APPLICATIONS OF MATHEMATICS 10

STUDENT REFERENCE

UNIT CONVERSION

	Common Imperial	Imperial and Metric	Metric
Length	1 mile = 1760 yards 1 mile = 5280 feet 1 yard = 3 feet 1 yard = 36 inches 1 foot = 12 inches	1 mile ≈ 1.609 km 1 yard ≈ 0.9144 m 1 foot ≈ 0.3048 m 1 inch ≈ 2.54 cm	1 km = 1000 m 1 m = 100 cm 1 cm = 10 mm
Capacity (Volume)	1 gallon = 4 quarts 1 gallon = 8 pints 1 quart = 2 pints	1 gallon ≈ 4.546 L	1 L = 1000 mL 1 mL = 1 cm^3
Mass (Weight)	1 imperial ton = 2000 pounds 1 pound = 16 ounces	1 pound ≈ 0.454 kg 1 ounce ≈ 28.35 g	1 t = 1000 kg 1 kg = 1000 g

FORMULAE

Trigonometry

(Put your calculator in Degree Mode)

- Right triangles

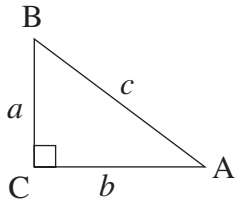
Pythagorean Theorem

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

$$\sin A = \frac{\text{opposite}}{\text{hypotenuse}}$$

$$\cos A = \frac{\text{adjacent}}{\text{hypotenuse}}$$

$$\tan A = \frac{\text{opposite}}{\text{adjacent}}$$



- Other triangles, use Sine Law or Cosine Law

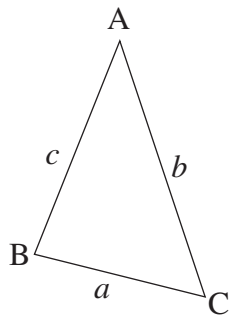
Law of Sines

$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$

Law of Cosines

$$a^2 = b^2 + c^2 - 2bc\cos A$$

or $$\cos A = \frac{a^2 - b^2 - c^2}{-2bc}$$



Other Formulae

- The equation of a line:

$$y = mx + b$$

- The slope of a line:

$$m = \frac{\text{rise}}{\text{run}} = \frac{y_2 - y_1}{x_2 - x_1}$$

- The distance between two points:

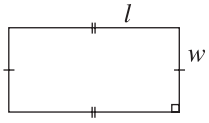
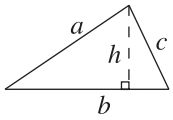
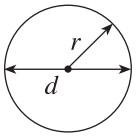
$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

- The midpoint formula:

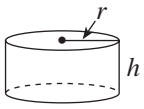
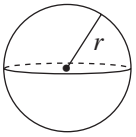
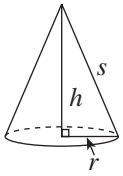
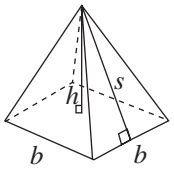
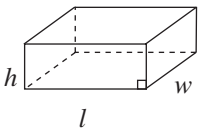
$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

GEOMETRIC FORMULAE

Key Legend	
l = length	P = perimeter
w = width	C = circumference
b = base	A = area
h = height	SA = surface area
s = slant height	V = volume
r = radius	
d = diameter	

Geometric Figure	Perimeter	Area
Rectangle 	$P = 2l + 2w$ **or** $P = 2(l + w)$	$A = lw$
Triangle 	$P = a + b + c$	$A = \frac{bh}{2}$
Circle 	$C = \pi d$ **or** $C = 2\pi r$	$A = \pi r^2$

NOTE: Use the value of π programmed in your calculator rather than the approximation of 3.14.

Geometric Figure	Surface Area	Volume
Cylinder 	$A_{top} = \pi r^2$ $A_{base} = \pi r^2$ $A_{side} = 2\pi rh$ $SA = 2\pi r^2 + 2\pi rh$	$V = \pi r^2 h$
Sphere 	$SA = 4\pi r^2$ **or** $SA = \pi d^2$	$V = \frac{4}{3}\pi r^3$
Cone 	$A_{side} = \pi rs$ $A_{base} = \pi r^2$ $SA = \pi r^2 + \pi rs$	$V = \frac{1}{3}\pi r^2 h$
Square-Based Pyramid 	$A_{triangle} = \frac{1}{2}bs$ (for each triangle) $A_{base} = b^2$ $SA = 2bs + b^2$	$V = \frac{1}{3}b^2 h$
Rectangular Prism 	$SA = wh + wh + lw + lw + lh + lh$ **or** $SA = 2(wh + lw + lh)$	$V = lwh$

NOTE: Use the value of π programmed in your calculator rather than the approximation of 3.14.

ROUGH WORK FOR GRAPHING
(No marks will be given for work done on this page.)