6	Lawrence, Mass.	85,068	84,323	-0.9
Dallas, Tex.	260,475	294,734	13.2	Lewiston, Me.	34,948	38,598	10.4
Davenport, Iowa	60,751	66,039	8.7	Lexington, Ky.	45,736	49,304	7.8
Dayton, Ohio	200,982	210,718	4.8	Lima, Ohio	42,287	44,711	5.7
Dearborn, Mich.	50,358	63,584	26.3	*Lincoln, Nebr.	75,933	81,984	8.0
Decatur, Ill.	57,510	59,305	3.1	*Little Rock, Ark.	81,679	88,039	7.8
*Denver, Colo.	287,861	322,412	12.0	Long Beach, Calif.	142,032	164,271	15.7
*Des Moines, Iowa	142,559	158,819	12.1	Lorain, Ohio	44,512	44,125	-0.9
Detroit, Mich.	1,568,662	1,623,452	3.5	Los Angeles, Cal.	1,238,048	1,504,277	21.5

## Population of Principal Cities

Cities Over 37,000 and State Capitals		% Increase or Decrease		Cities Over 37,000 and State Capitals		% Increase or Decrease	
1930	1940			1930	1940		
Louisville, Ky.	307,745	319,077	3.7	*Richmond, Va.	182,929	193,042	5.5
Lowell, Mass.	100,234	101,389	1.2	Roanoke, Va.	69,206	69,287	0.1
Lower Merion, Pa.	35,166	39,566	12.5	Rochester, N. Y.	328,132	324,975	-1.0
Lynchburg, Va.	40,661	44,541	9.5	Rockford, Ill.	85,864	84,637	-1.4
Lynn, Mass.	102,320	98,123	-4.1	Rock Island, Ill.	37,953	42,775	12.7
Macon, Ga.	57,899	57,865	-0.05	*Sacramento, Cal.	93,750	105,958	13.0
*Madison, Wis.	57,829	67,447	16.5	Saginaw, Mich.	80,715	82,794	2.6
Malden, Mass.	58,036	58,010	-0.05	St. Joseph, Mo.	80,935	75,711	-6.5
Manchester, N. H.	76,834	77,685	1.1	St. Louis, Mo.	821,960	816,048	-0.7
Mansfield, Ohio	33,525	37,154	10.8	St. Paul, Minn.	271,606	287,736	5.9
McKeesport, Pa.	54,632	55,355	1.3	St. Petersburg, Fla.	40,425	60,812	50.4
Medford, Mass.	59,714	63,083	5.6	Salem, Mass.	43,353	41,215	-4.9
Memphis, Tenn.	253,143	292,942	15.7	Salem, Ore.	26,266	30,908	17.7
Meriden, Conn.	38,481	39,494	2.6	*Salt Lake City, Utah	140,267	149,934	6.9
Miami, Fla.	110,637	172,172	55.6	San Antonio, Tex.	231,542	253,854	9.6
Milwaukee, Wis.	578,249	587,472	1.6	S. Bernardino, Cal.	37,481	43,646	16.4
Minneapolis, Minn.	464,356	492,370	6.0	San Diego, Calif.	140,267	203,341	37.4
Mobile, Ala.	68,202	78,720	15.4	San Francisco, Cal.	634,394	634,536	0.02
Montclair, N. J.	42,017	39,807	-5.3	San Jose, Calif.	57,651	68,457	18.9
*Montgomery, Ala.	66,079	78,084	18.2	Santa Fe, N. Mex.	39,251	35,500	-10.2
*Montpelier, Vt.	7,837	8,006	2.2	Santa Monica, Cal.	85,024	95,996	12.9
Mt. Vernon, N. Y.	61,499	67,362	9.5	Savannah, Ga.	95,692	87,549	-8.5
Muncie, Ind.	46,548	49,720	6.8	Schenectady, N. Y.	143,433	140,404	-2.1
Muskegon, Mich.	41,390	47,697	15.2	Scranton, Pa.	368,583	368,302	-0.1
*Nashville, Tenn.	153,866	167,402	8.8	Seattle, Wash.	392,555	406,638	3.5
Newark, N. J.	442,337	429,760	-2.9	Sheboygan, Wis.	76,255	98,167	28.1
New Bedford, Mass.	112,597	110,341	-2.0	Shreveport, La.	79,185	82,364	4.0
New Britain, Conn.	68,128	68,685	0.8	Stout City, Iowa	33,382	40,332	21.4
New Castle, Pa.	48,674	47,638	-2.1	Stout Falls, S. Dak.	103,908	102,177	-1.7
New Haven, Conn.	162,655	160,605	-1.3	Somerville, Mass.	104,193	101,268	-2.8
New Orleans, La.	458,762	494,537	7.7	South Bend, Ind.	115,514	122,001	5.6
Newport News, Va.	34,417	37,067	7.7	Spokane, Wash.	71,364	75,503	5.8
New Rochelle, N. Y.	54,000	58,408	8.2	*Springfield, Ill.	149,900	149,554	-0.2
Newton, Mass.	65,276	69,873	7.0	Springfield, Mass.	57,527	61,238	6.5
New York, N. Y.	6,920,446	7,454,995	7.7	Springfield, Mo.	68,743	70,262	2.2
Niagara Falls, N. Y.	75,460	78,029	3.4	Springfield, Ohio	46,346	47,928	3.4
Norfolk, Va.	129,710	144,332	11.3	Stamford, Conn.	35,322	37,651	6.3
Norristown, Pa.	33,853	38,181	12.6	Steubenville, Ohio	47,963	54,714	14.1
North Bergen, N. J.	36,019	39,849	10.6	Stockton, Calif.	209,326	205,967	-1.6
Norwalk, Conn.	284,063	302,163	6.4	Syracuse, N. Y.	106,817	109,408	2.4
Oakland, Calif.	40,108	48,982	22.2	Tacoma, Wash.	107,161	108,391	1.1
Okla. City, Okla.	185,389	204,424	10.3	Tallahassee, Fla.	10,700	16,240	51.8
*Olympia, Wash.	11,738	13,254	13.0	Tampa, Fla.	101,761	108,391	6.5
Omaha, Nebr.	214,006	223,844	4.6	Taunton, Mass.	37,355	37,395	0.1
Oshkosh, Wis.	40,108	39,089	-2.5	Terre Haute, Ind.	62,810	62,693	-0.2
Pasadena, Calif.	76,086	81,864	7.6	Toledo, Ohio	290,718	282,349	-2.9
Passaic, N. J.	62,959	61,394	-2.5	Topeka, Kans.	64,120	62,697	-2.3
Paterson, N. J.	138,513	139,656	0.8	Trenton, N. J.	123,356	124,674	1.1
Pawtucket, R. I.	77,149	75,797	-1.8	Troy, N. Y.	72,763	70,304	-3.4
Peoria, Ill.	31,779	37,449	18.6	Tulsa, Okla.	141,258	142,173	0.6
Perth Amboy, N. J.	43,516	41,242	-5.2	Union City, N. J.	58,659	56,173	-4.2
Philadelphia, Pa.	1,950,961	1,931,334	-1.0	Upper Darby, Pa.	47,145	56,883	20.7
*Phoenix, Ariz.	48,118	65,414	35.9	Utica, N. Y.	101,740	100,518	-1.2
*Pierre, S. Dak.	3,359	4,322	28.1	Waco, Tex.	52,848	53,982	2.1
Pittsburgh, Pa.	669,817	659,659	-1.5	Waltham, Mass.	39,247	40,020	2.0
Pittsfield, Mass.	49,677	49,684	0.01	Warren, Ohio	41,062	42,837	4.3
Plainfield, N. J.	34,422	37,469	8.9	Washington, D. C.	486,869	663,091	36.2
Port Arthur, Tex.	70,810	66,140	-6.7	Waterbury, Conn.	99,902	99,314	-0.6
Portland, Ore.	301,815	305,394	1.2	Waterloo, Iowa	46,191	51,743	12.0
Portsmouth, Ohio	42,860	40,466	-5.6	W. New York, N. J.	37,107	39,439	6.3
Portsmouth, N. H.	45,704	50,745	11.0	Wheeling, W. Va.	61,659	61,099	-0.9
*Poughkeepsie, N. Y.	40,288	40,478	0.5	White Plains, N. Y.	35,830	40,327	12.6
*Providence, R. I.	252,981	253,564	0.2	Wichita Falls, Tex.	43,690	45,112	3.3
Pueblo, Colo.	50,096	52,162	4.1	Willsboro, Pa.</			

## Legal Holidays in the Various States

Monday, January 1, 1945

1st Day—364 days to follow

<input type="checkbox"/>	CLEAR
<input type="checkbox"/>	CLOUDY
<input type="checkbox"/>	RAIN
<input checked="" type="checkbox"/>	SNOW

- JANUARY 1. NEW YEAR'S DAY:** In all the States, Territories and Colonial possessions.
- JANUARY 8. ANNIVERSARY OF THE BATTLE OF NEW ORLEANS:** In Louisiana.
- JANUARY 19. LEE'S BIRTHDAY:** In Ala., Ark., Fla., Ga., Miss., N. C., S. C., Tenn. and Va.
- FEBRUARY 12. GEORGIA DAY:** In Georgia. Date of Oglethorpe's landing in 1733.
- FEBRUARY 12. LINCOLN'S BIRTHDAY:** In Alaska, Calif., Colo., Conn., Del., Ia., Ill., Ind., Kan., Ky., Mich., Minn., Mo., Mont., Neb., Nev., N. J., N. Y., N. Dak., Ohio, Pa., S. Dak., Tenn., Utah, Wash., W. Va., Wyo., and observed by Governor's Proclamation in Mass.
- FEBRUARY 14. ADMISSION DAY:** In Arizona.
- FEBRUARY 22. WASHINGTON'S BIRTHDAY:** In all the States, Territories and Possessions.
- MARCH 2. ANNIVERSARY OF TEXAN INDEPENDENCE:** In Texas.
- MARCH 4. INAUGURATION DAY:** Every four years in the Dist of Columbia only.
- MARCH 25. MARYLAND DAY:** In that State only.
- MARCH 30. SEWARD DAY:** In Alaska.
- GOOD FRIDAY:** In Conn., Del., Fla., La., Md., Minn., N. J., Pa., Philippines, Porto Rico, Tenn.
- APRIL 12. HALIFAX INDEPENDENCE RESOLUTIONS:** In North Carolina.
- APRIL 13. THOMAS JEFFERSON'S BIRTHDAY:** In Alabama.
- APRIL 19. PATRIOTS' DAY:** In Me. and Mass.
- APRIL 21. ANNIVERSARY OF THE BATTLE OF SAN JACINTO:** In Texas.
- APRIL 26. CONFEDERATE MEMORIAL DAY:** In Alabama, Florida, Georgia and Mississippi.
- MAY 10. CONFEDERATE MEMORIAL DAY:** In Kentucky and North Carolina.
- MAY (Second Sunday). MOTHER'S DAY:** Is observed but not a legal holiday.
- MAY 20. ANNIVERSARY OF THE SIGNING OF THE MECKLENBURG DECLARATION OF INDEPENDENCE:** In North Carolina.
- MAY 30. DECORATION DAY:** In all the States and Possessions except Ala., Ark., Fla., Ga., La., Miss., N. Mex., N. C., S. C., Tenn. and Texas.
- JUNE 3. JEFFERSON DAVIS'S BIRTHDAY:** In Ala., Ark., Fla., Ga., Ky., La., Miss., Tenn., Tex. and Va.
- JUNE 11. KAMEHAMEHA DAY:** In Hawaii.
- JUNE 14. FLAG DAY:** Is widely observed but not a legal holiday.
- JUNE 15. PIONEER DAY:** In Idaho.
- JULY 4. INDEPENDENCE DAY:** In all the States, Territories and Possessions.
- JULY 10. ADMISSION DAY:** In Wyoming.
- JULY 24. PIONEERS' DAY:** In Utah.
- AUGUST 1. COLORADO DAY:** In Colorado.
- AUGUST 16. BENNINGTON BATTLE DAY:** In Vt.
- SEPTEMBER (First Monday). LABOR DAY:** In all the States and Territories except Ala., Wyo. and the Philippines.
- SEPTEMBER 6. LAFAYETTE DAY:** Also the anniversary of the First Battle of the Marne. Is not a legal holiday, but is celebrated in New York and ten other States.
- SEPTEMBER 9. ADMISSION DAY:** In California.
- SEPTEMBER 12. "OLD DEFENDERS' DAY":** In Baltimore, Md.
- OCTOBER 1. MISSOURI DAY:** In that State's schools.
- OCTOBER 12. COLUMBUS DAY:** In Ark., Ariz., Calif., Colo., Conn., Del., Fla., Idaho, Ill., Ind., Kan., Ky., La., Me., Md., Mass., Mich., Mo., Mont., Neb., Nev., N. H., N. J., N. M., N. Y., N. Dak., Ohio, Ore., Pa., R. I., Tex., Utah, Vt., Wash., W. Va., also in Porto Rico. In Arkansas and Kansas it does not affect notes or judicial proceedings.
- OCTOBER 12. FRATERNAL DAY:** Alabama only.
- OCTOBER 18. ALASKA DAY:** In Alaska only.
- OCTOBER 31. ADMISSION DAY:** In Nevada.
- NOVEMBER. GENERAL ELECTION DAY:** 1st Tuesday after 1st Monday. In every State and Territory except Alaska, Dist. of Col., Hawaii, Ill., Mass., Miss., Ohio, Philippines and Vt. In Illinois it is a legal holiday in Chicago, Springfield, East St. Louis, Galesburg, Danville, Cairo and Rockford. In Ohio it is a half holiday. In Maine it is a legal holiday only as to the courts, which also close on the State Election Day (biennially, 2nd Monday in Sept.).
- NOV. 11. ARMISTICE DAY:** In Ala., Ariz., Ark., Calif., Colo., Fla., Ill., Iowa, La., Mass., Minn., Mo., Mont., Neb., N. J., N. C., N. Dak., Pa., R. I., S. Dak., Tenn., Tex., Vt., Va. and Hawaii. In other States by Governor's Proclamation only.
- NOVEMBER. THANKSGIVING DAY:** Last Thursday in November. It is observed in all the States, although in some it is not a statutory holiday.
- DECEMBER 25. CHRISTMAS DAY:** In all the States, Territories and Possessions.
- DECEMBER 30. RIZAL DAY:** In Philippines.
- There are no statutory holidays in Mississippi, but by common consent the Fourth of July, Thanksgiving and Christmas are observed. In New Mexico, Washington's Birthday, Decoration Day, Labor Day, Flag Day (June 14), and Arbor Day are holidays, when so designated by the Governor. In South Carolina, Thursday of Fair Week is a legal holiday.
- ARBOR DAY** is a legal holiday in many States, although in some it is observed as designated by the Governor.

Marye-Ann and I hiked together tonight in a winter wonderland. As we ploughed through the knee-deep virgin snow down a narrow bough-roofed country lane it seemed to me that we were walking right into an old-fashioned Christmas card, the kind that is an etching of a winter scene in black and white. Later we cut off into Big Rock Woods, and though the lane was a wonderland the woods was a fairieland—and it didn't take much imagination. Hand in hand we crossed a crusted, drifted, windy field and headed down and out of Stadium Woods. The snow reflected so much soft night-light that walking was a pleasure. Russell was 14 years old today.

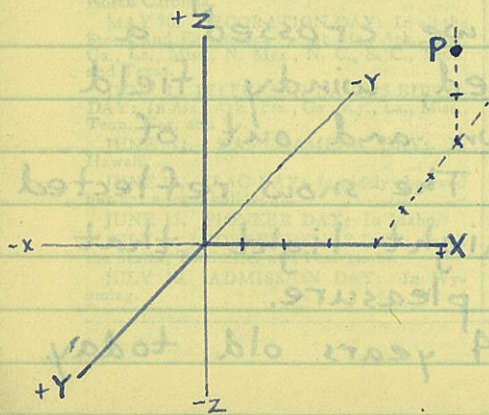
Tuesday, January 2, 1945

2nd Day—363 days to follow

CLEAR
CLOUDY
RAIN
X SNOW

Much of the day was spent preparing to return to Denison, and in trying to find a way to get there. It finally resolved to this fact: No buses would be able to make the trip since the two alternate highways were blocked with snow, and the only solution was a trip by train to Orrville and then Columbus. I gave Russ some B.S.A. pamphlets, etc., that he can use and also sorted some of my papers at home.

## SOLID ANALYTICAL GEOMETRY



Locating a point in space:  $(x, y, z)$

$P(4, -3, 2)$

(The "y" axis, if

it were shown truly, would be a point as it is coming directly toward the observer.)

Wednesday, January 3, 1945

3rd Day—362 days to follow

CLEAR
X CLOUDY
RAIN
SNOW

We traveled from about 11:30 P.M. until about 5:00 o'clock A.M. (The train was about an hour and a half late). We ate breakfast at a place near Union Station and then took a street-car to the University. I said good-bye, returned downtown, and took the 7:15 bus to Granville, arriving here about an hour later.

## FORMULAS VALUABLE:

1.  $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2}$  . . . length of line between 2 points

If length of line between 1 point and the origin it becomes  $d = \sqrt{x^2 + y^2 + z^2}$

A line is located in space by its direction cosines: ( $\alpha$  is the angle between its trace on the xy plane and the x axis, etc.)

2.  $\cos \alpha = \frac{x_2 - x_1}{d}$  ;  $\cos \beta = \frac{y_2 - y_1}{d}$  ;  $\cos \gamma = \frac{z_2 - z_1}{d}$

The sum of the squares of the cosines of  $\alpha$ ,  $\beta$ , and  $\gamma$  must equal "one." Or if two cosines are given the third can be found:

3.  $\cos^2 \alpha + \cos^2 \beta + \cos^2 \gamma = 1$

Thursday, January 4, 1945

4th Day—361 days to follow

CLEAR
CLOUDY
RAIN
SNOW

The "direction numbers"  $l, m,$  and  $n$  are ratios (just as the cosines are ratios) and are equal to  $x_2 - x_1, y_2 - y_1, z_2 - z_1,$  or the numerators of the cosines, as in  $\cos \alpha = \frac{x_2 - x_1}{d}$ ;  $x_2 - x_1 = l.$

Another way of finding the direction cosines (if the direction numbers are given in this case):

$$4. \quad \cos \alpha = \frac{l}{\sqrt{l^2 + m^2 + n^2}}; \quad \cos \beta = \frac{m}{\sqrt{l^2 + m^2 + n^2}};$$

$$\cos \gamma = \frac{n}{\sqrt{l^2 + m^2 + n^2}}$$

$\theta,$  The angle between two lines, if not in the same plane, is defined as the angle made between two lines which are parallel to them and which do pass through one point:

$$5. \dots \cos \theta = \cos \alpha_1 \cos \alpha_2 + \cos \beta_1 \cos \beta_2 + \cos \gamma_1 \cos \gamma_2.$$

6. ... If the  $\cos \theta = \pm 1$  the lines are parallel.

7. ... If the  $\cos \theta = 0$  the lines are perpendicular.

Using the direction numbers if:

$$6. \dots \frac{l_1}{l_2} = \frac{m_1}{m_2} = \frac{n_1}{n_2}, \text{ the lines are parallel;}$$

7. ... and if  $l_1 l_2 + m_1 m_2 + n_1 n_2 = 0$  the lines are perpendicular.

Friday, January 5, 1945

5th Day—360 days to follow

CLEAR
CLOUDY
RAIN
SNOW

After field night I went to the gym and tumbled.

PLANES:

The general equation of a plane can be taken as:

$$8. \quad Ax + By + Cz + D = 0.$$

GIVEN THREE POINTS:

Since three points

determine a plane

if the coordinates of the 3

points are substituted separately,

three equations in three unknowns,  $A, B, C,$  can be solved simultaneously (determinants),

and these values can be substituted in the general equation to get the equation of the plane.

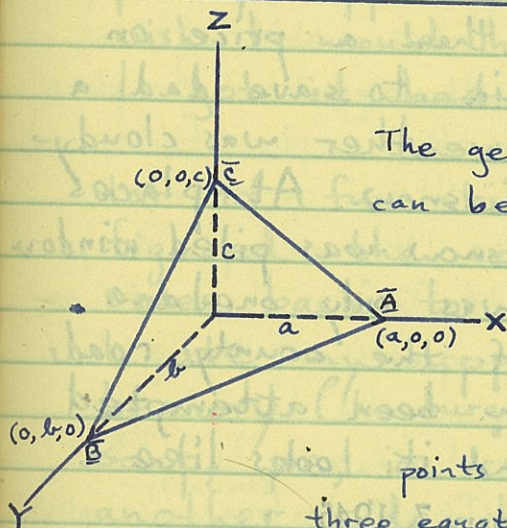
Intercept form (given  $a, b, c$ ):

$$9. \quad \frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 1.$$

To find the one point at which three planes intersect solve their equations simultaneously for  $(x, y, z).$

The angle between two planes is the same as that for a line:

$$10. \quad \cos \theta = \cos \alpha_1 \cos \alpha_2 + \cos \beta_1 \cos \beta_2 + \cos \gamma_1 \cos \gamma_2.$$



Saturday, January 6, 1945

6th Day—359 days to follow

<input type="checkbox"/>	CLEAR
<input checked="" type="checkbox"/>	CLOUDY
<input type="checkbox"/>	RAIN
<input type="checkbox"/>	SNOW

Today ends the ninth month of "going steady." Instead of hurrying to Columbus at 1300 I hitch-hiked to Sunbury to quote them a price on their stage curtain to save dad a trip down. The weather was cloudy, looking like more snow. At a place along the road snow was piled window high and there was only one-lane traffic. Some of the county roads have never even been attempted to clean out and it looks like a

Sunday, January 7, 1945

7th Day—358 days to follow

Got up at 6:30, -reveille, -mustered, and ate breakfast. Worked on term paper 'till almost 11:00; then went to communion at the Methodist Church in Granville. I slept all afternoon (catching up on the sleep lost over leave), worked some more on the term paper tonight and wrote Marye-Ann.

Monday, January 8, 1945

8th Day—357 days to follow

<input type="checkbox"/>	CLEAR
<input type="checkbox"/>	CLOUDY
<input type="checkbox"/>	RAIN
<input type="checkbox"/>	SNOW

Since I actually got caught up on sleep yesterday I feel pretty chipper this morning, but I wish I would have gone to Columbus. I got it bad. No it's "good"

lot of fun skiing. I got there, figured the cost, and got two rides back to Johnstown where I ate my supper in a typical bearery (hamburgs, baked beans, chili, soup, pie, ice cream, etc.). Finally another ride took me to Alexandria (seven miles to Granville) and I picked up the last ride back. The night was pretty dark. I wrote Marye-Ann and went to bed about 2300, two hours before liberty expires.

Tuesday, January 9, 1945

9th Day—356 days to follow

CLEAR
CLOUDY
RAIN
SNOW

## GIVEN: GENERAL EQUATION OF THE PLANE

To find the intercept form of an equation of a plane: to find "a," find just what X is equal to when y's "0" and z is zero, too.

Similarly for "b" and "c;" Then substitute in the intercept form of the equation of a plane.

To find the trace of the plane (the intersection with one of the co-ordinate planes) on the XY plane, for example, drop out the term with the "Z" in it in either the general or intercept form of the equation.

Thus, the equation of the plane trace on the xy plane is: (pg. 5; the trace is line  $\overline{AB}$ ):

$$11. \quad Ax + By + D = 0 \quad \text{the trace on } yz \text{ plane: } By + Cz + D = 0$$

$$12. \quad \frac{x}{a} + \frac{y}{b} = 1 \quad \text{Similarly — } \frac{y}{b} + \frac{z}{c} = 1, \text{ etc.}$$

## EQUATIONS OF LINES

Symmetrical equations; A straight line is determined if one point on the line, and its direction are known:

$$13. \quad \frac{x-x_1}{\cos \alpha} = \frac{y-y_1}{\cos \beta} = \frac{z-z_1}{\cos \gamma} \quad \text{OR} \quad \left[ (=d), \frac{x-x_1}{d} = \cos \alpha \right]$$

$$14. \quad \frac{x-x_1}{l} = \frac{y-y_1}{m} = \frac{z-z_1}{n}$$

Two points determine a straight line. Formula:

$$15. \quad \frac{x-x_1}{x_2-x_1} = \frac{y-y_1}{y_2-y_1} = \frac{z-z_1}{z_2-z_1}$$

Wednesday, January 10, 1945

10th Day—355 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Tonight five of us tumbled at the basketball game—during the half. The others were green, this being the first time.

forward rolls

backward rolls

roll over back

roll over with locked arms

roll over hip

snap-ups

headsprings

handsprings

pyramid (squash)

handstand pyramid (3 men)

handspring over knees

handspring over back

dive over 4 men

backward extension roll

back extension without hands

toss-up

back-flip (from stand)

front-flip (on deck bare feet)

Thursday, January 11, 1945

11th Day—354 days to follow

CLEAR
CLOUDY
RAIN
SNOW

\* Omit this page in a practical study only, unless it is desired to find specific facts about the line formed by the intersection of 2 planes: dir. cos. and traces.

\* A line can be defined as the intersection of two planes. To find the projection form first one, and then another variable must be eliminated from the original equations by multiplying one equation by a suitable number and then "combining out." Thus, two equations in two unknowns each, one of which is the present in both same,  $\Lambda$  is the result. Next, TO FIND SYMMETRIC FORM find the value of this one unknown common to both in terms of the other. Set, the results in the form of the equation  $\frac{x-x_1}{l} = \frac{y-y_1}{m} = \frac{z-z_1}{n}$ . In this case however the unknown itself is equal to the other and so it is in this form:

$$16. \quad \frac{x}{1} = \frac{y-y_1}{m} = \frac{z-z_1}{n}$$

The values of this form are twofold. Where  $x$  is zero,  $Y_1$  is the value of  $y$  and  $Z_1$  is the value of  $z$  where the line pierces the  $yz$  plane. (Because  $x$  is zero). Also the denominators are a set of direction numbers of the line, (one of which is always "one.")

By equation 4 the direction cosines can easily be found.

Friday, January 12, 1945

12th Day—353 days to follow

CLEAR
CLOUDY
RAIN
SNOW

## GRAPHS OF EQUATIONS

General form of equation in one unknown.

$$a_0 x^n + a_1 x^{n-1} + a_2 x^{n-2} \dots \dots \dots a_{n-1} x + a_n = 0$$

Example:

$$x^5 - 4x^4 + 3x^2 - 1 = 0$$

This equation is a function of  $x$  [  $f(x)$  ] because the value of the equation depends upon the value of  $x$ .

\* \* \*

$$\begin{aligned} x^2 - 3x - 4 &= 0 && \text{Immediately one can see} \\ (x-4)(x+1) &= 0 && \text{where the curve cuts} \\ x &= 4 && \text{the } y \text{ axis because here} \\ x &= -1 && x \text{ is zero and } y \text{ is the constant.} \end{aligned}$$

Where the coefficient of  $x^2$  is plus there can be no more than positive roots than the number of changes of sign in the equation.

\* \* \*

$$x^4 + 6x^3 - 9x^2 - 24x - 8 = 0$$

Since the coefficient of the first term (largest) is plus it will come in from above and go out above. <sup>red</sup>I in; out II. Since there is one change of

Saturday, January 13, 1945

13th Day—352 days to follow

CLEAR
CLOUDY
RAIN
SNOW

We had a real date for a change. Having an overnight meant that I didn't have to leave at 2030 as usual, and Marye-Ann didn't have to get in until 0100 as usual. We ate at Hennicks and went to the OSU "Snowball Dance."

Much of the snow in the country has melted, and it now is only a few inches deep.

We also went to the geology building and looked at some of the exhibits.

Sunday, January 14, 1945

14th Day—351 days to follow

We went to a Baptist Church near the Campus. We ate at Canfield Hall. After dinner we went down-town to the penny arcade. We came back, I said goodbye about 0430 and was lucky to get back here before seven. Naturally, I wrote her!

Monday, January 15, 1945

15th Day—350 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Went to sick bay this morning and have been feeling miserable since. I've been sneezing and coughing, and have a sore throat.

I'm writing Marye-Ann before turning in, per usual.

sign, it can have no more than one + root and since it crosses the "Y" axis in the minus part it must have at least one + root.

\* \* \*

If the coefficient of the first term is plus (as always in the general form) and the exponent is <sup>odd</sup> ~~minus~~ it starts in quad. I and 'goes out' in quad. 3.

\* \* \*

An equation has as many roots as the highest product of exponents in any of its terms.



Tuesday, January 16, 1945

16th Day—349 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Today marked the nineteenth birthday of the sweetest girl in the world. I called her right before taps.

Any equation to an odd power must start in I and end in III. Thus an equation with an odd power must always have at least one real root.

Imaginary roots always come in pairs.

### REMAINDER THEOREM

When graphing an equation the method is to find what "Y" equals when "X" equals any number.

$$2x^4 + 6x^3 - 9x^2 - 24x - 8 = 0$$

Thus we find the  $f(0)$ , the  $f(1)$ , etc., or in other words, we find what  $y$  equals when  $x$  equals 0, 1, etc.

- \* The remainder theorem is a short
- \* cut method of finding the value of "Y"
- \* when  $x$  is any desired number.

Wednesday, January 17, 1945

15

17th Day—348 days to follow

CLEAR
CLOUDY
RAIN
SNOW

We had an easy swimming period today—swimming ten minutes continuously. Found a book in the library Suwanee River, which is very interesting.

It is considerably shorter than merely substituting the value of  $x$  in the expression.

### EXAMPLE:

Find the roots of the equation  $2x^4 + 6x^3 - 9x^2 - 24x - 8 = 0$  to the nearest whole digit.

