PAGE(S)
MISSING

1699 EXAMPLES FOR PRACTICE MATHEMATICS FORM Q-15
SEVENTH HOUR

ADD:

1. +3, +7, +5 → +15
2. -4, -6, -7 → -17
3. +8, +3, -5 → 6
4. -8, -4, +3 → -10
5. +3, +2, -4 → +1
6. -5, +2, -1 → -4
7. -2, -3, -1 → -6
8. -6, +5, +2 → 1
9. -18, +16, +49, -24 → 23
10. -18, +16, -52, -27 → -81

SUBTRACT:

1. +8 − (+8) → +5
2. +3 − (+8) → -5
3. +4 − (-5) → 9
4. -7 − (+4) → -11
5. +11 − (+5) → +6
6. -17 − (+4) → -13
7. 9 − (-6) → +3
8. -.2 − (+1.7) → +1.5
9. 4 1/4 − (-2 1/2) → 4 3/4
10. -7 1/5 − (+2 3/5) → 2 2/5
11. -1 1/4 − (+2 1/2) → -3 3/4
12. 1 1/2 − 2 → 3/2

MULTIPLY:

1. (+3) x (-7) -21
2. (-5) x (-6) 30
3. (+3) x (-2) -6
4. (-4) x (-5) +20
5. (-4) x (+3) -12
6. (+2) x (-7) -14
7. (+2) (-2) (-2) +8
8. (+3) (-2) (+2) -12
9. $(-2)^2 \times (+3)^3 \times (-1)^3$ -108
10. $(-5) \times (-2)^3 \times (-3)^2$ +360

SEVENTH HOUR

DIVIDE:

1. $(+18) \div (+3)$ $+6$

2. $(+5) \div (-5)$ -1

3. $(-8) \div (+1)$ -8

4. $\frac{-18}{-12} = 1\frac{6}{12} = 1\frac{1}{2}$

5. $\frac{36}{-18} = -2$

6. $\frac{-3}{-9} = \frac{1}{3}$

7. $\frac{64}{-56} = -1\frac{8}{56} = -1\frac{1}{7}$

8. $\frac{-72.9}{-0.81} = +90$

SIXTH HOUR

Solve for x:

1. $5x + 3 - 2(x - 1) + (1 - x) = 4(9 - x)$

$5x+3-2x+1+1-x = 36-4x$

$8x = 32$

$x = 4$

2. $3(m + 1) - 6 = 5(2m + 7) - 3$

$3m+3-6 = 10m+35-3-3$

$-7m = 35$

$m = -5$

3. $3x - 7[x - 4(x - 2) + 3] = 4x - 2(2x - 1) - 7$

$3x-7x+28x-56-21 = 4x+4x+1-7$

$24x =$

4. $4(R - 3) = 33(4 - R) - 3(2R + 5)$

$4R-3 = 132-33R-6R-15$

$43R = 127$

$R = 3$

5. $4x - 2[3x - 2(2x + 4) - 6] = 4x - (3x + 2)$

$4x-2[3x-4x-8-6] = 4x-3x-2$

$4x-6x+8x+16+12 = 4x-3x-2$

$4x-6x+8x-4x+3x = -2-16-12$

$+5x = -30$

$x = -6$

6. $5x - [3x - 2(2x + 4) - (x + 6) + 4] = 2(x - 5)$

$5x-3x+2(2x+4+(x+6)-4 = 2x-5$

$5x-3x+4x+8+x+6-4 = 2x-5$

$5x = -15$

$x = -5$

Solve for x:

1. $\frac{11x}{3} - (x - 1) = 11x - 99$

$11x - 3(x-1) = 11x - 99$
$11x - 3x + 3 = 33x - 297$
$11x - 3x - 33x = -297 - 3$
$x = 12$

2. $\frac{8x - 11}{9} - \frac{11x + 10}{12} = \frac{3x - 8}{8} - \frac{2x + 3}{6}$

$64x - 88 - 66x - 60 = 27x - 72 - 24x - 36$
$64x - 66x - 27x + 24x = -72 - 36 + 60 + 88$
$-5x = -40$
$x = 8$

3. $\frac{10x + 11}{6} - \frac{12x - 13}{3} - 4 = \frac{7 - 6x}{4}$

$20x + 22 - 48x + 52 - 48 = 21 - 18x$
$20x - 48x + 18x = 21 - 22 - 52 + 48$
$-10x = -3$
$x = \frac{3}{10}$

4. $\frac{5x + 1}{3} + \frac{19x + 7}{9} - \frac{3x - 1}{2} = \frac{7x - 1}{6}$

$30x + 6 + 38x + 14 - 27x + 9 = 21x - 3$
$30x + 38x - 21x = -3 - 9 - 14 - 6$
$20x = -32$
$x = -1\frac{3}{5}$

5. $\frac{7x - 4}{9} + \frac{3x - 1}{5} - \frac{5(x - 1)}{6} = \frac{3(3x - 1)}{20} + \frac{x}{7}$

$980x - 560 + 756x - 252 - 1050x = 567x - 189 + 180x$
$980x + 756x - 1050x - 567x - 180x = -189 - 1092 + 252 + 560$
$-61x = -427$
$x = 7$

EIGHTH HOUR

1. The speed of an airplane is 90 mph. in calm weather. Flying with the wind, it can cover a certain distance in 4 hours, but when flying against the wind, it can cover only $\frac{3}{5}$ this distance in the same time. What is the speed of the wind?

$\frac{3}{5}(90+X)4=(90-X)4$ $\frac{8}{5}X=36$

$\frac{3}{5}4+\frac{3}{5}X=90-X$ $X=22\frac{1}{2}$

$\frac{3}{5}X+1X=90-54$

2. An airplane that goes 125 m.p.h. in still air can go twice as far in a given time with the wind as it can against the wind. What is the rate of the wind?

$125+X=2(125-X)$

$125+X=250-2X$

$3X=125$

$X=41\frac{2}{3}$

3. A pilot flies an airplane a distance of 370 miles in 1 hour and 40 minutes. Express his average ground speed in miles per hour.

$\frac{X}{150}$ $X=$

4. An airplane left Chicago for New York City flying 150 m.p.h. One half hour later a second plane followed it at the rate of 180 m.p.h. How soon after the second plane left should it overtake the first?

$\frac{X}{150}$ $X=1\frac{1}{2}$

Eighth Hour

1. An airplane leaves town A for town B flying at the rate of 200 m.p.h. At the same time another airplane leaves town B flying from town A at the rate of 150 mph. The distance from A to B is 875 miles. How long after they start will they meet?

$200x + 150x = 875$

$x = 2\frac{1}{2}$

2. An airplane flew 1100 miles in 5 hours with the wind. It would have taken 11 hours to have made the same trip against the wind. Find the speed of the plane and the velocity of the wind.

3. A pursuit plane flies 70 mph. faster than a bomber in still air. The bomber travels 50 miles while the pursuit plane travels 75 miles. Find the average speed of each aircraft.

EIGHTH HOUR

1. A pilot flies his plane from San Antonio to Dallas, a distance of about 240 miles by air. The plane was flying directly into a head wind. The air speed of the plane was 150 m.p.h. He made the trip in two hours. What was the average wind velocity?

2. An aircraft flies 2 hours 30 minutes at an average ground speed of 200 m.p.h. and the remainder of an 800 mile trip in 2 hours. What was the average ground speed for the last part of the flight?

3. An airplane flying 160 m.p.h. covers a certain distance in 3 hours and 45 minutes. How long would it take to cover the same distance when flying at 200 m.p.h.?

$V = L \cdot W \cdot H$

NINTH HOUR

1. The surface area of a sphere is given by the formula $S = 4\pi r^2$. Find the surface area of a sphere whose circumference is 31.416 inches.

314.16

2. $\frac{P_1}{P_2} = \frac{V_2}{V_1}$ or $P_1 V_1 = P_2 V_2$ If the volume of a certain gas is 200 cubic inches when its pressure is 100 pounds per square inch, what volume will it occupy when the pressure has been increased to 120 pounds per square inch.

$\frac{200}{X} = \frac{120}{100} = 120X = 20000$

$X = 166\frac{2}{3}$

3. The distance a uniformly accelerating object will travel in a given time is expressed by: $D = vt + \frac{1}{2}at^2$ where v = initial velocity, t = time and a = acceleration.

a. How far will an object, starting from rest, fall in 5 seconds if the acceleration due to gravitional pull is 32 feet per second?

$D = 16T^2$ $D = 16 \times 25$

$D = 400$ FT

b. A bomber flies 300 miles per hour at 30,000 ft. If we assume the wind resistance is negligible, how far from the target must the bombs be released? ($D = \frac{1}{2}at^2$)

$30000 = 16T^2$

$16T^2 = 3$ rrrrr

$T^2 = 1875$

$T = 43.301$

$43.301 \times 440 = 19,0$

FIFTH HOUR

Two thermometers are in general use, the Fahrenheit and the Centigrade. The formula for transforming the readings of one thermometer to those of the other is: $C = \frac{5}{9}(F - 32°)$

1. Find C when F = 50°

$C = \frac{5}{9}(50 - 32) =$

$C = \frac{5}{9}\,18$

$C = 10°$

2. Find F when C = 40°

$40° = \frac{5}{9}(F - 32°) =$

$360 = 5(9F - 288)$

$360 = 45F - 1040$

$F = 104°$

3. Find C when F = -32°

$C = \frac{5}{9}(F - 32°) =$

4. 20° Centigrade is how many degrees Fahrenheit?

$20° = \frac{5}{9}(F - 32°)$

$20° = 45F - 1440$

$1460 = 45F$

$F = 32$

NINTH HOUR

EVALUATE:

1. a. $(2)^3 = 8$ b. $(3)^4 = 81$ c. $(7)^2$ 49

2. $(2)^2 \times (5)^3 = 4 \times 125 = 500$

3. $(3)^2 - (2)^2 = 9 - 4 = 5$

4. $\left(\frac{2}{3}\right)^2 + \left(\frac{1}{2}\right)^3 = \frac{23}{72}$

5. $(12)^2 + (15)^2 - (11)^2$ $144 + 225 - 121 = 248$

6. $\sqrt{4225} = 65$

7. $\sqrt{2079.36} = 45.6$

8. $\sqrt{\frac{3}{4}}$ (Three Decimal places)

9. The square nut for a bolt is $3\frac{1}{8}$ inches on each side. What is the width across corners? (Three decimal places).

NINTH HOUR

1. Two planes fly from the same airfield. At a given time one plane is at a distance of 360 miles due north from the field; the other is at a distance of 450 miles due east from the field. What is the distance between the two planes? (To three decimal places).

$H^2 = 360^2 + 480^2$

$H^2 = 129600 + 202500$

$H^2 = 353210$

$H^2 = 376.281$

2. How far from the wall of a house must the foot of a 45 foot ladder be placed in order that the top of the ladder will touch a window sill 40 feet from the ground? (To two decimal places).

