

Course No.	Exam. Subject.	Date of Exam.	Unit
18	MATHEMATICS		18. I.T.W.
Index No.	Rank.	Name (Block letters)	Service Number.
	AC2	STAVES M.E.	1591418

Form 714.

ROYAL AIR FORCE.

Rough Notebook for use in Laboratories and Workshops.

$$1 \quad 3\frac{5}{22} - \frac{7}{16} \text{ of } 5\frac{2}{3} = \frac{7}{16} \times \frac{164}{3} = \frac{61}{3}$$

$$= 3\frac{5}{22} - \frac{7}{16} \times \frac{64}{11} = 3\frac{5}{22} - \frac{28}{11}$$

$$= \frac{71}{22} - \frac{28}{11} = \frac{71-56}{22} = \frac{15}{22}$$

Ans = $\frac{15}{22}$

$$2 \quad 1\frac{5}{7} \times 1\frac{5}{7} + 3\frac{3}{10} = 1\frac{5}{7}$$

$$= \frac{12}{7} \times \frac{12}{7} + \frac{61}{10} \times \frac{12}{7} = \frac{8}{3} + \frac{9}{4} = \frac{32+27}{12}$$

$$= \frac{59}{12} = 4\frac{11}{12} \quad \text{Ans} = 4\frac{11}{12}$$

$$3 \quad \frac{7}{80} \text{ as a decimal, } \begin{array}{r} .0875 \\ 80 \overline{) 700} \\ \underline{560} \\ 140 \\ \underline{112} \\ 280 \\ \underline{280} \\ 0 \end{array}$$

Ans = .0875

$$4 \quad 0.045 \text{ as a fraction} = \frac{045}{1000} = \frac{9}{200}$$

Ans = $\frac{9}{200}$

$$5 \quad 12.08 \times 1.35 = \begin{array}{r} 12.08 \\ \times 1.35 \\ \hline 6040 \\ 3624 \\ 1208 \\ \hline 163080 \end{array}$$

Ans = 16.3080

$$6 \quad 487.6 \div 26.5 = \begin{array}{r} 18.4 \\ 265 \overline{) 4876} \\ \underline{526} \\ 226 \\ \underline{213} \\ 130 \\ \underline{104} \\ 260 \end{array}$$

Ans = 18.4

1 horizontal mile = amount of latitude on the
 present lat. = 6080 ft
 Kataba mts. 8900 ft - 6080 ft = 3220 ft = 1 km
 32 km/hr when also very cold. Speed in
 mph $\begin{array}{r} 6080 \\ \times 2 \\ \hline 12160 \\ \hline 12160 \\ \hline 15440 \text{ ft/hr} \end{array}$ 37 mph
 100 ft in 10 min

- Q 1 945 km per hr - convert to mph
 Q 2 100 yds in 10 sec - do -
 Q 3 440 mph convert to ft per second
 Q 4 2600 ft per second convert to mph

$$1 \text{ imp.} = 28.3 \text{ liters} \quad 1 \text{ imp.} = 0.077 \text{ ltrs}$$

$$0.077 \text{ ltrs} = 28.3 \text{ liters}$$

$$1 \text{ liter} = \frac{0.077}{28.3} \text{ ltrs} = \frac{0.077}{28.3} \times \frac{454 \text{ gms}}{1 \text{ lb}}$$

$$\begin{array}{r} 0.077 \\ \times 454 \\ \hline 308 \\ 308 \\ \hline 34958 \text{ gms} \end{array}$$

$$= 34958 \div 28.3 = 1.23 \text{ grams}$$

$$\begin{array}{r} 283 \\ \times 454 \\ \hline 1265 \\ 1265 \\ \hline 12799 \end{array}$$

$$\text{Ans: } 1.23 \text{ grams } \frac{283}{12799} \quad \checkmark$$

Maps & Scales

Representative Fraction $\frac{1}{250,000}$ map = $\frac{1}{4}$ map

$$\frac{1}{250,000} \quad \frac{1}{500,000} \quad \frac{1}{1,000,000} \quad \frac{1}{2,500,000}$$

$$\begin{array}{r} 19^\circ 41' 29'' \text{ B} \\ 31^\circ 19' 58'' \text{ C} \\ \hline 101^\circ 01' 27'' \end{array}$$

$$\begin{array}{r} 180^\circ 00' 00'' \\ 101^\circ 01' 27'' \\ \hline 78^\circ 58' 33'' \text{ Angle A} \end{array}$$