### METHOD OF SYNTHETIC DIVISION

1. Write down coefficients in order with proper signs.  $2 + 6 - 9 - 24 - 8$
2. Put the number which you want "X" to equal on the left of a curved line.  
$$\begin{array}{r} 2 \phantom{0} \\ \hline 2 \phantom{0} + 6 - 9 - 24 - 8 \end{array}$$
3. Then skip a space under the above and draw a line as if adding.

Thursday, January 18, 1945

18th Day—347 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Tonight Johnson, Morrow, Hoh, Wilkinson, Cöble, and one other fellow had a special math class in the library-seminar room. After that I went to a bible class.

$$\begin{array}{r} 2 \ ) \ 2 \ +6 \ -9 \ -24 \ -8 \\ \hline \end{array}$$

4. Drop your first term down under the line and multiply it by the number which is the value of  $x$ . Put the result under the second coefficient and add. Multiply this result by the value of  $x$ , etc.

$$\begin{array}{r} 2 \ ) \ 2 \ +6 \ -9 \ -24 \ -8 \\ \quad \quad 4 \ +20 \ +22 \ -4 \\ \hline 2 \ +10 \ +11 \ -2 \ | \ -12 \end{array}$$

$\therefore$  When  $x$  is 2  $y$  is  $-12$ .  
It can be said that if

Friday, January 19, 1945

17

19th Day—346 days to follow

CLEAR
CLOUDY
RAIN
SNOW

After field night we went to a movie.

the last term comes out zero one of the roots of the equation is found, because when  $x$  equals a certain value  $y$  equals zero.

If the coefficients are written in descending powers (as they have to be) with the first term plus it the bottom line comes out all plus no roots greater will satisfy the equation. If they come out alternately  $+ - + -$  etc. (no number smaller) no greater negative number will solve it, or the lower limit is already found. Thus the roots can be found to be between two limits.

Horner's method will solve an irrational root correct to any decimal place. (See any higher algebra book; too long to write out).

Saturday, January 20, 1945

20th Day—345 days to follow

<input type="checkbox"/>	CLEAR
<input type="checkbox"/>	CLOUDY
<input type="checkbox"/>	RAIN
<input type="checkbox"/>	SNOW

The "oldman" was on a rampage again today. He passed out 540 demerits to one company on the billet inspection only. Finally, however I got to leave here - to late to go to Hebron, however, for Dad - and headed straight for O.S.U. A drunk picked me up and for about 10 miles I speeded along close to 65 mi/hr. M.A. and I ate at the Dutch Tavern and I got her some candy. We danced<sup>2</sup>

Sunday, January 21, 1945

21st Day—344 days to follow

Back to Columbus as early as possible. I met Roy Schwitzgebel, who was going home for the last time before overseas.

We ate at Canfield (M.A. & I), went for a walk and then to a movie. I hitchhiked back, stopping at Pataskala, when one car turned off, to go for a

Monday, January 22, 1945

22nd Day—343 days to follow

<input type="checkbox"/>	CLEAR
<input type="checkbox"/>	CLOUDY
<input type="checkbox"/>	RAIN
<input checked="" type="checkbox"/>	SNOW

Another math class tonight covering the material on solid analytical geometry. . . . . test tomorrow. It snowed again last night and it's white.

JAN 20, '45

at Pomerene Hall and then I had to beat it back to Granville. I just barely caught the bus leaving town, and slept most of the way in. That's one thing I've learned to do since last July - sleep anyplace anytime.

JAN 21, 45

short hike. The fields are surely different from January 1. Instead of plowing through kneedeep snow the crust was so hard that I could walk right on it. When I came to a stream I merely walked over it on the ice. Little mounds of snow built up around the corn stubble in the fields.

Tuesday, January 23, 1945

23rd Day—342 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Worked on the Denisonian to-night, and wrote to Marye Ann. I'm trying to write just as often as I possibly can.

Fractional roots will also work in synthetic division. If an equation has rational roots, if they are not integers they will be fractions.

First isolate the root between two successive integers. If it is a rational fractional root the numerator of the fraction will be factors of the last term (the constant) and the denominator will be factors of the coefficient of the first term (the highest power).

Wednesday, January 24, 1945

24th Day—341 days to follow

CLEAR
CLOUDY
RAIN
SNOW

FIVE LETTERS TODAY FROM MARYE-ANN. Is it any wonder I'm up to my neck in love. And more than that she's coming to the Pan Hellenic Dance here Saturday. Four girls offered to take care of her over the weekend. I called tonight and she was very happy to come. And am I happy to have her!

Find slope and y intercept

$$\begin{aligned} 1. \quad 5x - 4y &= 12 & y &= Mx + b \\ -4y &= 12 - 5x & M &= \frac{5}{4} \\ y &= \frac{5}{4}x + 3 & b &= 3 \end{aligned}$$

2. Find slope of line  $\perp$  to line joining points  $(3, -2)$  and  $(-1, 5)$ .

$$M_1 = \frac{5 - (-2)}{-1 - 3} = -\frac{7}{4}$$

$$M_2 = \frac{4}{7}$$

3. Find distance of pt.  $(4, -1)$  from line  $12x + 5y - 4 = 0$  [divide by  $\sqrt{A^2 + B^2}$ ]

$$\frac{|12(4) + 5(-1) - 4|}{\sqrt{144 + 25}} = 13.$$

Thursday, January 25, 1945.

25th Day—340 days to follow

CLEAR
CLOUDY
RAIN
SNOW

$$\frac{12}{13}x + \frac{5}{13}y - \frac{4}{13} = 0 \quad [\text{Subst. } (4, -1)]$$

$$\frac{12}{13} \cdot 4 + \frac{5}{13} \cdot (-1) - \frac{4}{13} = d$$

$$\frac{48}{13} - \frac{5}{13} - \frac{4}{13} = \frac{39}{13} = \underline{\underline{3}}$$

4. Equation of line through  $(5, 2)$  &  $(1, 3)$ .

$$M = \frac{1-5}{3-2} = -4$$

$$Y - 2 = -4(X - 2)$$

$$4x + Y - 10 = 0$$

5. Equation of  $\odot$  with center at  $(-3, 4)$  & tangent to  $X$  axis

$$(x-h)^2 + (y-k)^2 = r^2$$

$$(x+3)^2 + (y-4)^2 = 16$$

$$x^2 + 6x + 9 + y^2 - 8y = 0$$

$$x^2 + y^2 + 6x - 8y + 9 = 0.$$

6. Polar eq. of circle whose rectangular equation is  $x^2 + y^2 + 4x - 4y = 0$ 

$$r = \sqrt{x^2 + y^2} \quad x = r \cos \theta$$

$$r^2 = x^2 + y^2 \quad y = r \sin \theta$$

$$r^2 + 4r \cos \theta - 4r \sin \theta = 0 \quad \text{or}$$

$$r^2 + 4(r \cos \theta - r \sin \theta) = 0.$$

Friday, January 26, 1945

26th Day—339 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Tomorrow M.A. will be here!  
We scrubbed the bulkheads in our room today for tomorrow's inspection.

7. Write equation of family of lines through point  $(0, 5)$ .

$$Y - 5 = M(X - 0)$$

$$Y - 5 = Mx$$

$$Y = Mx + 5$$

8. Write equation of <sup>family of</sup> lines  $\parallel$  to line  $5x - 2y + 7 = 0$ .

$$M_1 = +\frac{5}{2}$$

$$Y = \frac{5}{2}X + b, \text{ or}$$

it could be written  $5x - 2y + k = 0$ .

9. Write equation of system of lines passing through intersection of  $2x - 5y + 4 = 0$ , and  $5x + 3y - 7 = 0$  substitute in:  
 $2x - 5y + 4 + k(5x + 3y - 7) = 0$ . This is the equation of the family of lines through this point. If you want the equation of

Saturday, January 27, 1945

27th Day—338 days to follow

CLEAR
CLOUDY
RAIN
SNOW

I had orderly duty in the morning (Mostly packing old clothes to send to Great Lakes). We had personnel inspection (Lt. Browne), which I didn't stand because I was on duty, and were restricted until almost 1530.

I met Marye-Ann at the bus station and we went to Beaver Hall, after eating a bite downtown.

I picked up the flowers for M.A. about 1830 and then picked her up. We went to the ball game →

Sunday, January 28, 1945

28th Day—337 days to follow

We didn't go to church, both sleeping late. We did get up in time to eat dinner at the Inn, however. We walked around after dinner for about an hour. [The snow is "plenty" deep] Afterwards we went to the Union and danced and played cards. She left on the 8:15 P.M. bus.

Monday, January 29, 1945

29th Day—336 days to follow

CLEAR
CLOUDY
RAIN
<input checked="" type="checkbox"/> SNOW

Studied for the physics test tomorrow. Snow again—At least four inches! and I left immediately, to get ready for the match. As soon as this was over and I had a shower we went to the dance.

First the Chi Omega house—then Delta Gamma and Alpha Omicron. And did we have a good time! We walked back to Beaver and said goodnight at 2400.

the single line through this point and another point substitute this second point for  $x$  and  $y$  and solve for "k". Substitute this "k" in the original long equation and this is the equation of the line.

10. Write equation of parabola: vertex at  $(1, 1)$ ; focus  $(5, 1)$ ; find length of latus rectum.  
S.F.  $(y-1)^2 = -2p(x-5)$ ;  $(y-1)^2 = -2 \cdot 6 = (x-5)$

Tuesday, January 30, 1945

30th Day—335 days to follow

CLEAR
CLOUDY
RAIN
SNOW

This winter it seems to start to snow every time the layer before gets dirty — and the result is that it keeps getting deeper and deeper. I believe it has snowed every Monday for a month plus lots of other days.... More snow than I can ever remember in previous years. At least it makes the trees pretty and the countryside white, but then I always have liked the winter.

11. Find the length of the latus rectum of the parabola with vertex  $(2, -1)$ , equation of directrix is  $Y = -3$ .

12. Write equation of ellipse; major axis = 8.  
l.r. = 2 ;  $a = 4$

Wednesday, January 31, 1945

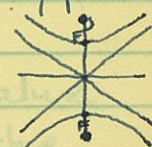
31st Day—334 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Yesterday we had our physics test which wasn't too difficult, and today the history test. This is Life Planning Week at Denison.

13. Find directrix of ellipse  $\frac{x^2}{4} + \frac{y^2}{25} = 1$  center at 0.  
 $a = 5$ ;  $b = 2$  \*  $d = \frac{a}{e}$  "a" is major axis.  
 \*  $e = \frac{c}{a}$   $c = \sqrt{25-4} = \sqrt{21}$   
 $e = \frac{\sqrt{21}}{5}$   $d = \frac{5 \cdot 5}{\sqrt{21}}$  distance =  $\frac{25}{\sqrt{21}}$ ;  $Y = \pm \frac{25}{\sqrt{21}}$
14. Find equation of ellipse through points  $(3, 1) + (0, 4)$  center at origin.  
 $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$  ;  $\frac{9}{a^2} + \frac{1}{b^2} = 1$  ;  $\frac{0}{a^2} + \frac{16}{b^2} = 1$  ;  
 $b = 4$  ;  $\frac{9}{a^2} = \frac{15}{16}$  ;  $15a^2 = 144$  ;  $a = \frac{12}{\sqrt{15}}$
- S.F.  $\frac{x^2}{144/15} + \frac{y^2}{16} = 1$  ;  $\frac{15x^2}{144} + \frac{y^2}{16} = 1$
15. Find the eccentricity of the conic  $\frac{y^2}{25} - \frac{x^2}{75} = 1$   
 In hyperbola  $c^2 = a^2 + b^2$  ;

16. Find equation of hyperbola with asymptotes  
 $Y = \pm \frac{3}{4} X$  ; foci  $(0, \pm 5)$   
 $\frac{A}{B} = \frac{3}{4}$   $c = 5$   $\therefore \frac{y^2}{9} - \frac{x^2}{16} = 1$



32nd Day—333 days to follow

CLEAR
CLOUDY
RAIN
SNOW

$$\text{Induced E.M.F.} = \frac{\text{lines cut per sec.}}{10^8}$$

OR

$$\text{E.M.F.}_i = \frac{N}{10^8 t} \quad t = \text{sec}; N = \text{total number of lines cut by the conductor (if a loop of } n \text{ turns it will be } n \cdot \text{lines that are cut.)}$$

$$\text{Lines cut per sec.} = 4 \cdot \text{area of coil} \cdot \text{field intensity} \cdot \text{revolutions per sec.}$$

$$\frac{\text{E.M.F.}_1}{\text{E.M.F.}_2} = \frac{v.p.m._1}{r.p.m._2}$$

$$\text{E.M.F.}_i = L \frac{di}{dt}$$

$$\text{E.M.F.}_i = \frac{N}{10^8} \cdot \frac{d\phi}{dt}$$

17. Find equation of locus of points twice as far from (6, 0) as from the origin.

$$\sqrt{(x-6)^2 + y^2} = 2\sqrt{x^2 + y^2}$$

$$x^2 - 12x + 36 + y^2 = 4x^2 + 4y^2$$

$$-3x^2 - 12x + 36 - 3y^2 = 0$$

$$x^2 + 4x + 4 + y^2 = 12 + 4$$

$$(x+2)^2 + y^2 = 16$$

equation of circle, center at (-2, 0), radius=4.

## REVIEW OUTLINE: ANALYTIC GEOMETRY

## I. ELEMENTARY IDEAS

## I. Co-ordinate system

- A. Distance between two points:

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

- B. Derived from formula of Pythagoras: In a right triangle:

$$c^2 = a^2 + b^2$$



## 2. Function notation

- A. When "x" is given a value in an equation then the function of x, f(x), is →



Friday, February 2, 1945

33rd Day—332 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Find co-ord. of center of hyperbola

$$4x^2 - 8x - 9y^2 + 36y = 68$$

$$4x^2 - 8x - 9y^2 + 36y = 0$$

$$4(x^2 - 2x + 1) - 9(y^2 - 4y + 4) = 68 + 4 - 36$$

$$4(x-1)^2 - 9(y-2)^2 = 36 \quad \text{Divide by } 36$$

$$\frac{(x-1)^2}{9} - \frac{(y-2)^2}{4} = 1$$

$a = 3$  ;  $b = 4$  ; hyperbola

equal to the value of the equation.  
 $f(2)$  means that two has been substituted for "x" in the equation, etc.

B. The purpose is to find values of x and y to graph

3. Elementary graphing

Saturday, February 3, 1945

34th Day—331 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Marye-Ann has some sort of attraction that varies directly as the product of the letters received since last I saw her, and directly as the square of the number of days since I kissed her good-bye. And never inversely.

Sunday, February 4, 1945

35th Day—330 days to follow

Forearmed, forearmed; to be prepared is half the victory.  
 Cervantes "Don Quixote"

worse than war is the fear of war.  
 Seneca

Monday, February 5, 1945

36th Day—329 days to follow

CLEAR
CLOUDY
RAIN
SNOW

$\rho = \frac{eP}{1 - e \cos \theta}$  Standard equation of polars with focus at pole. When using "Cos  $\theta$ " lies along "x" axis. When using "-" its directrix is left.

## II. THE STRAIGHT LINE

- The slope of a straight line is equal to the ration of  $\frac{Y}{X}$ , or simply the Tan  $\theta$ .


If a RR track rises 100 feet for every mile of horizontal extent its slope is  $\frac{100}{5280} = \frac{5}{264}$ . (Also the angle of the hill is the  $\arctan \frac{5}{264}$ )

- Slope intercept equation of a line:  
 $Y = Mx + b$  M is the slope, usually written as a fraction, b is the point where the line

Tuesday, February 6, 1945

37th Day—328 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Two equations in three unknowns; t, x, Y. Let the Origin be the point where the projectile starts  Using all the time, gives the range. Half the time gives the highest point of the projectile.

$$x = vt \cos \theta$$

$$y = yt \sin \frac{1}{2} gt^2$$

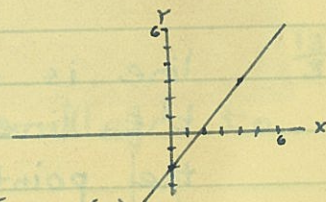
A man holds hose 4 ft. above ground at  $30^\circ$ . Water falls 25 feet from the man on the ground. Find nozzle V.

crosses the "y" axis. Substituting; (for the equation of this line):  $Y = \frac{5}{4}x + (-2)$

$$Y = \frac{5}{4}x - 2 \quad \text{or} \quad 4Y = 5x - 8 \quad \text{or} \quad 5x - 4Y - 8 = 0.$$

The slope of a horizontal line is zero; the slope of a vertical line is undefined — noted  $\infty$ .

- If two points on the line are given, the slope is:  $M = \frac{Y_2 - Y_1}{X_2 - X_1}$
- If one point on the line and the slope of the



Wednesday, February 7, 1945

38th Day—327 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Worked on the Denisonian

line is given, the equation of the line can be written in the point-slope form:

$$Y - Y_1 = M(X - X_1)$$

Ex: Slope of  $\frac{2}{3}$ , through point (2, -3)

$$Y + 3 = \frac{2}{3}(X - 2); Y + 3 = \frac{2}{3}X - \frac{4}{3};$$

$$3Y + 9 = 2X - 4; 2X - 3Y - 13 = 0$$

(If you want to find where the line crosses the y axis, "b", change it to the form  $y = mx + b$ .

$$3Y = 2X - 13; \underline{Y = \frac{2}{3}X - \frac{13}{3}}$$

In this form of the equation of the line it is seen by

Thursday, February 8, 1945

35

sorrow in hard c. der.

## The Denisonian

Established 1857

*Liberty is the right to see things as they are.*

Published every Friday as an extra-curricular activity by students of Denison University, except during vacation and examination periods.

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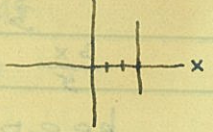
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talked  
I was ten  
days there,  
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destroyers.  
fantry train  
has been in  
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inspection that  $M = \frac{2}{3}$ , and  $b = -\frac{13}{3}$ .

5. If the line is parallel to one of the axes, it is simply  $X=3$  in this example.



(X = whatever value it is; or y = whatever value it is).

6. To write the equation of the straight line through two given points, find its slope first and then use one point in the point-slope form

Friday, February 9, 1945

40th Day—325 days to follow

CLEAR
CLOUDY
RAIN
SNOW

## 7. "Normal form" of a straight line.

Divide every term by  $\pm \sqrt{A^2+B^2}$ 

$$3x + 4y - 10 = 0$$

$$\frac{3x}{5} + \frac{4y}{5} - \frac{10}{5} = 0 \quad \text{Use } \pm \text{ to}$$

keep the constant term minus.

When the equation is in the "Normal form" the constant term tells how far the line is from the origin.

If a point is substituted in the equation for  $x$  and  $y$  the answer will be the shortest distance of the point to the line.

Saturday, February 10, 1945

41st Day—324 days to follow

CLEAR
CLOUDY
<input checked="" type="checkbox"/> RAIN
SNOW

Today is a red-letter day. Things were sort of twisted up. It all started when Frank and I left for Columbus, bound for Canfield. The weather wasn't the best. In fact it was downright sloppy. We didn't leave together, and I was out in the rain most of the time.

Sunday, February 11, 1945

42nd Day—323 days to follow

Monday, February 12, 1945

43rd Day—322 days to follow

CLEAR
CLOUDY
RAIN
SNOW

8. When the equation of the straight line is in the general form:  $Ax + By + C = 0$ , the slope,  $M, = -\frac{A}{B}$ .

The intercepts or points where the line crosses the x and y axis is found by letting one equal zero and finding the other, or  $a = -\frac{C}{A}$ ;  $b = -\frac{C}{B}$ .

The equation of the normal form of a straight line:

$$\frac{A}{\pm\sqrt{A^2+B^2}} + \frac{B}{\pm\sqrt{A^2+B^2}} + \frac{C}{\pm\sqrt{A^2+B^2}} = 0.$$

The formula for the shortest distance from a point to a line can be found by:

$$d = \frac{Ax_1 + By_1 + C}{\pm\sqrt{A^2+B^2}}, \text{ remembering}$$

to divide by the number to keep "C" minus.

Tuesday, February 13, 1945

39

44th Day—321 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Yesterday I sent Marye-Ann a little carved wooden pin—also, my mother some flowers

### III The CIRCLE

Standard Form  $(x-h)^2 + (y-k)^2 = r^2$

r is radius

h is "x" co-ord. of center; k is "y" coord of center

### HYPERBOLA: CENTER AT O.

$$\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1 \text{ with center at } O$$

S.F.  $\frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2} = 1$

Ellipse

"a" is semi-axis || "x" axis; h is "x" coord of center.

"b" " " " || "y" ; k "y" " " " "

S.F.  $(y-k)^2 = 2p(x-h)$

PARabola.

Wednesday, February 14, 1945

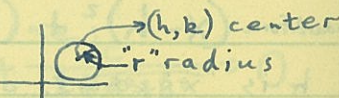
45th Day—320 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Valentine's Day. I sent a telegram to my valentine, and just thought about her all day long - as usual. I don't think any guy ever had a truer, prettier, sweeter valentine. And, golly, do I love her!

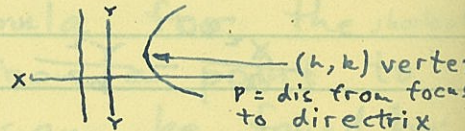
## STANDARD EQUATIONS

CIRCLE


$$(x-h)^2 + (y-k)^2 = r^2$$


$(h, k)$  center  
"r" radius

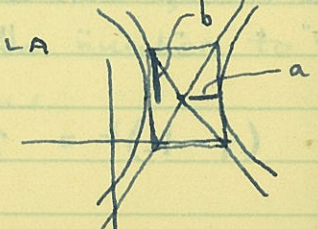
PARABOLA

$$(y-k)^2 = 2p(x-h)$$


$(h, k)$  vertex  
 $p$  = dis. from focus to directrix

$$\frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2} = 1$$


$(h, k)$

$$\frac{(x-h)^2}{a^2} - \frac{(y-k)^2}{b^2} = 1$$


$a$   
 $b$

Thursday, February 15, 1945

46th Day—319 days to follow

CLEAR
CLOUDY
RAIN
SNOW

I read American history most of the afternoon - from the first World War to Herbert Hoover, inclusive. It just seemed like reading a series of blunders - probably most of them unintentional, but practically all inexcusable. The American international foreign policy seemed the most striking to me - isolationism, great tariff barriers (Hawley-Smoot tariff for one), continual nagging for World War debts that should have been cancelled six months after the war, and pussey-footing with Japan in the Far East.

I took a strength test in the morning and had wrestling in the afternoon.

Wednesday, February 14, 1945

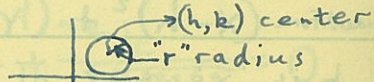
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CLOUDY
RAIN
SNOW

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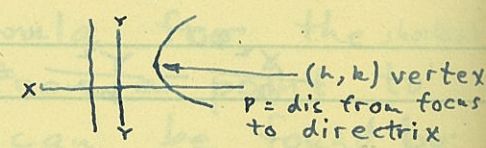
## STANDARD EQUATIONS

CIRCLE

$$(x-h)^2 + (y-k)^2 = r^2$$



$(h, k)$  center  
 $r$  radius

PARABOLA

$$(y-k)^2 = 2p(x-h)$$


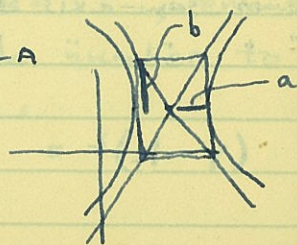
$(h, k)$  vertex  
 $p = \text{dis from focus to directrix}$

ELLIPSE

$$\frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2} = 1$$


$(h, k)$

HYPERBOLA

$$\frac{(x-h)^2}{a^2} - \frac{(y-k)^2}{b^2} = 1$$


$(h, k)$

Thursday, February 15, 1945

46th Day—319 days to follow

CLEAR
CLOUDY
RAIN
SNOW

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I took a strength test in the morning and had wrestling in the afternoon.

Friday, February 16, 1945

47th Day—318 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Hopper and I went to the comic opera Robin Hood after field night. I didn't appreciate it too much.

SAT. FEB. 17.

Dusk was beginning to creep up on us by the time dinner was over, so by this time dark had settled. We were fortunate in getting several rides to Pataskala, but it was still comparatively early, and before too long another car stopped and brought us in to Granville. It was cold, but lots of stars were out, and I kept happy by thinking of my darling.

Saturday, February 17, 1945

48th Day—317 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Hinchee and I went to Columbus immediately after the fire drill at 1330. Marye-Ann and I had our pictures taken together and then the three of us took a streetcar downtown. We had "goose" at the Deshler-Walleck, and stopped to get a coke or lemon-ade before starting back. After taking Marye-Ann back to Canfield Hall I said good-bye and H.H. and I started back<sup>to 92</sup>

Sunday, February 18, 1945

49th Day—316 days to follow

I had to walk three or four miles tonight to get to a good corner, but didn't mind it at all. The stars were out again.....



Monday, February 19, 1945

50th Day—315 days to follow

<input checked="" type="checkbox"/> CLEAR
<input type="checkbox"/> CLOUDY
<input type="checkbox"/> RAIN
<input type="checkbox"/> SNOW

This list of birds was taken from Trantman's Birds of Buckeye Lake, Ohio. and are those which I shall look for on a bird trip there. All of these birds are "fairly abundant" during the month of February, especially the latter part.

Common mallard

Black duck

American golden-eye

American merganser

Cooper's hawk

Eastern red-tailed hawk

\* Northern red-shouldered hawk

\* American rough-legged hawk

Marsh hawk

Eastern sparrow hawk

Eastern bob-white

Ring-necked pheasant

Herring Gull

Ring-billed Gull

Tuesday, February 20, 1945

51st Day—314 days to follow

<input type="checkbox"/> CLEAR
<input checked="" type="checkbox"/> CLOUDY
<input type="checkbox"/> RAIN
<input type="checkbox"/> SNOW

- \* Eastern mourning dove  
 Barn owl  
 Eastern screech owl  
 Northern barred owl  
 Northern flicker  
 Red-bellied woodpecker  
 Eastern hairy woodpecker  
 Northern downy woodpecker  
 Northern Horned lark  
 The Northern blue jay  
 \* Prairie Horned Lark  
 Eastern crow  
 Carolina chickadee  
 Tufted titmouse  
 White breasted nuthatch  
 Eastern winter wren  
 Carolina wren  
 Eastern robin  
 Eastern golden-crowned kinglet  
 Starling  
 English sparrow  
 Eastern redwing  
 \* Bronzed grackle

Wednesday, February 21, 1945

52nd Day—313 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Eastern cardinal  
 Eastern gold finch  
 Slate-colored junco  
 Eastern tree sparrow  
 Swamp sparrow  
 Allegheny Song sparrow  
 Eastern snow bunting

\* Rare or uncommon before  
 February 20. (Not recorded  
 at least 6 out of 12  
 winters)

February 20, 1945

I went to the SAE's house to-  
 night. They've been high-press-  
 uring Jervis and I for some  
 time to pledge. I do like the  
 guys in that fraternity better than  
 any other.

I called Marye-Ann, and sure  
 was pleased to talk with her.

Thursday, February 22, 1945

53rd Day—312 days to follow

CLEAR
CLOUDY
RAIN
SNOW

FEB. 21, 1945

Several inches of snow is  
 on the ground. Worked on  
 the paper tonight. Believe I  
 will pledge since M.A. wants me  
 to.

Feb. 22.

Studied in spare time for finals  
 beginning tomorrow.

Friday, February 23, 1945

54th Day—311 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Two exams today! One in Naval Organization and the other in Analytical Geometry.

I've been hearing the robins while standing in ranks lately.

Sat. Feb. 25.

Morning—while waiting for inspection I walked across the lawn to the Wigwam (gymnasium) and back. Saw two robins, several cardinals, a bluejay, about six little white-breasted nuthatches, a flock of house sparrows and lots of starlings. Also heard a bronzed grackle.

Saturday, February 24, 1945

55th Day—310 days to follow

CLEAR
CLOUDY
RAIN
SNOW

The weather was wonderful. It is really Spring outside. Marye Ann and I went for a walk. She was all ready to go when I reached Canfield. We took the Whittier car to the edge of town. Some of the fields are green with the wheat starting up. The ground was "springy" from the melted snows. We ate, and went back to the university. I took the 9:30 P.M. bus back to Granville.

Sunday, February 25, 1945

56th Day—309 days to follow

We went to a movie this afternoon. I left in time to get back fairly early, but it was still dark for the last part of the way. We had a good time together.

Friday, February 23, 1945

54th Day—311 days to follow

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CLOUDY
RAIN
SNOW

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Sunday, February 25, 1945

56th Day—309 days to follow

We went to a movie this afternoon. I left in time to get back fairly early, but it was still dark for the last part of the way. We had a good time together.

Monday, February 26, 1945

57th Day—308 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Final in American history.

The last is the last is today. After taking the English examination the morning after the morning all my belongings to store in another room till after leave. I was ready and anxious to start for Columbus. The Navy fooled us up as tomorrow instead of today. I had at 11:00 a.m. previously announced we were to wait till 1:00. It was a joke but we didn't reach Cantfield Hall until it was too late to catch anything but the last bus and it was almost an hour before we were waiting for the bus but the bus was there so we started before we got to the Webster about 12:30. It was a bit of a wait for the west coast bus which finally reached Canton and was soon at home.

Tuesday, February 27, 1945

58th Day—307 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Physics final.