$H^2 = a^2 + b^2$

$45^2 = 40^2 + b^2$

$b^2 = 40^2 - 45^2$

$b^2 = 2105 - 2400$

$b = 20.61$

3. A flag pole is broken by the wind 16 feet from the ground. The two pieces hold together, and the top of the pole touches the ground 30 feet from the foot of the pole. Find the length of the pole.

1713

EXAMPLES FOR PRACTICE MATHEMATICS FORM Q-26
TENTH HOUR

1. The scale used for a series of airplane models is 1:72. Wing span of the PBM-1 is actually 118 ft. How long will the wing span of the model be?

$\frac{1}{72} = \frac{1''}{6'} \div 118' = 19.67$

2. The R.F. for a map is 1:760,320. Express this in miles per inch; in inches per mile.

$\frac{1}{760,320} = 760,320 \div 63360 = 12$ mi

1 in = 12 mi + $\frac{1}{12}$ in + mile

3. The distance from San Antonio to New Orleans measures $2\frac{1}{2}$ inches on a map which has an R.F. of 1:12,672,000. What does this represent in miles?

$\frac{1}{12,672,000} \div 63360 = 200 \times 2\frac{1}{2} = 500$ miles

1. If the distance between two cities on a certain map is $5\frac{7}{16}$ inches, what is the distance in miles between these cities if 1 inch = 150 miles?

$5\frac{7}{16} \times 150 = 815.625$

2. On a certain map, $\frac{1}{8}$ inch = 1 mile. What is the R.F. of this map?

$8 \times 63360 = 1:506,880$

3. The distance between New York and Los Angeles on a certain map is $8\frac{3}{16}$ inches. What is the distance in miles between these cities when the R.F. of the map is $\frac{1}{19,008,000}$?

$63360 \overline{)1900800}$ (300)

$300 \times \frac{3}{16} = 2456.25$

4. Seven inches on a certain map is equal to 42 miles. Express the scale of this map: (a) In miles per inch. (b) In inches per mile. (c) As a R.F.

$\frac{1}{42} = 1:6$ $\frac{1}{6} = 1$ mile $6 \times 63360 = 380,160$

EXAMPLES FOR PRACTICE MATHEMATICS FORM Q-28
TENTH HOUR

1. On the map given in your Q-Book with scale as shown, find the distance between:

   a. Springfield, Ill. and New York 825

   b. Springfield, Ill. and New Orleans 682

   c. Springfield, Ill. and Denver 825

   d. Springfield, Ill. and Los Angeles 1603

   e. Springfield, Ill. and Seattle 1726

2. How long will it take an airplane traveling 200 m.p.h. to fly from:

   a. New York to Los Angeles 12:20

   b. St. Louis to Seattle 8:35

   c. St. Paul to San Diego 7:33

   d. Richmond to Denver 7:24

   e. San Antonio to New York

3. Suppose we wish to make a map with scale one inch equals 500 miles. What should be the distance in inches between San Antonio and Salt Lake City?

4. On a map where one inch equals 400 miles, what should be the distance between New York and Los Angeles?

3,000

TENTH HOUR

1. What length in inches on your map represents 1° of latitude difference between two points? Is this constant?

2. The earth measures about 25,000 miles in circumference at the equator. How many miles are there in one degree of longitude at the equator? Is this constant for all parts of your map?

3. How many degrees of longitude does the sun pass over in one hour? Is this constant? How many inches does this correspond to on your map at the latitude of New Orleans? At the latitude of Seattle?

4. On a certain winter day it becomes daylight in New York at 7 A.M. How many hours later will it become daylight in Portland?

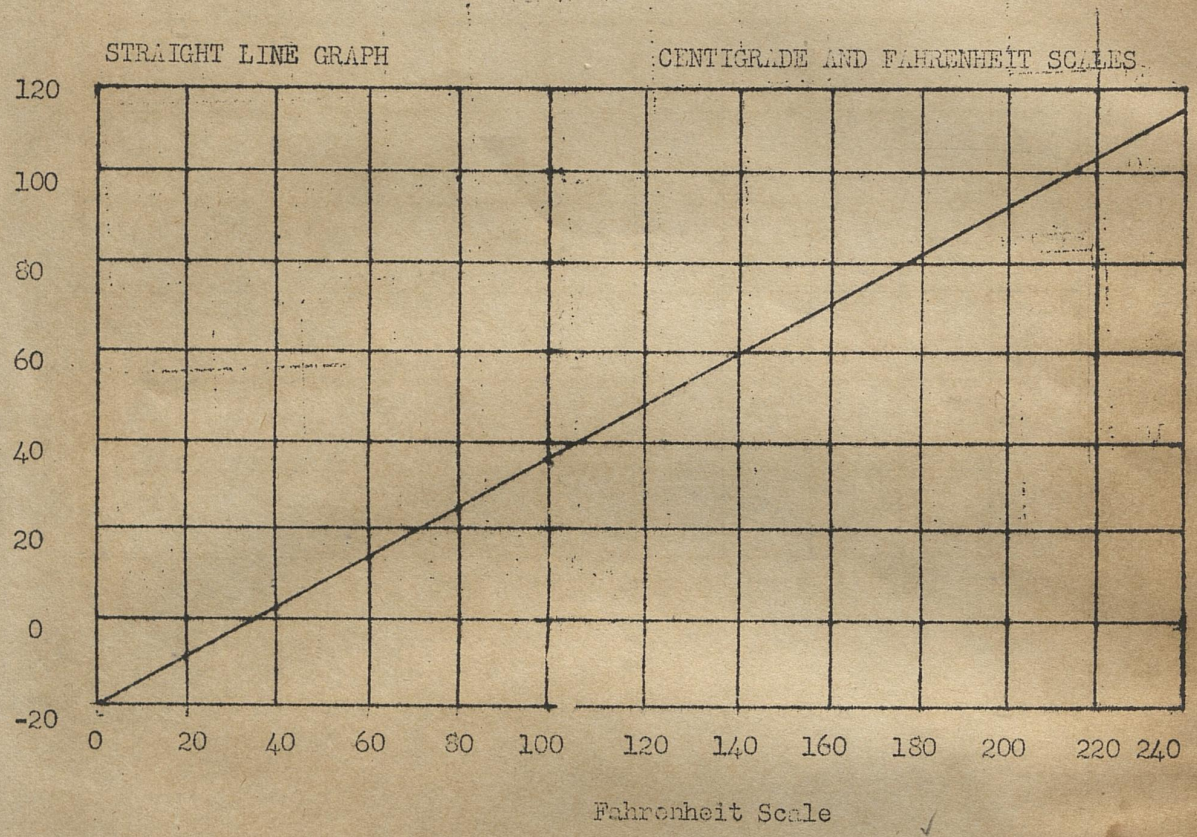
5. On a certain summer day the sun sets at 7 P.M. at Los Angeles. How many hours earlier has it set at Philadelphia?

6. Find the scale of your map in miles per inch.

7. What is the R.F. of your map?

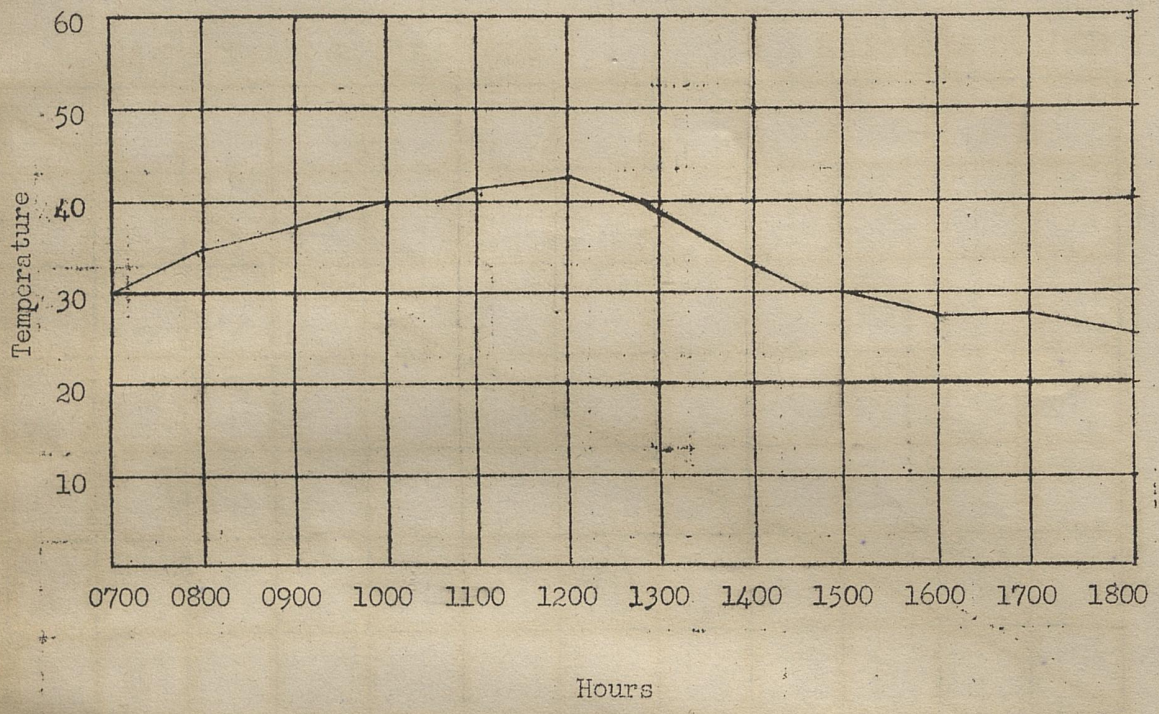

MAP
OF THE
UNITED STATES
Statute Miles
Seattle
Tacoma
Olympia
Portland
Salem
Helena
Butte
Boise
Bismarck
Pierre
Duluth
St Paul
Minneapolis
Sacramento
Carson City
Salt Lake City
Cheyenne
Denver
Lincoln
Des Moines
Topeka
Kansas City
Jefferson City
St. Louis
Springfield
Madison
Lansing
Detroit
Cleveland
Akron
Columbus
Indianapolis
Cincinnati
Louisville
Frankfort
Charleston
Pittsburg
Harrisburg
Buffalo
Rochester
Syracuse
Albany
Augusta
Concord
Boston
Hartford
New York
Newark
Trenton
Philadelphia
Baltimore
Washington
Richmond
Raleigh
Nashville
Memphis
Chattanooga
Columbia
Atlanta
Birmingham
Montgomery
Jackson
Little Rock
Tulsa
Oklahoma City
Ft. Worth
Dallas
Austin
San Antonio
Houston
Baton Rouge
New Orleans
Tallahasse
Jacksonville
Tampa
Los Angeles
San Diego
Phoenix
Tucson
Santa Fe
Albuquerque
El Paso

