Abdulla Aljunibi

ARITHMETIC

INTEGERS: Integers are all positive and negative whole numbers including 0.

WHOLE NUMBERS Whole numbers are the numbers : 0, 1, 2, 3, 4, 5, 6, 9, 8, 9, 10, 11, 12, 13... and so on.

ADDITION OF WHOLE NUMBERS

2 + 5 = 7 50 + 23 = 73 163 + 129 = 292 1729 + 1347 = 3076

SUBTRACTION OF WHOLE NUMBERS

7 - 5 = 2 50 - 23 = 27 163 - 129 = 34

MULTIPLICATION OF WHOLE NUMBERS

3 X 7 = 21 50 x 29 =

DIVISION OF WHOLE NUMBERS

7 ÷ 239 = 34 R = 1

034
7 | 239
-21↓
29
-28
1

18 ÷ 1325 = 11

x 73
18 | 1325
-126↓
065
-54
11

LOWEST COMMON MULTIPLE (LCM) AND HIGHEST COMMON FACTOR (HCF)

LCM

3 and 6 LCM = 6

3 = 3, 6, 9, 12, 15

6 = 6, 12, 18, 24, 30

4 and 10 LCM = 20

4 = 4, 8, 12, 16, 20,

10 = 10, 20, 30, 40

9 and 6 LCM = 18

9 = 9, 18, 27, 36

6 = 6, 12, 18, 24

12 and 4 and 8 LCM = 24

12 = 12, 24, 36, 48

4 = 4, 8, 12, 16, 20, 24

8 = 8, 16, 24

HCF

16 and 12 HCF = 4

12 = 1, 2, 3, 4, 6, 12

16 = 1, 2, 4, 8, 16

24 and 30 HCF = 6

24 = 1, 2, 3, 4, 6, 8

30 = 1, 2, 3, 5, 6

40 and 60 and 75 HCF = 5

40 = 1, 2, 3, 4, 5, 8, 10, 20

60 = 1, 2, 3, 4, 5, 6, 10, 12

75 = 1, 3, 5, 15

PRECEDENCE

Priority Order of Calculation	
First	Brackets
Second	Powers and Roots
Third	Multiplication and Division
Fourth	Addition and Subtraction

Figure 1-3. Order in which calculations are carried out table.

P E M D A S

P = ( )
E = x²
M = x
D = ÷
A = +
S = −

PEMDAS

34 - 2 × (3 × (6 - 2) + 3) = 4

1 (6-2) = 4
2 (3 x 4 + 3) = 12 + 3 = 15
3, -2 x 15 = -30
4, 34 - 30 = 4

34 - 2 x (3 x (6 - 2) + 3)

1, 6-2 = 4
2, 3 x 4 + 3 = 12 + 3 = 15
3, 34 - 2 x 15
4, -2 x 15 = -30
5, 34 - 30 = 4

USE OF VARIABLES

Calculate the value of 2 (x + 3y) - 4xy When x = 5 and y = 2

2 (5 + 3(2)) = 22
3(2) = 6
5 + 6 = 11
2 x 11 = 22

2 (x + 3y) - 4xy
x = 5
y = 2
1, 2 (5 + 3(2)) - 4 (5 x 2)

2, 5 + 6 = 11
(5 x 2) = 10
3, 2 x 11 - 4 x 10
22 - 40 = -18

Calculate the value of u + at When u = 2, a = 4 and t = 9

4 + 9t = 2 + (4 x 9)
4 x 9 = 36
2 + 36 = 38

POSITIVE AND NEGATIVE NUMBERS (SIGNED NUMBERS)

ADDITION OF POSITIVE AND NEGATIVE NUMBERS

The weight of an aircraft is 2 000 pounds. A radio rack weighing 3 pounds and a transceiver weighing 10 pounds are removed from the aircraft. What is the new weight? For weight and balance purposes, all weight removed from an aircraft is given a minus sign, and all weight added is given a plus sign.