Today is the last is today. After taking the English examination the morning after the morning all my belongings to store in another room till after leave. I was ready and anxious to start for Columbus. The Navy fooled us up as tomorrow instead of today. I had at 11:00 a.m. previously announced we were to wait till 1:00. It was a joke but we didn't reach Cantfield Hall until it was too late to catch anything but the last bus and it was almost an hour before we were waiting for the bus but the bus was there so we started before we got to the Webster about 12:30. It was a bit of a wait for the west coast bus which finally reached Canton and was soon at home.

Wednesday, February 28, 1945

59th Day—306 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Today is the last day of this term. After taking an English examination this morning and packing all my belongings to store in another room 'till after leave, I was ready and anxious to start for Columbus.

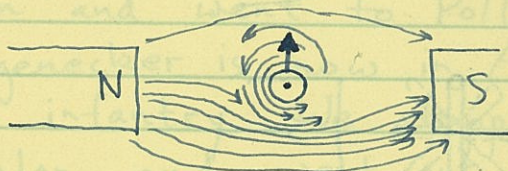
The Navy fouled us up as usual. Instead of letting me leave at 1700 as previously announced we had to wait until 1900.

I was lucky to get a bus out of Granville but didn't reach Canfield Hall until it was too late to catch anything but the last bus out. We went to a movie while waiting for the bus, but at 2345 were start on our way home. We got to Wooster about 0330 and had a two hour wait for an west-east bus. We finally reached Canton and were soon at home.

Special Data

## ALTERNATING CURRENT

- I. Compare the motor and dynamo  
 (a) Motor,  $\odot$  current coming toward you  
 $\otimes$  current going out



When the current is coming out lines of force are added on one side. The conductor tends to move away from the side on which lines of force are added.

When the conductor is moved in the field it induces electricity which is in such a direction as to add lines of force on the side toward which it is moving (to oppose the moving)

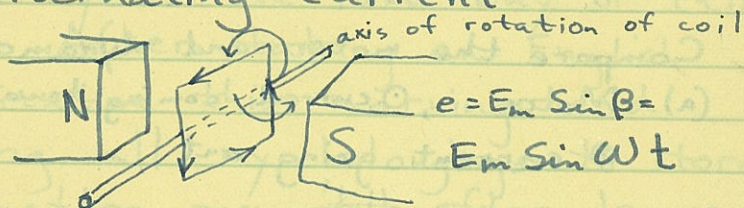


(current result when the wire is moved down)

60th Day—305 days to follow

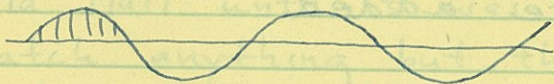
CLEAR
CLOUDY
RAIN
SNOW

## 2. Alternating current



## 3. Effective value of the E.M.F. equals the square root of the average current squared.

$$\text{E.M.F. effective} = \text{E.M.F. maximum} \cdot .707$$



## 4. Phase relations

a. Circuit containing only resistance (R)

b. " " " inductance (L)

$$\text{E.M.F. induced} = L \frac{di}{dt}$$

c. Current lags behind E.M.F. by



I slept for seven hours today! I helped Raymond a little with trig. Marye-Ann and I went to the library (for Ray), saw Elouise downtown and went to Polly's. Ray Longenecker is now in Alabama in the infantry. We stopped at the Avalon and went out to Brookside. The night was clear and cold-bright.

c. Circuit has R + L

current lags by angle and whose

$$\tan \theta = \frac{L\omega}{R}$$

Inductive reactance =  $X_L = \omega L = 2\pi fL$ 

d. Circuit containing (C)

$$X_c = \text{Capacitance reactance} = \frac{1}{\omega c} = \frac{1}{2\pi f c}$$

current lags behind E.M.F. by 90°

e. Circuit containing R L C

Z = impedance in ohms

$$Z = \sqrt{R^2 + (L\omega - \frac{1}{\omega c})^2}$$

IN SERIES CIRCUIT:

$$Z = \sqrt{R^2 + (X_L - X_c)^2}$$

Friday, March 2, 1945

61st Day—304 days to follow

CLEAR
CLOUDY
RAIN
SNOW

5. Direct current from rotating coil which has commutator that causes the current to go in the same direction.



makes it almost steady with little pulsation.

Saturday, March 3, 1945

62nd Day—303 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Sunday, March 4, 1945

63rd Day—302 days to follow



Monday, March 5, 1945

64th Day—301 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Arriving so late last evening meant that I slept most of today. Got my schedule fixed up. Am taking calculus I, Heat power, Naval history, Economic Principles, and Inorganic chemistry.

Tuesday, March 6, 1945

65th Day—300 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Classes began today without books.

### DEDUCTION OF ATOMIC WEIGHTS

1. Atomic weights
2. Molecular weight
3. Percentage composition
4. Formula.

If you know "3" of the above "4" the 4th can be deduced.

With a gas

Take many compounds.

1. Find % composition
2. Find molecular weight by Dumas bulb <sup>ppg. 78 ↓</sup>
3. Find part of molecular wght due to the element in question smallest number is atomic weight.

From, 1, 2, & 3 get exact formula

Now calculate exact atomic wght.

Rule of Dulong and Petit

Atomic wght  $\times$  specific heat = 6.4  
(approx. true for a solid)

Wednesday, March 7, 1945

66th Day—299 days to follow

CLEAR
CLOUDY
RAIN
SNOW

**GAY-LUSSAC'S Law of combining volumes.**  
When two gases combine there is a whole number ratio between their volumes and between the volume of either one of them and that of the product if it is a gas.

### TYPES OF REACTIONS

1. Direct union
2. Decomposition
3. Substitution
4. Double decomposition  $\text{CaCO}_3 + 2\text{HCl} \rightarrow \text{CaCl}_2 + \text{H}_2\text{CO}_3$   
 $\text{CaCO}_3 + 2\text{HCl} \rightarrow \text{H}_2\text{O} + \text{CO}_2 + \text{CaCl}_2$

Thursday, March 8, 1945

67th Day—298 days to follow

CLEAR
CLOUDY
RAIN
SNOW

### HEAT POWER FORMULAS

Energy equations of a perfect gas

Non-flow:

$$dQ = dU + dW$$

for Air:

(k varies w. temp.)

$$k = \frac{C_p}{C_v}$$

$$C_p = 0.24 \quad C_v = 0.1715$$

(R = gas constant)

(J = 778)

$$\Delta U = W C_v (T_2 - T_1)$$

$$C_p = \frac{kR}{(k-1)J}$$

$$V_1 = \frac{WRT_1}{P_1} \quad P = \text{lb/ft}^2$$

( $\log_e X = 2.30 \log X$ )

$$\Delta s = W C_p \log_e \frac{T_2}{T_1}$$

$$PV = WRT$$

Friday, March 9, 1945

68th Day—297 days to follow

CLEAR
CLOUDY
RAIN
SNOW

### CARNOT CYCLE

$$e = \frac{T_1 - T_2}{T_1} \quad \text{Any cycle}$$

$$W = e Q_A \quad \begin{array}{l} \text{Any cycle} \\ \text{Diesel cycle, otto, carnot, etc} \end{array}$$

$$W = \frac{Q_A - Q_R}{Q_A} \quad \text{Any cycle}$$

$$\Delta S = \frac{Q_R}{T_2} \quad \text{Change of entropy is measure of unavailable energy}$$

Saturday, March 10, 1945

63

69th Day—296 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Overnight weekend. Tonight we went to the Victory Room at the Neil House. We wanted to dance but it was so crowded that we didn't stay long. Marye-Ann didn't appreciate the place, and I never did. Too much like Brookside.

Sunday, March 11, 1945

70th Day—295 days to follow

We saw Meet Me In St. Louis, and it was really a good show for a change.

Monday, March 12, 1945

71st Day—294 days to follow

CLEAR
CLOUDY
RAIN
SNOW

## Crystals

When liquids freeze they change into a mass of solid bodies which have definite geometric form and are called crystals. Always bounded by plane surfaces, arranged orderly with reference to imaginary lines thru them called axes. All may be referred to one of six fundamental crystallographic systems. (May also be deposited by solutions or condensing vapors).

ITOMTH ← Remember Key

1. **Isometric or regular:**  
Three equal axes at right angles to each other.
2. **Tetragonal:**  
Two equal axes and third of diff. length all at rt. angles.
3. **Orthorhombic:**  
3 unequal axes all at rt. angles.
4. **Monoclinic:**  
2 axes at rt. angles and 3rd inclined. Varying length and angle of inclination.

Tuesday, March 13, 1945

72nd Day—293 days to follow

CLEAR
CLOUDY
RAIN
SNOW

5. **Triclinic:**  
3 axes inclined toward each other. Any relative lengths and varying angles.
6. **Hexagonal:**  
3 equal axes in same plane intersecting at  $60^\circ$  L's, and a 4th axis at rt. angles to these. Many rhombic and complicated forms.

Crystals are characteristics of the substance. Shape may vary but any one substance will crystallize in the same form of some system.

If 2 substances have the same "form" (a cube + octahedron have same form under 1) they are isomorphous.

Allotropic forms are different crystalline forms of the same element or compound. Carbon: Diamond, isometric; graphite hexagonal....

Crystallizes in 2 systems called dimorphous. (one form on freezing, another from solution). Trimorphous known to pg. 70.

Wednesday, March 14, 1945

73rd Day—292 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Denisonian tonight. Carey is taking care of Marye-Ann when she comes for the dance.

— from pg. 69. —

bus into Mount Vernon. I lost. On the way back a couple picked me up and gave me several pocket mysteries. When I finally reached Granville I hiked up to the spot we were at yesterday. I found my neckerchief which I had lost, and then lay down on the warm grass and started to read one of them. I just couldn't get my darling off my mind. (I didn't want to though).

I felt terrible but finally got up and walked back. I wrote home and went to bed.

Meadow-lark, bronzed grackle, tufted titmouse, hairy woodpecker, downy woodpecker, junco, yellow warbler, mourning dove, cuckoo.

Thursday, March 15, 1945

74th Day—291 days to follow

CLEAR
CLOUDY
RAIN
SNOW

One day and Marye-Ann will be here I called here tonite and she's coming as soon after 4:00 o'clock tomorrow evening as possible.

Went to Sutton's meeting at \$2100. Was a little sick.

cont. from pg. 69

We came back by another route — cutting on over the hill and down to a road which lead to Rose Quarry. We went to the Student Union, played cards, and then down to Megaws to eat.

I took M.A. back up to Beaver and in the meantime took a bromoselber and 3 aspirins. I was sick but I sure wanted to take my darling to the dance.

She was beautiful — as always in a black formal. The dance couldn't have been nicer.

Friday, March 16, 1945

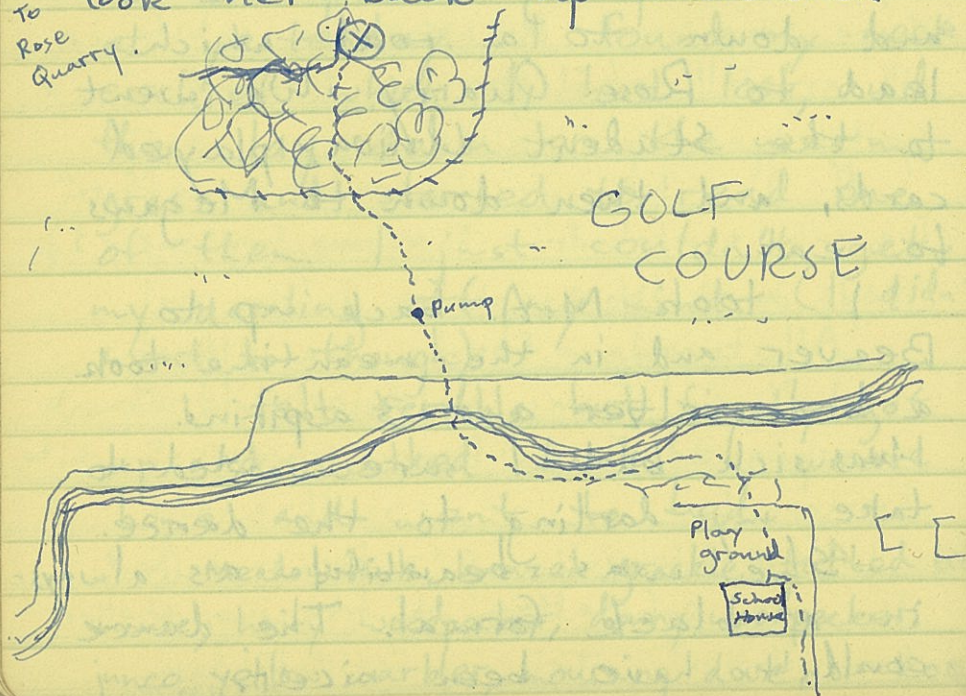
75th Day—290 days to follow

CLEAR
CLOUDY
RAIN
SNOW

I met Marye-Ann in front of the Granville Drug Store at 16:15. There isn't a happier man in the Unit. We went up to Beaver Hall, and then I went to the SAE house to do some work.

After field night we went to the movie—a very mixed-up affair, incidentally—and then I took her back up to Beaver.

To  
Rose  
Quarry.



Saturday, March 17, 1945

76th Day—289 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Two tests in the morning. In the afternoon we went for a hike near the Granville Golf Course. (Map page 68). The weather was wonderful. We hiked across the golf course over a fence and up a wooded hillside to a grassy spot beside a wire fence. The clouds were white, the day clear. All kinds of birds were around. We talked, sometimes seriously.

Back to page 67

Sunday, March 18, 1945

77th Day—288 days to follow

We didn't go to church, but went to Newark and checked the bus time. One left at 1:00 o'clock which gave us time enough to eat a dinner and that's about all.

I wanted to see her again and tried to beat the back to pg. 66.

Monday, March 19, 1945

78th Day—287 days to follow

CLEAR
CLOUDY
RAIN
SNOW


After classes today I went over to sick bay and lo<sub>x</sub> and behold I'm in the hospital!

The food is excellent, the service is wonderful, and I'm not very sick!

In fact, it's quite a vacation.

from pg. 65.

Crystal lattice or space lattice is made up of ions, molecules or atoms.

Most plastic metals (malleable and ductile) have a face-centered cubic lattice  whose very structure allows plane-slippage easily. (atoms compose the crystal)

Have method of X-Ray analysis allows the determination of the lattice by descriptive geometry.

Most atoms in earth crust are ion crystals. Metallurgists changes some to metal atoms.

Tuesday, March 20, 1945

79th Day—286 days to follow

CLEAR
CLOUDY
RAIN
SNOW

I'm still up here.

### CHEMICAL COMPOUND

1. At least 2 diff. elements
2. Definite composition by weight
3. Chem. energy diff. from sum of chem. energy of constituents.
4. Own characteristic properties

### ATOMIC THEORY

1. All matter minute bodies called atoms
2. Atoms of each element have same average mass, which is diff. from other elements
3. Mass doesn't change in a reaction
4. Elements combine in whole number ratios of atoms
5. Two kinds of atoms can unite in diff. ratios.

(Law of multiple proportions, Ratio of other to fixed weight of one is in a ratio.)

Wednesday, March 21, 1945

80th Day—285 days to follow

CLEAR
CLOUDY
RAIN
SNOW

I got discharged from the hospital at 0930, just in time for most of my classes.

## LAVOISIER 1743-1794

Names oxygen, believing it necessary for acids, demonstrates true nature of burning (combustion), gets system to naming, Bases + Acids  $\rightarrow$  Salts (showed this), collected taxes for French gov., guillotined during Fr. Rev.

Named hydrogen (water former)

Demonstrates Law of Conservation of Mass. (Checked by Landolt, 1906)

Breaks phlogiston theory. Uses balance.

Father of modern chemistry.

## KINETIC MOLECULAR THEORY (of gases)

1. All gases composed of extremely tiny particles (molecules) which are relatively far apart in comparison to their diameter.

Thursday, March 22, 1945

81st Day—284 days to follow

CLEAR
CLOUDY
RAIN
SNOW

I slept a good bit of the afternoon after classes—or rather tried to sleep. I was awake thinking most of the time.

2. These molecules are in motion with great speed.
3. Particles are perfectly elastic. No loss of energy when they collide with each other.
4. A rise in temperature increases the kinetic energy of the moving molecules. (Thus, this constant motion is heat!)

## AMEDEO AVOGADRO (1776-1856)

Professor in University of Turin, Italy.

Formulated fundamental principle of modern chemistry—Avogadro's principle.

Avogadro's number,  $N$ , is the number of atoms in one <sup>element</sup> g-atom wght. or one <sup>compound</sup> g-mol. wght. (or in a gas—<sup>g-mol vol.</sup> 22.4 liters <sup>under standard conditions</sup>)



Friday, March 23, 1945

82nd Day—283 days to follow

CLEAR
CLOUDY
RAIN
SNOW

All I can say for today is that I'm glad it's Friday.

Avoagadro's Law: "Equal volumes of all kinds of gases at the same temperature and pressure contain the same number of molecules."

A gram-molecular volume of a gas at standard conditions occupies 22.4 liters. Thus 22.4 liters of any gas contains  $N$  molecules, and the weight of 22.4 liters of any gas will be the g-mol wght. of the gas.

This number  $N = 6.02 \times 10^{23}$  (correct 1:1000)

#### PROOFS OF ATOMIC-MOLECULAR THEORY

1. Evaporation and diffusion
2. Solution and diffusion
3. Radiometer (spin a vane: black & white)
4. Brownian motion - smoke, dust
5. Spinthariscopes - to see flash of alpha ray from radium.

Saturday, March 24, 1945

83rd Day—282 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Marye-Ann is at home today and I'm lost. I'm always lost anymore without her.

Frank, Al, and I went to Walt's tonight to eat supper. He belongs to the Primitive Baptist Church and they had a hymn session until about 10:30 P.M.

Al and I played baseball this afternoon.

Sunday, March 25, 1945

84th Day—281 days to follow

Today Hopper and I went to the Catholic Church in Newark together. It is Palm Sunday. In the afternoon I went up on the hill and slept off and on until evening. Many insects are out on the grass and trees.

Monday, March 26, 1945

85th Day—280 days to follow

CLEAR
CLOUDY
RAIN
SNOW

## Gases - characteristics

1. compressibility
2. expansibility
3. diffusion

$$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2} \quad \text{combined gas law.}$$

PV Boyle ;  $\frac{P}{T}$  Gay-Lussac ;  $\frac{V}{T}$  Charles

DALTON'S LAW

$$P = P_1 + P_2 + P_3 \dots$$

## HEAT - POWER

Vaporize - boil to vapor

Sublimation - solid to vapor

Perfect or ideal gas - fills all laws.

Properties in thermodynamics: pressure, specific volume or density, temperature, internal energy, enthalpy, entropy.

Properties are coordinates locating a point (defining the state).

Thus planes, PV, TS, etc. are used graphically to illustrate problems.

Tuesday, March 27, 1945

86th Day—279 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Thus, by Dalton's Law subtract the vapor pressure <sup>or AQUEOUS TENSION</sup> at the temp. collected from the barometric press. to find the press. of the dry gas.

$$P_{\text{dry gas}} = \text{Barometric Press} - \text{Aqueous Press.}$$

(For gases collected over water) ↑

Graham's Law: Rate of diffusion

$$\frac{V_1}{V_2} = \frac{\sqrt{m_2}}{\sqrt{m_1}}$$

## PRESSURE:

$$P_{\text{Absolute}} = P_{\text{GAGE}} + P_{\text{ATMOSPHERIC}}$$

$$P = G_p + 14.7 \quad (\text{lbs./in}^2)$$

Pressure in inches of mercury times .491 gives pressure in lbs./in<sup>2</sup>.

specific volume:  $V$  in cu. ft. per lb.

density  $\rho = \frac{1}{V}$  lb per cu. ft.

Temp. measures intensity of pressure and is the thermal state of a body.

BOYLES LAW  $\frac{P_1}{P_2} = \frac{V_2}{V_1}$  (Temp. constant)



change of state according to a curve is a process. This, isothermal.

Wednesday, March 28, 1945

87th Day—278 days to follow

CLEAR
CLOUDY
RAIN
SNOW

### DUMAS METHOD OF FINDING MOLECULAR WEIGHT OF A GAS

Fill a vacuumated bulb of known volume with a known quantity by weight of the gas.

$$\frac{V_s \text{ of Dumas bulb (c.c.)}}{22,400 \text{ c.c.}} = \frac{\text{Known weight of gas}}{\text{APPROX. MOL. WGHT.}}$$

$$T^\circ R = t^\circ F + 459.69 = t^\circ F + 460 \text{ (nearly)}$$

( $T^\circ K = t^\circ C + 273.16$ ). combined gas laws:

$$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2} = R, \text{ a constant for the gas}$$

(R is listed in tables for diff. gases.)

$$pV = wRT \text{ (press, vol., weight, R, temp.)}$$

(Always be sure that p is lb/sq. ft. & V = cu. ft.)

R = 53.3 for air (approximately) at standard conditions

Specific volume is the volume of one pound of gas. (varies with temp.)  
for air at 32°F: specific volume = 12.39 cu. ft.

Density is mass per unit volume.

Thursday, March 29, 1945

88th Day—277 days to follow

CLEAR
CLOUDY
RAIN
SNOW

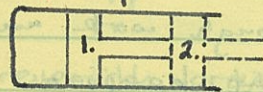
kinetic and van der Waals forces among particles. <sup>electrical in nature holding together</sup>

- States of matter
  - gas, liquids, solids (depends on these forces)
- Surface tension (a) capillary attraction
- Viscosity—internal resistance to flow

Manometer—measures vapor pressure

Boiling point—vapor press. just exceeds atmospheric press.

The simple energy or non-flow equation:



$$dQ = dU + dW$$

Transferred heat     DIFFERENCE in internal energy     work

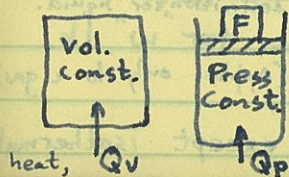
Notation: all signs + in process-like diagram. Heat added, internal energy increased, work done by machine, not on it.

Specific heat: Amt. of heat necessary to raise one lb. 1° F.

$$Q_v = WC_v (T_2 - T_1)$$

$$Q_p = WC_p (T_2 - T_1)$$

for AIR:  $C_p = 0.24$  ;  $C_v = 0.1715$   
 $k = C_p / C_v = 1.40$



Friday, March 30, 1945

89th Day—276 days to follow

CLEAR
CLOUDY
RAIN
SNOW

High vapor press., thus low boiling point, are highly volatile  
Faraday liquefied  $\text{NH}_3$ ,  $\text{Cl}$ , &  $\text{CO}_2$

Joule-Thomson effect: Most compressed gases become cooled when throttled to a lower pressure.

Refrigeration possible ( $\text{KOH}$  removes  $\text{H}_2\text{O} + \text{CO}_2$ )

Crystalline or amorphous solids.

Amorphous (glass) highly viscous liquids.

the ratio of specific heats  $k = \frac{C_p}{C_v}$ .

$C_p$  is greater because enough work must be done to lift the weight keeping the pressure constant.

$$C_p - C_v = \frac{R}{J}$$

Joules Law: (Perfect gas)

"The change of internal energy is a function of the temp. change."

$$\Delta U = W C_v (T_2 - T_1) \quad \text{True for every process except isothermal.}$$

Enthalpy: defined by equation:

$$H = U + \frac{PV}{J} \quad \text{general definition for liquid. Btu. for "w" lb.}$$

$$\Delta H = W C_p (T_2 - T_1) \quad \text{(Applies only to a gas)}$$

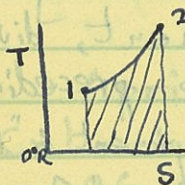
True for every process except isothermal.

Saturday, March 31, 1945

90th Day—275 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Entropy: Defined by equation  
 $dS = \frac{dQ}{T}$  (limited to reversible process. Theory usually reversible)  
Area under curve is  $Q$ .  
(found by equation  $Q = W C_{\text{vap}} (T_2 - T_1)$ )



change in entropy:

$$\Delta S = W C_{p \text{ or } v} \log_e \frac{T_2}{T_1}$$

$$\log_e X = 2.3026 \log X$$

## THE BINOMIAL THEOREM

Used to raise a binomial to any desired power.

$$(a + b)^5 = a^5 + 5a^4b + 10a^3b^2 + 10a^2b^3 + 5ab^4 + b^5.$$

1. The first term in the expansion is the first term of the binomial raised to the power of the binomial.
2. In the second term the power of the first term "a" is reduced one and the first power of "b" is introduced.

The coefficient is the exponent of the "a" <sup>factor</sup> term in the preceding term times its exponent, divided by the number of the preceding term. Ex. Where the exponent is "10."

$$4 \times 5 = 20 \quad 20 \div 2 = 10$$

$$3 \times 10 = 30 \quad 30 \div 3 = 10$$

3. The powers are ascending and descending until finally b is left to the power of the binomial.

## OXYGEN

Discovered by Priestly and Scheele.

Priestly isolate many gases,  $O_2$  by  $HgO$ .

\*Most abundant element

21 volumes in 100 of dry air

Total wght. everywhere about equal to all the rest combined.

## Preparation

1. heating certain compounds
2. Decomposition of water - electrolysis
3. separation from air.

Lab: from  $KClO_3$ ; Manganese dioxide is a catalyst.

Sunday, April 1, 1945

91st Day—274 days to follow

April Fool's Day. I went to Columbus. We went to a movie.

Of course the main thing is that it's Easter. Marye-Ann is simply beautiful. We went to the Indianola Presbyterian church.

Monday, April 2, 1945

92nd Day—273 days to follow

CLEAR
CLOUDY
RAIN
SNOW

more expensive  $\text{Na}_2\text{O}_2$   
 Commercial — liquid air  
 Colorless, odorless, tasteless, slightly soluble. Critical temp.  $-118.8^\circ\text{C}$ . at which is needed 49.7 atm. to liquefy. Freezes to snow-like solid at  $-218.4^\circ\text{C}$ . Two atoms in molecule. Moderately active, more active with temp. rise. Oxide; any comp. of 2 elements, one of which is O.

#### V The elements of a thermodynamic cycle:

1. working substance, medium
2. source of heat, hot body
3. receiver or cold body
4. heat pump, to convert heat into work

The working substance goes thru same processes and returns to initial condition.

Closed cycle: closed by man, steam engine

Open cycle: closed by nature, plants use  $\text{CO}_2$  etc.

$$\text{Net Work} = W_{\text{OUT}} - W_{\text{IN}} \quad \text{or}$$

$$\text{Net } W = Q_A - Q_R \quad \text{heated added + rejected}$$

$$\text{Efficiency } e, = \frac{Q_A - Q_R}{Q_A} \quad \text{or} \quad \frac{\text{Net Work}}{Q_A}$$

$$W = eQ_A$$

Tuesday, April 3, 1945

93rd Day—272 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Spontaneous combustion needs slow reaction good heat insulation.  
 speed of chem. reactions.

1. Properties of reacting substances
2. Temp.
3. Concentration [Oxygen used to
4. Catalyst [purify + in stratosphere

Ozone, allotropic form.

Carnot cycle: 2 isothermal + 2 isentropic

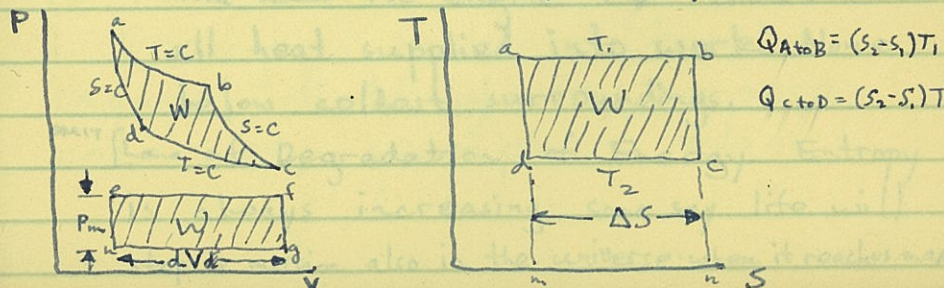
$$W = (T_1 - T_2)(S_B - S_A) \quad \text{besides other formula}$$

$$e = \frac{T_1 - T_2}{T_1} \quad \text{also}$$

$$W = (T_1 - T_2) W R \log_e \frac{V_b}{V_a}$$

$$\text{M.E.P. (Mean effective pressure, } p_m) = \frac{W}{\Delta V} \quad \text{lb/ft}^2$$

Ratio of expansion or compression for each process  $\frac{V_b}{V_a}$  or  $\frac{V_c}{V_d}$ , etc.  
 Most efficient yet not practical.



Wednesday, April 4, 1945

94th Day—271 days to follow

CLEAR
CLOUDY
RAIN
SNOW

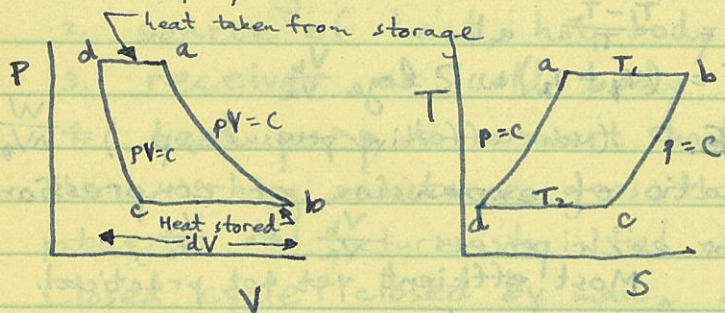
Ozone prepared by passing  $O_2$  between electric charged plates. Pale-blue color w. characteristic odor.

Three atoms to molecule  
Sterilization commercial use.  
(Equations on page 222)

## HYDROGEN

Paracelsus (1493-151) observed a gas fr. sulfuric acid on iron.

Ericsson Cycle: (regenerative heating)  
[In any cycle, most work from reversible process.]