GRAPH NUMBER I



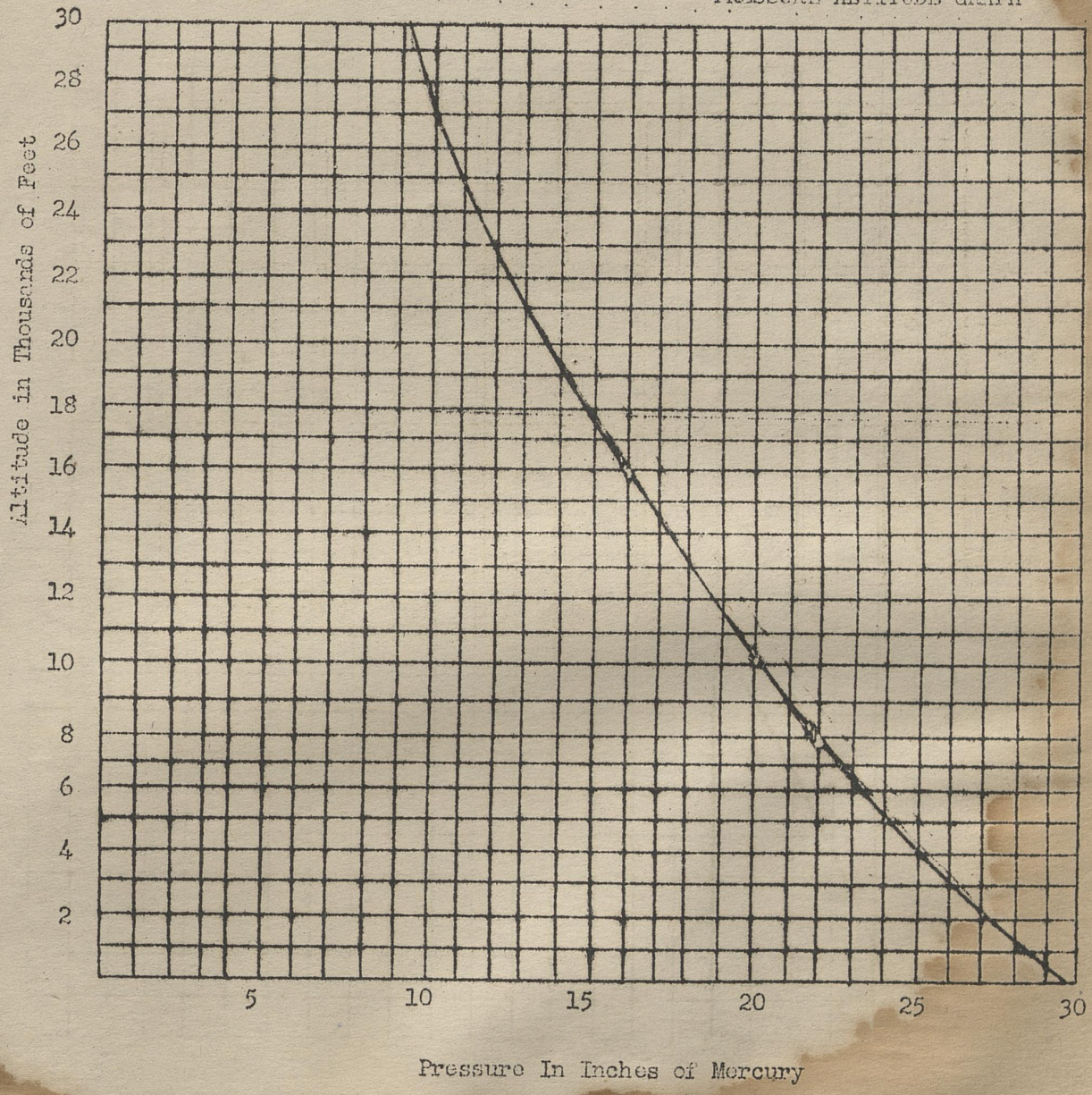
GRAPH NUMBER II

BROKEN LINE GRAPH TEMPERATURE GRAPH



GRAPH NUMBER III

CURVED LINE GRAPH PRESSURE ALTITUDE GRAPH

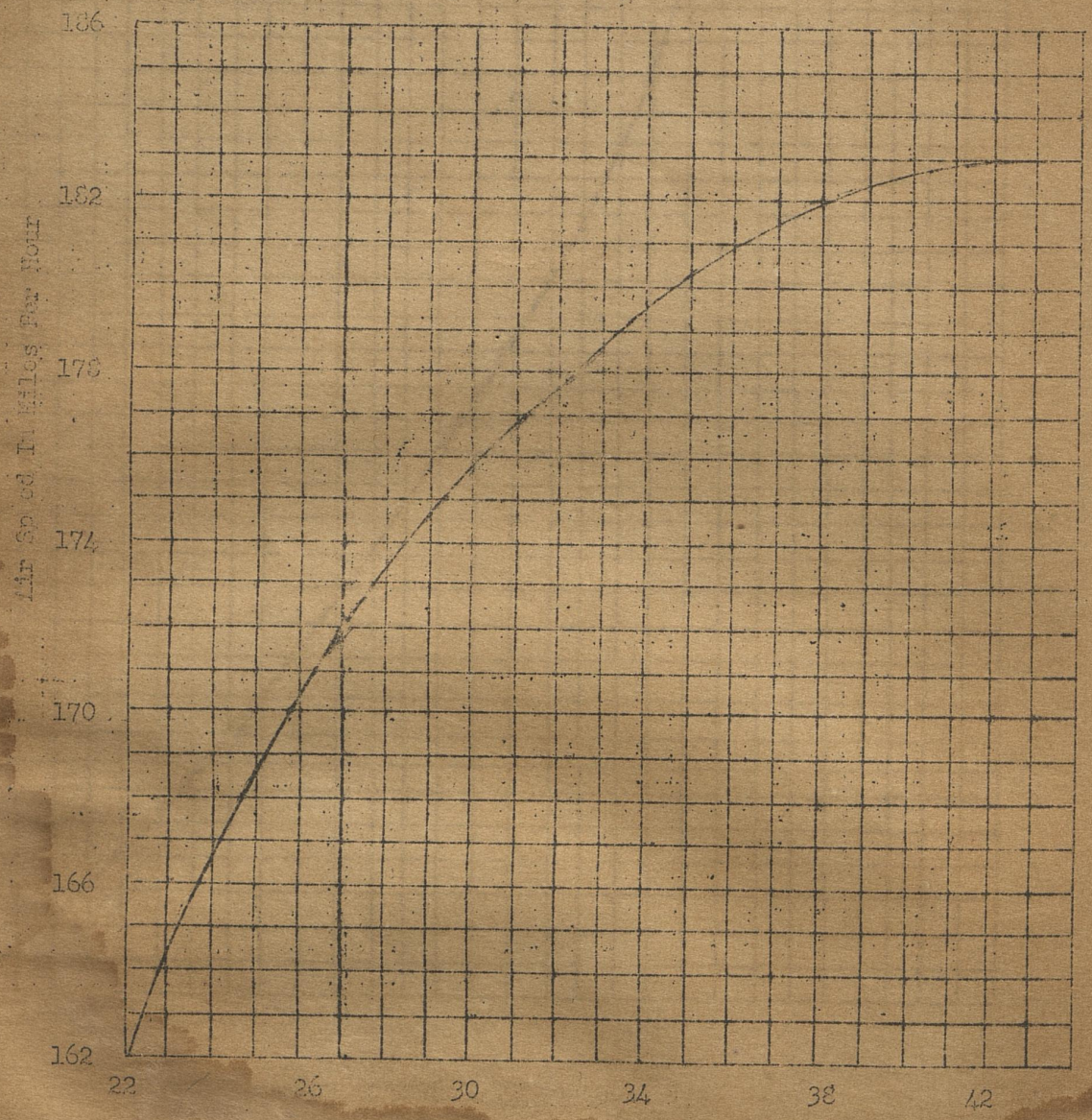


EXAMPLES FOR PRACTICE MATHEMATICS FORM Q-33
ELEVENTH HOUR

GRAPH NUMBER IV

CURVED LINE GRAPH

MANIFOLD PRESSURE VERSUS AIR SPEED



1. Referring to Graph Number I, answer the following;

   a. What temperature on the Centigrade scale corresponds to 140 degrees on the Fahrenheit scale? 60°

   b. 100 degrees on the Fahrenheit scale corresponds to what degree on the Centigrade scale? 36°

   c. 100 degrees on the Centigrade scale is equal to what temperature on the Fahrenheit scale? 212°

   d. What temperature on the Fahrenheit scale is equal to 80 degrees on the Centigrade scale? 175°

2. Referring to Graph Number II, answer the following:

   a. What is the temperature at 1200? +25°

   b. At what time was the temperature 25 degrees? 1650

   c. Between 1200 and 1600, was the temperature falling or rising? How many degrees did the temperature change during this period? Fallen 4 44° to 28

1. Referring to Graph Number III, answer the following:

   a. What is the altitude if the barometer reading is 17.5 inches?

   b. If the recorded altitude is 22,000 feet, what is the barometer reading?

   c. At what height is the barometer reading just half of what it is at sea level?

2. Referring to Graph Number IV, answer the following:

   a. What must the manifold pressure be in order to obtain an air speed of 179.5 miles per hour?

   b. Is the percentage of increase in manifold pressure greater in increasing the air speed from 160 to 162 miles per hour than it is in increasing the air speed from 170 to 172 miles per hour? If so, how much?

   c. What is the air speed if the manifold pressure is 38?

3. Make a broken line graph of:

   The average temperature in one city during each month?

January	43°	July	75°
February	46°	August	76°
March	39°	September	70°
April	56°	October	57°
May	66°	November	43°
June	75°	December	36°

1. Make a broken line graph of:

World's record of speed of airplanes:

1910	68 m.p.h.	1923	267 m.p.h.	1932	430 m.p.h.
1913	127 m.p.h.	1928	319 m.p.h.	1933	433 m.p.h.
1920	194 m.p.h.	1931	409 m.p.h.	1934	440 m.p.h.

2. Make a continuous curved line graph:

Altitude and temperature graph:

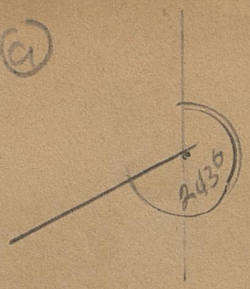
Altitude (feet)	Temperature (°F.)
0	59.0
500	57.2
1,000	55.4
1,500	53.6
2,000	51.9
2,500	50.1
3,000	48.3
3,500	46.5
4,000	44.7
4,500	43.0
5,000	41.2
6,000	37.6
7,000	34.0
8,000	30.5
9,000	26.9
10,000	23.3
11,000	19.8
12,000	16.2
13,000	12.6
14,000	9.1
15,000	5.5
20,000	- 12.3
30,000	- 48.0

3. Plot a straight line graph from the formula, V = at, when a is a constant 32.

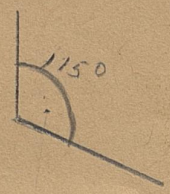
4. Plot a straight line graph from the formula, D = rt, if the rate is constant at 60 miles per hour.