$= 2000 + -3 + -10 = 2000 + -13 = 1987$

$2000 - 3 - 10 =$

$2000 - 13 =$

$20 + -20 = 0$

$-20 + 20 = 0$

$20 - (-20) = 40$

$-20 + -20 = -40$

SUBTRACTION OF POSITIVE AND NEGATIVE NUMBERS

Example: The daytime temperature in the city of Denver was 6° below zero (−6°). An airplane is cruising at 15 000 feet above Denver. The temperature at 15 000 feet is 20° colder than in the city of Denver. What is the temperature at 15 000 feet?

$-6 + -20 = -26$

MULTIPLICATION OF POSITIVE AND NEGATIVE NUMBERS

3 × 6 = 18,
−3 × 6 = −18,
3 × −6 = −18
−3 × −6 = 18

DIVISION OF POSITIVE AND NEGATIVE NUMBERS

6 ÷ 3 = 2,
−6 ÷ 3 = −2,

−6 ÷ −3 = 2,
6 ÷ −3 = −2

FRACTIONS

1 → numerator

4 → denominator

The denominator of a fraction cannot be 0

A proper fraction

1⁄4, 1⁄2, 3⁄16, and 7⁄8

proper fraction: الرقم الي تحت اكب من الي فوق

improper fraction:

4⁄4, 9⁄8, 26⁄21, 3⁄2

improper fraction: الرقم الي فوق اكبر من الي تحت

$\frac{10}{12}$ $\frac{11}{9}$

mixed numbers

1 1⁄2, 5 1⁄4, 10 3⁄4, and 8 1⁄8

ADDITION AND SUBTRACTION OF FRACTIONS

$\frac{1}{5} + \frac{1}{6} = \frac{1}{5} \times \frac{1}{6} = \frac{5+6}{30} = \frac{11}{30}$

$\frac{4}{3} - \frac{3}{4} = \frac{4}{3} \times \frac{3}{4} = \frac{16-9}{12} = \frac{7}{12}$

$\frac{3}{9} \times \frac{16}{10} = \frac{30+54}{90} = \frac{84}{90}$

$\frac{3}{10} \times \frac{9}{2} = \frac{6-90}{20}$

$= \frac{84}{20}$

MULTIPLICATION OF FRACTIONS

$\frac{2}{3} \times \frac{3}{7} = \frac{2 \times 3}{3 \times 7} = \frac{6}{21}$

$\frac{5}{6} \times \frac{7}{10} = \frac{35}{60}$

DIVISION OF FRACTIONS

$\frac{7}{8} \div \left(\frac{4}{3}\right) = \frac{7}{8} \times \frac{3}{4} = \frac{7 \times 3}{8 \times 4} = \frac{21}{32}$

$\frac{8}{9} \div \frac{10}{11} = \frac{8}{9} \times \frac{11}{10} = \frac{88}{90}$

THE DECIMAL NUMBER SYSTEM

ADDITION OF DECIMAL NUMBERS

$2.34 + 37.5 + 0.9$

$$\begin{array}{r} {\scriptstyle 1\ \ \ \ \ } \\ 2.34 \\ +37.5 \\ .09 \\ \hline 39.93 \end{array}$$

$2.34 + 37.5 =$

$$\begin{array}{r} 2.34 \\ +37.5 \\ \hline 39.84 \end{array}$$

SUBTRACTION OF DECIMAL NUMBERS

$37.272 - 14.88$

$$\begin{array}{r} {\scriptstyle 6\ 11\ \ \ } \\ 37.272 \\ -14.88 \\ \hline 22.392 \end{array}$$

$37.272 - 14.88$

$$\begin{array}{r} {\scriptstyle 6\ 11\ \ \ } \\ 37.272 \\ -14.88 \\ \hline 22.392 \end{array}$$