Thursday, April 5, 1945

95th Day—270 days to follow

CLEAR
CLOUDY
RAIN
SNOW

I got a beautiful letter from my darling today.

Cavendish, (contemporary w. Priestly) gets credit. Lavoisier names it.

Sources of hydrogen:

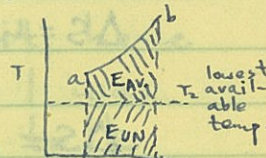
1. water
  2. acids
  3. bases
1. (a) electrolysis (b) certain metals  
Na, K, Ca, liberate  $\frac{1}{2} H_2$  in  $H_2O$

## VI. Entropy and 2nd Law of Thermo.

$\frac{Q_R}{Q_A} = \frac{T_2}{T_1}$  Some energy is unavailable since the engine doesn't operate at  $-273^\circ C$ .

Change in entropy is a measure of the unavailable heat.

$$* Q_R = T_2 (S_b - S_a)$$



2nd Law: <sup>shortly</sup> No engine can convert <sup>S</sup> all heat supplied into work. None below coldest surroundings.

<sup>ONLY</sup> Law of Degradation of Energy. Entropy is always increasing. Some say life will stop & motion also in the universe when it reaches max.

Friday, April 6, 1945

96th Day—269 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Tonight I studied a little on meteorology. I also learned some of the alphabet flags.

2. (a) Dilute HCl & dil  $H_2SO_4$  give  $H_2$  with many metals.
3. (a) Zn and Al w. many bases give-off  $H_2$ .  
Equivalent wght, Ae, is weight of element which combines w. 1 part of  $H_2$ .

These equations are independent of the processes, but the properties of the gas must be known.

$$\Delta S = WC_v \log_e \frac{T_2}{T_1} + \frac{WR}{J} \log_e \frac{V_2}{V_1}$$

$$\Delta S = WC_v \log_e \frac{P_2}{P_1} + WC_p \log_e \frac{V_2}{V_1}$$

Saturday, April 7, 1945

97th Day—268 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Marye-Ann and I were together all day today. We hiked North of Columbus and picked violets on the flood plain of the Sciota. The dogtooth violets and dutchman's breeches are also out. I got stuck for a while out on the road. I'm very happy that M.A. and I now know what the other thinks.

Sunday, April 8, 1945

98th Day—267 days to follow

I was able to make it home and back again today! I was glad to get home, to talk to Mom and Dad, Ray and Russ. I brought back a tennis racket, field glasses, morse code set, semaphore flags.



Monday, April 9, 1945

99th Day—266 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Studied heat power. Worked in book.

PVT Relations

PERFECT GAS FORMULAS <sup>constant.</sup>  $V, P, T, S.$

$$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$$

All but isentropic

ISENTROPIC  $P, V.$

Equivalent weight =  $\frac{\text{Atomic weight}}{\text{valence}}$

Commercial preparation, Bosch process.

Steam over Carbon  $H_2O + C \rightarrow CO + H_2$

Then  $CO + H_2O \rightarrow CO_2 + H_2$

$CO_2$  separated passing thru water under pressure which dissolves  $CO_2$ .

from methane:  $CH_4 + H_2O \rightarrow CO + 3H_2$

$CO + H_2O \rightarrow CO_2 + H_2$

Also given off when getting chlorine and catalytic decomposition of ammonia.

Colorless, odorless, tasteless. Lightest substance. Dewar liquefied it.

Palladium and platinum absorb or occlude hydrogen. 1 vol. Palladium absorbs 800 vol. of  $H_2$ .

hydrides correspond to oxides.

Burns, explosively with  $O_2$  + forms water.

Tuesday, April 10, 1945

100th Day—265 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Used extensively as a reducing agent to get pure metals.

Many uses:

1. ammonia, fertilizer, manuf. of soap, changing coal to other products, making methyl alcohol, lab purposes, etc.

Formulas pg. 222.

### RARE GASES

colorless, odorless, tasteless, difficult to liquefy. Characterized by their chemical inertness.

Argon. Cavendish observed that air was more than just  $O_2$  &  $N_2$ . Lord Raleigh (John Wm. Strutt—1842-1919, prof. in Great Brit. winner of Nobel prize in 1904) observed  $N_2$  from compounds  $\frac{1}{200}$  lighter than  $N_2$  from air. Sir Wm Ramsay and he worked together discov. argon. (Ramsay discovered Neon, Krypton, Xenon, won Nobel chem. prize in 1904).

Helium Hillebrand observed gas coming fr. uranium. Thought it was  $N_2$ . Ramsay found

Wednesday, April 11, 1945

101st Day—264 days to follow

CLEAR
CLOUDY
RAIN
SNOW

it had same spectrum as Janssen (1868) found in the sun's corona.

Travers helping Ramsay. Both isolate Neon, Krypton and Xenon, in 1898.

He twice as heavy as  $H_2$  with 92.6% of  $H_2$  lifting power. Helps prevent bends ( $N_2$  dissolves into blood). Liquid He under reduced pressure made temp of  $-272.3^\circ C$ . Neon signs. Argon gas-filled electric filament lamps. Weight: ( $H_2$ ), He, Ne, Ar, Kr, Xe

**SPECTRA** seen by spectroscope

Continuous spectrum: solid body heated to incandescence

Bright line: gas or vapor of an element usually

Absorption or black line spectrum. Layer of gas absorbs its bright lines between incandescent solid.

### NITROGEN

$\frac{4}{5}$  air; 3% human body - proteins

$NH_3$  + fertilizers

Thursday, April 12, 1945

102nd Day—263 days to follow

CLEAR
CLOUDY
RAIN
SNOW

The Public Utility Commission is a form of commission control of public utilities.

Heat Power test today!

Commercial - liquid air

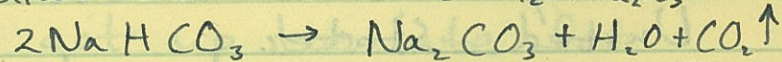
Lab - Air over hot copper

Nitrides. Chief use  $NH_3$  by direct combination with hydrogen

$HNO_3$  used in explosives, laquers, films.

### CARBON DIOXIDE

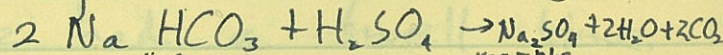
In air  $\frac{3}{10,000}$ : Commercial, combustion of coal  
Products of solution sprayed with solution of sodium carbonate.  $CO_2 + H_2O + Na_2CO_3 \rightarrow 2NaHCO_3$



At  $20^\circ$  liquefies at 56.3 atm.

Dry ice, "pop", sodium bicarbonate.

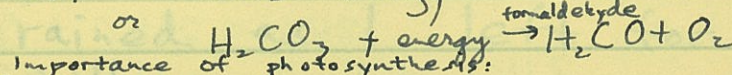
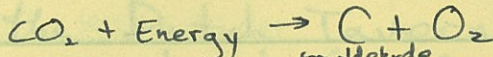
Fire extinguisher; Air conditioning



GEOLOGY



BIOLOGY



Importance of photosynthesis:  
Foods, fuels, liberate  $O_2$ ,

Friday, April 13, 1945

103rd Day—262 days to follow

CLEAR
CLOUDY
RAIN
SNOW

It's Friday the thirteenth, but it is a lucky day, because Marye-Ann is coming! Marye-Ann is here!! And she sure is a good sport. Even sat while I wrote up an experiment. Cleaned Lt. Browne's office after taps.

APRIL 15.

Denison held a memorial service for Franklin Delano Roosevelt tonight. 1882-1945, Thirty-first President of the United States.

Saturday, April 14, 1945

104th Day—261 days to follow

CLEAR
CLOUDY
RAIN
SNOW

In the afternoon we played cards in the union. Frank and Clare and M.A. and I ate at the Inn together and then went to the dance. The dance was very nice. We walked afterwards.

Sunday, April 15, 1945

105th Day—260 days to follow

He got up too late for church, meeting the girls after eleven. I went back to Columbus with Marye-Ann, and we had a swell time. We went to the movie and ate at the Dutch Tavern. It rained as I left for Granville.

Monday, April 16, 1945

106th Day—259 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Calculus test this morning.  
On maxima and minima practical applications.

Also one of those lousy strength tests.

## WATER

Hydrosphere mostly water  $\frac{5}{7}$  covered  
If world flat all water and snow melted would be 10,000 feet deep!

Condensed water is pure

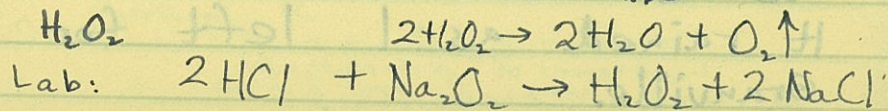
1. Acidic oxides combine w.  $H_2O$  to form acids
2. Basic " " " " " " bases

Anhydrous - without water

3. Hydrates - with water in the crystal  
Water of crystallization or hydration.  
All crystals do not have water of crystallization.

4. Oxidizing agent  $C + H_2O \rightarrow CO + H_2$
5. Catalyst

## HYDROGEN PEROXIDE

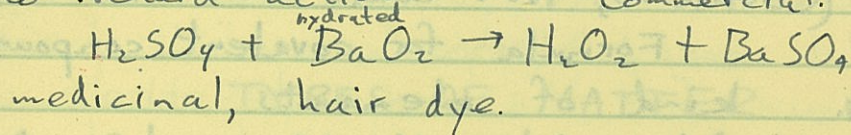


Tuesday, April 17, 1945

107th Day—258 days to follow

CLEAR
CLOUDY
RAIN
SNOW

strong oxidizing agent. Catalyst added to retard action commercial.

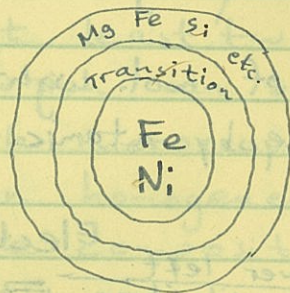


## OXIDES

most abundant in earth's crust. mostly complex

O	46.71
Si	27.69
Al	8.07
Fe	5.05
Ca	3.65
Na	2.75
K	2.58

In crust.



Crust 36 to 60 mi deep.

oxides of metals and nonmetals

	Minerals	Nonmetallic
$Al_2O_3$	corundum	
$SiO_2$	quartz	$SO_2$
$Fe_2O_3$	hematite	$CO_2$
$TiO_2$	rutile	$N_2O_5$
$ZnO$	zincite	$SO_3$
$Cu_2O$	cuprite	

Wednesday, April 18, 1945

108th Day—257 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Metals, electrovalent - ions)  $Ca^{++}O^{--}$   
 (Covalent, Non-metals - bonds)  $H-O-H$

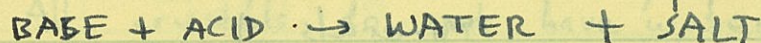
Formula for covalent compound:

1. kind of elements
2. At. wghts of these elements
3. Approx. mol. wght
4. %age composition

Find % of mol. wght. <sup>in grams</sup> due to each element  
 Divide by atomic wght. to get no. of atoms.

$$\frac{\text{g. silver left}}{\text{g. at wght. silver used}} = \frac{\text{Electrovalent g. } O_2 \text{ liberated}}{x}$$

Heat in calories to decompose one gram is heat of decomposition.



Thursday, April 19, 1945

109th Day—256 days to follow

CLEAR
CLOUDY
RAIN
SNOW

I was amazed with the heat-power returns.

### TYPES OF MATTER

- A. Compounds: homogenous substance whose composition is always exactly the same by weight.
- B. Mixture: At least two constituents which can be seen by eye or with microscope.
- C. Solution: An homogeneous mixture whose composition may be varied within certain limits, but whose individual particles (molecules, atoms, or ions) cannot be seen because they are ultimate particles (Too small to be seen).

Solutions can be of gases, liquids, or solids in any combinations.

The solvent is the medium which the solute is dissolved in.

Friday, April 20, 1945

110th Day—255 days to follow

<input checked="" type="checkbox"/>	CLEAR
<input checked="" type="checkbox"/>	CLOUDY
<input type="checkbox"/>	RAIN
<input type="checkbox"/>	SNOW

Went swimming after tumbling class. Went to the house tonight. I'm sorry Marye-Ann can't be here for the dance tomorrow night, but I'll get to see her on Sunday.

Dalton's law applies because a mixture of gases is a solution.

Gases will be dissolved by liquids. Two types: those of rather small solubility O, H, N, H and those of much larger solubility as  $\text{NH}_3$ ,  $\text{HCl}$ ,  $\text{SO}_2$ .

#### FACTORS EFFECTING

those slightly soluble.

1. Specific property of the gas
2. Henry's law: weight of gas dissolved is directly prop. to the press. (w. temp. the same).

In a mixture of gases they dissolve separately according to their own press.

3. Heat reduces solubility. At. B.P. <sup>of solvent</sup> none in solution.

Saturday, April 21, 1945

111th Day—254 days to follow

<input type="checkbox"/>	CLEAR
<input type="checkbox"/>	CLOUDY
<input type="checkbox"/>	RAIN
<input type="checkbox"/>	SNOW

tlopper and I played tennis this afternoon. Marye-Ann is being initiated tonight, so I couldn't go to Columbus. Walt, Al, and I saw a mystery show—the thin man—in Newark tonight.

Factors effecting those of very soluble gases:

Will not follow Henry's law quantitatively, only qualitatively. A chemical reaction occurs. These solutions effect liter.

Sunday, April 22, 1945

112th Day—253 days to follow

Oh, Marye-Ann, I love you, darling. I can't write how much, because I don't know how. When I'm with you I'm happier than I ever was in my life. I wait for the day, sweet-heart when we can be together forever.

You're the sweetest "active" in the world. I love you.

Friday, April 20, 1945

110th Day—255 days to follow

D

<input checked="" type="checkbox"/>	CLEAR
<input checked="" type="checkbox"/>	CLOUDY
<input type="checkbox"/>	RAIN
<input type="checkbox"/>	SNOW

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Gases will be dissolved by liquids. Two types: those of rather small solubility O, H, N, H and those of much larger solubility as  $\text{NH}_3$ ,  $\text{HCl}$ ,  $\text{SO}_2$ .

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Saturday, April 21, 1945

111th Day—254 days to follow

<input type="checkbox"/>	CLEAR
<input type="checkbox"/>	CLOUDY
<input type="checkbox"/>	RAIN
<input type="checkbox"/>	SNOW

Hopper and I played tennis this afternoon. Marye-Ann is being initiated tonight, so I couldn't go to Columbus. Walt, Al, and I saw a mystery show—the thin man—in Newark tonight.

Factors effecting those of very soluble gases:

Will not follow Henry's law quantitatively, only qualitatively. A chemical reaction occurs. These solutions effect litmus

Sunday, April 22, 1945

112th Day—253 days to follow

Oh, Marye-Ann, I love you, darling. I can't write how much, because I don't know how. When I'm with you I'm happier than I ever was in my life. I wait for the day, sweet-heart when we can be together forever.

You're the sweetest "active" in the world. I love you.

Monday, April 23, 1945

113th Day—252 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Today I had the Naval History test. Mostly current events.

Chemical equilibrium of very soluble gases:



#### LIQUIDS IN LIQUIDS

Some are freely miscible (dissolve in all proportions). Some retain individual properties (Alcohol & water). Other have new properties (acids mixed with water, suggesting a reaction such as ionization).

1. The vapor pressure of the mixture at the temp. of the room is always less than the sum of the vapor press. of the constituents at that temp.

2. Boiling point can not be predicted and varies as one boils off faster than the other.

Tuesday, April 24, 1945

114th Day—251 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Studying, mostly, today.

3. Fractional distillation can be used since the one with the highest vapor press generally boils off first.
4. At one particular point of concentration, sometimes, is the highest boiling point.

Evaporation leaves the solute in its original chemical condition.

The word "dilute" is relative.

Concentration can be expressed by % or in other ways:

A MOLAR SOLUTION (gram-molecular) is the result when 1 gr-mol. wght. of a comp. is dissolved so as to make 1 liter of the solution.

A MOLAL SOLUTION is the result of dissolving 1 gm-mol. wght. of the solute in 1 liter of the solvent.



Wednesday, April 25, 1945

115th Day—250 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Chemistry this afternoon. Good questions.

A saturated solution is one that has the maximum solute dissolved for that temp. The substance undissolved is in equilibrium with the dissolved particles.

A super-saturated solution <sup>often</sup> occurs when the substance (solution) is cooled with no solid present already to maintain equilibrium.

If the temp-solubility curve has a sharp break the substance has probably changed to an anhydrous salt.

Brass is a solid solution of about 3 Cu to 1 Zn.

HEAT OF SOLUTION. When a crystalline solid dissolves a change of temp. occurs (usually falls indicating absorption of heat)

Thursday, April 26, 1945

116th Day—249 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Heat power test. Fairly easy, open book.

DETERMINING THE MOLECULAR WEIGHT OF A SOLID THAT WILL DISSOLVE IN WATER AND HAS A CO-VALENT BOND, AND HAS NO VAPOR PRESS. OF ITS OWN.

[A solution of sugar and water has smaller vapor pressure than water itself]. Raoult found that this lowering is dir. prop. to the concentration of the solution. (If the solute has no vapor press. and it is covalent)

A deliquescent substance absorbs water, or, it is very soluble, in other words.

If the vapor pressure is lowered, the boiling point (B.P.) is raised.

1 g-mol. wght. of a covalent solid, with no vapor press. of its own, when dissolved in 1000 cc. of  $H_2O$  (1000g) will raise the boiling point  $.518^\circ C$ . This is the B.P. constant for water.  
to PG. 116

Friday, April 27, 1945

117th Day—248 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Rugged calculus test, with impractical problems.

I was all packed and ready to go at 1600. I didn't get to Columbus until after supper. We went to a movie, and were very happy to be together. I slept at Baker Hall.

SATURDAY

In the morning we met at Cantfield at 8 o'clock and went down to catch the bus to Canton. After putting her on the bus I hitch-hiked, arriving about 1330. We played cards at Marye-Ann's in the evening and then went for a ride. I'm worried over Patchy because I think she's lonely at college. I get more in love every time I see her. I have a one-way ticket back.

Saturday, April 28, 1945

118th Day—247 days to follow

CLEAR
CLOUDY
RAIN
SNOW

The family was all fine. Activities going on as usual.

SUNDAY

We went to New Harrisburg to visit Aunt Anna, Uncle Don, and James, who is home on a little furlough. James is an electrical engineer, now working on radio charts for the army and Navy. The equations he uses are really whoppers.

Sunday, April 29, 1945

119th Day—246 days to follow

The first rumour of the end of the European war came today—or rather tonight about 1900. Later in the evening we found that it was a false alarm. Marye-Ann and I went for a ride and played cards at her house.

Monday, April 30, 1945

120th Day—245 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Today I went to college with my co-ed, and it was so much fun. I guess college could be fun, if we were going together. While she was in two classes (she skipped French) I went to the library to look up the "carbon and nitrogen" cycles, for bacteriology, and the "Mayas and Aztecs" for English. Both were very interesting. Marye-Ann is writing a term paper on Chichen Itza, one of the old Mayan cities.

In the afternoon we went for a walk and in the evening she went to an Alpha Chi banquet. (I didn't eat because I was practically broke, but she didn't know it.) In the evening, afterwards, we went to a movie, and then I slept in Baker Hall on a couch.

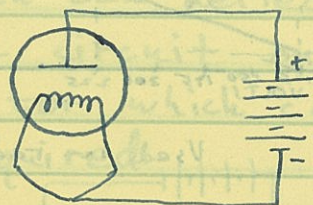
Special Data

## THE ELECTRON

1. Molecular theory of matter
  - a. Atom composed of relatively large (+) protons and relatively small (-) electrons
    1. Ratio of 1800-1 in mass
    2. The electron is the mobile particle
2. Discharge of electricity thru gases

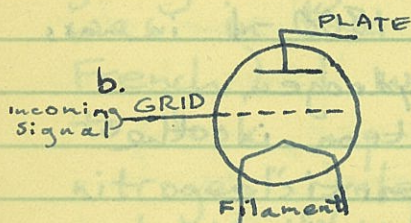
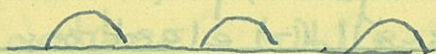
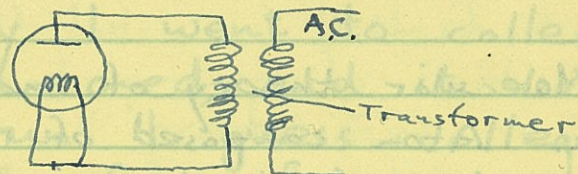


- a. Put thru a tube they travel in a straight line but can be deflected by a magnet
3. Thermionic vacuum tube



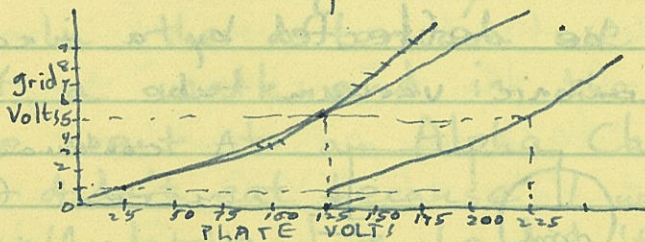
A continuous current flows but only in one direction. Electrons given off by heated filament like evaporation.

- b. Can be used as a rectifier to charge storage batteries



The small energy from the grid will cause a large plate change. This could be stepped up again (amplified) by sending it into the grid of another tube.

For example



$\Delta E_p = 100$  volts Used in radio amplifier.

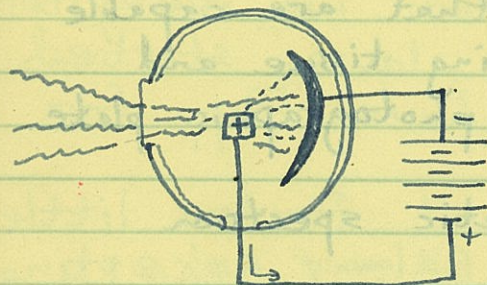
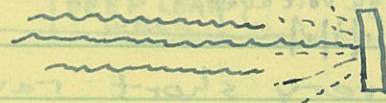
$\Delta E_g = 6$  volts

Amplification factor =  $\frac{100}{6} = 16\frac{2}{3}$

Thus a little bit of voltage on the grid causes a large change on the plate

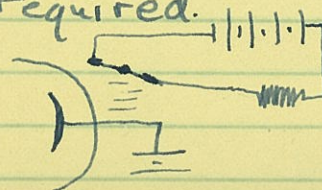
CLEAR
CLOUDY
RAIN
SNOW

When you put energy (say an ultra-violet light) (visible light will do it to some metals like potassium) or cesium to a zinc plate electrons are "splashed" off the plate



Thus, the light causes a current to flow

To put to practical use: the wire causes a magnetic effect which can deflect a needle close the circuit on a battery or motor which can do the work required.

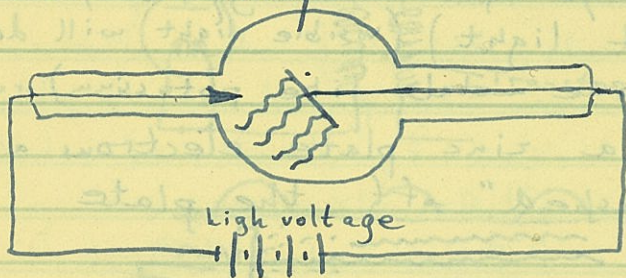


Wednesday, May 2, 1945

122nd Day—243 days to follow

CLEAR
CLOUDY
RAIN
SNOW

### c. The X-Ray



Causes very short rays to come off that are capable of penetrating tissue and affecting a photographic plate.

### 6. Electromagnetic spectrum

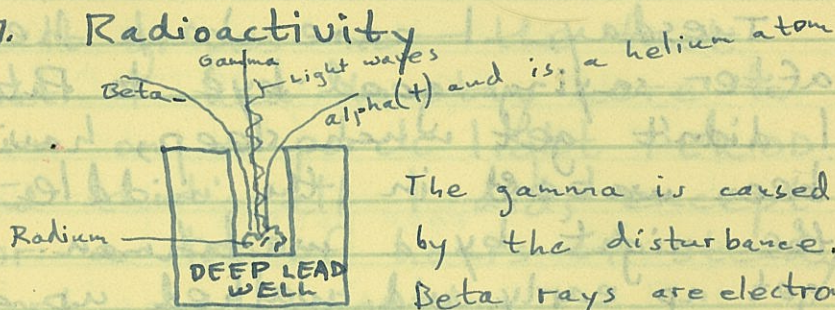
Thursday, May 3, 1945

113

123rd Day—242 days to follow

CLEAR
CLOUDY
RAIN
SNOW

### 7. Radioactivity



The gamma is caused by the disturbance. Beta rays are electrons.

Friday, May 4, 1945

124th Day—241 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Tuesday, I came back here after saying good-bye to Patchy. I didn't get much sleep, having been wakened in the middle of the night by a watchman. I got up early and walked up and down High Street. It was cold. In the afternoon we re-registered.

Wednesday, classes started again. I now have Rupp for calculus.

Thursday and Friday little of interest (always excepting international events which are really popping) occurred.

I can't go to Columbus to be with my darling Saturday because I have duty here.

Saturday, May 5, 1945

125th Day—240 days to follow

CLEAR
CLOUDY
RAIN
SNOW

It gripes me — the fact that I had to stay here to turn on a porch light PERIOD. And that's all I did, except for a lot of hours of steady work on navigation.

Sunday, May 6, 1945

126th Day—239 days to follow

I spent all day working on Navigation and The Principles of Flying.

Monday, May 7, 1945

127th Day—238 days to follow

CLEAR
CLOUDY
RAIN
SNOW

The war is over, literally if not officially. <sup>Germany has</sup> surrendered.

Molecular weight of co-valent solute.  
DATA NEEDED

1. Find B.P. of water
2. Weigh the water and an amount of the solute that will dissolve completely
3. Find the B.P. of the solution.

COMPUTATIONS

1. Find by the ratio the amount dissolved in 1000g. of  $H_2O$ .  
 { If 2 g. dissolved in 100 cc.  
 then use 20g " " 1000 cc.
4. The boiling Point is raised the same in each case
2.  $\frac{\text{GRAM-MOL. WGT. TAKEN}}{\text{GRAM-MOL. WGT.}} = \frac{\text{Rise in B.P.}}{.518}$  if 1000g.  $H_2O$  were used

LOWERING OF FREEZING POINT

1 g-mol. wght. dis. lowers the F.P. by  $1.87^\circ C$  (approx). (Dissolved in 1000g  $H_2O$ )  
 Every solvent has its own constant.  $H_2O$  is about  $1.87^\circ C$ .

Tuesday, May 8, 1945

128th Day—237 days to follow

CLEAR
CLOUDY
RAIN
SNOW

At 9:00 o'clock A.M. today President Truman officially declared today as V-E Day (Victory in Europe).

Unconditional surrender of all German forces by Doenitz, the new Fuehrer, including the forces in Norway, has ended the European phase of the war. Thank God.

When ice, and a soluble salt are put in a vessel of water, the temperature drops below zero. The ice absorbs heat due to melting and the solid solute absorbs heat as it dissolves. The lowest temperature which a particular salt can bring a solution to, is called its eutectic temperature. It is the point at which both solvent and solute form crystals. (Cryohydric temp. is that w.  $H_2O$  as solvent)

Wednesday, May 9, 1945

129th Day—236 days to follow

CLEAR
CLOUDY
RAIN
SNOW

I spent three hours again today studying navigation. It's a lot more absorbing than the courses I'm supposed to be taking.



## OSMOSIS:

A semi-permeable membrane (such as non waterproof cellophane) when holding a solution (as in the thistle tube) will permit, if submerged in a vessel of the solvent, the solvent to pass thru the membrane and dilute the solution, but will not permit particles of the solute to go into the beaker. Osmotic pressure is the pressure just required to stop the flow of solvent from a region of less concentration to a region of greater concentration.

Thursday, May 10, 1945

130th Day—235 days to follow

CLEAR
CLOUDY
RAIN
SNOW

By experiment it was found that the osmotic pressure of a solution is approximately equal to the gas pressure which the solute would exert if it were a gas occupying the same volume as the solvent, at the same temp.

$$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$$

760

## FORMULAS

$$\frac{\% \text{ element}}{\text{Atomic no.}} = \text{No. of atoms in molecule}$$

Do this for each element in the compound and the smallest no. let equal 1, etc.

At. wght. • Specific heat = 6.4 approx.

Mol. wght. gas = wght. of 1st liter × 22.4



Friday, May 11, 1945

131st Day—234 days to follow

CLEAR
CLOUDY
RAIN
SNOW

$$\text{Equivalent wght.} = \frac{\text{Atomic wght.}}{\text{Valence}}$$

#### TYPES OF CRYSTALS

Isometric

Tetragonal

Orthorhombic

Monoclinic

Triclinic

Hexagonal

Saturday, May 12, 1945

132nd Day—233 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Sunday, May 13, 1945

133rd Day—232 days to follow

Monday, May 14, 1945

134th Day—231 days to follow

CLEAR
CLOUDY
RAIN
SNOW

GUARDIANS OF OCEANS NARROW  
PLACES

Ceylon  
Singapore  
Soerabaja  
Amboina  
Manila  
Hongkong  
Sydney  
Auckland  
Petropavlovsk  
Dutch Harbor  
Magallanes  
San Juan  
Reykjavik  
Natal  
Dakar  
Capetown  
Diego Sudraz  
Oman  
Aden  
Istanbul

Tuesday, May 15, 1945

135th Day—230 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Gibraltar  
London  
Helgoland  
Scapa Flow

STRATEGIC MAN-MADE SHORT-CUTS

Panama Canal  
Suez Canal

Wednesday, May 16, 1945

136th Day—229 days to follow

CLEAR
CLOUDY
RAIN
SNOW

GUARDIANS OF OCEANS  
 PLACES  
 Ceylon  
 Singapore  
 STRATEGIC MAN-MADE CANALS  
 Ambon  
 Panama Canal  
 Suez Canal  
 Sydney  
 Auckland  
 Port of Spain  
 Dutch Harbor  
 Magallanes  
 San Juan  
 Reykjavik  
 Natal  
 Dakar  
 Capetown  
 Diego Suarez  
 Oman  
 Aden  
 Istanbul

Thursday, May 17, 1945

137th Day—228 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Faded handwritten notes, possibly describing a journey or observations.