In a right angled triangle A one of the angles = $49^\circ 57' 48''$ what is the size of the other angle.

$$\begin{array}{r} 180^\circ 00' 00'' \\ 29^\circ 57' 48'' \\ \hline 150^\circ 2' 12'' \end{array}$$

8° W in 1943 11' annually

60 years 2003.

$$\begin{array}{r} 1943 \\ 1951 \\ \hline 8 \text{ years } \times 11' = 88' = 1^\circ 28'' \\ 143^\circ 50' \\ 1^\circ 28'' \\ \hline 145^\circ 22'' \text{ in } 1951 \end{array}$$

In a Δ 2 of the angles are equal & the 3rd is equal to $51^\circ 44' 54''$. What is the size of one of the equal angles?

$$\begin{array}{r} 180^\circ \\ 51^\circ 44' 54'' \\ \hline 2 \mid 128^\circ 05' 06'' \\ 64^\circ 22' 33'' \end{array}$$

$$\text{Ans: } 64^\circ 22' 33'' \quad \checkmark$$

$$1 \frac{1}{2} \div 3 \frac{1}{2} \times \left(\frac{5}{8} - \frac{7}{10} \right) = 1 \frac{1}{2} \div 3 \frac{1}{2} \times \left(\frac{5}{8} - \frac{7}{10} \right) = \frac{10-7}{16}$$

$$1 \frac{1}{2} = 3 \frac{1}{2} \times \frac{2}{2} = \frac{15}{10} \times \frac{2}{10} \times \frac{3}{10} = \frac{15 \times 2 \times 3}{10 \times 10} = \frac{9}{10}$$

Ans: (a) $\frac{15}{10} \times \frac{2}{10} \times \frac{3}{10} = \frac{9}{10}$

$$1 \frac{1}{2} \times 0.078 \times 0.076 = 0.078 \times 0.076$$

$$\begin{array}{r} 0.078 \\ \times 0.076 \\ \hline 4680 \\ 5460 \\ \hline 59280 \end{array}$$

Ans: (b) 0.59280

$$1 \frac{1}{2} \cdot 1.57932 \div 4.92$$

$$\begin{array}{r} 0.321 \\ 492 \overline{) 157932} \\ \underline{1476} \\ 1033 \\ \underline{984} \\ 4930 \\ \underline{4920} \\ 1000 \\ \underline{984} \\ 1600 \\ \underline{1572} \\ 2800 \\ \underline{2808} \\ 24 \end{array}$$

Ans: (a) 0.321

2. a) No. of gallons in a 50 liter drum. 1 gal = 4550 cc. 1000 cc = 1 liter

No. of gallons in drum = 50,000

No. of gallons = $\frac{50,000 \text{ cc}}{4550 \text{ cc/gal}} = \frac{1000}{91} = 9 \frac{1098}{91}$

$$\begin{array}{r} 1098 \\ 91 \overline{) 1000} \\ \underline{819} \\ 1810 \\ \underline{1818} \\ 282 \\ \underline{272} \\ 100 \\ \underline{91} \\ 900 \\ \underline{819} \\ 810 \\ \underline{728} \\ 82 \end{array}$$

Ans: 11 gallons.

2. b) No. of ounces in 0.4 kg. 1 kg = 2.2 lbs.

No. of ounces in 0.4 kg = 2.2 x 16 = 35.2 oz.

No. of ounces in 0.4 kg after 1 kg = 35.2 oz.

$\frac{1}{10}$ of 35.2 = $\frac{1}{10} \times 35.2 = 3.52$ oz.

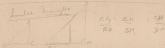
Ans: (b) 14.68 oz.

3. (a) 420 mph to fph. 1 mile = 5280 ft in a mile.

(b) 950 fph to mph.

$$\begin{array}{r} 420 \\ \times 5280 \\ \hline 1718400 \\ 840000 \\ \hline 2212800 \end{array}$$

Ans: (a) 2212800 ft



$$\frac{AC}{BC} = \frac{DF}{EF} = \frac{AD}{DE}$$

$$\frac{AB}{BC} = \frac{DE}{EF} = \frac{AD}{DF}$$

$$\frac{AC}{BC} = \frac{DE}{EF} = \frac{AD}{DF}$$





$$\frac{AB}{BC} = \frac{BE}{CE}$$

$$\frac{3}{6} = \frac{3}{x}$$

EF = 4 m
 multiply and simplify

$$3x = 18$$



2. In $\triangle ABC$ and $\triangle ADE$

$\angle A$ is common

$\angle ACB = \angle AED$

$\therefore \triangle ABC \sim \triangle ADE$ (AA Similarity)