MULTIPLICATION OF DECIMAL NUMBERS

0.2×6.03

$$\begin{array}{r} 6.03 \\ \times\ \ 0.2 \\ \hline 1.206 \end{array}$$

3 Decimal Point

9.45×120

$$\begin{array}{r} 945 \\ \times\ 120 \\ \hline 11000 \\ +\ 18900 \\ \ \ 94500 \\ \hline 113400 \end{array}$$

2 Decimal Point

9.45×120

$$\begin{array}{r} 945 \\ \times\ 120 \\ \hline 11000 \\ +\ 18900 \\ \ \ 94500 \\ \hline 113400 \end{array}$$

DIVISION OF DECIMAL NUMBERS

$5.76 \div 0.3 = 19.2$

$0.3 \overline{)5.76}$ (×10, ×10) =

$$\begin{array}{r} 19.2 \\ 3\overline{)57\overset{\uparrow}{.}6} \\ -3\downarrow \\ \hline 27 \\ -27 \\ \hline 06 \\ -6 \\ \hline 0 \end{array}$$

$5.76 \div 0.3 = 19.2$

$0.3 \overline{)5.76}$ (×10, ×10)

$$\begin{array}{r} 19.2 \\ 3\overline{)5\ 7\ 6} \\ -3 \\ \hline 27 \\ 27 \\ \hline 0.6 \\ 6 \\ \hline 0 \end{array}$$

$86.4 \div 0.12 = 720$

$0.12 \overline{)86.40}$ (×10, ×10, ×10, ×10) =

$$\begin{array}{r} 720 \\ 12\overline{)864\ 0.} \\ -84\downarrow \\ \hline 24 \\ -24 \\ \hline 00 \\ -0 \\ \hline 0 \end{array}$$

$4.85 \div 5 = 0.97$

$$
\begin{array}{r}
0.97 \\
5 \overline{)\,4.85} \\
-\,45 \\
\hline
35 \\
-\,35 \\
\hline
0
\end{array}
$$

$95.1 \div 6 = 15.85$

$$
\begin{array}{r}
15.85 \\
6 \overline{)\,95.10} \\
-\,6 \\
\hline
35 \\
-\,30 \\
\hline
51 \\
-\,48 \\
\hline
30 \\
-\,30 \\
\hline
0
\end{array}
$$

AREA AND VOLUME

RECTANGLE

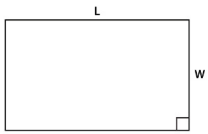


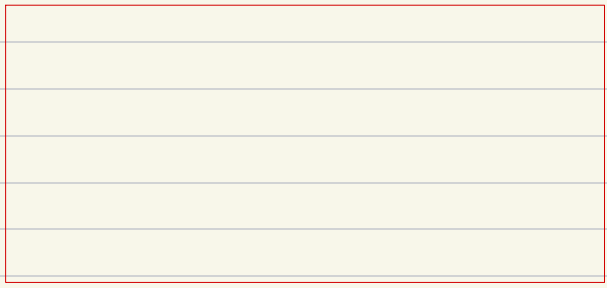
Figure 1-16. A rectangle.

The formula for the area of a rectangle is:

Area = Length × Width or A = L × W

L = 6m

W = 5m

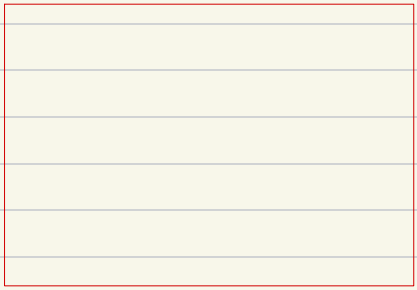


Area = 6 x 5 = 30

SQUARE

Area = Side × Side or $A = S^2$

W = 7



L = 3

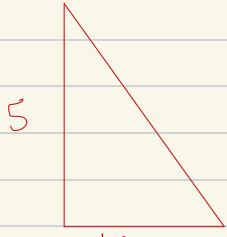
Area = 7 x 3 = 21

TRIANGLE

The formula for the area of a triangle is:

Area = ½ × (Base × Height) or A = ½ BH

$\frac{1}{2} \times (5 \times 12) = 30$



PARALLELOGRAM

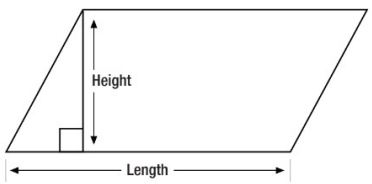
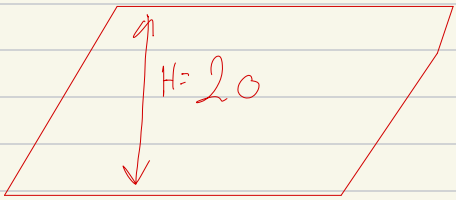


Figure 1-20. A Parallelogram.

$$Area = Length \times Height \qquad A = LH$$



L = 10

A = 20 x 10 = 200

TRAPEZOID

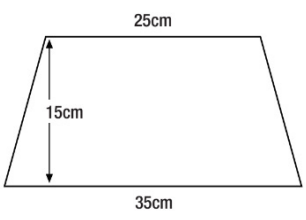


Figure 1-22. A trapezoid with dimensions.

the area of a trapezoid is:

$$Area = \tfrac{1}{2}(Base_1 + Base_2) \times Height$$

$$A = \frac{1}{2}(35+25) \times 15$$

$$= \frac{1}{2} \times 60 \times 15$$

$$A = 450\,cm$$

60
15
300
600
900

CIRCLE

Written as a formula:

$$Circumference = \pi \times d \quad or \quad C = 2\pi \times r$$

The formula for finding the area of a circle is:

$$Area = \pi \times radius2 \quad or \quad A = \pi r2$$

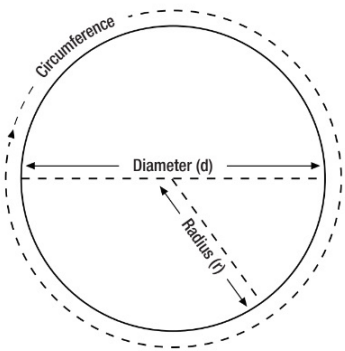
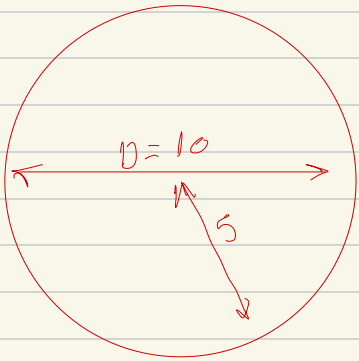


Figure 1-23. A circle.

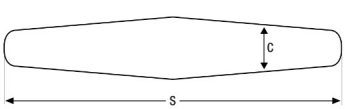


$C = 2 \times 3.14 \times 5$

$C = 10 \times 3.14 = 31.40$

$$\begin{array}{r} 10 \\ \times\ 3.14 \\ \hline 40 \\ 100 \\ 3000 \\ \hline 31.40 \end{array}$$

WING AREA



C = Average Chord
S = Span

Figure 1-25. Area of an aircraft wing.

$C = 30$
$S = 100$

$WA = 30 \times 100 = 3000$

The formula for calculating wing area is:

$$Area\ of\ a\ Wing = Wing\ Span \times Mean\ Chord \quad or \quad AW = SC$$

RECTANGULAR SOLIDS

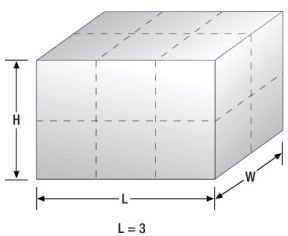


Figure 1-27. A rectangular solid.