(2)

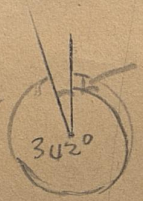
(A)



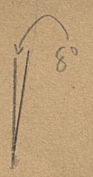
(B)



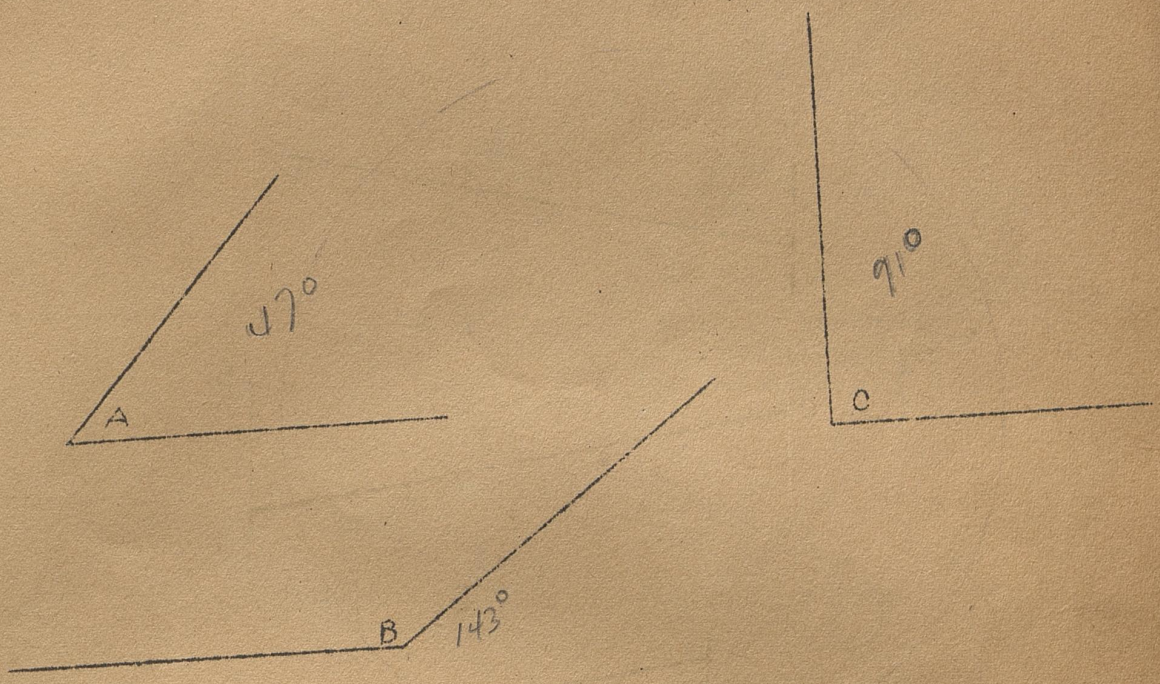
C



D



1. Using a protractor measure the following angles.



2. With a protractor, draw the following angles:

(a) 243°
(b) 115°
(c) 342°
(d) 8°

3. Find the complement of the following angles:

(a) 40° 50° (b) 65° 25° (c) 24° 66°

4. Find the supplement of the following angles:

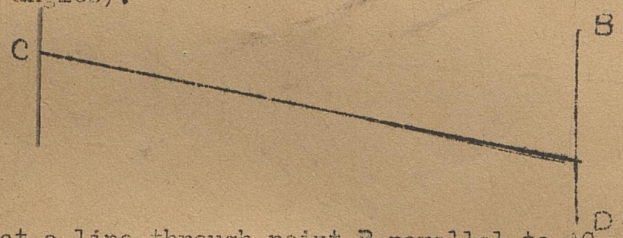
(a) 75° 105° (b) 135° 45° (c) 159° 21°

5. Classify the following angles:

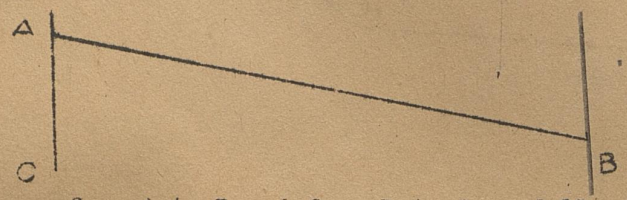
(a) 135° (b) 65° (c) 90° (d) 210° (e) 180°
obtuse acute rt ∠ reflex ∠ st. ∠

1. Construct a line through point P parallel to AB. (Use supplementary angles).

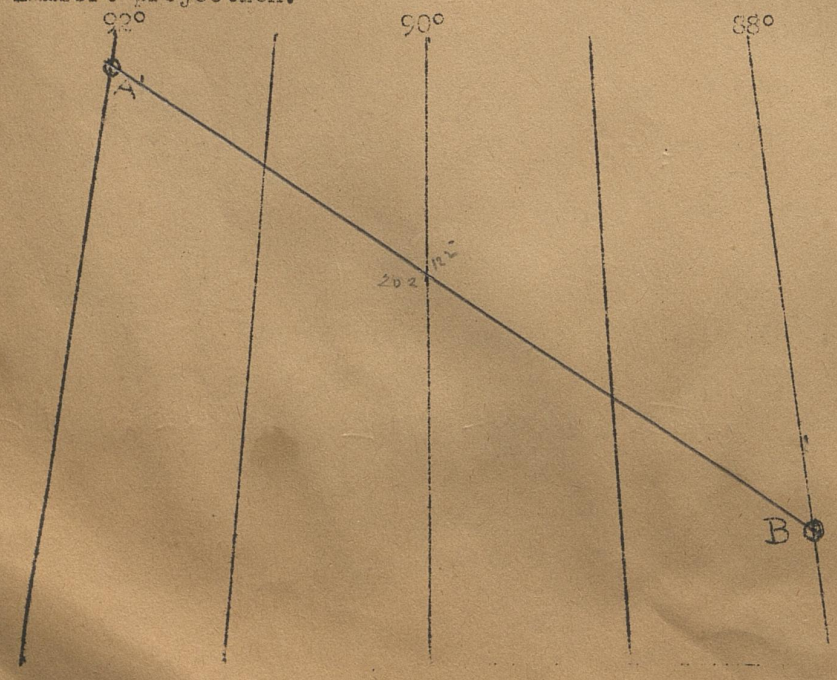
2. Construct a line through point C parallel to BD. (Use supplementary angles).



3. Construct a line through point B parallel to AC.



4. Find the course from A to B and from B to A on following Lambert projection.

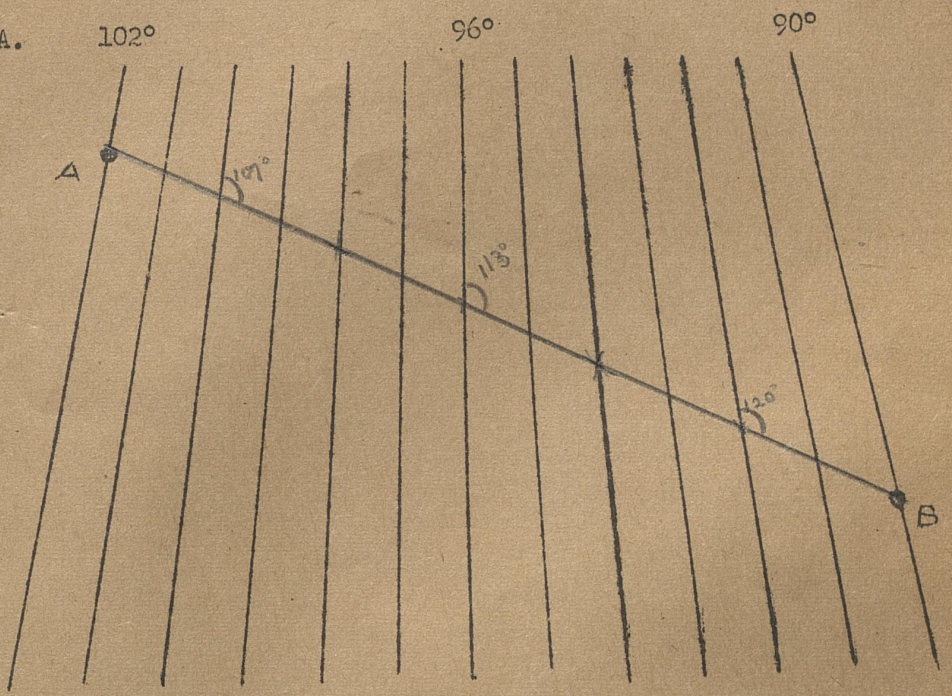


EXAMPLES FOR PRACTICE
FOURTEENTH HOUR

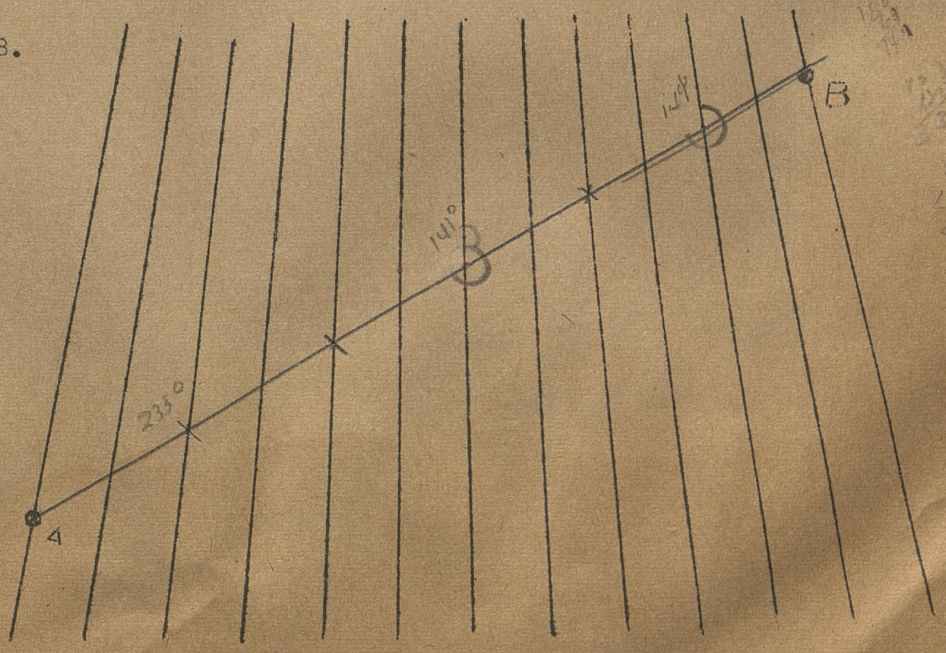
I. Find the series of courses a plane would take in flying from A to B on the following Lambert projections.

II. From B to A.

A.



B.