Sum of angles $\Delta = 180^\circ$

see next page

$$\frac{AB}{AD} = \frac{BC}{DE} \quad \frac{300x^2}{800x^2} \times \frac{40}{x} \quad \frac{3}{8} \times \frac{40}{x} \quad 3x = 120$$

$$x = 106 \frac{2}{3} \text{ ft}$$

A man whose eye is 5 ft from the ground is standing 10 ft from the edge of a cliff 120 ft high. He can just see a rock at the edge of the shore below how far is the rock from the base of the cliff?



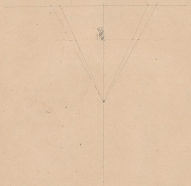
$$\frac{5}{10} = \frac{120}{x} \quad 5x = 1200 \quad x = 240 \text{ ft}$$

Ans = 240 ft

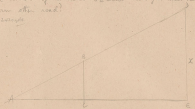
Depth of conical drain diameter of top = 2 ft
 1 ft in depth what is the diameter?



Finish Gues!



Two roads cross at A. A man walking down
 one road for 200 yds is then 240 yds from the
 other road. If he walks $3\frac{1}{2}$ miles how far will he
 be from other road?
 same



see over for working

$\triangle ABC \sim \triangle ACD$
 One similar

$$\frac{DE}{BC} = \frac{AD}{AC}$$

$$\frac{x}{440} = \frac{1200}{1200}$$

$$\frac{x}{440} = \frac{6600}{1200}$$

$$12x = 66 \times 440$$

$$x = \frac{66 \times 440}{12}$$

$$= 2420 \text{ yds.}$$



Ans: 2420 yds

$\triangle ABC \sim \triangle ACD$
 $\angle ACB = \angle ACD$ (vert. \angle)
 \hat{A} is common
 $\angle ABC = \angle ADC$
 (sum of angles) $\hat{A} = 180^\circ$

Distance between foresight & back-sight of a gun is 25 inches. The front at a target 200 yds range, the bullet's strike $9\frac{1}{2}$ inches to the right. How far should the back-sight be moved to correct the error?



$$\frac{AB}{DB} = \frac{BC}{CB} = \frac{x}{9.5} = \frac{25}{200 \times 36}$$

$$9.536 \times x = 9.5 \quad x = \frac{9.5}{288}$$

$$288x = 9.5$$

$$\frac{0.029}{288/9.50}$$

$$\frac{576}{2740}$$

Ans: 0.29 inches

11/6/43

Formula

Area of circle = $\pi r^2 = \pi \cdot \frac{22}{7} \cdot 7 \cdot 7$ or 6.1416

$\therefore A = \frac{22}{7} \times 7 \times 7 = 154$

C. $\frac{H}{500} (50 - T)$ in units of hours
of distance $H = 1500 \text{ ft.}$
 $T = 10$

$C = \frac{1500}{500} (50 - 10)$ ft

Ans = 60 $L = 1500 \text{ ft.}$

For long bridge use K Formula & F. to L. Formula

$C \& F = \frac{1}{3} + 32$

$F \& C = 32 + \frac{1}{3}$

$H = 10000$ $T = -5$ central $T = -5 \times \frac{2}{3} + 32 = 23\frac{1}{3}$

$\frac{10000}{500} (50 - 23\frac{1}{3})$ $20 \cdot (\frac{107}{3})$

Ans: = 540 $C = 10540 \text{ ft.}$

1. $A = \frac{W}{T-t}$ calculate A if $T = 20, W = 18, t = 75$

2. $B = \frac{x-y}{2}$ " B if $x = 4, y = +8$

3. $V = \frac{2R}{E+B}$ " V if $E = 240, R = 120$

4. $L = \frac{1}{2WT}$ " L if $C = 0.16, W = 0.05$

2. $H = \frac{2ml}{25}$ calculate H if $m = 2, l = 12, n = 2$

Answer: $A = \frac{18 \pm 120}{120 - 75} = \frac{138}{45} = 3.07$

1. $B = \frac{-4 - 48}{2} = -\frac{52}{2} = B = -26$

3. $V = \frac{240 \times 120}{240 + 120} = \frac{28800}{360} = 80$

4. $L = \frac{1}{0.16 \times 0.05^2} = \frac{1}{0.004} = 2500$

$\frac{1}{0.004} = \frac{1}{\frac{4}{1000}} = 2500$

5. $H = \frac{2(2 \times 12)}{2 \times 2 \times 2} = \frac{12}{2} = H = 6$

6. $M = \frac{1}{2} H \left(\frac{a^2 - b^2}{a} \right)^2$ calculate M if $H = 0.16, a = 10, b = 5$