Sunday, May 20, 1945

140th Day—225 days to follow

Faded handwritten notes on the right page of the second day.

Friday, May 18, 1945

138th Day—227 days to follow

CLEAR
CLOUDY
RAIN
SNOW

One more day of paddle-breaking and I'll be through with being a pledge.

I get it, I wanted to pin her the very same day. Marye-Ann's lovelier every time I see her. She was getting back from a formal tea, and she really has a sun tan already, too.

Saturday, May 19, 1945

139th Day—226 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Tonight was informal initiation. The two last whacks were from "Shorty" Lawrence and "Whitey" Emerton. They were undoubtedly the two hardest I've ever gotten. The first one made me straighten right up. We didn't even have to eat our egg. The national test was really a sucker. We all passed though.

Sunday, May 20, 1945

140th Day—225 days to follow

After Deni-Sunday we were initiated into Sigma Alpha Epsilon. Following the formal initiation we had dinner at the Inn. After that we went over to the Doll House. I had a few hours so I went to Columbus. Even though I'm going to pin her with my jeweled pin when

Monday, May 21, 1945

141st Day—224 days to follow

CLEAR
CLOUDY
RAIN
SNOW

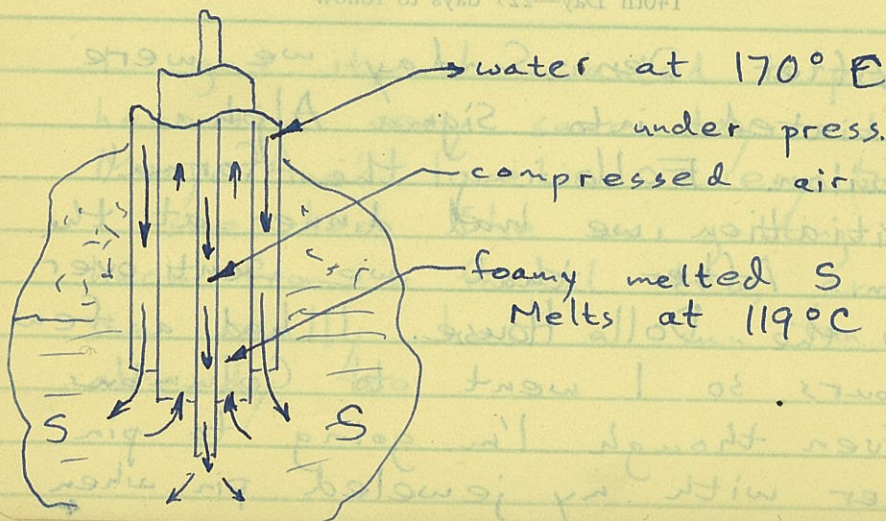
XJO

Tonight I went to the first active meeting of SAE. It was pretty much fun.

SULFUR No 16  
S weight 32.06  
Group VI Val. -2

Found free in nature or as metallic sulfides. Mined 80% in U.S. Much also in Sicily Brimstone of the Bible. Also a constituent of proteins.

99.5% pure FRASCH PROCESS IN U.S.



Tuesday, May 22, 1945

142nd Day—223 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Tonight I helped Roy Wilkinson with his calculus. We got into some pretty nice problems.

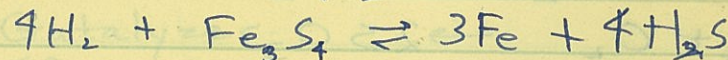
In Sicily it is heated and distilled. Sol. in CS<sub>2</sub>

95.5°C

Rhombic sulfur  $\rightleftharpoons$  monoclinic sulfur

H<sub>2</sub>S present in volcano gases  
 Dissolved in water is "sulfur waters."  
 Colorless, disagreeable taste, offensive odor  
 Poisonous.

Prep.



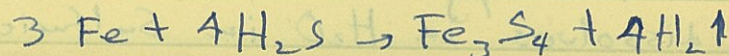
Lab.



Hydrosulfuric acid. H<sub>2</sub>S + 2H<sub>2</sub>S + 3O<sub>2</sub> → 2H<sub>2</sub>O + 2S

CuS, Ag<sub>2</sub>S black      CdS, As<sub>2</sub>S<sub>3</sub> yellow

ZnS white

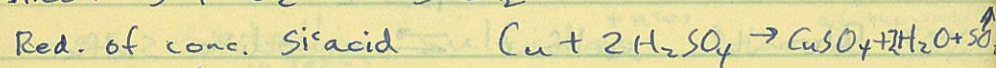
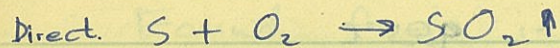


Wednesday, May 23, 1945

143rd Day—222 days to follow

CLEAR
CLOUDY
RAIN
SNOW

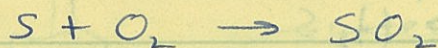
One more month at this place.  
And then I'll be home, and will  
be able to see Marye-Ann every  
single day for over a week!



antiseptic, preservative, bleaching

Making  $H_2SO_4$

CONTACT PROCESS



In the first step  $2FeS + 3O_2 \rightarrow 2FeO + 2SO_2$   
if a sulfide is at hand.

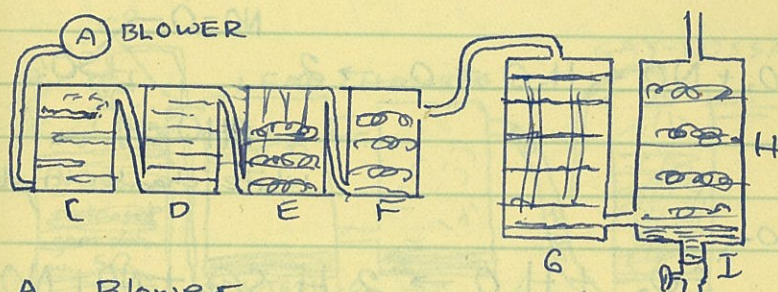
- $SO_2$  made, freed from dust, dried,  
excess oxygen combines, finally  
dissolves in  $H_2O$  in Sulfuric acid.

Thursday, May 24, 1945

144th Day—221 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Pt, Vd, and  $Fe_2O_3$  used as catalysts.



A Blower

C Dryer Freed from dust

D Free from dust

E Conc.  $H_2SO_4$  absorbs moisture

F " " " "

G Catalyzer

H  $SO_3$  absorbed by acid

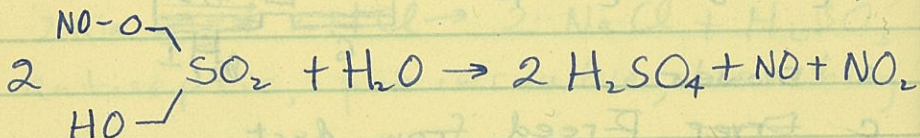
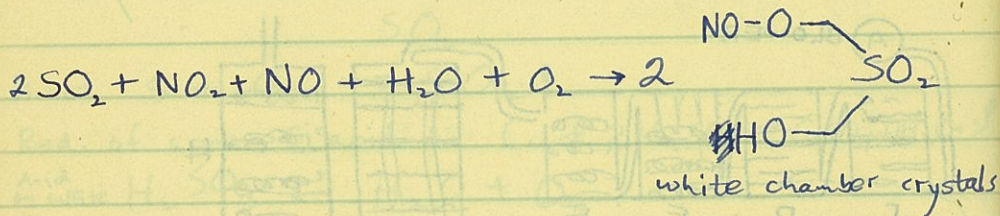
I Passes off as concentrated acid

Friday, May 25, 1945

145th Day—220 days to follow

CLEAR
CLOUDY
RAIN
SNOW

## LEAD CHAMBER PROCESS



$\text{SO}_2$  often obtain as by-product

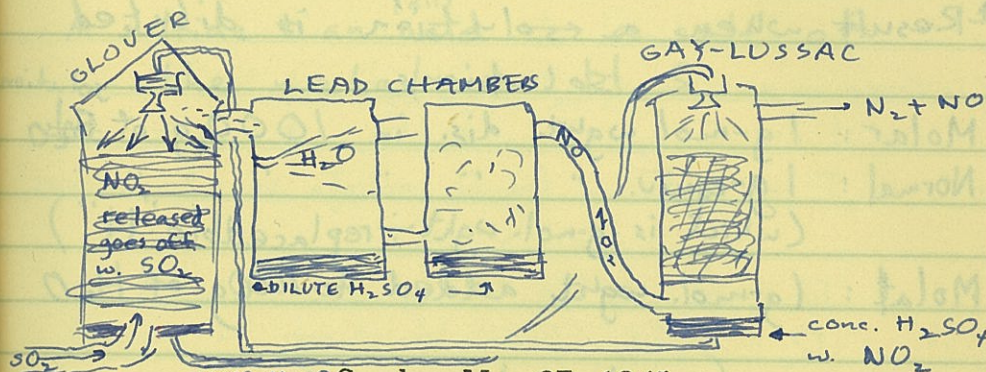


Everything introduced in Glover tower  
 Water introduced to form the acid  
 in the lead chamber. Conc.  $\text{H}_2\text{SO}_4$   
 absorbs the  $\text{NO}_2$  in the Gay-Lussac  
 tower which is piped over to the  
 Glover Tower.

Saturday, May 26, 1945

146th Day—219 days to follow

CLEAR
CLOUDY
RAIN
SNOW



Sunday, May 27, 1945

147th Day—218 days to follow





Wednesday, May 30, 1945

150th Day—215 days to follow

CLEAR
CLOUDY
RAIN
SNOW

## ELECTRICITY

## SUMMARY OF CIRCUIT FORMULAS

Ohm's Law

For D.C. circuits

$$I = \frac{E}{R}$$

For A.C. Circuits

$$I = \frac{E}{Z}$$

FORMULAS FOR DEVICES IN SERIES  
CELLS OR OTHER EMF SOURCES

$$E = E_1 + E_2 + E_3 + E_4 + \dots$$

$$E = n E_1 \quad (\text{Equal voltage sources in series})$$

RESISTORS

$$R = R_1 + R_2 + R_3 + R_4 + \dots$$

$$R = n R_1 \quad (\text{Equal resistances in series})$$

CONDENSERS

$$\frac{1}{C} = \frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3} + \frac{1}{C_4} + \dots$$

$$C = \frac{C_i}{n} \quad (\text{equal capacities in series})$$

CURRENT

$$I = I_1 = I_2 = I_3 = I_4$$

## FORMULAS FOR DEVICES IN PARALLEL

$$E = E_1 = E_2 = E_3 = E_4$$

(only equal voltage cells must be used in parallel or it will short circuit the current, thru. the lesser voltage cell.)

Thursday, May 31, 1945

151st Day—214 days to follow

CLEAR
CLOUDY
RAIN
SNOW

(PARALLEL DEVICES continued:)

RESISTORS

$$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \frac{1}{R_4} + \dots$$

$$R = \frac{R_i}{n} \quad (\text{equal resistances in parallel})$$

CONDENSERS

$$C = C_1 + C_2 + C_3 + C_4 + \dots$$

$$C = n C_1 \quad (\text{equal capacities in parallel})$$

CURRENT (PARALLEL D.C. CIRCUITS)

$$I = I_1 + I_2 + I_3 + I_4 + \dots$$

## MISCELLANEOUS A.C. FORMULAS

$$Z = \sqrt{R^2 + X^2}$$

$$X = X_L + X_C \quad (\text{value of } X_C \text{ usually taken negative})$$

$$X_L = 2\pi f L$$

$$X_C = \frac{1}{2\pi f C}$$

POWER FACTOR

$$\text{p.f.} = \frac{\text{true power}}{\text{apparent power}}$$

$$\text{p.f.} = \frac{\text{watts}}{\text{volts} \cdot \text{amperes}}$$

instrument readings

$$\text{p.f.} = \frac{R}{Z}$$



## POWER IN D.C. CIRCUITS

$$\text{Power} = \text{watts} = \text{Amps} \times \text{Volts} = I \times E$$

## POWER IN A.C. CIRCUIT

$$\text{Power} = I \times E \times \text{p.f.}$$

## Meaning of Symbols

- C Capacity of circuit in farads  
 E electromotive force or potential difference or voltage drop in volts  
 f frequency in cycles per second  
 I current in amperes (effective current in A.C. circuits)  
 L Inductance in henries  
 n number of cells, resistors, condensers, etc.  
 p.f. power factor  
 R Resistance of circuit in ohms  
 X Reactance of circuit in ohms  
 X<sub>L</sub> Inductive reactance of circuit in ohms  
 X<sub>C</sub> Capacitive " " in ohms  
 Z Impedance of circuit in ohms

Friday, June 1, 1945

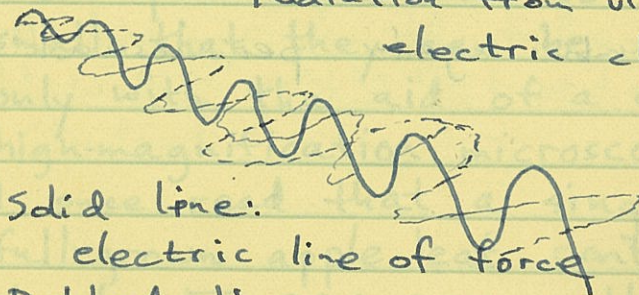
152nd Day—213 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Dear Russ,

Perhaps you've been wondering about the things around you—what they're made of and how they're put together. Take a tree, for example; you know it has leaves, limbs, a trunk, and roots; and you know that if you look at an individual branch you see the bark and under the bark the wood. Perhaps you don't know—probably you do—

Radiation from vibrating electric charge



Solid line:

electric line of force

Dotted line

magnetic line of force  
vibrating at right angles.

Saturday, June 2, 1945

153rd Day—212 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Columbus. We went to a movie

Sunday, June 3, 1945

154th Day—211 days to follow

Columbus again per usual.

Monday, June 4, 1945

155th Day—210 days to follow

CLEAR
CLOUDY
RAIN
SNOW

that the wood is composed of tiny little units called cells. If you had one <sup>of these</sup> microscope, which would magnify what you see many <sup>thousands of</sup> times, those tiny cells would be visible to your eyes. If you took a piece of the bark and put it under the microscope, curiously enough, you would find the same thing! The microscope would magnify the tiny piece of bark many

I > Most plant cells are so very small that they can be seen only with the aid of a compound, high-magnification microscope. I once read that a single, full-grown apple leaf contains about 50,000,000 cells.

Tuesday, June 5, 1945

156th Day—209 days to follow

CLEAR
CLOUDY
RAIN
SNOW

times and what looked like one solid <sup>pieces</sup>, although rough and irregular, now is seen to be composed, — or made of, — many thousands of these tiny cells.

So much for the tree. How about yourself? If you took a tiny piece of your skin — a tiny bit you pinched off your hand — and held it under the microscope you would probably be surprised, because it, too,

Heat produced by electric current  
Cal. produced per second =  
.24  $I^2 R$  or .24 watts.

Wednesday, June 6, 1945

157th Day—208 days to follow

CLEAR
CLOUDY
RAIN
SNOW

when magnified many times is seen to be composed of hundreds of tiny units called cells. In fact, any piece of living material when looked at closely is composed of the very same units.

Now of course these cells look different. A bone cell doesn't look <sup>exactly</sup> like a skin cell, and a leaf cell doesn't look exactly like a root cell, but they do look enough alike to say

Washed the hammock today, and am going to take it home with me Saturday.  
Studied chemistry a little.

Thursday, June 7, 1945

158th Day—207 days to follow

CLEAR
CLOUDY
RAIN
SNOW

that all living plants or animals—  
in other words all living things—  
are composed of cells. There are  
many plants, as well as animals,  
though, that consist of only one  
cell. These of course are very  
simple organisms (an organism is  
just another way of saying  
plants and animals because every-  
thing necessary for life must be  
done by the ~~one~~ cell itself—  
such as food-taking, <sup>food</sup>digesting, and

Friday, June 8, 1945

159th Day—206 days to follow

CLEAR
CLOUDY
RAIN
SNOW

~~and the ability to move around.~~

By now we begin to realize  
how vastly complicated our own  
body is and how really wonderful  
a flower is.

Saturday, June 9, 1945

160th Day—205 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Marye-Ann, Bobby, and Earl picked me up at 2:30 and we went home together. MaryeAnn finished school and is now a sophomore at O.S.U.

Dave Mraz was home.

We were at Marye-Ann's a little while in the evening.

Sunday, June 10, 1945

161st Day—204 days to follow

Marye-Ann took me to Newcomerstown today. We ate dinner and supper there. We went on a hike in the afternoon. I didn't start back 'till seven and arrived here at ten 'till ten!

Monday, June 11, 1945

162nd Day—203 days to follow

CLEAR
CLOUDY
RAIN
SNOW

I've got everything packed except my clothes. (I could finish packing in five minutes). Now, if these two weeks will just fly by.

Tuesday, June 12, 1945

163rd Day—202 days to follow

<input checked="" type="checkbox"/>	CLEAR
<input type="checkbox"/>	CLOUDY
<input type="checkbox"/>	RAIN
<input type="checkbox"/>	SNOW

Starting a new day. Getting ready for exams.

Marye Ann was in the house. I have a sophomore. Dave Mraz was home. We were at Marye Ann's a little while in the evening.

Sunday, June 10, 1945

164th Day—204 days to follow

Marye Ann took me to Newmarket today. We ate dinner and supper there. We went on a hike in the afternoon. I didn't start back till seven and arrived here at ten till ten.

Wednesday, June 13, 1945

164th Day—201 days to follow

<input type="checkbox"/>	CLEAR
<input type="checkbox"/>	CLOUDY
<input type="checkbox"/>	RAIN
<input type="checkbox"/>	SNOW

Strength test this afternoon.

They played football in the afternoon. Marye Ann is at home now.

Thursday, June 14, 1945

165th Day—200 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Went swimming today. This evening went to a play.

Friday, June 15, 1945

166th Day—199 days to follow

CLEAR
CLOUDY
RAIN
SNOW

I called my darling tonight. One more Friday and I'm through with this place. M.A. is at home now.

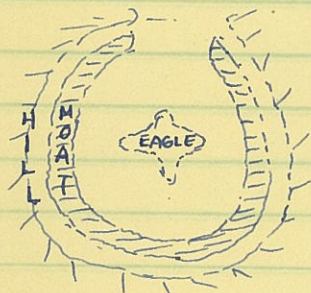


Saturday, June 16, 1945

167th Day—198 days to follow

	CLEAR
	CLOUDY
X	RAIN
	SNOW

We ate at Walts tonight and then went out to mound-builders park. The mound was evidently a sort of protective barricade against invasion. (No water is in it now). An eagle (or bird) is made in the form of a mound in the center.



Sunday, June 17, 1945

168th Day—197 days to follow

I went to the old Episcopal Church in Granville. I was told to go in before I leave Granville, mainly because of its age, but was not impressed by its beauty, etc.

In the afternoon Al, Hinchey, and I went to a movie in Newark. No Marge-Ann.

Monday, June 18, 1945

169th Day—196 days to follow

	CLEAR
	CLOUDY
	RAIN
	SNOW

No exams today, only the preparing for exams which is perhaps worse (at least more work) than the actual taking of the exam.

Raymond and Russell came down to visit me today. I was semi-expecting them. In the afternoon we walked around the campus. In the evening I did a little calculus while they went to a movie in Newark.

They came back after taps and we signalled to each other in the language of the Re. Later I saw two shadows—one big one and one little one slip into Walt Morrow's room in King Hall, where they stayed for the night.

Tuesday, June 19, 1945

170th Day—195 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Calculus exam this morning.  
Ray and Russ walked around  
by themselves. About all I  
could give them were some  
cigarettes which their friends  
will appreciate.

I watched them get the  
first ride towards home  
this afternoon.

Wednesday, June 20, 1945

171st Day—194 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Mostly discussion test in  
Naval History from 1300 to  
1600.

Thursday, June 21, 1945

172nd Day—193 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Hard day today. Chemistry;  
14 pages of it in the morn-  
ing, and heat power in  
the afternoon—standardized  
test.

Friday, June 22, 1945

173rd Day—192 days to follow

CLEAR
CLOUDY
RAIN
SNOW

A long, long economics exam  
I started to check out.  
Bought some of my text-  
books.

Saturday, June 23, 1945

174th Day—191 days to follow

CLEAR
CLOUDY
RAIN
SNOW

We moved furniture. I finished packing the last odds and ends. We didn't get our leave papers until after 1700. Then, I had the best luck I've ever had hitch-hiking up from Granville. This is a momentous day: I gave Marye-Ann my SAE pin. (My darling, my only regret is that it isn't a ring. I'm so much in love that it seems that love is all that matters.)

Sunday, June 24, 1945

175th Day—190 days to follow

Monday, June 25, 1945

176th Day—189 days to follow

CLEAR
CLOUDY
RAIN
SNOW

An important concept when studying the theory of steam boilers, etc. (simple as it is):

Saturated vapor can have only one density. Thus it can exert only one pressure.

COROLLARY

An attempt to increase the density of a saturated solution causes condensation.

\* \*

Just as much water vapor would evaporate into a jar of air as into the same jar with a state of vacuum, but the air retards the rate of evaporation greatly.

Thus lakes and oceans do not instantly saturate the air over them.

Tuesday, June 26, 1945

177th Day—188 days to follow

CLEAR
CLOUDY
RAIN
SNOW

When the air is saturated it is usually because the temperature has dropped down to the place where the moisture previously in the air will saturate the air.

It then condenses to form dew, fog, cloud, or rain.

If the surface upon which the water vapor condenses is less than freezing the result is frost.

Fog is formed when the water vapor condenses on dust and smoke particles in the air in suspension.

When a gas is compressed heat is <sup>transferred from the work of compression to the gas</sup> produced, conversely when gas is allowed to expand it does work.

Wednesday, June 27, 1945

178th Day—187 days to follow

CLEAR
CLOUDY
RAIN
SNOW

thus lowering the energy of the gas by taking a part of its heat content and lowering its temperature.

If the temp. drops to the dew point and the vapor condenses it forms clouds or rain.

If the temp. drops below freezing and condenses while it is below freezing snow is formed.

Heat tries to distribute itself evenly. This is the ultimate reason\* for such phenomena as the monsoon, land and sea breezes, the Gulf Stream.

\* Not too true

158  
Thursday, June 28, 1945

179th Day—186 days to follow

CLEAR
CLOUDY
RAIN
SNOW

\* \* \*  
Ultimate Reasons?

There are no such. However it is common knowledge that various substances possess different specific heats. These variances in the specific heats of the earth's crust result in various temperatures on the crust. Just as important, perhaps, is the topography and elevation of the land and its distance from the geographic position of the sun. At any rate the sum total of these factors is an uneven distribution of surface temperature.

These variances in the temperature of the earth effect the air over the

163  
Friday, June 29, 1945

180th Day—185 days to follow

CLEAR
CLOUDY
RAIN
SNOW

surface in a reasonable manner. First, by setting up convectional currents in air that has a lower temperature than the earth. (By heating the lower layers of air they expand and rise since the density is less and air from cooler portions of the surface rush in to take its place.)

Thus, variations in surface temperature result in variations of pressure in the air over the earth. This is the most direct cause for winds. Actually instead of blowing directly from the high pressure to the low pressure area the rotation of the earth deflects the winds and they seem to spiral out of the high and into the low.

Saturday, June 30, 1945

181st Day—184 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Also, these high and lows moved eastward across the U.S. as a result of earth's rotation, and we see that all these phenomena known collectively as "weather" are a result of uneven heat distribution and the tendency in nature to spread this heat out evenly.

Special Data

182nd Day—183 days to follow

CLEAR
CLOUDY
RAIN
SNOW

AELTYPHEALT  
HFEZPAONHEF  
OHCDLFNTCOC  
EOFZDPYACFX  
TECFOXLDPNH  
PACETLDTOOC  
FPZTDELXOYC

EVTHZFOLXCA  
OAPENDZOLOT  
DEVTOCPALHF

FELOPZD

FOZECPT

DEFPOTEC

TOZCELDF

Sunday, July 1, 1945

182nd Day—183 days to follow

TALOE

ALDOTF

FLOTDEXC

FXVTDEAL

VEDTOFCAL

... worked at the University of Cincinnati, hunted up the SAE house during war, and went to bed

Monday, July 2, 1945

183rd Day—182 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Raymond and Marye-Ann and I had a lot of fun this afternoon playing bridge. M.A. won by five points. We then went up to the Avalon. I had to pay for the booby prize.

Later in the evening we went out to Boyd's house. We took Marye-Ann's books to the library; stopped to visit Aunt Eva and then went to see M.A.'s Aunt Connie.

We went out to Marye-Ann's and I did a lousey job trying to tell her how much I'd miss her.

Tuesday, July 3, 1945

184th Day—181 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Marye-Ann, it's hard to say goodbye to you, <sup>even though it's</sup> only for a few months. And, Mother, it's hard to say good-bye to you because I know what tragic memories it means.

At 1210 the train left. Traveled west, past the well-kept Ohio farms, to Mansfield and then Crestline. Had an hour and a half wait for a train cutting down to Cincinnati via Columbus.

Arrived at the beautifully modern Union Station. Passed a couple of bums, crossed "nigger" town; took a street-car up to the University of Cincinnati, hunted up the SAE house during war, and went to bed.



Wednesday, July 4, 1945

185th Day—180 days to follow

<input checked="" type="checkbox"/>	CLEAR
<input type="checkbox"/>	CLOUDY
<input type="checkbox"/>	RAIN
<input type="checkbox"/>	SNOW

I woke up barely in time to dress and catch a street-car, then transfer to a cross-city bus to get to the R.R. Station in time. I rode the train all day long. The most interesting <sup>incident</sup> aspect to me was when the train crossed the Tennessee River. The track was built up on a pile of limestone rock and the water of the TVA had backed-up to make a large reservoir. The poverty of the people, many negroes, of southern Kentucky was striking. The way in which the corn kept getting taller until finally it was ready to pick—almost—by the time I reached Tennessee & the appearance of the summer wild flowers was fascinating.

Thursday, July 5, 1945

186th Day—179 days to follow

<input checked="" type="checkbox"/>	CLEAR
<input type="checkbox"/>	CLOUDY
<input checked="" type="checkbox"/>	RAIN
<input type="checkbox"/>	SNOW

Slept in cat-naps all night. Flies were pestering me. (I slept at the USO, Memphis. Hal King & I waited for the boys to collect and then we came together on a Navy bus here. We reported at 11:30. Ate noon lunch, slept several hours, moved clothing, unpacked, etc. The Air Station is very large. Our barracks are wood frame—housing about 75. In the evening I went over to the recreation bldg. and borrowed Fogs Clouds and Aviation. Of course I wrote my darling and home.

I went swimming practically all afternoon and evening. Practiced especially water swimming and also distance.

I forgot. Also went to a movie.

Friday, July 6, 1945

187th Day—178 days to follow

CLEAR
CLOUDY
RAIN
SNOW

We went to a meeting in the morning, mostly do's and don'ts. In the afternoon we had to wait around without doing anything.

The sun is very bright around here. Fast moving clouds most of the time.

The chow is very good, and traditionally with the Navy, plenty of it.

Saturday, July 7, 1945

188th Day—177 days to follow

CLEAR
CLOUDY
RAIN
SNOW

We checked in at sick-bay in the morning. In the afternoon we drilled for an hour. No rifles, altho he was pretty touchy about the drilling. 1st Class Bosun's Mate & a Lieut. (Sr. G) are our immediate officers.

It was really hot while we drilled.

Sunday, July 8, 1945

189th Day—176 days to follow

Church is compulsory. I don't like that. The Protestant service was held in Rec Hall.

I went swimming practically all afternoon and evening.

Practiced, especially, underwater swimming and also distance.

I forgot. Also went to a movie.

Monday, July 9, 1945

190th Day—175 days to follow

CLEAR
<input checked="" type="checkbox"/> CLOUDY
RAIN
SNOW

We went to a long meeting this morning & put our transportation chits in. Also got lectured to about fire extinguishers.

Class A: wood, paper, deepseated

B: burning gasoline, oil, etc.

C: caused by electrical equip.

Controlled by.

A: Water

B: CO<sub>2</sub> foam as result of reaction.

C: CO<sub>2</sub> foam <sup>liquid</sup> under pressure

I slept in the afternoon & studied weather.

Tuesday, July 10, 1945

191st Day—174 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Finally got to the line. Another talk on safety: "Beware of propellers".

I worked today helping to make an upper wing. Followed the steps clear thru from framework to finally covering. (I didn't go to the dope shop).

Also checked the controls, etc., studying the cable arrangement.

Wednesday, July 11, 1945

192nd Day—173 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Examined two different kinds of wings today, one made with a  $\frac{1}{16}$  inch wood covering, and the other with riveted metal.

Also examined framework of the fuselage. There just isn't much. Period.

Thursday, July 12, 1945

193rd Day—172 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Heard a lecture on parachutes three times. Main thing: dive head first. Clear plane. Pull rip cord.

If too close to ground. Dive head first, pulling rip cord. Pray.