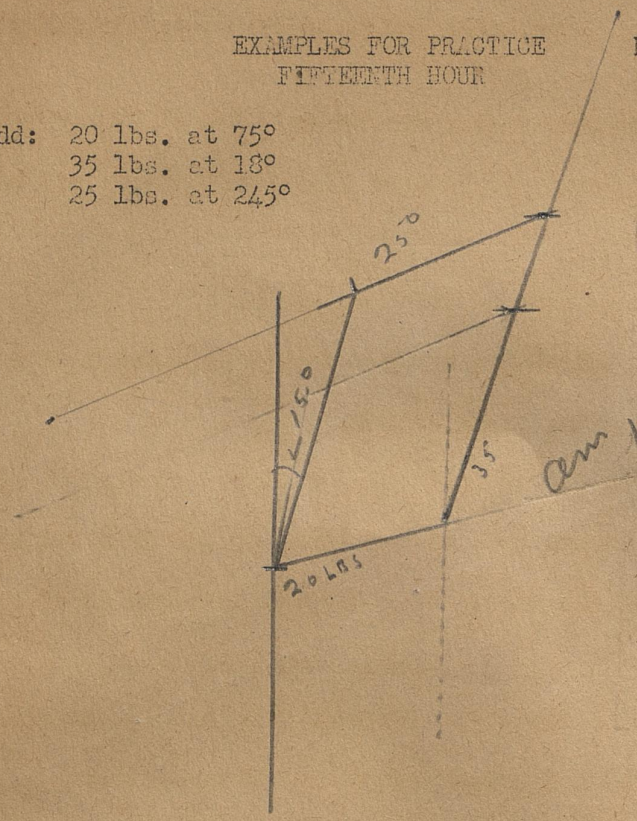


FIFTEENTH HOUR.

Suggested aids in drawing vector diagrams:

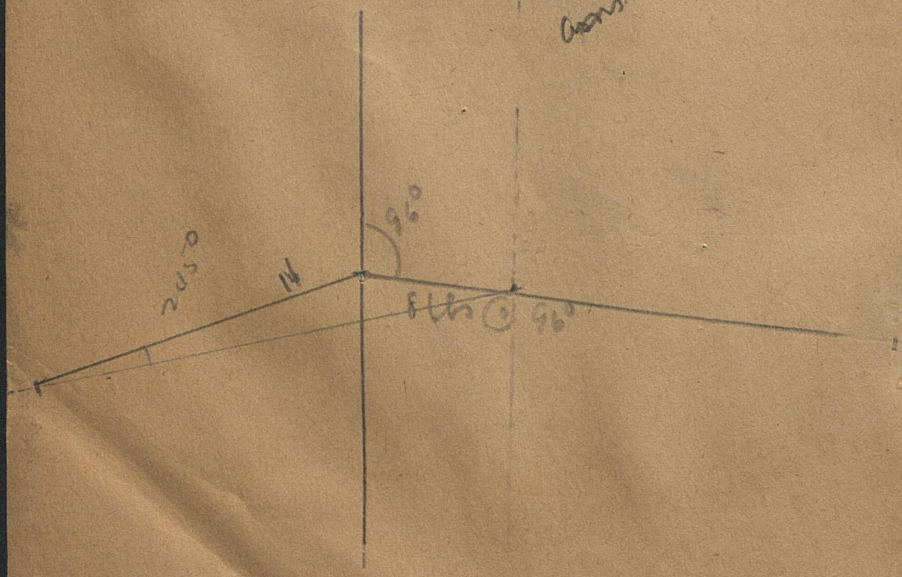
1. Lines should be drawn with a hard lead pencil sharpened to a fine point.
2. Label all lines as soon as they are drawn.
3. Make a rough sketch of the problem to get acquainted with all details before making final sketch.
4. Place the diagram correctly in the available space. If all the diagram is on one side of N-S line, do not draw N-S line in the middle of the page. Make diagram as large as space will allow.
5. Remember that wind blows the aircraft from heading to course.
6. Course (or track) and ground speed are on same line.
7. Heading and air speed are always on same line.
8. Directions are always measured with respect to North in a clockwise direction.
9. In all triangle of velocity problems, ground speed vector is always the resultant; wind and air speed vectors are the components.

1. Add: 20 lbs. at 75°
35 lbs. at 18°
25 lbs. at 245°



2. Add: 8 lbs. at 96°
18 lbs. at 257°

Ans 245° = 14 lbs.



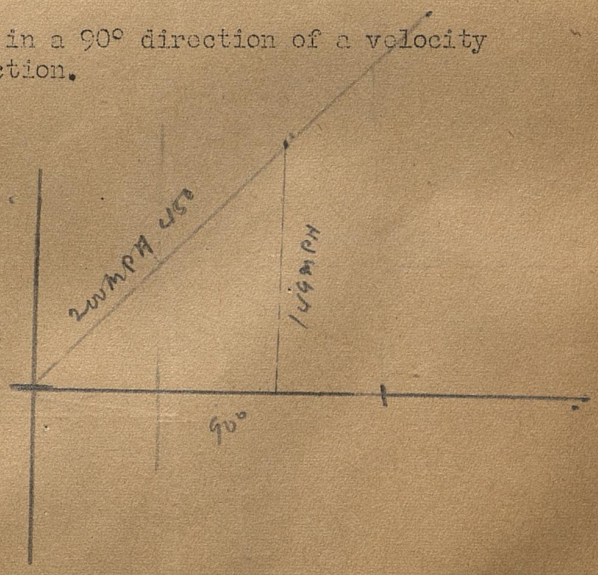
1. Add (A), (B), and (C) where their magnitudes and directions are as follows:

   (A) 2 lbs. at 90°

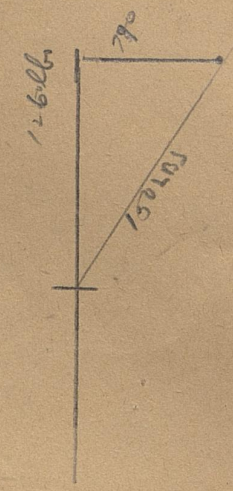
   (B) $1\frac{1}{2}$ lbs. at 135°

   (C) 2 lbs. at 210°

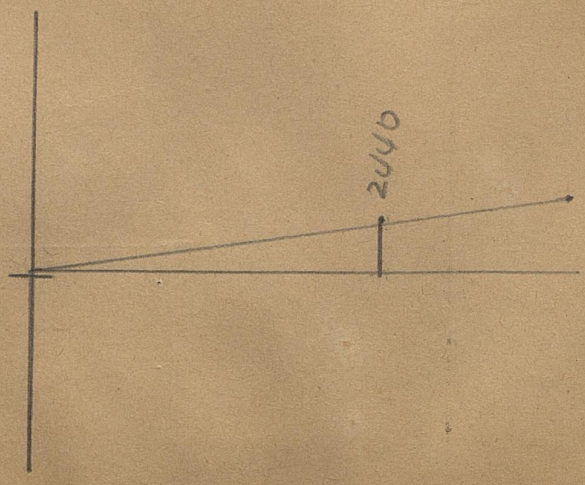
2. Find the component velocity in a 90° direction of a velocity of 200 m.p.h. in a 45° direction.



1. Find the horizontal and vertical components of a force of 150 pounds acting at an angle of 32° from North.



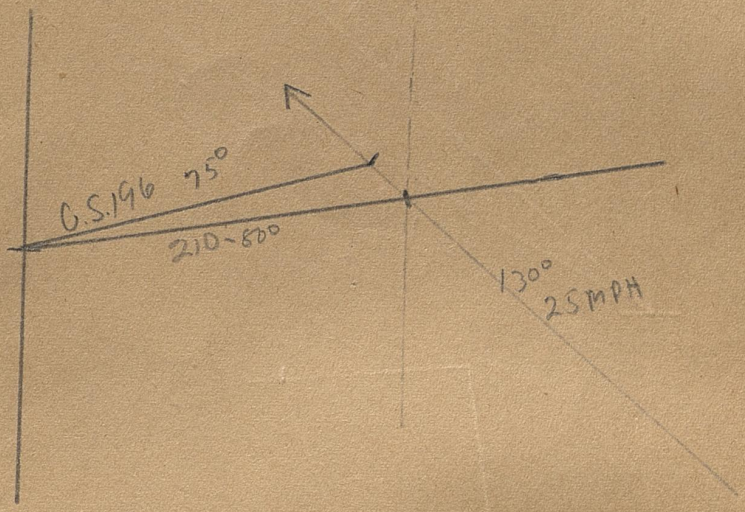
2. A plane is rising at an angle of 10° to the horizontal at a velocity of 180 m.p.h. How much altitude is gained in 60 seconds?



1730 EXAMPLES FOR PRACTICE MATHEMATICS FORM Q-44
SIXTEENTH HOUR

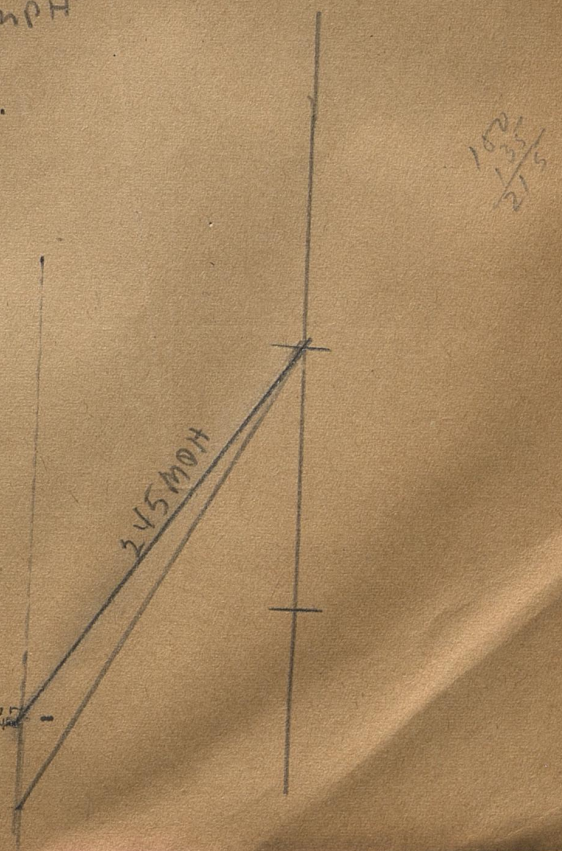
1. Given: Heading 80°
Air speed 210 m.p.h.
Wind 25 m.p.h. from 130°