7. $L = \frac{1885}{LC}$ calculate L if $C = 1600, C = 9$

Answer: $M = \frac{1}{2} \cdot 0.16 \left(\frac{100 - 25}{10} \right)^2$

$$1/P = \frac{2x^2}{1-x^2} \text{ Find } P \text{ if } x=6, x=\frac{1}{2}$$

$$P = \frac{6 \times \frac{1}{2} \times 1}{1 - \frac{1}{2} \times 1} = \frac{\frac{3}{2}}{1 - \frac{1}{2}} = \frac{3}{2} - \frac{1}{2} = \frac{2}{2} = 1$$

Ans: $P=1$

$$1/R = \frac{x-y}{2} \text{ Find } R \text{ if } x=3, y=-10$$

$$\frac{1}{R} = \frac{3 - (-10)}{2} = \frac{13}{2} \Rightarrow R = \frac{2}{13}$$

Ans: $R = \frac{2}{13}$

Graphs

Altitude Ft.	0	10000	20000	30000	40000	50000
Pressure	14.7	10.1	6.75	4.86	2.72	2.1

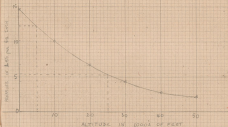
If we draw straight lines through the points, the lines are horizontal at the top and vertical at the bottom.

- ✓ up of any size 90 ft also would tend to take up $\frac{1}{2}$ diameter of an equal height at a range of 400 yds.
- (a) Range: the air will rise when it falls $\frac{1}{2}$ of the diameter of the height at range of 400 yds. from 90 ft.
- (b) At what location of the night will both coming at 400 yds?
- (c) At what range will a lot of soft span fill the whole of the night?

$$\text{range } \frac{3}{4} = 40$$



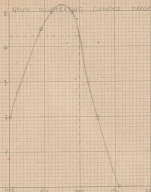
Graph of the Change of Pressure with Altitude



SCALE: - 1 inch represents 10000 feet on the horizontal axis
 1 inch represents 5 lbs per square inch on the vertical axis.

Pressure at 5000 ft =
 at 25000 ft =

Y.P.



Y.P.

-1

1

2

Y.P.

al

Pr

1/2

1/2

1/2

1/2

1/2

1/2

1/2

1/2

1/2

SCALE: 1" = 100 yds. and 1" = 1000 ft. Bearing 1" = 1000 yds. and 1" = 1000 ft.

HEADING OF U/C	000°	045°	090°	090°	125°	155°
COMPASS ERROR	+3°	+4.5°	+5°	45°	+2°	0°

COMPASS HEADING AT 100° = 4.5°

$$1(a) 3\frac{1}{2} + 1\frac{1}{2} = 4 = \frac{5+8}{10} = 4\frac{13}{10} = 5\frac{3}{10}$$

$$b) 2\frac{1}{2} - 1\frac{1}{2} = 1 = \frac{5-8}{12} = \frac{7}{12}$$

$$c) 5\frac{1}{2} \times 1\frac{1}{2} = \frac{11}{2} \times \frac{3}{2} = \frac{33}{4} = 8\frac{1}{4}$$

$$d) 4 \div 5\frac{1}{2} = \frac{4}{1} \div \frac{11}{2} = \frac{4}{1} \times \frac{2}{11} = \frac{8}{11}$$

Ans: (a) $5\frac{3}{10}$ (b) $\frac{7}{12}$ (c) $8\frac{1}{4}$ (d) $\frac{8}{11}$

$$3(a) 0.045 \times 0.68$$

$$\begin{array}{r} 0.045 \\ \times 0.68 \\ \hline 360 \\ 2700 \\ \hline 03060 \end{array}$$

Ans: (a) = 0.03060

$$b) 0.364 \div 0.35 = 35 \overline{) 364}$$

$$\begin{array}{r} 1.04 \\ 35 \overline{) 364} \\ \underline{35} \\ 140 \\ \underline{140} \\ 000 \end{array}$$

Ans: = 1.04

3(a) Distance between 2 towns is 297 km. which

is measured in statute miles 66 km = 41 statute miles

$$\frac{297}{66} = \frac{91}{21} = \frac{31}{7} = 154\frac{1}{2} \text{ statute miles}$$

Ans (a) = 154 1/2 statute miles

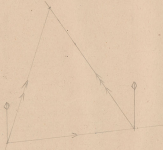
3(b) Speed in mph of a bullet having a velocity of 2000 ft per sec. = $\frac{2000}{5280} \times 60 \times 60 = 1363.63$

Ans (b) = 1363.63 mph.