(All Navy personnel required to wear parachutes on every flight.)

The flight line is pretty hot and the truth of the matter is that none of us do much work.

Friday, July 13, 1945

194th Day—171 days to follow

CLEAR
CLOUDY
RAIN
SNOW

We bided the Cadets about the day, but had no accidents. Working on the line is a pretty hot job with the pavement radiating heat and the sunlight reflecting into our eyes.

Saturday, July 14, 1945

195th Day—170 days to follow

CLEAR
CLOUDY
RAIN
SNOW

We stood a Captain's Parade Inspection today and then didn't get liberty. About 177 Tarmac would like to shoot some people. (Out of 180) There's always that two per cent. You know. And then worked all day including P.T.

Sunday, July 15, 1945

196th Day—169 days to follow

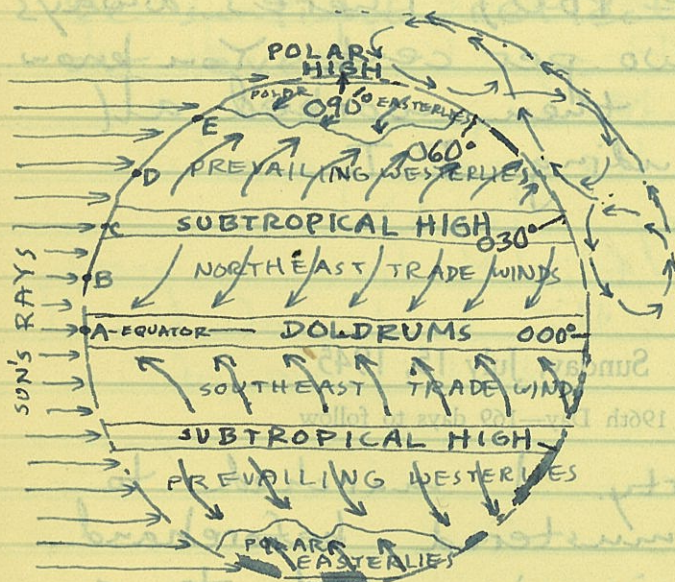
No liberty. I marched to church—mustered beforehand. Went swimming and to a movie, but was still on the base.

Monday, July 16, 1945

197th Day—168 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Working with a different squadron this week. Cranking and starting planes, and securing and untying them is what our work consists of.



General  
Circulation  
of the atmosphere.

Three great vertical circles plus air going all the way to the pole from the equator.

The region near the equator heats most since it is under nearly perpendicular solar rays. (The same number of rays strike the earth at  $\overline{DE}$  as at  $\overline{AB}$ , but at  $\overline{DE}$  they have to cover more area.)

Tuesday, July 17, 1945

198th Day—167 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Drilling is really hard work in the afternoon. We are boxing in PT. This stuff of working from 0600 to 1830 will have to knock-off or I'm just going to start taking as much rope as possible.

→ The air at the equator heats expands and rises and flows poleward, most of it descending about 30° the rest continuing on to the poles.

At 30° it splits some coming back along the surface toward the equator the rest starting poleward on the surface.

The cold heavy air at the poles seeps down to about 60° where it rises as shown in the

Wednesday, July 18, 1945

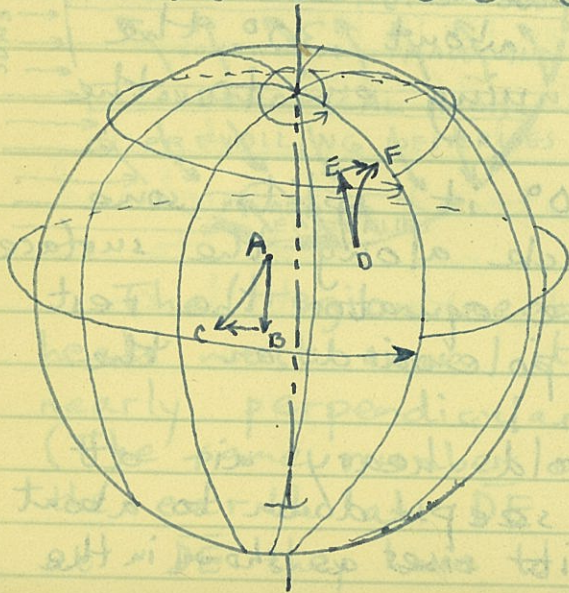
199th Day—166 days to follow

CLEAR
CLOUDY
RAIN
SNOW

I went swimming for a little while this afternoon. Worked on the lines in the morning.

→ diagram.

The reason for this rather complicated theory is to try to explain in connection with another theory the actual wind belts that do exist on the earth.



Since the earth is spinning on an axis a point on the equator will obviously have to travel faster in one revolution than

Thursday, July 19, 1945

200th Day—165 days to follow

CLEAR
CLOUDY
RAIN
SNOW

I finally swam 25 yards under water today. (I've been trying it for quite a while now.) A fellow here showed me how to breathe deeply before starting to get oxygen in the blood. (I was able to add three strokes trying this for about 5 minutes first.)

→ one near the pole.

Let us start out by assuming that our atmosphere is hugging the earth closely and spinning with it (which it does).

If air at "d" is forced northward by the weight of the descending air it is going to appear to deflect to the right since the air from "d" will be traveling faster than that at "e." The result is →

Wednesday, July 18, 1945

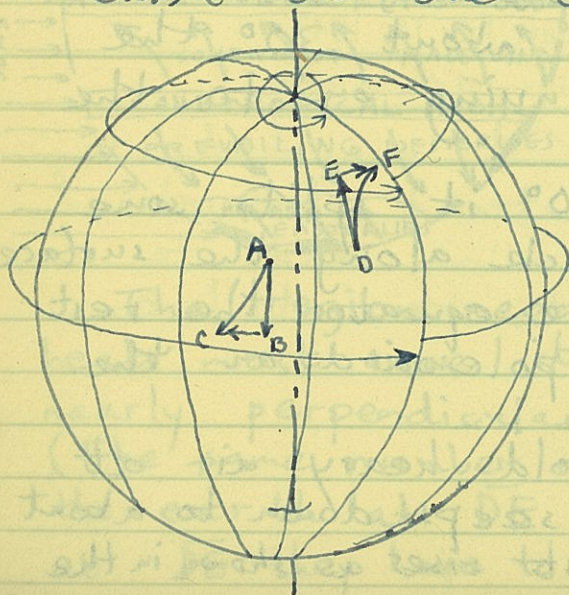
199th Day—166 days to follow

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CLOUDY
RAIN
SNOW

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Friday, July 20, 1945

201st Day—164 days to follow

CLEAR
CLOUDY
RAIN
SNOW

I washed airplanes today. An admiral visited the base—2 stars.—Rear Adm.

→ what is known as the prevailing westerlies. Air being forced toward the equator from "A" will lag behind the air at the equator and will seem to come from the North East.



(Try it with a pencil & a sphere. Bring the pencil straight down as the sphere is rotated counter-clockwise. The apparent direction of the wind will be from the northeast—these are the northeast trade winds.)

The polar easterlies are formed in the same manner.

END.

Saturday, July 21, 1945

202nd Day—163 days to follow

CLEAR
CLOUDY
RAIN
SNOW

LIBERTY, finally. Altho all I did was go to Memphis and look over the town. I came back because I was afraid I had the duty Sunday. I like the city of Memphis. It has a friendly atmosphere.

Sunday, July 22, 1945

203rd Day—162 days to follow

After church (I sang in the choir) I ate and went to Overton Park to the Zoo. It is a very big one with plenty of animals.

Monday, July 23, 1945

204th Day—161 days to follow

CLEAR
CLOUDY
RAIN
SNOW

This week I'll be working at A + R (Assembly and Repair). I got an odd job out in the sun, but it didn't take long, and now I'm just going to watch out, and work where I want to. The other guys have been assigned jobs in the steam room, etc., and I don't want any part of that.

Tuesday, July 24, 1945

205th Day—160 days to follow

CLEAR
CLOUDY
RAIN
SNOW

The temperature rose to 100° Fahrenheit and still going up. I didn't do anything in the afternoon. Just walked around watching others work.

Wednesday, July 25, 1945

206th Day—159 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Hot again. At A+R today I helped tear-down an air-craft engine, especially the parts in the crank-case assembly. The mech told me that in general the engine is divided into three main sections — nose section, crank case, and accessories, including respectively (1) exhaust manifolds, (2) cylinders + connecting rods, and (3) starter, etc.

In the evening ~~he~~ finished reading the prophets in the Old Testament.

Played touch football in 100°F. Rain later cooled it off.

Thursday, July 26, 1945

207th Day—158 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Swam 840 yd in 25 min. today using elementary back stroke and a little side stroke. (We only had 25 minutes in the pool).

Sunday, July 29, 1945

210th Day—155 days to follow

Friday, July 27, 1945

208th Day—157 days to follow

CLEAR
CLOUDY
RAIN
SNOW

At 11 AM today I started work on the engine. The engine is divided into three main sections — nose section, crank case, and accessories, including respectively (1) exhaust manifold, cylinders + connecting rods, and (2) starter, etc.

In the evening I finished reading the prophets in the Old Testament.

Played touch football in 100°F. Rain later cooled it off.

Saturday, July 28, 1945

209th Day—156 days to follow

CLEAR
CLOUDY
RAIN
SNOW

At 10 AM I started work on the engine. After painting a small room here in the barracks I was occupied about 3:30 PM. I read primer book that I went to with the tub this day. Went swimming.

I swam continuously (al tho practically took a break) until about 10:00 PM. For a while when the pool

Sunday, July 29, 1945

210th Day—155 days to follow

minutes when the pool was closed. I went to work on the engine at 10 AM. Also wrote to Mary + Tom.

Monday, July 30, 1945

211th Day—154 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Mon. Wrote to Marye-Ann  
Slept out on the line

Tues. Went swimming  
Slept out on the line

Wed. Went to library  
Slept out on the line

Thurs. Slept under airplane wing  
Slept out on the line

P.S. Also wrote to Marye-Ann  
on Tues, Wed. & Thurs.

Tuesday, July 31, 1945

212th Day—153 days to follow

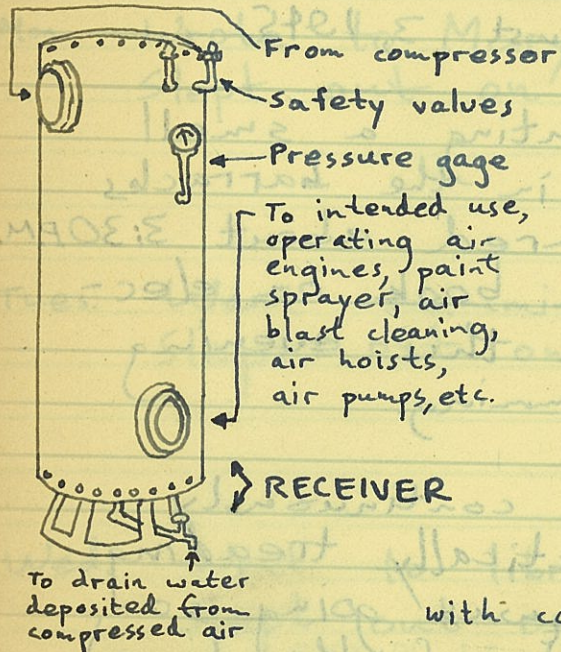
CLEAR
CLOUDY
RAIN
SNOW

Friday, August 3, 1945

After painting a small  
room here in the barracks  
I was secured about 3:30 P.M.  
I read a book on elec-  
tricity and this evening  
went swimming.

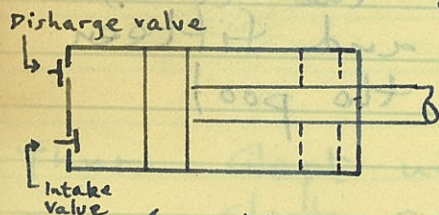
I swam continuously  
(altho practically treading  
water, I was going so  
slow, most of the time.)  
for an hour and fifteen  
minutes, when the pool  
closed.

COMPRESSION & EXPANSION OF AIR

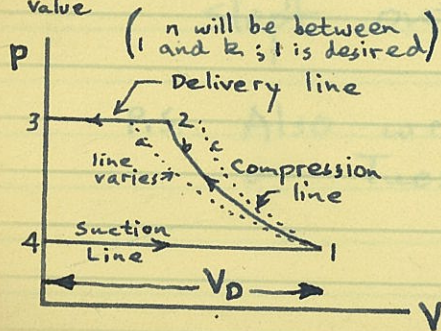


In practice the compression curve approaches an internally reversible polytropic process. Ideal compression curve because least work is isothermal, never really attained.

Often compared with conventional isentropic compression curve.



CONVENTIONAL DIAGRAM WITHOUT CLEARANCE



The net work done is being done on the air and is equal to the area enclosed by the diagram on the PV plane.

- a. isothermal
- b. polytropic
- c. isentropic

CLEAR
CLOUDY
RAIN
SNOW

Work of Compressor Without Clearance

Polytropic compression:

$$P_1 V_1^n = P_2 V_2^n$$

OMIT USUALLY

$$W = \frac{n(P_2 V_2 - P_1 V_1)}{1-n} = \frac{nWR(T_2 - T_1)}{1-n} \text{ ft.}$$

OR

$$* W = \frac{nWR T_1}{1-n} \left( \frac{T_2}{T_1} - 1 \right) =$$

$$* W = \frac{n P_1 V_1}{1-n} \left[ \left( \frac{P_2}{P_1} \right)^{\frac{(n-1)}{n}} - 1 \right]$$

ISENTROPIC:

Same equations but substitute "k" for "n".

ISOTHERMAL:

$$W = P_1 V_1 \log_e \frac{V_2}{V_1}$$

OR

$$W = wRT_1 \log_e \frac{V_2}{V_1}$$

$$\left[ \log_e X = 2.3 \log_{10} X \right]$$



Saturday, August 4, 1945

216th Day—149 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Monday, August 6, 1945

197

218th Day—147 days to follow

CLEAR
CLOUDY
RAIN
SNOW

$$V = \sqrt{\frac{c_p}{c_v} \cdot \frac{P}{\rho}} \quad (\text{by Laplace})$$

$k = \frac{c_p}{c_v}$  = ratio of specific heats of a gas

$P$  = pressure of the gas

$\rho$  = density of the gas

$V$  = velocity of sound

$$V_{\text{at } 0^\circ\text{C}} = V_{\text{at temp } t^\circ} - 2 t^\circ \frac{\text{ft}}{\text{sec}}$$

$$V_0 = V_t - .6 t \frac{\text{meters}}{\text{sec}}$$

Velocity of sound = 1087 ft/sec <sup>dry air</sup> @ 0°C

$$= 331.6 \frac{\text{m}}{\text{sec}} \quad "$$

$$* \quad V_t = 1087 + 2 t \frac{\text{ft}}{\text{sec}}$$

$$* \quad V_t = 331.6 + .6 t \frac{\text{m}}{\text{sec}}$$

presence of water vapor tends to increase speed up to not more than .7t at ordinary temp.

At 24°C;  $P = 982000 \text{ dynes/cm}^2$ ;  $\rho = .00115 \text{ g/cm}^3$

$$V_t = 331.6 + .6 \cdot 24$$

$$V_t = 346 \text{ m/sec.}$$

$$\therefore 34600 = \sqrt{k \frac{982000}{.00115}} \quad k = 1.40+$$

Sunday, August 5, 1945

217th Day—148 days to follow

$w$  = weight of gas or air drawn into cylinder.



Tuesday, August 7, 1945

219th Day—146 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Assuming  $H_2O$  vapor in the air

$$v = \sqrt{k \frac{p}{\rho}}$$

$$v_{24^\circ C} = 331.6 + .7 \cdot 24 = 348.4$$

$$v_{24^\circ C} = 348.4 \text{ m/s.}$$

$$348.4 = \sqrt{k \frac{982000}{.00115}}$$

$$k^2 = 2.17$$

$$k = 1.42+$$

Two fellows were fighting today in a playful way. The small one was hitting and running.

"He who hits and runs away lives to fight another day."

We were all laughing at him but he said "Discretion is the better part of valor."

Wednesday, August 8, 1945

220th Day—145 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Today is Mother's birthday. I sent her a pin several days ago. Wish I could see her.

Thursday, August 9, 1945

221st Day—144 days to follow.

CLEAR
CLOUDY
RAIN
SNOW

"What hath man wrought?"

The atomic bomb has awful potentialities, in the proper sense of the word.

I think it is safe to predict a race for the moon (similar to the race for the North Pole) before my death. When man learns to control atomic energy—and he will, I have no doubt—the biggest problem, weight of fuel, will be solved.

Atomic energy making use of the rocket principle will achieve the first goal in space travel.

Friday, August 10, 1945

222nd Day—143 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Thursday, August 9, 1945

221st Day—144 days to follow

<input type="checkbox"/>	CLEAR
<input type="checkbox"/>	CLOUDY
<input type="checkbox"/>	RAIN
<input type="checkbox"/>	SNOW

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Friday, August 10, 1945

222nd Day—143 days to follow

<input type="checkbox"/>	CLEAR
<input type="checkbox"/>	CLOUDY
<input type="checkbox"/>	RAIN
<input type="checkbox"/>	SNOW

102°  
Saturday, August 11, 1945

223rd Day—142 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Sunday, August 12, 1945

224th Day—141 days to follow

Monday, August 13, 1945

203

225th Day—140 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Every other Monday night the Welfare Dept. takes us into Memphis to a "Monday Night Club." The Club holds no appeal but the extra liberty does— not that my liberties are so important but even going to the library in Memphis or walking in the Park overlooking the river on a summer evening is worth the trip. (We have to be back at midnight and catch a bus at 2300

Tuesday, August 14, 1945

226th Day—139 days to follow

CLEAR
CLOUDY
RAIN
SNOW

During the past several weeks we have been working at the control tower, A & R, and the line. Working isn't really the proper name for it. I take a nap every afternoon under a Steerman wing. (It's really quite an art on the hard cement.)

After the nap I usually go up to the library. Since I've been here I read several books on weather, part of the Koran, one by Sir James Jeans, a complete text on electricity, a shorter version of Victor Hugo's Les Miserables and finished the Bible.

At about 6:00 P.M. tonight Pres. Truman announced that Japan has accepted the allied surrender terms.

Wednesday, August 15, 1945

227th Day—138 days to follow

CLEAR
CLOUDY
RAIN
SNOW

George Irish and I left as soon as possible on a special liberty which all hands received.



FOGS CLOUDS AND AVIATION  
by W. J. Humphreys

16,000,000 tons a sec. of rain drop over the world.

An endless cycle of evaporation & condensation.

RATE OF EVAPORATION DEPENDS:

- The evaporating surface
- The temp. of the evaporating water
- Velocity of the wind to which exposed
- Ant. of moisture already in the air

Ant. of moisture necessary for saturation increases rapidly with rise in temp. & is not effected by presence or absence of other gases in the atmosphere.

Thursday, August 16, 1945

228th Day—137 days to follow

CLEAR
CLOUDY
RAIN
SNOW

with the announcement of the end of the war. Our destination was Sheffield,

PROCESS BY WHICH H<sub>2</sub>O vapor can lose its heat of condensation so as to change state into a liquid.

1. Contact with colder objects.
2. Mixing " " air
3. Radiation
4. Expansion
  1. Dew
  2. Not effective. Sometimes a layer of Stratus forms where they meet
  3. Not effective except to form fog.
  4. The way most clouds are formed.

It does work as it rises & expands because of the lessened density & uses some of its internal heat to do the work, thus

Friday, August 17, 1945

207

229th Day—136 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Alabama. (Near Florence, Ala. and the Wilson Dam.) We left Memphis, temp. high, and had

decreasing the temp. as it rises.

This temp gradient is 1°F per 187 feet above the earth up to the base of the cloud. Then less change thru the cloud.

The increase in vapor capacity due to increased volume is very small compared to the decrease in vapor capacity due to the lower temperature.

\* \* \*  
Condensation nuclei are needed

1. Mineral dust
2. Vegetable fibers
3. Pollen
4. Spores, bacteria, etc.
5. Soot, mineral ash, etc.
6. Salt particles - chief over oceans
7. Hygroscopic droplets  
see 210 →

Saturday, August 18, 1945

230th Day—135 days to follow


CLEAR
CLOUDY
RAIN
SNOW

Early this morning I got a phone call.

\* \* \*  
 → bum luck. It was our own fault of course because we attempted to go by the shortest route even though it was over a dirt-red road in Mississippi. (I learned later that Ol' Miss. has either very excellent highways or

Sunday, August 19, 1945

231st Day—134 days to follow

very rutty, red roads. The highway was  (us route) when we got to the northern edge of Holly Springs Forest we hit the mud. We stopped at a little back-woods store and talked with an ex-soldier.

Monday, August 20, 1945

232nd Day—133 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Tuesday, August 21, 1945

233rd Day—132 days to follow

CLEAR
CLOUDY
RAIN
SNOW

- formed by union of water w. hygroscopic gases. —  $\text{NO}$ ,  $\text{NO}_2$ ,  $\text{NH}_3$
8. Volcanic ash
  9. Meteoric or cosmical dust.

No. 9 will be used first by the vapor.

Avg. condensation nuclei outdoors 39,309/cu.in.

\*\*\*

Fogs are clouds lower than 50 feet.

The earth is always radiating a constant amount of heat. In the day the sun gives more heat than the earth radiates off. This <sup>taken from the streams</sup> increases the vapor content. At night the land cools quick-

Wednesday, August 22, 1945

234th Day—131 days to follow

CLEAR
CLOUDY
RAIN
SNOW

er and fog forms  
 ∴ Fogs are likely to form along rivers + large creeks + in mt. vallies in the latter part of any still, cloudless night of summer or autumn.

(Wind would blow it away + clouds radiate too much heat back to the earth.) especially when they are low.

∴ Radiation fogs.

1. Summer fogs
2. Land fogs
3. Valley fogs.

ADVECTION FOGS — produced by horizontal movement of air Drifting of relatively warm, humid air over places much colder.



Thursday, August 23, 1945

235th Day—130 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Such as drifting of on-shore winds over snow banks.

Winter fog

Sea fog

Frost smoke of polar seas steaming of rivers & lakes on cold, frosty mornings.

Causes fog at Grand Banks where warm wind blows from Gulf stream over cold Labrador current.

(Fog 3' x 6' x 100' contains less than  $\frac{1}{4}$  glass of water.)

Advection fog is deep, dangerous, hundreds to thousands of feet deep, extensive over high latitude seas. Over Aleutians. Doesn't disappear with the sun.

Friday, August 24, 1945

236th Day—129 days to follow

CLEAR
CLOUDY
RAIN
SNOW

The atmosphere as a whole because of convection and when it precipitates it makes it dryer than when it started when it finally reaches the earth again.

Clouds would fall @ 8ft/min. if they weren't formed in uprising currents, or keep forming at the condensation level.

Rain is formed because the lower cloud particles filter the uprising air leaving fewer particles for the water to form on. Some of the larger drops coalesce. Most drops have the same size since they drop as soon as they are heavy enough.

Saturday, August 25, 1945

237th Day—128 days to follow

<input type="checkbox"/>	CLEAR
<input type="checkbox"/>	CLOUDY
<input type="checkbox"/>	RAIN
<input type="checkbox"/>	SNOW

Monday, August 27, 1945

215

239th Day—126 days to follow

<input type="checkbox"/>	CLEAR
<input type="checkbox"/>	CLOUDY
<input type="checkbox"/>	RAIN
<input type="checkbox"/>	SNOW

Sunday, August 26, 1945

238th Day—127 days to follow

Method of figuring cloud heights  
1. Cumulus scattered fair weather  
2. Nimbostratus layer of cloud  
with rain drizzle + rain.  
+ stratus drizzle.

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1. Cumulus scattered fair weather  
2. Nimbostratus layer of cloud  
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Method of figuring cloud heights  
1. Cumulus scattered fair weather  
2. Nimbostratus layer of cloud  
with rain drizzle + rain.  
+ stratus drizzle.

Tuesday, August 28, 1945

240th Day—125 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Methods of figuring cloud heights.

1. Aviator
  2. Pilot balloon
  3. Definite spot, triangulation
  4. Angular altitude of kite
  5. Level of storm clouds
- Cloud levels of maximum cloudiness.

About  $-60^{\circ}\text{F}$  the air loses as much heat by radiation as it gains. No clouds higher.

Clouds lower in winter

" thinner " high latitudes

Cumulus char. of summer

Stratus " " winter

Cumulus char. of tropics

Stratus " of high lat.

Wednesday, August 29, 1945

241st Day—124 days to follow

1. Cumulo-nimbus, thunderhead storm
2. Cumulus scattered, fair weather
3. Nimbo-stratus, layer of cloud with rain drizzle + rain.
4. Stratus, drizzle.

CLEAR
CLOUDY
RAIN
SNOW

When moving in their prevailing direction.

Density  $\times$  velocity = constant

Cloudiness increases toward pole  
Over 10 miles thick in tropics

### WEATHER SIGNS

Thin cirrus not growing thicker  
ind. fair weather for at least 24

changing to formless sheet rain or snow in few  
Ci growing denser, rain within  
24 hr. Mackerel scales + mare's tail  
Make lofty ships carry low sails

Large cumuli developing in  
forenoon ind. showers in afternoon

Clouds @ dif. levels moving  
in dif. dir. ind. foul weather soon

Thursday, August 30, 1945

242nd Day—123 days to follow

CLEAR
CLOUDY
RAIN
SNOW

This last week I have been studying the weather sequence reports and wind →

Clouds of lower & intermediate level from North to West imply fair weather for a day or two.

Fog clearing up early means fair weather, persisting means rain later in afternoon or night.

Strato-cumulus generally doesn't bring rain.

Cloud splendors

1. Crepuscular rays
2. Lightning
3. Rainbow
4. Halo
5. Corona
6. Cloud iridescence (sunset) (fragments of giant coronas. Red on outside.)

Friday, August 31, 1945

219

243rd Day—122 days to follow

CLEAR
CLOUDY
RAIN
SNOW

charts coming in to the operational tower.

WEATHER GUIDE FOR AIR PILOTS. Bats.

Seasons + temp. vary w. earth's orbit

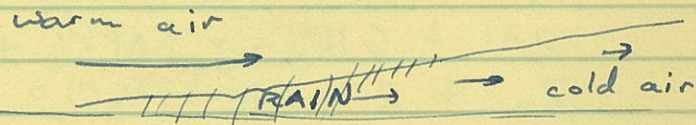
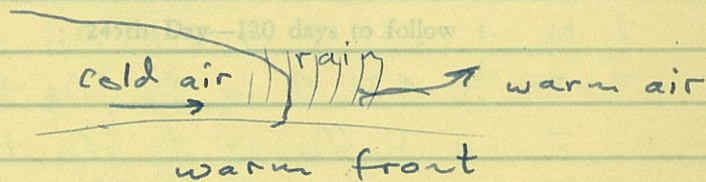
LAND + SEA BREEZES

MOUNTAIN + valley breezes

Cyclones winds blow in crossing isobars at 20-35° angle.

Upper winds twice as strong flowing along isobar.

Air masses displace, seldom mix  
cold front



Avg rate cyclone moves is 25 to 30 mph.