Required: Ground speed 196
Course 75°



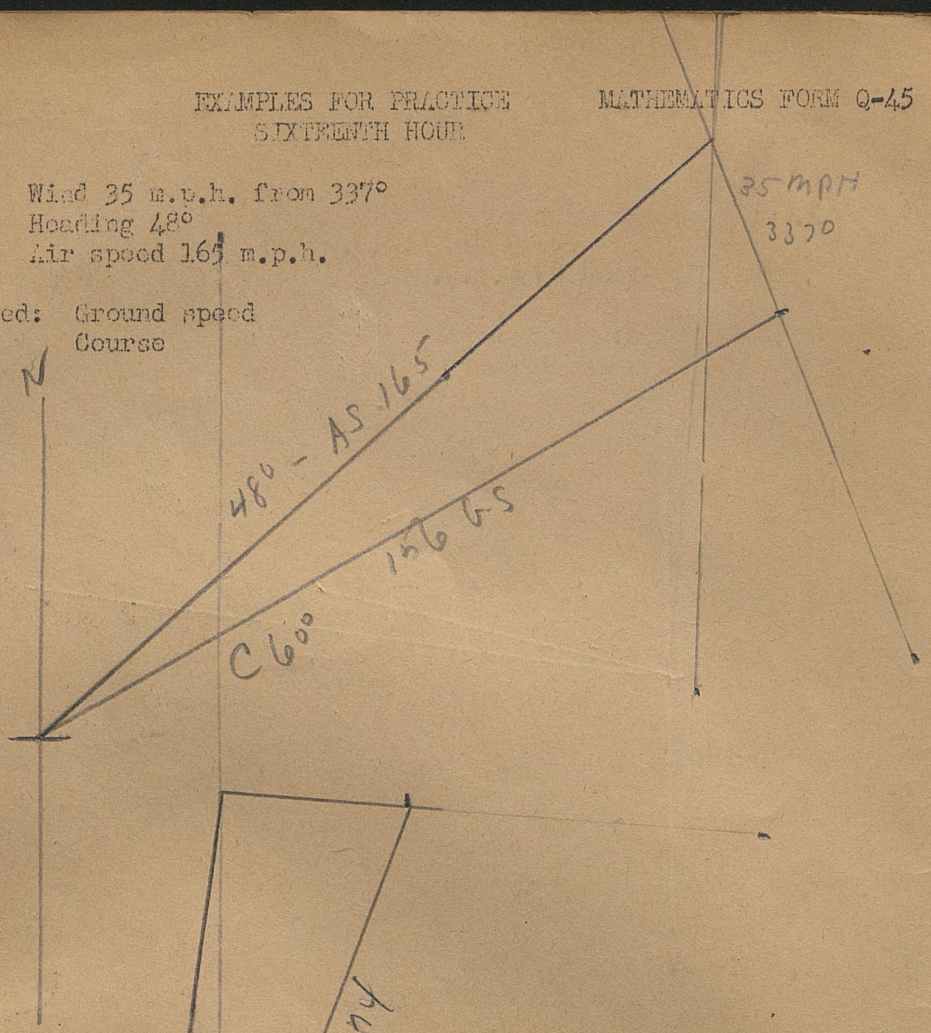
2. Given: Heading 210°
Air speed 280 m.p.h.
Wind 40 m.p.h. from 180°

Required: Ground speed 245MPH
Course 215°



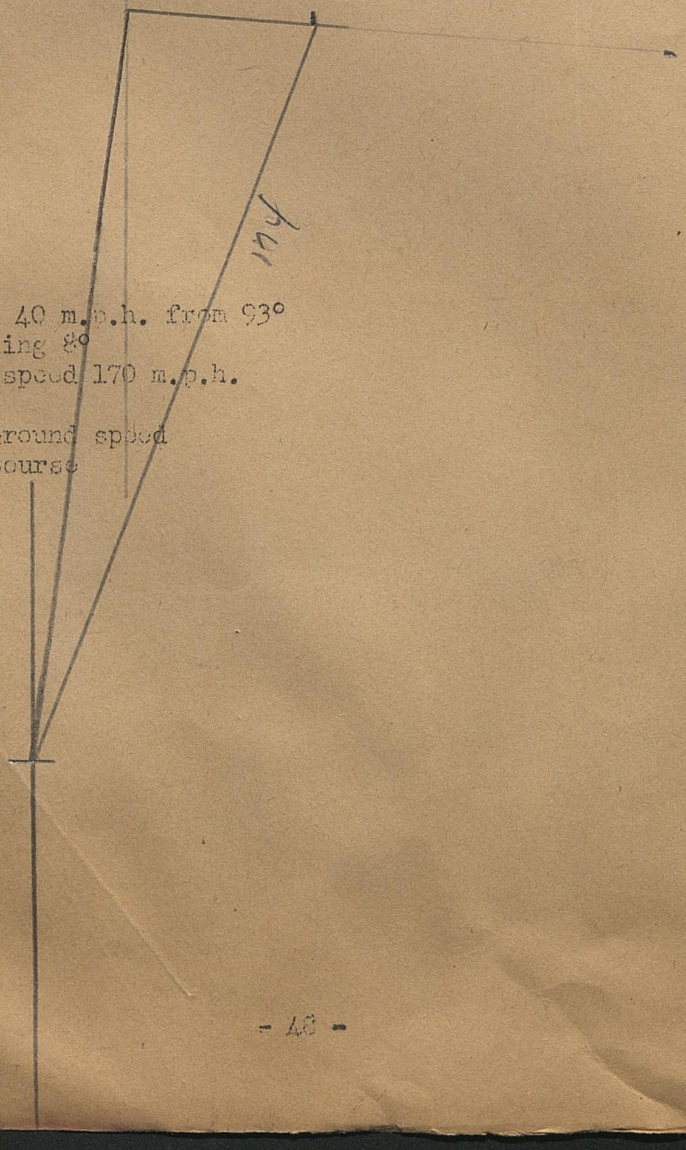
1. Given: Wind 35 m.p.h. from 337°
Heading 48°
Air speed 165 m.p.h.

Required: Ground speed
Course

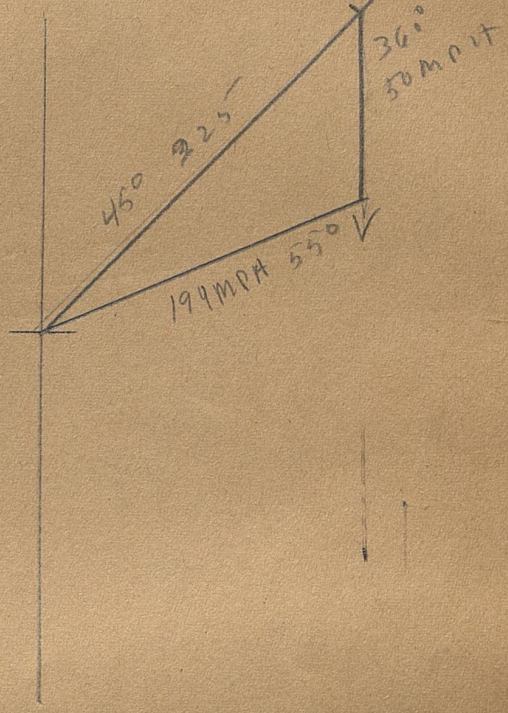


2. Given: Wind 40 m.p.h. from 93°
Heading 8°
Air speed 170 m.p.h.

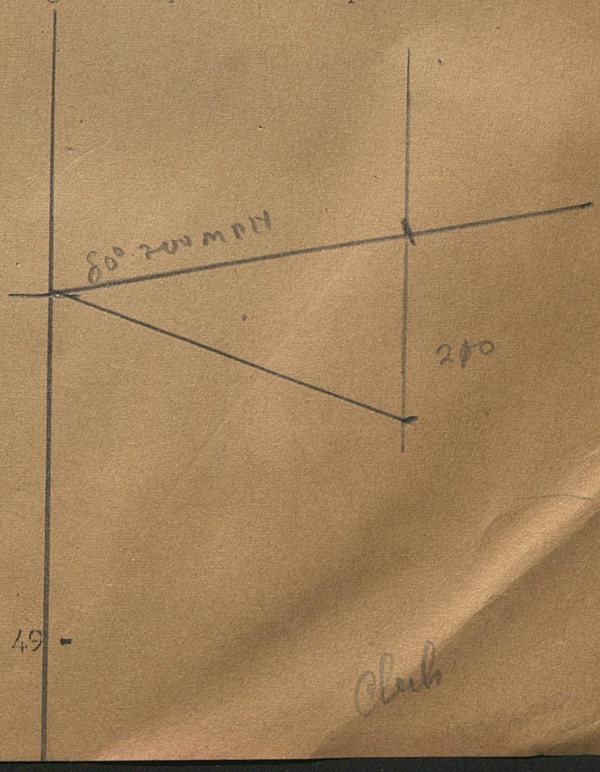
Required: Ground speed
Course



1. A plane is flying with a 45° heading at an air speed of 225 m.p.h. There is a wind from 360° with a speed of 50 m.p.h. What is the course, and what is the ground speed in miles per hour and in knots?



2. A plane flying at an air speed of 200 m.p.h. left point A heading 80° from N. If the wind was from the north at 50 m.p.h., what was the course and ground speed of the plane?



SIXTEENTH HOUR

1. Given: Heading 40°
Air speed 220 m.p.h.
Wind 40 m.p.h. from 120°

Required: Course
Ground speed

2. Given: Heading 141°
Wind 60 m.p.h. from 270°
Air speed 240 m.p.h.

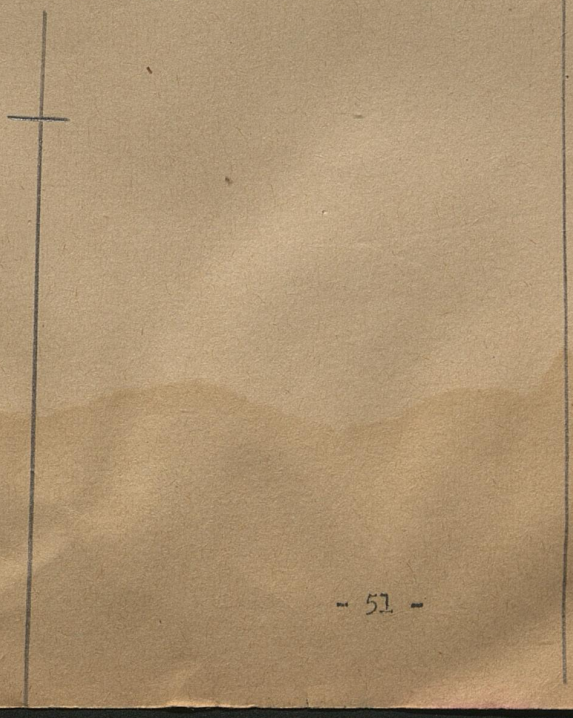
Required: Ground speed
Course

1. Given: Course 87°
Air speed 240 m.p.h.
Wind 20 m.p.h. from true north

Required: Ground speed
Heading

2. Given: Wind 30 m.p.h. from 216°
Course 143°
Air speed 270 m.p.h.

Required: Ground speed
Heading



1. Given: Wind 35 m.p.h. from 13°
Course 67°
Air speed 210 m.p.h.

Required: Ground speed
Heading

2. Given: Course 348°
Wind 20 m.p.h. from 230°
Air speed 240 m.p.h.

Required: Ground speed
Heading

1. Given: Wind 28 m.p.h. from 180°
Course 220°
Air speed 300 m.p.h.

Required: Ground speed
Heading

2. A pilot plots his course for a trip. His data are:
Wind velocity = 40 m.p.h. from 330°
Air speed = 210 m.p.h.
Desired course of 100°
What is his ground speed, heading, wind correction angle?

1. A plane is to fly from town A to town B which is southeast of A. If the plane has an air speed of 250 m.p.h. and there is a 40 m.p.h. wind from 220°, what will be the ground speed and the heading?