tangular solid is:

$$Volume = Length \times Width \times Height \quad or, \quad V = LWH$$

CUBE

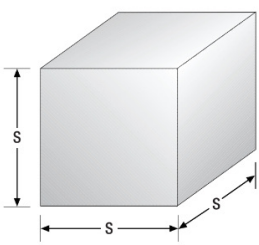


Figure 1-28. A cube.

the volume formula for a cube can also be written as

$$Volume = Side \times Side \times Side \quad or \quad V = S^3$$

CYLINDER

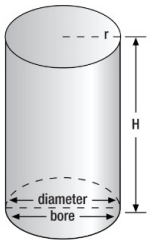


Figure 1-29. A cylinder.

$H = 20$

$r = 5$

$V = 3.14 \times 5^2 \times 20$

$= 3.14 \times 25 \times 20$

$V = 1570$

The formula for the volume of a cylinder is:

Volume = π × radius2 × height of the cylinder
or, V = π r2H

SPHERE

$$Volume = \frac{4}{3} \times \pi \times radius^3 \quad or \quad V = \frac{4}{3} \times \pi r^3$$

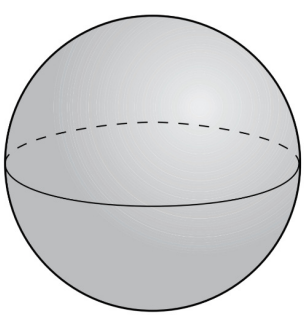


Figure 1-31. A sphere.

CONE

The formula for the volume of a cone is:

$$V = \frac{1}{3} \pi r^2 H$$

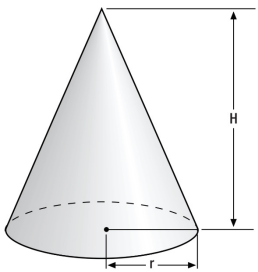


Figure 1-32. A cone.

COMMON CONVERSIONS

IMPERIAL SYSTEM		SI (METRIC)
Distance		
1 Inch	is equal to	2.54 Centimeters
1 Foot	is equal to	0.304 8 Meters
1 (Statute) Mile	is equal to	1.609 3 Kilometers
Weight		
1 Pound	is equal to	0.453 59 Kilograms
Volume		
1 Quart	is equal to	0.946 35 Liters
1 Gallon	is equal to	3.785 4 Liters
Temperature		
0 Fahrenheit	is equal to	(-)17.778 Celsius
0 Fahrenheit	is equal to	255.37 Kelvin
Area		
1 Square Inch	is equal to	6.451 6 Square Centimeters
1 Square Foot	is equal to	0.092 903 Square Meters
1 Square Mile	is equal to	2.59 Square Kilometers
Speed		
1 Foot Per Second	is equal to	0.304 8 Meters Per Second
1 Mile Per Hour	is equal to	1.609 3 Kilometers Per Hour
1 Knot	is equal to	1.852 Kilometers Per Hour

SI (METRIC)		IMPERIAL SYSTEM
Distance		
1 Centimeter	is equal to	0.394 Inches
1 Meter	is equal to	3.28 Feet
1 Kilometer	is equal to	0.621 Miles
Weight		
1 Kilogram	is equal to	2.204 Pounds
Volume		
1 Liter	is equal to	1.057 Quarts
1 Lites	is equal to	0.264 Gallons
Temperature		
0 Celsius	is equal to	33.8 Fahrenheit
0 Kelvin	is equal to	(-)437.87 Fahrenheit
Area		
1 Square Centimeter	is equal to	0.155 Square Inches
1 Square Meter	is equal to	10.763 91 Square Feet
1 Square Kilometer	is equal to	0.386 Square Miles
Speed		
1 Meters Per Second	is equal to	3.281 Feet Per Second
1 Kilometer Per Hour	is equal to	0.621 Miles Per Hour
1 Kilometer Per Hour	is equal to	0.540 Knots

Figure 1-33. Common conversions chart.