(a) Distance flown by an aircraft in 2 1/2 hours at a speed of 276 mph. In 2 1/2 = 550 miles. In hours = $\frac{276}{1000} \times 2.5 = 0.69$ hours.
 Answer = 276 miles

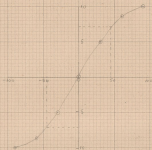
(b) How many meters is 2763 km.
 1000 = meter = 1 km.
 $2763 \times 1000 = 2763000$ meters.
 Answer (b) 2763000 meters

(c) Scale 1 inch = 10 mph find resultant of the following 3 vectors
 (a) 26 mph in the direction of 82°
 (b) 44 mph do - 82°



Ans: 61.7 mph

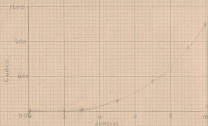
A GRAPH ILLUSTRATING THE CURRENT FLOWING IN THE ARMATURE OF A DYNAMO WHEN IT HAS TURNED THROUGH THE ANGLES SHOWN.



SCALE: - 1" = 90° on horizontal axis
 do - 2 amperes on vertical axis

CURRENT (AMPS)	-10	-8.5	-5	0	+5.0	+8.5	+10.0
ANGLE (DEGREES)	-90	-60	-30	0	+30	+60	+90

ANGLE = 45° CURRENT = 7.1 AMPS
 ANGLE = 45° CURRENT = -7.1 AMPS

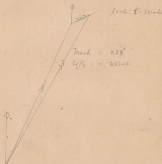


State - Amount built in horizontal distance

Distance	0	2	4	6	8	10
Cubes	0	8	64	216	512	1000

Scale of map is 1:100,000 what measured on map represent a distance of 50 miles?

$$50 \times 0.19 = 9.5 \text{ miles} \approx 15.5 \text{ km}$$



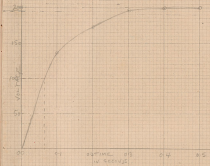
CO. 100° TAS 210 mph
TR 125° of 25 mph



Lead
 $\frac{1}{2}$ sec

W. 71

GRAPH SHOWING THE CHARGING OF A
CONDENSER



100 volt
+ 1/10 second

CENTRAL EXAMINATION BOARD, ROYAL AIR FORCE
- WIRELESS OPERATOR, AIR/GUNNER -
INITIAL TRAINING WING EXAMINATION

MATHEMATICS

UNLESS OTHERWISE STATED, ANSWERS ARE NOT REQUIRED TO
A GREATER ACCURACY THAN THREE SIGNIFICANT FIGURES.

TOTAL MARKS: 100.

TIME ALLOWED: $1\frac{1}{2}$ hours.

ALL QUESTIONS TO BE ANSWERED.

NO MARKS WILL BE AWARDED FOR ANY ANSWER UNLESS THE FULL WORKING IS CLEARLY SHOWN.

1. Evaluate:-

(a) $8\frac{1}{2} + 1\frac{4}{5}$ (b) $2\frac{1}{4} - 1\frac{2}{3}$ (c) $5\frac{1}{3} \times 1\frac{1}{2}$ (d) $4 \div 5\frac{1}{3}$

2. Evaluate:-

(a) 0.045×0.65 (b) $0.384 \div 0.35$

3. (a) The distance between two towns is 297 kilometres. Calculate this measurement

in statute miles. (80 km = 41 statute miles).

(b) What is the speed in m.p.h. of a bullet having a velocity of 2,000 f.p.s.?

4. (a) Calculate the distance flown by an aircraft in 2 hours 8 minutes at a speed
of 275 m.p.h.

(b) How many metres are there in 37.68 kilometres?

5. (a) The scale of a map is 1:1,000,000. What measurement on the map represents a
distance of 50 miles?

(b) Calculate the numerical value of W in the formula $W = \frac{E \cdot I}{I^2}$ if $E = 1.5 \times 10^3$,
 $I = 4 \times 10^2$ and $I = 20$.