2. A pilot leaves point x at hour 1300 for point y which is in a 30° direction and 700 miles away. If his air speed is to be maintained at 250 m.p.h. and there is a wind of 50 m.p.h. from 300°, find his heading, ground speed, and the time of arrival.

NOTE: In solving problems on Q-Sheets 52 and 53 use the map given in workbook.

1. Plan a flight from San Antonio to Austin leaving at 1312.

Given: Variation 10°E.
Average Deviation 5°W.
Wind 20 m.p.h. from 270°
Air speed 120 m.p.h.

Required: 1 True Course 37½
4 True Heading (1,217 grid) = 30°
6 Magnetic Course = T.C 37½ - 2
7 Magnetic Heading 27½
8 Compass Course
9 Compass Heading 32½
5 Ground speed 130
ETA

1244

2. Plan a flight from Austin to Laredo.

Given: Variation 10°E.
Average Deviation 2°E.
Wind 20 m.p.h. from 355°
Air speed = 140 m.p.h.

Required: Compass Course 199
Compass Heading 197
Time required for flight 1.28 hrs

1. Plan a flight from San Antonio to Corpus Christi and return.

Given: Variation 10°E.
Average Deviation 4°E.
Wind 15 m.p.h. from 235°
Air speed 180 m.p.h.

Required: Compass Course out
Compass Course back
Compass Heading out
Compass Heading back
Time out
Time back

TC = 149°
MC = 139°
CC = 135°

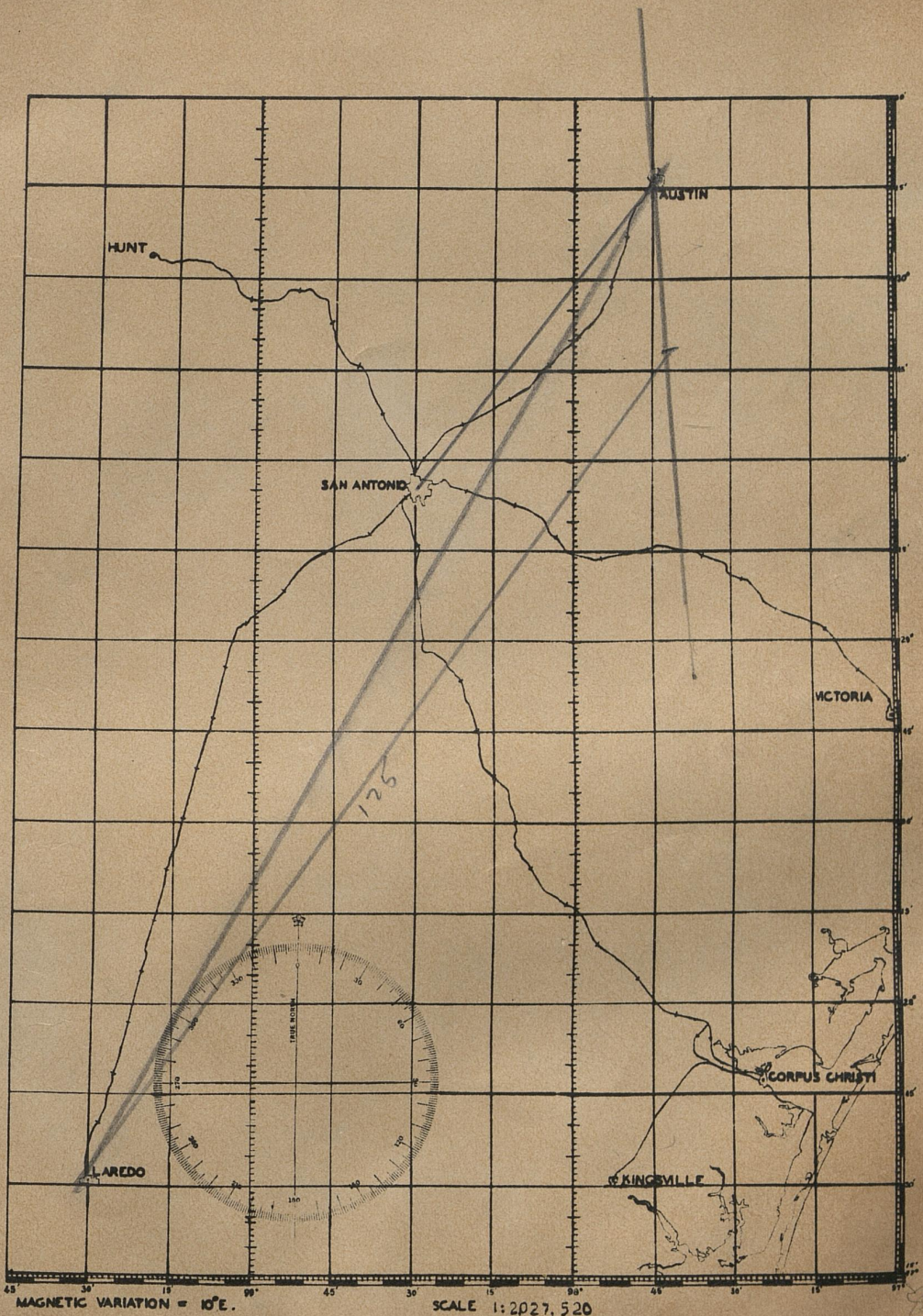
TH = 154
MH = 144
CH = 140

TC = 329°
MC = 319°
CC = 315°

2. Plan a flight from Victoria to Laredo leaving at 0945.

Given: Variation 10°E.
Average Deviation 3°W.
Wind 25 m.p.h. from 105°
Air speed 160 m.p.h.

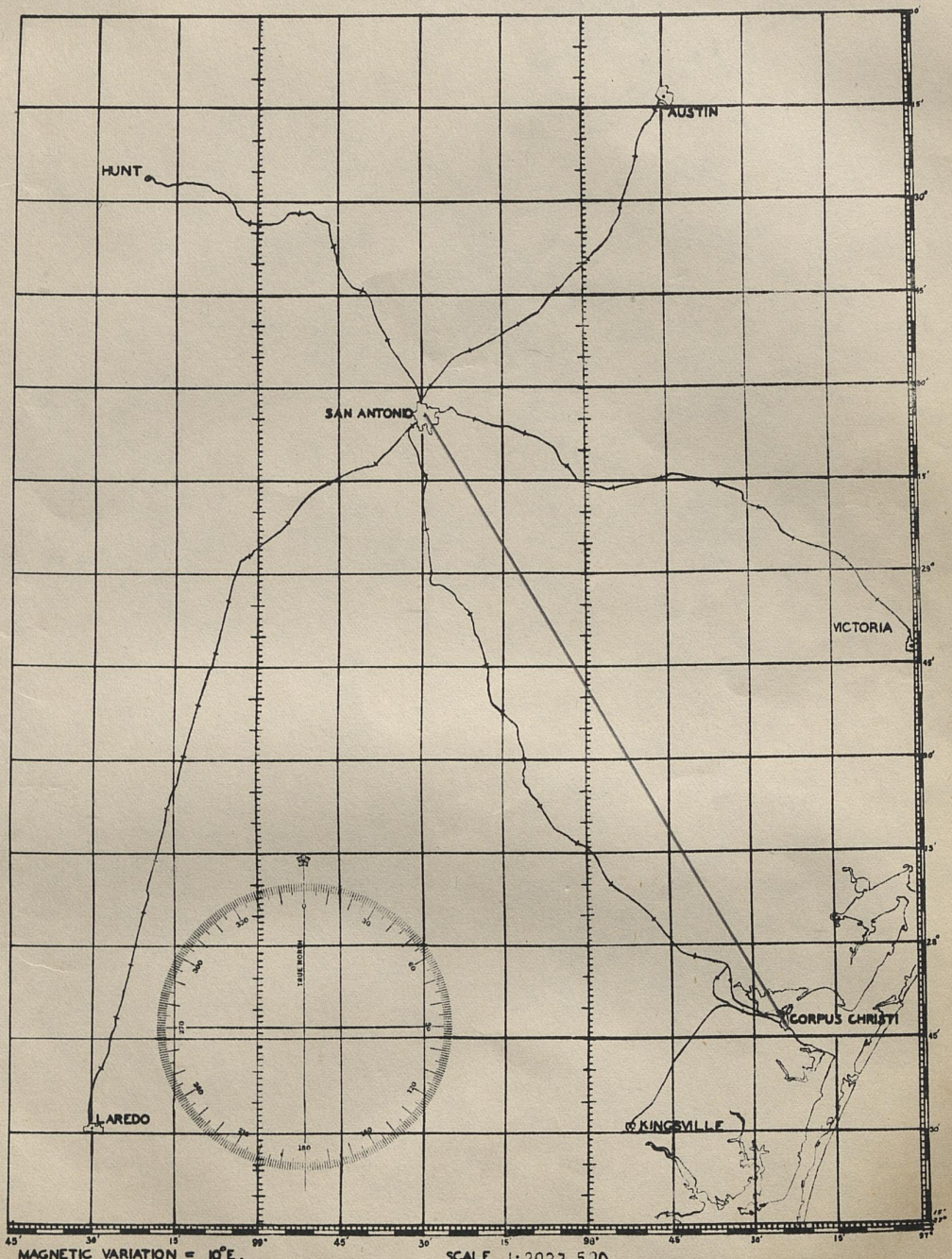
Required: Compass Heading
Ground speed
ETA



MAGNETIC VARIATION = 10°E.

SCALE 1:2027,520

5



MAGNETIC VARIATION = 10°E.

SCALE 1:2027,520

I. CLASSES OF MEASURE:

A. Linear Measure

1. U. S. Standard Measures:

12 inches = 1 foot
3 feet = 1 yard
6080 feet = 1 nautical mile
5280 feet = 1 statute mile

2. Metric System:

10 millimeters = 1 centimeter
10 centimeters = 1 decimeter
10 decimeters = 1 meter
1000 meters = 1 kilometer

B. Square Measure:

1. U. S. Standard Measures:

144 sq. in. = 1 sq. ft.
9 sq. ft. = 1 sq. yd.
640 acres = 1 sq. mile

2. Metric system of square measure is set up by squaring each unit in the table of linear measure.

C. Cubic Measure:

1. Common Measures:

1728 cu. in. = 1 cu. ft.
27 cu. ft. = 1 cu. yd.

2. Cubic measure in the metric system would be found by cubing each unit in the linear table.

D. Capacity Measure:

1. Liquid Measure:

2 pints = 1 quart
4 quarts = 1 gallon
$31\frac{1}{2}$ gallons = 1 barrel

2. In the metric system the units of liquid measure is the liter which contains 1000 cubic centimeters.

E. Weight Measure:

1. Avoirdupois Weight:

16 ounces = 1 pound (lb.)
2000 pounds = 1 ton

2. In the metric system the unit of weight is the gram which is the weight of a cubic centimeter of water.

1000 grams = 1 kilogram

F. Temperature:

1. Fahrenheit scale - water freezes at 32° and boils at 212°.

2. Centigrade scale - water freezes at 0° and boils at 100°.

II. IMPORTANT RELATIONS:

A. Length:

1 inch = 2.54 centimeters
1 foot = .3048 meters
1 mile = 1.609 kilometers
1 nautical mile = 1.15 statute miles = 1.85325 kilometers
1 centimeter = .3937 inches
1 meter = 3.28 feet = 39.37 inches
1 kilometer = .62 miles

B. Capacity:

1 gallon = 231 cu. in.