Special Data

343rd Day - 122 days to follow

CLEAR	
CLOUDY	
RAIN	
SNOW	

The prop oxide  $\text{C}_2\text{H}_5\text{O}_2$  +  $\text{H}_2$   
 $2 \text{KClO}_4 \rightarrow 2 \text{KCl} + 3 \text{O}_2$   
 $2 \text{Na}_2\text{O}_2 + 2 \text{H}_2\text{O} \rightarrow 4 \text{NaOH} + \text{O}_2$   
 $\text{H}_2 + \text{C}_2\text{O}_4 \rightarrow 2 \text{CO} + \text{H}_2\text{O}$   
 $\text{Fe} + 2 \text{H}_2\text{O} \rightarrow \text{FeO} + \text{H}_2$   
 $3 \text{Fe} + 4 \text{H}_2\text{O} \rightarrow \text{Fe}_3\text{O}_4 + 4 \text{H}_2$   
 $\text{C} + \text{O}_2 \rightarrow \text{CO}_2$   
 $2 \text{H}_2 + \text{O}_2 \rightarrow 2 \text{H}_2\text{O}$   
 $3 \text{Fe} + 4 \text{H}_2\text{O} \rightarrow \text{Fe}_3\text{O}_4 + 4 \text{H}_2$   
 with  $\text{H}_2\text{O}$  as  $\text{Fe}_3\text{O}_4$  thin  
 inter particles  
 $3 \text{O}_2 \rightarrow 2 \text{O}_3$   
 $2 \text{H}_2 + \text{O}_2 \rightarrow 2 \text{H}_2\text{O}$   
 $2 \text{H}_2 + \text{O}_2 \rightarrow 2 \text{H}_2\text{O}$   
 $\text{Fe} + \text{HCl} \rightarrow \text{FeCl}_2 + \text{H}_2$   
 $2 \text{Al} + 6 \text{HCl} \rightarrow 2 \text{AlCl}_3 + 3 \text{H}_2$   
 $2 \text{NaOH} + \text{H}_2\text{O} \rightarrow \text{Na}_2\text{O} + 2 \text{H}_2\text{O}$   
 both gases  
 $\text{H}_2\text{O} + \text{C} \rightarrow \text{CO} + \text{H}_2$   
 $\text{CO} + \text{H}_2\text{O} \rightarrow \text{CO}_2 + \text{H}_2$   
 (CO dissolves in  $\text{H}_2\text{O}$ )

Saturday, September 1, 1945

244th Day - 121 days to follow

CLEAR	
CLOUDY	
RAIN	
SNOW	

CHEMICAL REACTIONS

The prop oxide  $\text{C}_2\text{H}_5\text{O}_2$  +  $\text{H}_2$   
 $2 \text{KClO}_4 \rightarrow 2 \text{KCl} + 3 \text{O}_2$   
 $2 \text{Na}_2\text{O}_2 + 2 \text{H}_2\text{O} \rightarrow 4 \text{NaOH} + \text{O}_2$   
 $\text{H}_2 + \text{C}_2\text{O}_4 \rightarrow 2 \text{CO} + \text{H}_2\text{O}$   
 $\text{Fe} + 2 \text{H}_2\text{O} \rightarrow \text{FeO} + \text{H}_2$   
 $3 \text{Fe} + 4 \text{H}_2\text{O} \rightarrow \text{Fe}_3\text{O}_4 + 4 \text{H}_2$   
 $\text{C} + \text{O}_2 \rightarrow \text{CO}_2$   
 $2 \text{H}_2 + \text{O}_2 \rightarrow 2 \text{H}_2\text{O}$   
 $3 \text{Fe} + 4 \text{H}_2\text{O} \rightarrow \text{Fe}_3\text{O}_4 + 4 \text{H}_2$   
 with  $\text{H}_2\text{O}$  as  $\text{Fe}_3\text{O}_4$  thin  
 inter particles  
 $3 \text{O}_2 \rightarrow 2 \text{O}_3$

Sunday, September 2, 1945

245th Day - 120 days to follow

$2 \text{Na}_2\text{O}_2 + 2 \text{H}_2\text{O} \rightarrow 4 \text{NaOH} + \text{O}_2$   
 $2 \text{H}_2 + \text{O}_2 \rightarrow 2 \text{H}_2\text{O}$   
 $2 \text{H}_2 + \text{O}_2 \rightarrow 2 \text{H}_2\text{O}$   
 $\text{Fe} + \text{HCl} \rightarrow \text{FeCl}_2 + \text{H}_2$   
 $2 \text{Al} + 6 \text{HCl} \rightarrow 2 \text{AlCl}_3 + 3 \text{H}_2$   
 $2 \text{NaOH} + \text{H}_2\text{O} \rightarrow \text{Na}_2\text{O} + 2 \text{H}_2\text{O}$   
 both gases  
 $\text{H}_2\text{O} + \text{C} \rightarrow \text{CO} + \text{H}_2$   
 $\text{CO} + \text{H}_2\text{O} \rightarrow \text{CO}_2 + \text{H}_2$   
 (CO dissolves in  $\text{H}_2\text{O}$ )

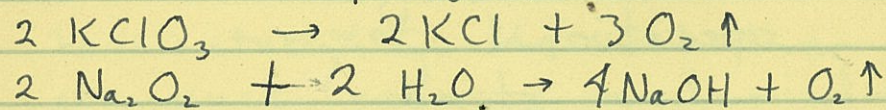
Monday, September 3, 1945

246th Day—119 days to follow

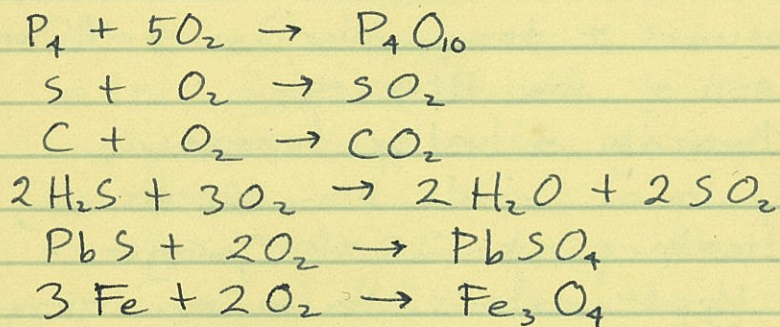
CLEAR
CLOUDY
RAIN
SNOW

## CHEMICAL REACTIONS

Prep. oxygen



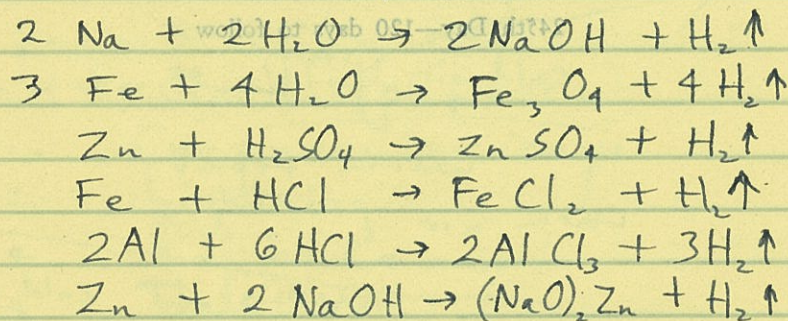
oxidation



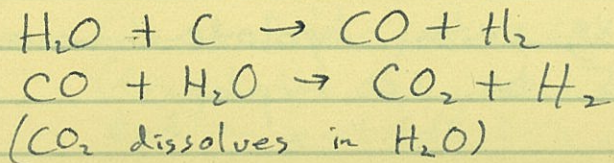
ozone



## HYDROGEN



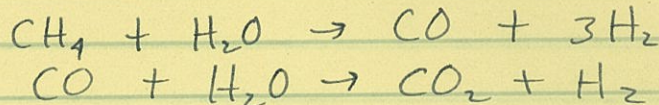
Bosch Process



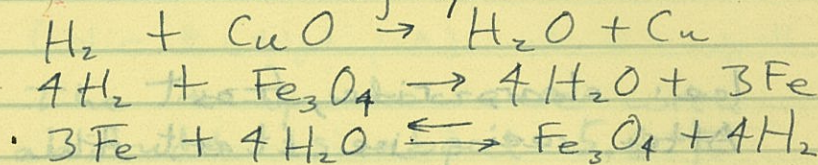
Tuesday, September 4, 1945

247th Day—118 days to follow

CLEAR
CLOUDY
RAIN
SNOW



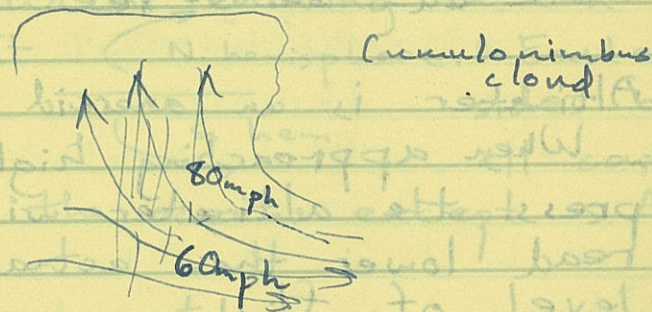
Reducing agent



occluded front.

Cold mass displaces cool mass  
with warm mass aloft. In  
winter practically impassable

Thunderstorm



Wednesday, September 5, 1945

248th Day—117 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Ice: clear, rime, frost

After seeing ice start the pilot has about 6 min. max. to get above or below

by 2000 ft. & he'll be out of it. <sup>because of temp. inv.</sup> puts him out of critical range.

If there is no visible moisture, clouds, fog, rain, etc. there can be NO <sup>ice</sup> fee.

Altimeter is an aneroid barometer

\* When approaching high press. the altimeter will read lower than actual level of flight.

When flying between 1500 + 2500 ft. flying into high will have the winds crossing from the right.

Thursday, September 6, 1945

249th Day—116 days to follow

CLEAR
CLOUDY
RAIN
SNOW

The temp. decrease with altitude is about  $5.6^{\circ}\text{F}$  per 1000 ft. of altitude.

### WEATHER AROUND THE WORLD

#### Tannehill

Tropical storms originate near equator, curving in and then out

N. hemisphere. On Eastern sides of all continents on the oceans except S. Am.

S. hem.

Friday, September 7, 1945

250th Day—115 days to follow

CLEAR
CLOUDY
RAIN
SNOW

High Clouds (Avg. hght about miles)

1. Cirrus
2. Cirrocumulus
3. Cirrostratus

Middle Clouds (Avg. hght. 1 to 4 mi)

4. Altocumulus
5. Altostratus

Low Clouds (Avg hght few hundred ft to mi)

6. Stratocumulus
7. Stratus
8. Nimbostratus

Heaped-up clouds (base low and flat  
but top may be very high)

9. Cumulus
10. Cumulonimbus

Saturday, September 8, 1945

251st Day—114 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Sunday, September 9, 1945

252nd Day—113 days to follow



Monday, September 10, 1945

253rd Day—112 days to follow

CLEAR
CLOUDY
RAIN
SNOW

### Prevailing winds

Doldrums at equator where SE + NE trade winds come together. Horse latitudes about  $30^\circ$  N lat., belt of calms where prevailing westerlies start. (In southern hemisphere south of Australia and Africa, but run into Southern S. Am.)

Monsoons from Asia in winter blowing from NE along east coast of Africa.

Doldrums and winds shift with the sun slightly with the seasons.

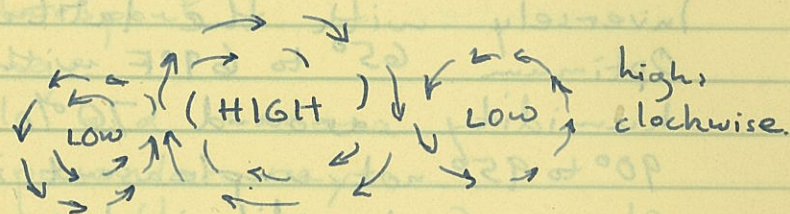
Tuesday, September 11, 1945

229

254th Day—111 days to follow

CLEAR
CLOUDY
RAIN
SNOW

### Norther latitude:



opposite in Southern hemisphere

### OCEAN CURRENTS

Clockwise in Northern hemisphere (like Gulf Stream or Japan current. (warm current going up, cold coming down. Counterclockwise up the west coast of S. Am. + Africa and Asia, all in S. hemisphere.

Wednesday, September 12, 1945

255th Day—110 days to follow

CLEAR
CLOUDY
RAIN
SNOW

### TEMPERATURE ISOTHERMALS

Inversely with the latitude  
Optimum  $65^{\circ}$  to  $69^{\circ}$ F with  
humidity around 70%  
 $90^{\circ}$  to  $95^{\circ}$  not unpleasant in  
China if humidity is less  
than 30% and good air movement.

Cloudy areas, N. Atlantic, N. Pacific,  
W. Bulge of S. Am., west  
spot of Patagonia, Antarctic  
N. coast.

Rainfall abundant from  $40^{\circ}$  to  
 $60^{\circ}$  S. lat. (below Australia),  
in doldrums, spot under  
eastern Alaska, in N. Atlantic  
west of Norway.

Thursday, September 13, 1945

231

256th Day—109 days to follow

CLEAR
CLOUDY
RAIN
SNOW

### Phenomena

Waterspout  
Mirage  
Halo and Corona  
Crepuscular rays  
Green flash  
Rainbow  
Line squall  
St. Elmo's fire or Corpusants

### Europe

Br Isles, windy, cloudy, foggy, much  
humidity, cooler in N. Europe  
in summer. Temp. extremes  
less. Gets colder as it  
crosses toward Siberia

125  
Friday, September 14, 1945

257th Day—108 days to follow

CLEAR
CLOUDY
RAIN
SNOW

West Indies pleasantly warm  
in winter

233  
Saturday, September 15, 1945

258th Day—107 days to follow

CLEAR
CLOUDY
RAIN
SNOW

### AIRCRAFT ENGINES

Variable pitch propellers compare to geared automobiles — low pitch to low gear. By use of larger wing area, larger gross weight / sq. ft. of wing area, larger planes a low pitch is needed on the take-off to increase engine speed, power output and propeller efficiency, thus increasing effective thrust to permit take-off in limited space.

Operation between overhauls has increased from 75 hr. to 500 hr.

Monday, September 17, 1945

260th Day—105 days to follow

CLEAR
CLOUDY
RAIN
SNOW

west Indies pleasantly warm  
in winter

Sunday, September 16, 1945  
259th Day—106 days to follow

235

Tuesday, September 18, 1945

261st Day—104 days to follow

CLEAR
CLOUDY
RAIN
SNOW

#### AIRCRAFT ENGINES

Variable pitch propellers compare to geared automobiles — low pitch to low gear. By use of larger wing loadings (lb. of gross wght. / sq. ft. of wing area) with larger planes a low pitch is needed on the take-off to increase engine speed, power out-put and propeller efficiency, thus increasing effective thrust to permit take-off in limited space.

Operation between overhauls has increased from 75 hr. to 500 hr. <sup>approx.</sup>

Wednesday, September 19, 1945

262nd Day—103 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Power loading: ratio of gross plane weight to Rated HP of the engine.

Engine weight,  $\left(\frac{\text{wght. of engine in lb.}}{\text{Rated HP}}\right)$  is approx. 2 to 3 lb/HP on small engines and less than one on large engines.

Reliability: <sup>sited to conditions at which it operates</sup> operation under varying conditions.

Economy measured in Specific Fuel Consumption, which is  $\frac{\text{wght. of fuel burned per hr.}}{\text{HP developed}}$

1 gallon of gasoline weighs about 6 lb.

Flexibility: Varying conditions

Balance: Free from destructive vibration

Counterweights, dynamic dampers, increase the number of cylinders.

Gasoline fuel (a) Heat energy, volatility, knock value, purity, cost

Thursday, September 20, 1945

237

263rd Day—102 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Took a ride down the river a little way on the river boat "Bland Queen" a pleasure boat which regularly takes passengers from Cincinnati to Cayuga Island Amusement Park but

safety fuel is high flash + needs a high temp. to vaporize

Breathing capacity is the ability to supply air to burn the fuel.

Compression ratio varies from 5:1 to 8:1

Reisel fuels rated in Cetane numbers, indicating the smoothness of combustion characteristics to prevent "rattle" (vibration).

Gasoline engine has more power on take-off, and more flexible. Also lighter. <sup>Modern engine has gone thru</sup> stages. Mechanical, Chemical, Heat Control.

A Engines classified as external or internal combustion. Internal: expanded within comb. chamber.

B As two stroke or four-stroke cycle engines. (Reciprocating piston).

Friday, September 21, 1945

264th Day—101 days to follow

CLEAR
CLOUDY
RAIN
SNOW

- C. As to method of carburation introducing fuel into cylinder. "Carburation; atomizing, vaporizing + mixing fuel with air.
- " Fuel injection; pumped, sprayed into air as it enters intake (latter has advantage over carburetor because it may be ignited by electric spark or compression. (Diesel).

ENGINE NOMENCLATURE

Cylinder barrel — steel <sup>or cast iron (bearing)</sup>  
Cylinder head — Al alloy <sup>high conductivity</sup> (high temp)  
Flange — base of cylinder where bolted  
Skirt — Cylinder <sup>keeps oil out</sup> extending into crankcase  
Pistons — Al alloy (high conductivity)  
Piston rings — high grade cast iron  
(a) seal for presi. (b) oil seal (c) conduct heat  
Piston pin — steel

Saturday, September 22, 1945

239

265th Day—100 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Took a ride down the river a little way on the river boat "Island Queen," a pleasure boat which regularly takes passengers from Cincinnati to Coney Island Amusement Park, but comes down to Memphis in the winter.

Bus Hayes and I went to a high school football game tonight.

Sunday, September 23, 1945

266th Day—99 days to follow

George Irish (Knoxville) and I went to Shelby State Forest this afternoon. Just like old times. We found a hanging grape vine, a pretty lake, lots of trails and trees. We climbed a rugged beech and swung on the vine. A place to go back to.

Monday, September 24, 1945

267th Day—98 days to follow

CLEAR
CLOUDY
RAIN
SNOW

I went to a wrestling match tonight. It was rather poor. The wrestlers grunted and puffed, as usual, but didn't hurt each other much.

Connecting rods - high grade steel with bronze alloy at piston end for bearing.

Other end split with bearing shells or liners

"Converts reciprocating motion to rotating motion"

Radial engines, articulating - all connecting rods to same bearing. <sup>Master rod & link rods.</sup>

Crankshaft: hollow for oil & weight

Radial ball thrust bearing <sup>centrifugal & gyroscopic thrust forces of prop</sup>

Con. rod. bearing journal on crank throw.

Crankcase includes breather system

and sump. Diffuser system also included. (Distributes mixture to cylinders.)

#### SYSTEMS

Lubrication. Oil press. around crankshaft by gear pumps. Splash and fumes.

Tuesday, September 25, 1945

268th Day—97 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Marye-Ann, I'm waiting for the time when we'll be doing everything together. Just a couple more years and then...

Cooling system. 1. Liquid; plumbing, water, prestone

2. Air cooling, baffle and cowl direct air to fins.

Induction. Venturi controls it. Throttle closed

Gasoline octane

determines anti-knock

value of the gas

Knocking means detonating.

\* \* \*



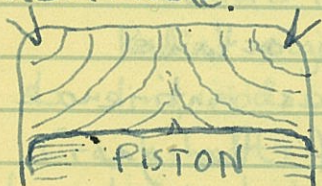
The more the mixture is compressed before it is ignited, the greater the power produced - up to a certain point determined by

Wednesday, September 26, 1945

269th Day—96 days to follow

CLEAR
CLOUDY
RAIN
SNOW

the characteristics of the gas itself. Thus, gas which can be compressed more is more desirable.



When the mixture is ignited the gases expand out from both spark plugs evenly and

push against the piston with a steady force.

The compression ratio can be made greater as long as this is true. A certain point is reached however where the expanding gases coming out from both spark

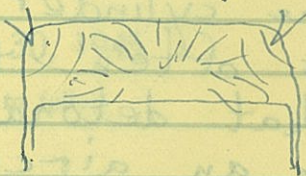
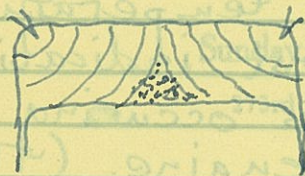
Thursday, September 27, 1945

243

270th Day—95 days to follow

CLEAR
CLOUDY
RAIN
SNOW

plugs compress the mixture to the point where it ignites itself. (The temp. is raised to the kindling point by compression.)



When this occurs a violent explosion occurs which strains the cylinder walls ~~but~~ and wastes the power of the fuel.

In fact the power is reduced to about  $\frac{1}{4}$  of what it is when the mixture burns steadily. Most of the energy



Friday, September 28, 1945

271st Day—94 days to follow

CLEAR
CLOUDY
RAIN
SNOW

At five o'clock this afternoon our orders arrived, And I'm on the list. We are leaving for St. Mary's Pre Flight School, St. Mary's, California, tomorrow.

I cleaned out my locker and did other odd jobs.

is wasted as heat loss and as a result an increase in the cylinder head temperature is often the first indication that detonation is occurring in an aircraft engine. (The metallic click can be heard in an automobile engine.)

Saturday, September 29, 1945

272nd Day—93 days to follow

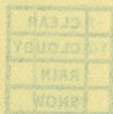
CLEAR
CLOUDY
RAIN
SNOW

I'm already to leave Memphis—Sea bag and hand bag both packed, telegram sent home, special delivery letter to Marye-Ann.

Sunday, September 30, 1945

273rd Day—92 days to follow

Formulas used in calculus:



$$\sin^2 X + \cos^2 X = 1$$

$$\sec^2 X = 1 + \tan^2 X$$

$$\csc^2 X = 1 + \cot^2 X$$

$$\sin 2X = 2 \sin X \cos X$$

$$\cos 2X = \cos^2 X - \sin^2 X$$

$$= 2 \cos^2 X - 1$$

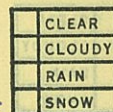
$$= 1 - 2 \sin^2 X$$

$$\text{or.}$$

$$\sin \frac{X}{2} = \frac{\sqrt{1 - \cos X}}{2}$$

$$\cos \frac{X}{2} = \frac{\sqrt{1 + \cos X}}{2}$$

274th Day—91 days to follow



## DERIVATIVES OF TRIG FUNCTIONS

When  $y =$  Then  $\frac{dy}{dx} =$ 

$$\sin x \quad \cos x$$

$$\cos x \quad -\sin x$$

$$\tan x \quad \sec^2 x$$

$$\cot x \quad -\csc^2 x$$

$$\sec x \quad \tan x \sec x$$

$$\csc x \quad -\cot x \csc x$$

arcsin X

Tuesday, October 2, 1945

275th Day—90 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Wednesday, October 3, 1945

249

276th Day—89 days to follow

CLEAR
CLOUDY
RAIN
SNOW

We arrived at St Mary's this afternoon after stopping at Treasure Island receiving station and it was obvious from the start that our days of leisure are over. I never saw so many facilities for bone-breaking crowded into such a small area. This is the muscle factory I guess. I've already begun to dislike Pre-Flight and I haven't even started.

St. Mary's college itself is very pretty. It is nestled in a valley surrounded by bald hills. The buildings are stucco and tiled with Spanish patios and lovely flower beds and gravel paths.

We slept in sleeping bags on the gym floor the first night.

Wed. Morn.

stopped at Sacramento, the capital of Cal., for a few minutes. Children were going to school. Put ice under the cars.

Thursday, October 4, 1945

277th Day—88 days to follow

CLEAR
CLOUDY
RAIN
SNOW

### ENGINES COMPREHENSIVE TEST

R-1830 means Radial engine w.  
1830 cu. in piston displacement  
In checking mags neither should  
drop over 100 RPM

Operating on one mag on take off  
would probably cause detonation  
Tachometer indicates RPM of crankshaft  
In switching fuel tanks part of proced.  
is to switch tanks and then operate  
wobble pump if a drop of fuel  
pressure is noticed

A green line on a gage shows  
desired operating range

Dilution system is used to assist  
in cold weather starting  
When flying under favorable carb.  
ice conditions use at least 75% power

The mech. or manu. sets carb.  
to provide slightly richer  
than rich best.

Excessive priming may cause  
scoring of cylinder walls

Friday, October 5, 1945

257

278th Day—87 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Flying at alt. of 8000ft, it may be  
necessary to move mixture control to  
"lean" position to prevent excessive  
rich mixture.

The throttle stop for take-off is  
used on some planes such as the SNJ  
for the purp. of preventing excessive  
manifold press.

Use carb. heat in a long glide  
If oil collects on lower cylinders  
remove lower spark plugs  
In absence of fuel air ratio indicators,  
the instr. to indicate proper use  
of mixture control is the cylinder  
head temp. gage

When engine is equipped w. constant  
speed or auto. prop, the crankshaft  
speed is controlled by the prop control.  
Hydraulically operated controllable or  
constant speed are stopped, started,  
and stored in high pitch.

For landing prop should be in  
high RPM

Saturday, October 6, 1945

279th Day—86 days to follow

CLEAR
CLOUDY
RAIN
SNOW

If specification calls for 91 octane, 100 octane may be used.

9 cyl. eng. operating at 2000 RPM, BMEP 165psi, stroke 6", area of cross section 28 sq. in., it will have an IHP of about 625.

Hamilton const. speed, feathering prop utilizes an <sup>oil</sup> press. to either increase or decrease pitch.

Detonation readily detected by cyl. head temp. gage.

Max power with mixture 13 to 1

Sunday, October 7, 1945

280th Day—85 days to follow

Volumetric eff. decreased by increase in air temp.

Altimeter measures directly the pressure altitude.

Engine performance and power is directly dependent on density altitude.

Loss of power w. inc. altitude is due primarily to loss of vol. efficiency

Monday, October 8, 1945

253

281st Day—84 days to follow

CLEAR
CLOUDY
RAIN
SNOW

On a hot day w. temp.  $10^{\circ}\text{C}$  above standard the density alt. will be greater than the press. alt.

BMEP inc. w. inc. manifold press. N2S has cockpit control for carb. <sup>air</sup> <sup>press</sup> heat icing in N2S indicated by drop in RPM without moving throttle.

Propellant - explosive whose rate of reaction is characteristically a burning rate. Burn progressively and reaches max. press. comparatively late.

Black <sup>BP</sup> Powder 75%  $\text{KNO}_3$  (saltpeter), 10% Sulfur, 15% charcoal

Highly inflammable and sensitive

Hygroscopic (Fuse delay, impulse, etc.)

Smokeless <sup>SP</sup> powder Single base

ether alcohol colloid of nitrocellulose

containing small amt of diphenylamine

When confined rate of burning

increases rapidly with temp.

and press. standard U.S. gun propellant

Tuesday, October 9, 1945

282nd Day—83 days to follow

CLEAR
CLOUDY
RAIN
SNOW

w. prop like N2S the <sup>operation of</sup> proper mixture control can be determined directly by tach.

Typical N2S readings in flight:

Oil press 75 psi, Oil temp. 55°C

In procedure for stopping N2S, the engine will normally stop when the throttle is advanced after mixture control is in "full lean" position.

Ballistite (double base prop.)

Mixture of Nitrocellulose +

Nitroglycerin w. small % diphenylamine  
& inorganic salts. <sup>(Pyrotechnic)</sup> Rocket propellant)

### INITIATORS

Burning rate of high explosive but initiate detonation of other explosives.

Mercury fulminate  $Hg(ONC)_2$

Readily detonates when confined by shock, spark, etc.

Lead Azide - more sensitive to flame, less to shock Not effected by moisture

Wednesday, October 10, 1945

255

283rd Day—82 days to follow

CLEAR
CLOUDY
RAIN
SNOW

In case oil press. does not show on gage within 30 sec. shut off engine

From performance curve of R-670

if you plan to cruise @ 70% full sea level power the RPM will be 1850

From same if no wind exists & same conditions the IAS will be 88k.

### DETONATING OR HIGH EXPLOSIVES

Tetryl - booster charge, complex organic compound

TNT - Toluol with mixture of sulfuric nitric acids - Main charge in mines, depth charges, but too sensitive for armor piercing.

AMATOL TNT and ammonium nitrate from 50/50 to 80/20

Hygroscopic - Same uses as TNT

TORPEX - RDX, Al powder, TNT

Thursday, October 11, 1945

284th Day—81 days to follow

CLEAR
CLOUDY
RAIN
SNOW

With same conditions the fuel-air ratio will be.

From engine char. curve for R-1340 the BHP for 1750 RPM, 26" Hg., dens. alt 5000 ft., is 310

From same engine curve it indicates that to have 400 HP at 3000 ft dens. alt. at 2000 RPM the manifold press. should be 29 in. of mercury.

### Explosive train

#### I (To get shell in air)

1. Initiator or primer
2. Igniter (BP)
3. Propellant BP<sub>SP</sub> Ballistite

#### II (To explode shell)

1. Primer in the fuze-initiator
2. Igniter (BP)
3. Booster Granular TNT or Tetryl
4. Bursting charge

Friday, October 12, 1945

257

285th Day—80 days to follow

CLEAR
CLOUDY
RAIN
SNOW

We took swimming tests, speed agility & strength tests, medical examination, and were issued our cadet uniforms.

I skipped the 7th Batt's graduation today. Mr. Price & Mr. Nisson also skipped it.

.60 cal. largest small arms <sup>no distance</sup> pieces  
to 5" 38 - fixed ammo  
6" semi-fixed  
8" up bag ammo

Ogive called windshield on armor piercing

Saturday, October 13, 1945

286th Day—79 days to follow

CLEAR
CLOUDY
RAIN
SNOW

I went for a hike over the hills today. Compared to our Ohio woodlands it didn't have as much to offer. The breeze is stiffer on the tops of the hills.

The barracks are named for CV's. The one the 13th is stationed in is Essex.

Sunday, October 14, 1945

287th Day—78 days to follow

The chapel is beautiful. We stepped inside one evening when only the lights on the altar were burning, and all the Catholic statue work and stained windows produced a striking effect.

Monday, October 15, 1945

288th Day—77 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Frontogenesis - formation of a front  
by conflicting winds → ←

Frontolysis - smoothing out a wave  
by blowing away ← →

General path of storms across the U.S. is eastward.

Warm front always extends eastward from a low at from 15-25 mph  
The low pressure area moves about the same rate.

The low will move in the direction of the greatest decrease in press. in the last 3 hours.

Warm front slope 1 mi. : 150 mi.  
Cloud deck and precipitation

Correct for drift right and long banded Cu in NE

From S to N when flying from warm air into C.F.



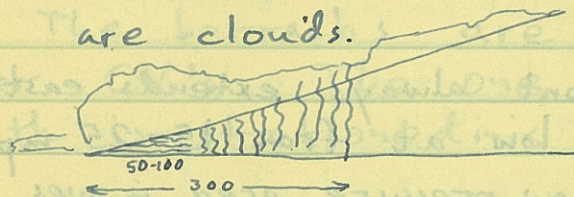
Tuesday, October 16, 1945

289th Day—76 days to follow

CLEAR
CLOUDY
RAIN
SNOW

After the temp. drops and the wind changes the surface front is behind you.

Precipitation is 300 mi. before warm front. Poor Visibilities and low ceilings extend 50-100 mi. before front. 600 mi. ahead are clouds.



In warm sector Stratus clouds over water always and in winter over land.

Over summer Cu and always Cu in low latitudes.

Cold front 1:40 or 100 mi.  
25 - 35 mph

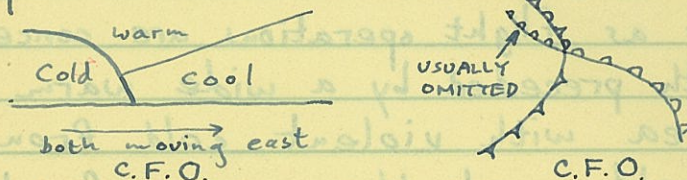
Wednesday, October 17, 1945

261

290th Day—75 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Occluded front - cold front catches up with warm front



On a warm front occlusion the upper front is drawn on the map because it is 200 mi. ahead of surface front.