6. By means of a scale drawing using a scale 1 inch = 10 m.p.h., find the
resultant of the following two vectors:-

(a) 35 m.p.h. in the direction $065^{\circ}T$.

(b) 42 m.p.h. in the direction $326^{\circ}T$.

7. The voltage acquired at certain times during the charging of a condenser is
shown in the following table:-

VOLTAGE (volts):	0	136	163	196	199	200
TIME (seconds):	0	0.1	0.2	0.3	0.4	0.5

(a) Draw a graph on a Time base.

Use the scales 1 inch = 0.1 second for Time.

1 inch = 50 volts for voltage.

(b) From your graph find:-

(i) Time taken for the condenser to acquire a 100 volt charge.

(ii) Voltage acquired by the condenser in 0.25 second.

$$1(a) \quad 2\frac{1}{2} \times 2\frac{1}{2} = 2\frac{1}{2} \times \frac{5}{2} = 6\frac{1}{2}$$

$$(b) \quad 3\frac{1}{2} \times 2\frac{1}{2} = \frac{7}{2} \times \frac{5}{2} = \frac{35}{4} = 8\frac{3}{4}$$

$$(c) \quad 5 \div 2\frac{1}{2} = 5 \times \frac{2}{5} = \frac{20}{5} = 4$$

Ans: (a) $6\frac{1}{2}$ (b) $8\frac{3}{4}$ (c) 4

$$2(a) \quad 0.351 \times 0.27$$

$$\begin{array}{r} 0.351 \\ \times 0.27 \\ \hline \end{array}$$

$$2457$$

$$702$$

$$\hline 09477$$

$$(b) \quad 0.0605 \times 96$$

$$\begin{array}{r} 0.0605 \\ \times 96 \\ \hline \end{array}$$

$$3630$$

$$5445$$

$$\hline 5805$$

$$= 5.805$$

$$\hline 5.805$$

$$(c) \quad 0.0087 \times 10^3 = 0.0087 \times 1000$$

$$= 8.7$$

Ans: (a) 0.9477 (b) 0.0605×96 (c) 8.7

2 24 mph 0.2 T
 24 mph 1.0 T mile back = 10 mph



Ans: Resultant Velocity is 10 mph in a direction of 0.88 T



Ans: 10 mph
 0.99 T

1 400 at 3/4 200 at 300 yds

2 of 300 yds $\frac{1500}{2} = 750$ yds
 $\frac{100 \text{ yds}}{300} \times 5 \text{ ft} = \frac{5 \text{ ft}}{3}$
 $\frac{5 \text{ ft}}{3} \times 3 = 5 \text{ ft}$
 $\frac{750}{400} = 1.875$
 $\frac{750}{200} = 3.75$
 $\frac{750}{600} = 1.25$
 166 2/3 yds

2 like give a plus
 1 of each - 600 - 0.2

$$E = \frac{nL}{T \times 10^8} \quad n = 10,000 \text{ L} \cdot 1000 \text{ T} \cdot 1$$

$$E = \frac{10,000 \times 1000}{10^8 \times 1} = \frac{10,000,000}{10^8} = 0.1$$

$$W = \frac{m f i}{10^8} \quad m = 1.5 \times 10^8$$

$$f = 4 \times 10^2 \quad i = 20$$

$$W = \frac{1.5 \times 10^8 \times 4 \times 10^2 \times 20}{10^8} = 1.5 \times 2 \times 2 = \frac{6}{8} = 1.5$$

Range of scales

$\frac{1}{1000,000}$ 50 mm

$\frac{1}{1000}$
1000

1000

$\frac{1}{1000}$ miles = 1609 m

700
 $\frac{1}{5280}$
12 ft

Weight

Ounce	gram	4.54 grains = 1 lb
lb	kilogram	2.2 lbs = 1 kg
ton		2240 lbs = 1 ton

Volume

Pint	cubic centimeter (cc)
Gallon	litre (1000 cc = 1 litre)

1 litre = 1.76 pints

Similar triangles are triangles in which the angles of one triangle are equal to the corresponding angles of the other triangle.

To convert mph to ft/sec
 $\frac{60}{3600}$

60 mph = 88 ft/sec

$\frac{5280}{3600}$

To convert mph to ft/sec
 $\frac{5280}{3600}$

$\frac{5280}{3600}$

Light Source: carbon arc lamp
at 10000 GPa. 1000000

1000
1000
1000

0.02
0.02
0.02
0.02

1000000
1000000