1 cu. ft. = $7\frac{1}{2}$ gallons

1 liter = 1.0567 quarts

C. Weights:

1 pound = .4536 kilograms
1 kilogram = 2.2 lbs.

D. Temperature:

1. To convert from Centigrade to Fahrenheit use the formula, $F = 1.8C. + 32°$

2. To convert Fahrenheit to Centigrade, use the formula,

$C. = \frac{5}{9} (F - 32°)$

3. The Knot is a unit of speed and is defined as one nautical mile per hour. One knot is equivalent to 1.15 statute miles per hour. Rate in m.p.h. = knots x 1.15. Rate in knots = $\frac{\text{m.p.h.}}{1.15}$

MATHEMATICS FORM Q-1: (1) 5738.009 (2) 579.5001 miles (3) 418.614594 (4) 2004.48372

MATHEMATICS FORM Q-2: (1) 6.708" (2) 11.121264" (3) 200 plates (4) 375 bolts

MATHEMATICS FORM Q-3: (1) 0.541 (2a) 6.375 (2b) 1.625 (3) 0.103" (4) 212.73 gallons

MATHEMATICS FORM Q-4: (1a) $\frac{39}{8}$ (1b) $\frac{19}{5}$ (1c) $\frac{143}{9}$ (2a) $4\frac{1}{2}$ (2b) $2\frac{1}{3}$ (2c) $9\frac{3}{4}$ (3a) $\frac{1}{9}$ (3b) $\frac{40}{3}$ (3c) $\frac{4}{5}$ (4a) $\frac{1}{8}$ (4b) $\frac{2}{3}$ (4c) $\frac{1}{2}$ (4d) $\frac{9}{11}$ (4e) $\frac{4}{11}$ (4f) $\frac{28}{25}$ (4g) $\frac{93}{4}$

MATHEMATICS FORM Q-5: (1) 75 gallons (2) 30" (3a) $1\frac{3}{8}$ hours (3b) $1\frac{1}{2}$ times as fast (4) 732 miles

MATHEMATICS FORM Q-6: (1) $37\frac{1}{2}$ minutes or 37.5 minutes (2a) $\frac{5}{6}$ gallons or 0.833 gallons (2b) $\frac{1}{72}$ gallons or 0.0139 gallons (3) $3\frac{4}{7}$ hours or 3.571 hours

MATHEMATICS FORM Q-7: (1) 140 miles (2) $794\frac{5}{12}$ miles (3) $3\frac{7}{15}$ hours

MATHEMATICS FORM Q-8: (1) .267, .520, 9.3125, 4.625, 25.360 (2) $\frac{9}{20}$, $\frac{7}{1250}$, $45\frac{73}{1000}$, $88\frac{17}{50}$ (3) $8\frac{3"}{8}$ (4) 342.5 miles

MATHEMATICS FORM Q-9: (1) 1200 H.P. (2) 250 m.p.h. (3) 55%

MATHEMATICS FORM Q-10: (1) 344.400 (2) 375 (3) 324 m.p.h.

MATHEMATICS FORM Q-11: (1) 264.5 m.p.h. (2) 200 planes (3) 81 men

MATHEMATICS FORM Q-12: (1) 306.24 lb. (2) 720 miles (3) 72 r.p.m. (4) 390 r.p.m.

MATHEMATICS FORM Q-13: (1) 3.754 gals. (2) 18 teeth (3) 33.75 ft. (4) 11.25 ft. or 11 ft., 3 in. (5) 2, 3

MATHEMATICS FORM Q-14: (1) 27.5 ft. (2) 20.8 lb. (3a) $147\frac{1}{5}$ mi. (3b) 1 hour, 23 minutes, 12 seconds

MATHEMATICS FORM Q-15: (ADDITION) (1) 15 (2) -17 (3) 6 (4) -9 (5) 1 (6) -4 (7) -6 (8) 1 (9) 23 (10) -81 (SUBTRACTION) (1) 5 (2) -5 (3) 9 (4) -11 (5) 6 (6) -21 (7) 15 (8) -1.9 (9) 6 3/4 (10) 2 2/5 (11) -3 3/4 (12) -1/2 (MULTIPLICATION) (1) -21 (2) +30 (3) -6 (4) +20 (5) -12 (6) -14 (7) +8 (8) -12 (9) -108 (10) +360

MATHEMATICS FORM Q-16: (1) +6 (2) -1 (3) -8 (4) $+1\frac{1}{2}$ (5) -2

(6) $+\frac{1}{3}$ (7) $-1\frac{1}{7}$ (8) +90

MATHEMATICS FORM Q-17: (1) 5 (2) -5 (3) +3 (4) +3 (5) -6 (6) -4

MATHEMATICS FORM Q-18: (1) +12 (2) -8 (3) $+\frac{1}{2}$ (4) $-1\frac{3}{5}$ (5) +7

MATHEMATICS FORM Q-19: (1) 22.5 m.p.h. (2) $41\frac{2}{3}$ m.p.h. (3) 222 m.p.h.

(4) $2\frac{1}{2}$ hrs.

MATHEMATICS FORM Q-20: (1) $2\frac{1}{2}$ hrs. (2) Plane 160 m.p.h., Wind 60 m.p.h.

(3) Speed of bomber 140 m.p.h.; Pursuit 210 m.p.h.

MATHEMATICS FORM Q-21: (1) 30 m.p.h. (2) 150 m.p.h. (3) 3 hrs.

MATHEMATICS FORM Q-22: (1) 314.16 inches (2) $166\frac{2}{3}$ cu. in. (3a) 400 ft.

(3b) 19,052 ft.

MATHEMATICS FORM Q-23: (1) 10°C. (2) 104°F. (3) -30°C. (4) 68°F.

MATHEMATICS FORM Q-24: (1a) 8 (1b) 81 (1c) 49 (2) 500 (3) 5 (4) $\frac{41}{72}$

(5) 248 (6) 65 (7) 45.6 (8) 0.866 (9) 4.419

MATHEMATICS FORM Q-25: (1) 576.281 mi. (2) 20.61 (3) 50 ft.

MATHEMATICS FORM Q-26: (1) 19.67 in. (2) 12 miles per inch, $\frac{1"}{12}$ = 1 mi.

(3) 500 mi.

MATHEMATICS FORM Q-27: (1) 815.625 mi. (2) 1:506,880 (3) 2456.25 in.

(4a) 6 mi. per in. (4b) $\frac{1"}{6}$ = 1 mi. (4c) 1:380,160

MATHEMATICS FORM Q-28: (NOTE: Answers were computed using the R.F. for this map as 1:20,736,000) (1a) 832 mi. (1b) 682 mi. (1c) 808 mi. (1d) 1603 mi. (1e) 1698 mi. (2a) 12 hrs., 12 min. (2b) 8 hrs., 33 min. (2c) 7 hrs., 37 min. (2d) 7 hrs., 24 min. (2e) 7 hrs., 57 min. (3) 2 21/125 or 2.17 in. (4) 6.1 in.

MATHEMATICS FORM Q-29: (1a) $\frac{17}{80}$ or .21 in. (1b) Constant (2a) $69\frac{4}{9}$ miles per degree of longitude at equator. (2b) Varies (3a) 15° of longitude per hour (3b) Constant (3c) $2\frac{25}{32}$ in. at New Orleans (3d) $2\frac{5''}{32}$ at Seattle (4) 3 hrs., 15 min. later in Portland (5) 2 hrs., 52 min. earlier (6) 1 in. = $327\frac{3}{11}$ mi. (7) R.F. = 1:20,736,000

MATHEMATICS FORM Q-34: (1a) 60°C. (1b) 36°C. (1c) 214°F. (1d) 175°F. (2a) 42.5° (2b) 1800 (2c) Falling, 15°

MATHEMATICS FORM Q-35: (1a) 14,000 ft. (1b) 12.5 in. (1c) 16,000 ft. (2a) 34 in. (2b) Yes, 4.5% (2c) 162 m.p.h.

MATHEMATICS FORM Q-37: (1a) 47° (1b) 142° (1c) 92° (3a) 50° (3b) 25° (3c) 66° (4a) 105° (4b) 45° (4c) 21° (5a) Obtuse angle (5b) Acute angle (5c) Right angle (5d) Reflex angle (5e) Straight angle

MATHEMATICS FORM Q-39: (1a) 109°, 114°, 119° (1b) 299°, 294°, 289° (2a) 55°, 59°, 65° (2b) 245°, 239°, 235°

MATHEMATICS FORM Q-41: (1) 29# at 15° (2) 10# at 243°

MATHEMATICS FORM Q-42: (1) $3\frac{1}{2}$# at 145° (2) 142 m.p.h. in 90° direction

MATHEMATICS FORM Q-43: (1) 79 lbs. horizontal, 128 lbs. vertical (2) .5208 mi. or 2749.8 ft.

MATHEMATICS FORM Q-44: (1) G.S. = 195 m.p.h., Course = 74° (2) G.S. = 245 m.p.h., Course = 215°

MATHEMATICS FORM Q-45: (1) G.S. = 156 m.p.h., Course = 60° (2) G.S. = 172, Course = 354°

MATHEMATICS FORM Q-46: (1) G.S. = 194 m.p.h. or 168.7 knots, Course = 55° (2) Course = 94°, G.S. = 198 m.p.h.

MATHEMATICS FORM Q-47: (1) Course = 30°, G.S. = 216 m.p.h. (2) G.S. = 275 m.p.h., Course 134°

MATHEMATICS FORM Q-48: (1) G.S. = 238 m.p.h., Heading 80° (2) G.S. = 260 m.p.h., Heading 149°

MATHEMATICS FORM Q-49: (1) G.S. = 187 m.p.h., Heading 60° (2) G.S. = 253 m.p.h., Heading 342°

MATHEMATICS FORM Q-50: (1) G.S. = 276 m.p.h., Heading = 216° (2) G.S. = 233 m.p.h., Heading 92°, Angle of drift 8°

MATHEMATICS FORM Q-51: (1) G.S. = 242 m.p.h., Heading = 140° (2) Heading = 19°, G.S. = 245 m.p.h., Time of arrival 1551

MATHEMATICS FORM Q-52: (1) T.C. = $37\frac{1}{2}°$; TH = 29°; MC = $27\frac{1}{2}°$; MH = 19°; CC = $32\frac{1}{2}°$; CH = 24°; GS = 130 m.p.h. ETA = 1348 (2) CC = $197\frac{1}{2}°$; CH = 202°; Time = 1 hr. 26 min.

MATHEMATICS FORM Q-53: (1) CC out = 136°; CC back = 316°; CH out = 141°; CH back = 311°; Time out = 44 min.; Time back = 49 min. (2) CH = 226°; GS = 175 m.p.h.; ETA = 1066