Approach from either side looks like that kind of front.

mT Hawaii + Azores

cP Northern Canada

Ci Cs As Ns St Warm front series  
Icing, rain or snow, fog Winter warm front

From SE to SW as warm front passes  
Would not look for squall line on warm front  
8000 ft.

Freezing rain at 5000 ft - warm air aloft

123  
Thursday, October 18, 1945

291st Day—74 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Weather conditions for either  
occlusion is about the same as  
far as flight operations are concerned.  
Both preceded by a wide warm front  
area with violent cold front  
weather at the upper front.  
The WORST POSSIBLE flying weather  
is from the peak of the warm  
sector to 50 or 100 mi. north.

WFO - Upper front precedes occluded  
front by as much as 200 mi.

CFO - Upper front follows  
occluded front from 20-30 mi.

263  
Friday, October 19, 1945

292nd Day—73 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Sunday, October 21, 1945

294th Day—71 days to follow

22  
Saturday, October 20, 1945

293rd Day—72 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Weather conditions for either  
occlusion is about the same as  
far as flight operations are concerned.  
Both preceded by a wide warm front  
area with violent cold front  
weather at the upper front.

The WORST POSSIBLE flying weather  
is from the peak of the warm  
sector to 50 or 100 mi. north.

WFO - Upper front precedes occluded  
front by as much as 200 mi.

CFO - Upper front follows  
occluded front 20-30 mi.

Sunday, October 21, 1945

294th Day—71 days to follow

265  
Monday, October 22, 1945

295th Day—70 days to follow

CLEAR
CLOUDY
RAIN
SNOW

232  
Tuesday, October 23, 1945

296th Day—69 days to follow

<input type="checkbox"/>	CLEAR
<input type="checkbox"/>	CLOUDY
<input type="checkbox"/>	RAIN
<input type="checkbox"/>	SNOW

Sunday, October 21, 1945

294th Day—71 days to follow

267  
Wednesday, October 24, 1945

297th Day—68 days to follow

<input type="checkbox"/>	CLEAR
<input type="checkbox"/>	CLOUDY
<input type="checkbox"/>	RAIN
<input type="checkbox"/>	SNOW

Thursday, October 25, 1945

298th Day—67 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Friday, October 26, 1945

299th Day—66 days to follow

CLEAR
CLOUDY
RAIN
SNOW

269

Sunday, October 28, 1945  
301st Day—64 days to follow

102  
Saturday, October 27, 1945

300th Day—65 days to follow

<input type="checkbox"/>	CLEAR
<input type="checkbox"/>	CLOUDY
<input type="checkbox"/>	RAIN
<input type="checkbox"/>	SNOW

Sunday, October 28, 1945

301st Day—64 days to follow

271  
Monday, October 29, 1945

302nd Day—63 days to follow

<input type="checkbox"/>	CLEAR
<input type="checkbox"/>	CLOUDY
<input type="checkbox"/>	RAIN
<input type="checkbox"/>	SNOW

Most of the day was spent in the gymnasium. The afternoon was spent in the mess hall and at a movie. The night was spent in the mess hall.

The sports:

Swimming  
Football  
Basketball  
Baseball

Gymnastics  
Track  
Wrestling  
Fencing  
Handball  
Baseball and Basketball  
Theory of Flight

Instruction is given in periods of one hour a day. The sports program is inter-battalion competition.

Tuesday, October 30, 1945

303rd Day—62 days to follow

	CLEAR
	CLOUDY
X	RAIN
	SNOW

More California liquid sunshine—  
all day long. Wrote Marye-Ann  
and got a wonderful letter  
from her today.

The subjects:

Aerology

Navigation: Dead Reckoning  
and Celestial

Gunnery

Survival

Engines

Communications

Code and Blinker

Theory of Flight

Essentials of Naval Service

Wednesday, October 31, 1945

273

304th Day—61 days to follow

	CLEAR
X	CLOUDY
	RAIN
	SNOW

In swimming this morning we did  
the 100 yd. medley and a half  
mile.

The sports:

Swimming

Football

Basketball

Soccer

Tumbling

Track

Wrestling

Hand to Hand

Boxing

We have two sports instruction  
periods a day (Not much  
instruction, though) and a  
sports Program, which is inter-  
battalion competition.





Friday, November 2, 1945

306th Day—59 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Saturday, November 3, 1945

307th Day—58 days to follow

CLEAR
CLOUDY
RAIN
SNOW

We took a hike in survival in the afternoon. We hiked "up" and also south. Finally we got to the top of a hill and stretching out in the distance was San Francisco Bay. These hills are quiet, and pastoral - and beautiful. Cool glades of sweet-smelling trees are situated at irregular intervals on the slopes.

Sunday, November 4, 1945

308th Day—57 days to follow

SMPEF's football team tied Fleet City today in a gruelling 13-13 final score. It was a good display of professional ball.

Monday, November 5, 1945

309th Day—56 days to follow

CLEAR
CLOUDY
RAIN
SNOW

## QUANTUM THEORY

## ENERGY &amp; MATTER

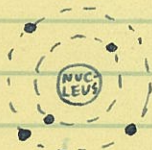
Relation between energy and frequency:

$$E = 6.55 \times 10^{-27} \cdot f = hf$$

$E$  = energy to remove an electron from one level

$h$  = Planck constant

$f$  = frequency of radiated light



When an electron is knocked out of place it leaves a vacancy which another electron drops into, giving up potential energy in the form of light of frequency " $f$ " radiated into space.

When energy falls on an atom it is absorbed not continually but only in

Tuesday, November 6, 1945

310th Day—55 days to follow

CLEAR
CLOUDY
RAIN
SNOW

definite amounts called quanta.

Similarly when a change in internal arrangement takes place within the atom altering its energy content the emission of energy by the atom is likewise in discreet amounts or quanta. (called "photons" when referring to quanta of light.)

Light waves have any wave length which is dependent on their origin but its energy content is thereby fixed, and no matter how far the wave travels its energy content remains unchanged.

The color is associated with the energy or wave length.

A beam of yellow light grows dim in intensity as one moves farther away from the source but

Wednesday, November 7, 1945

311th Day—54 days to follow

CLEAR
CLOUDY
RAIN
SNOW

yellow in color it remains. Fewer and fewer of its photons strike any given area per sec. (as one moves from the source.), but every one that does has its full complement of energy  $hf$  or in terms of wave length,  $\frac{hc}{\lambda}$ .  
 $\lambda$  = wave length;  $c = 186,000$  mi/sec.

All photons are not uniform in magnitude. The amount of energy is directly and exactly proportional to its frequency. For this reason photons were first discovered in X-rays because having a frequency 1000 times that of visible light their photons or energy packets are a thousand times greater, and when they give up energy to atoms or electrons their

Thursday, November 8, 1945

281

312th Day—53 days to follow

CLEAR
CLOUDY
RAIN
SNOW

punch is correspondingly greater. Cosmic rays have the largest photons yet discovered.

Compton showed that radiant energy is a material object since it obeys the laws of mechanics. (Velocity, momentum, & energy.)

Sunday, November 11, 1945

315th Day—50 days to follow

Friday, November 9, 1945

313th Day—52 days to follow

CLEAR
CLOUDY
RAIN
SNOW

... of the photons is directly proportional to its frequency. For this reason photons were first discovered in X-rays because having a frequency 1000 times that of visible light their photons or energy packets are a thousand times more energetic than those of visible light. All photons are not uniform in magnitude. The amount of energy is directly proportional to its frequency. For this reason photons were first discovered in X-rays because having a frequency 1000 times that of visible light their photons or energy packets are a thousand times more energetic than those of visible light.

Saturday, November 10, 1945

314th Day—51 days to follow

CLEAR
CLOUDY
RAIN
SNOW

... of the photons is directly proportional to its frequency. For this reason photons were first discovered in X-rays because having a frequency 1000 times that of visible light their photons or energy packets are a thousand times more energetic than those of visible light. All photons are not uniform in magnitude. The amount of energy is directly proportional to its frequency. For this reason photons were first discovered in X-rays because having a frequency 1000 times that of visible light their photons or energy packets are a thousand times more energetic than those of visible light.

Sunday, November 11, 1945

315th Day—50 days to follow

... of the photons is directly proportional to its frequency. For this reason photons were first discovered in X-rays because having a frequency 1000 times that of visible light their photons or energy packets are a thousand times more energetic than those of visible light. All photons are not uniform in magnitude. The amount of energy is directly proportional to its frequency. For this reason photons were first discovered in X-rays because having a frequency 1000 times that of visible light their photons or energy packets are a thousand times more energetic than those of visible light.

Monday, November 12, 1945

316th Day—49 days to follow

<input type="checkbox"/>	CLEAR
<input type="checkbox"/>	CLOUDY
<input type="checkbox"/>	RAIN
<input type="checkbox"/>	SNOW

## ECONOMICS

(Part of the following is repetition, but important concepts.) from Bowman and Bach

### ENDS OF SOCIAL POLICY (in the U.S.)

1. Allocation of resources in accordance with consumer preferences
2. Freedom in the choice of a job or business
3. Equity in the distribution of incomes
4. Progress in raising planes of living; elimination of waste.
5. Stability and security.

These ends are primarily social, not individual, and the function of society in its use of the total economic resources available to it is correspondingly ultimately directed toward providing what we as consumers want.

Tuesday, November 13, 1945

285

317th Day—48 days to follow

<input type="checkbox"/>	CLEAR
<input type="checkbox"/>	CLOUDY
<input type="checkbox"/>	RAIN
<input type="checkbox"/>	SNOW

Under capitalism with the maximizing of profits as the motive of the entrepreneur he will endeavor to furnish products in accordance with consumer preference.

Wednesday, November 14, 1945

318th Day—47 days to follow

CLEAR
CLOUDY
RAIN
SNOW

### LAW OF DEMAND

Peoples' wants differ. Some will pay \$10 for a silk shirt, others \$12, still less will pay \$14.

THE LOWER THE PRICE THE GREATER THE EFFECTIVE DEMAND.

Or, the greater the amt. of a given commodity to be sold, <sup>in a given market,</sup> the lower must be the price. <sub>at a given time</sub>

(because more people will talk business as the price comes within reach)

WHY THE PRICE COMES DOWN  
Law of Diminishing Utility

1. AFTER A CERTAIN POINT HAS BEEN REACHED, THE INTENSITY OF ONE'S DESIRE FOR ADDITIONAL UNITS OF GOODS DIMINISHES AS THE STOCK POSSESSED INCREASES.

The significant is the marginal utility, or what

Thursday, November 15, 1945

257

319th Day—46 days to follow

CLEAR
CLOUDY
RAIN
SNOW

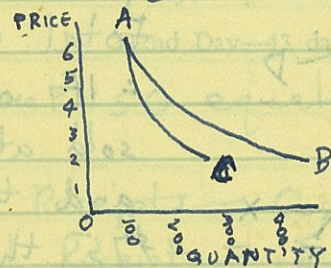
a person will pay for one more unit.

2. It will be put to less important uses if the price comes down.
3. Different desires & incomes allow a different amt. willing to pay.

### ELASTICITY OF DEMAND

sensitivity to change in price.

Elastic — very sensitive  
Inelastic — not " "



AB More elastic than AC.

EXAMPLE  
AB Automobiles  
AC BREAD

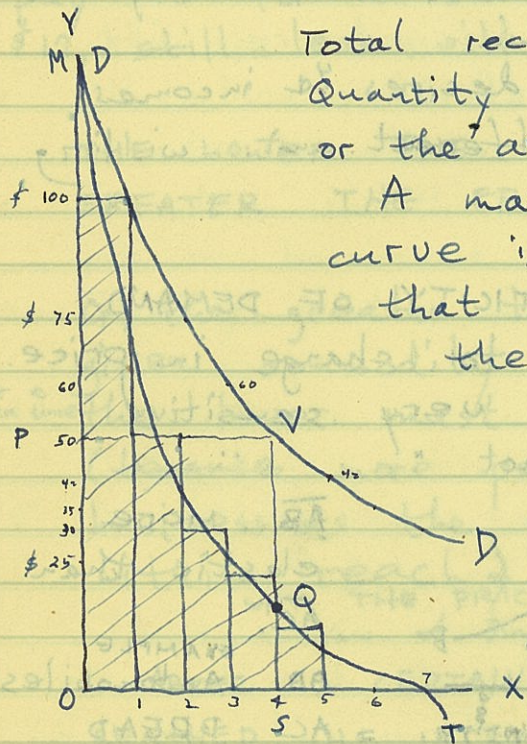
More elastic if it costs large % of income, + if there are substitutes

Friday, November 16, 1945

320th Day—45 days to follow

CLEAR
CLOUDY
RAIN
SNOW

The amt. of change in receipts which results from a unit change in price is known as marginal receipts.



Total receipts equals Quantity times cost, or the area of PVSO

A marginal receipts curve is drawn so that the area under the curve at

any quantity gives the total receipts.

∴ If one is sold at \$100 and two at \$75 the marginal receipts are

\$50 and a curve is drawn to have an area of 100 + 50. (Marginal receipts of one over one plus one unit more over one

Saturday, November 17, 1945

289

321st Day—44 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Price per Rug	Quantity Sold	Total Receipts	Marginal Receipts
∞*	0	0	0
\$100	1	\$100	\$100
75	2	150	50
60	3	180	30
50	4	200	20
42	5	210	10
35	6	210	0
30	7	210	0
25	8	200	-10

\*A price at which none will be sold, finite.

Sunday, November 18, 1945

322nd Day—43 days to follow

∴ Area PVSO equals area MQSO

Total Receipts = Cost × Quantity sold  
 Total Receipts =  $\sum \Delta$  Marginal Receipts  
 OR in other words the summation of increments of marginal receipts, plotted by a unit increase in quantity sold against price at that time.

Monday, November 19, 1945

323rd Day—42 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Scarcity is fundamental in determining price, also costs of production. i. effort, ability, <sup>(interest)</sup> saving, land space, natural materials, riskbearing & in case of monopolies, withholding.

Costs to the economist are what the community must pay for the good, thus it includes interest on enterprisers' savings, wages of management, and a reward for risk.

The use of any agent in production involves a cost which is determined by the prices offered for that agent in all its alternative uses.

Fixed costs; insurance taxes, interest, etc. Same if idle or running  
Variable costs; wages, etc.

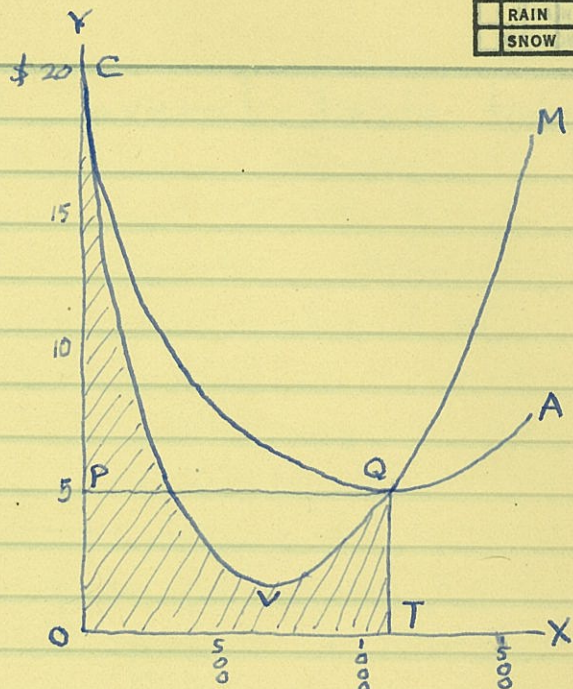
Tuesday, November 20, 1945

291

324th Day—41 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Curve CA





Wednesday, November 21, 1945

325th Day—40 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Scarcity is fundamental. AD (demand) raising price, also costs of production (effort, ability, saving, land, space, natural materials, riskbearing & is case of monopolies, withholding).

Costs to the entrepreneur and what the consumer must pay for the good, thus it includes interest on entrepreneur's savings, wages of management, and a reward for risk.

The use of any agent in production involves a cost, which is determined by the prices offered for that agent in all its alternative uses.

Fixed costs; income taxes;

Thursday, November 22, 1945

326th Day—39 days to follow

CLEAR
CLOUDY
RAIN
SNOW

We had several tests today

Sunday, November 25, 1945

329th Day—36 days to follow

Liberty today in Berkeley and Oakland. Just getting the lay of the land, then went to a movie with Dick Landis.

Friday, November 23, 1945

327th Day—38 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Saturday, November 24, 1945

328th Day—37 days to follow

CLEAR
CLOUDY
RAIN
SNOW

We had several tests today.

Operate at maximum allowable  
 cruising BMEP and engine RPM  
 to maintain desired air speed.  
 To maintain constant BMEP  
 reduce manifold pressure one inch  
 for every 2500 ft. increase in  
 density altitude.

For a given power maximum  
 BMEP permits use of minimum RPM  
 before taking. For cost of  
 interaction with normal response  
 to response of

Sunday, November 25, 1945

329th Day—36 days to follow

Liberty today in Berkeley  
 and Oakland. Just getting  
 the lay of the land, then  
 went to a movie with Jack  
 Landis.

Monday, November 26, 1945

330th Day—35 days to follow

CLEAR
CLOUDY
RAIN
SNOW

### ENGINES

Operate at maximum allowable cruising BMEP and enough RPM to maintain desired air speed.

To maintain constant BMEP reduce manifold press. one inch for every 2500 ft. increase in density altitude.

For a given power maximum BMEP permits use of minimum RPM.

Octane rating: Per cent of iso-octane with normal heptane to reproduce burning char. of the fuel tested: 35% heptane & 65% isooctane = Octane number 65.

Idling requires a richer mixture due to the higher temp. in cylinder caused by the exhaust diluting the mixture and making it burn slower and throughout more

Tuesday, November 27, 1945

331st Day—34 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Wednesday, November 28, 1945

332nd Day—33 days to follow

CLEAR
CLOUDY
RAIN
SNOW

My finger is still in a splint.  
The doctor extended my  
limited activities <sup>but</sup> until  
Dec. 12 because <sup>my finger</sup> ~~it~~ was  
still swollen.

Thursday, November 29, 1945

333rd Day—32 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Friday, November 30, 1945

334th Day—31 days to follow

CLEAR
CLOUDY
RAIN
SNOW

My finger is still in a splint  
The doctor extended my  
limited activities <sup>by finger</sup> butta until  
Dec. 12 because ~~it~~ was  
still swollen.

Saturday, December 1, 1945

335th Day—30 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Sunday, December 2, 1945

336th Day—29 days to follow

Friday, December 1, 1945

Special Data

334th Day—31 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Saturday, December 1, 1945

335th Day—30 days to follow

CLEAR
CLOUDY
RAIN
SNOW

The Proflight Football League  
 was held tonight at the  
 St. Francis Hotel in  
 -977M, you missed you  
 Marye

Sunday, December 2, 1945

336th Day—29 days to follow

Monday, December 3, 1945

337th Day—28 days to follow

CLEAR
CLOUDY
RAIN
SNOW

The PreFlight Football banquet  
was held tonight at the  
St. Francis Hotel in 'Frisco.

I really missed you, Marye-  
Ann.

Sunday, December 2, 1945  
336th Day—29 days to follow

Tuesday, December 4, 1945

338th Day—27 days to follow

CLEAR
CLOUDY
RAIN
SNOW

384  
Wednesday, December 5, 1945

339th Day—26 days to follow

CLEAR
CLOUDY
RAIN
SNOW

The Preflight Football banquet  
was held tonight at the  
St. Francis Hotel in Frisco.  
I really missed you, Marye-  
Ann.

30  
Thursday, December 6, 1945

340th Day—25 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Sunday, December 9, 1945

343rd Day—22 days to follow



Friday, December 7, 1945

341st Day—24 days to follow

<input type="checkbox"/>	CLEAR
<input type="checkbox"/>	CLOUDY
<input type="checkbox"/>	RAIN
<input type="checkbox"/>	SNOW

Saturday, December 8, 1945

309

342nd Day—23 days to follow

<input type="checkbox"/>	CLEAR
<input type="checkbox"/>	CLOUDY
<input type="checkbox"/>	RAIN
<input type="checkbox"/>	SNOW

Sunday, December 9, 1945

343rd Day—22 days to follow

Monday, December 10, 1945

344th Day—21 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Sunday, December 9, 1945  
 343rd Day—22 days to follow

Tuesday, December 11, 1945

345th Day—20 days to follow

CLEAR
CLOUDY
RAIN
SNOW

What more was needed outside of  
 the weather report? The weather  
 forecast was for a clear day  
 with a light breeze and a  
 few clouds. The temperature  
 was expected to be in the  
 40s. The humidity was expected  
 to be in the 60s. The  
 wind was expected to be from  
 the west at 5 to 10 miles  
 per hour. The sky was  
 expected to be clear with  
 a few wispy clouds. The  
 sun was expected to be out  
 for most of the day. The  
 moon was expected to be out  
 for most of the night. The  
 stars were expected to be  
 visible for most of the  
 night. The weather was  
 expected to be perfect for  
 a hike. We hiked to Moraga  
 Canyon at about 10:00 AM.  
 The road was a dirt road  
 and was in good condition.  
 We hiked along the road for  
 several miles to the entrance  
 to Redwood Canyon State  
 Park. Here we had a few  
 more miles ahead of us.  
 We stopped for a "blow"  
 at the entrance to the park.

Wednesday, December 12, 1945

346th Day—19 days to follow

CLEAR
CLOUDY
RAIN
SNOW

We were issued our survival gear: after sports-program. The gear included a sleeping bag with wool liner, three days of K-rations, a knap-sack and a machete.

I managed to pick up two extra wool liners which will be well worth the extra weight since the weather is cold.

Thursday, December 13, 1945

347th Day—18 days to follow

CLEAR
CLOUDY
RAIN
SNOW

About noon we mustered for the hike and then set off at a terrific pace for parts unknown. The day was cold and the pack was heavy. The sun was shining even with the thermometer lower than usual and it wasn't long until the shoulder-straps started getting wet.

We hiked to Moraga, turned up a country road ("up" was the correct preposition!). We hiked along this road for several miles to the entrance to Redwood Canyon State Park. Here we had a few more miles ahead of us.

We stopped for a "blow," then turned to tackle a very slippery, treacherous trail over a high, steep

Friday, December 14, 1945

348th Day—17 days to follow

CLEAR
CLOUDY
RAIN
SNOW

bluff. The trail was muddy and the packs kept trying to pull us back down, but eventually we reached a fence and then a road (wagon-trail) and we were at the crest of a ridge. From here it was all downhill. I literally rolled my pack about 400 yards. A clearing in the valley was our campsite. "Gismo" and I joined our half pup-tents, unrolled our sleeping bags and went to bed about 6:30.

It got cold. My wool liners felt good. Many of the fellows were too cold to sleep we found out the next morning. They had tried to

Saturday, December 15, 1945

349th Day—16 days to follow

CLEAR
CLOUDY
RAIN
SNOW

in getting chilled, burned, and cut. We got up at 8:00 when a muster was called. Puddles of water had frozen during the night. We ate our K-rations after heating the meat & boiling some water for coffee.

Besides eating we spent the day in building snares, collecting edible wild plants, making a fishing line from the inner bark of willow, and

and a Sunday, December 16, 1945 fish hook from the <sup>350th Day—15 days to follow</sup> key to a can of meat in the K-Rations. We also scraped the wax from the boxes to manufacture a crude sort of candle. These little items had to be checked-off on Saturday.

Monday, December 17, 1945

351st Day—14 days to follow

CLEAR
CLOUDY
RAIN
SNOW

became a muddy flat. The only comfortable place was in the sleeping bag so for that reason I spent most of my time there. We all got a steak that night, and a steak never tasted better than it does when it is seared and roasted over a two-foot bed of coals—hardwood coals.

The hike back was uneventful, but it was still a race of some sort. I started itching from poison oak after a shower, but was really fortunate compared to the way some of the fellows got it.

Tuesday, December 18, 1945

352nd Day—13 days to follow

CLEAR
CLOUDY
RAIN
SNOW

### NATURAL WONDERS AT YOSEMITE & BEAUTIFUL SCENES

Nevada Falls  
 Yosemite Falls  
 Vernal Fall  
 Bridal Veil Fall  
 Half Dome  
 Cathedral Rocks  
 Washington Column  
 Happy Isles, Yosemite valley  
 Mirror Lake  
 El Capitan  
 Glacier Point  
 Sentinel Rock  
 Mariposa "Big Tree" Grove  
 Snow scenes

Wednesday, December 19, 1945

353rd Day—12 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Robert would be if  
he were alive.

This is our routine for  
the monkey show:

Entrance routine

Dive thru legs

Single Challenge

Double Challenge

6 man-roll-jumps

Thursday, December 20, 1945

354th Day—11 days to follow

CLEAR
CLOUDY
RAIN
SNOW

We are going to move  
from the barracks. This  
is official now and I'm  
really glad that we are.

One of my room-mates  
is:

Robert George Kerr

Route 5, Box 798

Bremerton, Washington.

It will mean that I'll  
be able to keep up  
on my correspondence  
now that I'm in a  
room. The confusion  
now will only be from  
four guys instead of  
a barracksful.

Friday, December 21, 1945

355th Day—10 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Marye-Ann and I are going to write each other our "Christmas dreams" on Christmas Eve. We'll be thinking of each other so much on that night. How I'd like to be with her.

I have a hunch that our Christmas dreams are going to be the same. We're just waiting for each other.

I love you so much,  
my smilin' darlin'.....

I've been moving all evening long. I don't see how I accumulated so much stuff in the short time we've been here. (But it seems real

Saturday, December 22, 1945

356th Day—9 days to follow

CLEAR
CLOUDY
RAIN
SNOW

We had our Christmas program for the stations children today.

(In which RWJ is a monkey.) Santa Claus showed up right on schedule. Most of the fellows left for Los Angeles on their Christmas leave. Mr. Nisson and his wife put on a tramp act.

Sunday, December 23, 1945

357th Day—8 days to follow

Went to chapel this morning. They didn't sing many Christmas carols. I was rather disappointed with church two days before Christmas. Mr.

Monday, December 24, 1945

358th Day—7 days to follow

CLEAR
CLOUDY
RAIN
SNOW

George Irish and I left for Yosemite about 9:30 in very ugly weather.

We had quite a time running around from the O.D.'s office to personnel to the military office and back again three times. We had to get our leave papers changed and we had to change our uniform.

We were in Merced, The Gateway to Yosemite, by 5:00 P.M. where a ranger picked us up and drove us the last winding eighty miles to the valley.

We checked out a cabin with an oil heater. Later in the evening, after eating supper at the lodge, I wrote home and my Christmas dreams to Marye-Ann.

Tuesday, December 25, 1945

359th Day—6 days to follow

CLEAR
CLOUDY
RAIN
SNOW

When I awoke this morning the cabin was nice and warm. Marye-Ann's gift was on the table by my bunk and the first thing I did was to open it. In it was a book, "Naturalists at Large" and the watch.

Honey, thank you so much. I'm sure you picked out the very book that I would have and the watch is so much more than I'm worth.....

We ate Christmas dinner at the ranger's home and he also took us to Badger pass ski lodge in the afternoon. There is at least five feet of snow and the big pines are magnificent or exquisite or whatever adjective one wants to use.



Wednesday, December 26, 1945

360th Day—5 days to follow

CLEAR
X CLOUDY
RAIN
SNOW

George and I were really lucky. After walking over to the foot of Yosemite Falls and admiring the grandeur of the valley once again, we walked back to the lodge to hitch-hike. The first ride we got was all the way from the park to about twenty miles from St. Mary's. It was also the first car that came along.

When I walked into my room I was greeted with four letters from M.A., several from home and a card or two plus a huge box of cookies from home and one from Mrs. McQueen, Uncle Howard, and mother's Sunday School Class.

Thursday, December 27, 1945

361st Day—4 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Today was the last day of our Christmas leave. We didn't have to be back until 1930 tonight so we played bridge most of the day.

\* \* \*

Yosemite Valley is a natural wonder. It is a valley floor about 3000 feet beneath towering rocky cliffs. Six falls add their beauty of falling water and flying spray. When we saw it from the base of Yosemite falls the pines on the cliffs looked very small. The snow was plainly visible. Altho snow was on the valley floor we could easily distinguish

Friday, December 28, 1945

362nd Day—3 days to follow

CLEAR
CLOUDY
RAIN
SNOW

Classes started again.  
In code we listened to  
music and I wrote to  
Marye-Ann.

When we left on our  
leave it was raining and  
when we come back it  
still is.

I'm told that it rained  
all the time we were gone  
also—sunny California.

Largest monolith in the world  
were two accessible rock  
formations plainly visible  
from the valley.

Unmistakable "glacial polish"  
was visible on some of  
the rocks leaving the  
history of the formation  
of the valley.

Saturday, December 29, 1945

363rd Day—2 days to follow

CLEAR
CLOUDY
RAIN
SNOW

A two hour period of  
navigation this morning  
to make up for the  
time we got off.

No liberty this week-end  
as usual. Bridge as usual.

Sunday, December 30, 1945

364th Day—1 day to follow

We played cards in the  
afternoon... As I look out  
the room window  
I see these  
red berries with  
very dark green



Monday, December 31, 1945

365th Day—Last day of year

CLEAR
CLOUDY
RAIN
SNOW

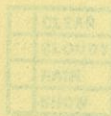
New Year's Eve.

After a station movie we had a terrific pillow fight in our new dormitory until we broke a large glass bulb around the light.

There was quite a bit of noise and confusion for an hour or so after taps but I went to bed about eleven—expecting to be pulled out at midnight—but slept straight thru until reveille on 1 January 1946.

Special Data

365th Day—Last day of year



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100  
Special Data

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333  
Memo for Next Year

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# Memo for Next Year

# Memo for Next Year

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