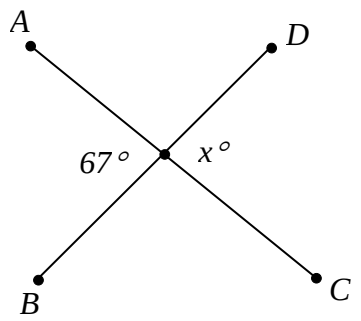
Year 7-10 Formula Sheet

Year 7

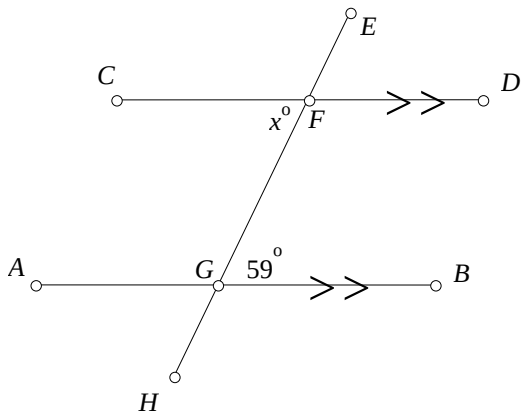
Angles

Vertically opposite angles are equal



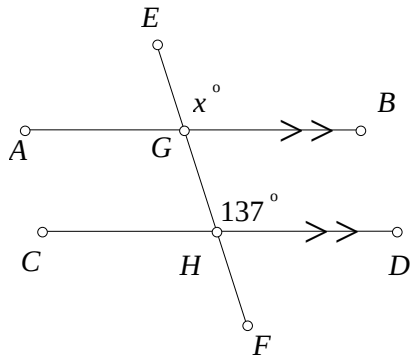
$x = 67$

Alternate angles on parallel lines are equal



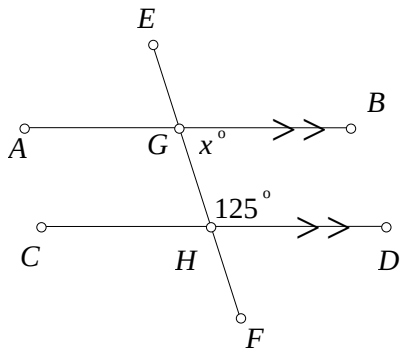
$x = 59$

Corresponding angles on parallel lines are equal



$x = 137$

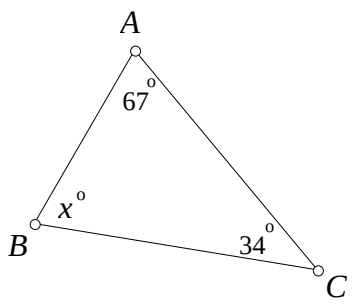
Co-interior angles on parallel lines are supplementary



$x + 125 = 180$
$x = 55$

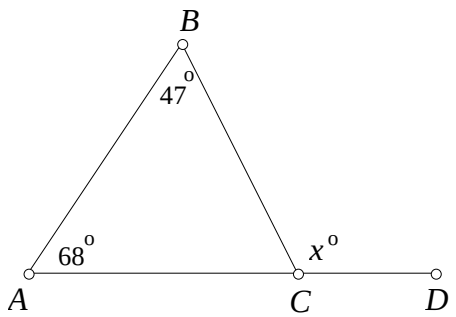
Geometry

Angle sum of a triangle is 180°



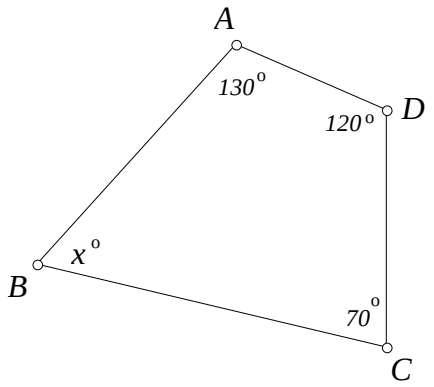
$$x + 67 + 34 = 180$$
$$x + 101 = 180$$
$$x = 79$$

Exterior angle of a triangle equals the sum of the opposite interior angles



$$x = 68 + 47$$
$$x = 115$$

Angle sum of a quadrilateral is 360°



$$x + 130 + 120 + 70 = 360$$
$$x = 40$$

Area and Volume

Area of a rectangle

$$A = l \times b$$

l	is length
b	is breadth

Area of a triangle

$$A = \frac{1}{2}bh$$

b	is base
h	is perpendicular height

Area of a parallelogram

$$A = b \times h$$

b	is base
h	is perpendicular height

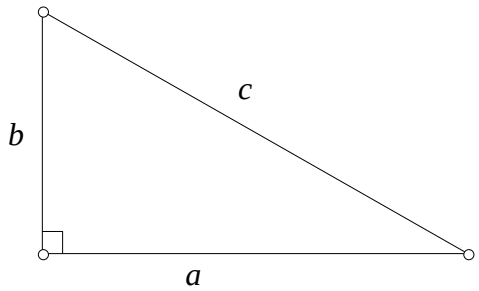
Volume of a rectangular prism

$$V = l \times b \times h$$

l	is length
b	is breadth
h	is height

Year 8

Pythagoras' Theorem



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

Algebra

Index laws

$$x^m \times x^n = x^{m+n}$$

$$x^m \div x^n = x^{m-n}$$

$$(x^m)^n = x^{mn}$$

$$x^0 = 1$$

Area and Volume

Area of a trapezium

$$A = \frac{1}{2}h(a + b)$$

h	is perpendicular height
a, b	are the parallel sides

Area of a kite and rhombus

$$A = \frac{1}{2}xy$$

x, y	are the diagonals

Circumference of a circle

$$C = 2\pi r$$
$$C = \pi d$$

r	is the radius
d	is the diameter

Length of an arc

$$l = \frac{\theta}{360} \times 2\pi r$$

r	is the radius

Area of a circle

$$A = \pi r^2$$

r	is the radius

Area of a sector

$$A = \frac{\theta}{360} \times \pi r^2$$

r	is the radius

Volume of a cylinder

$$V = \pi r^2 h$$

r	is the radius
h	is the height

Year 9

Pythagoras' Theorem and Surds

Surd rules

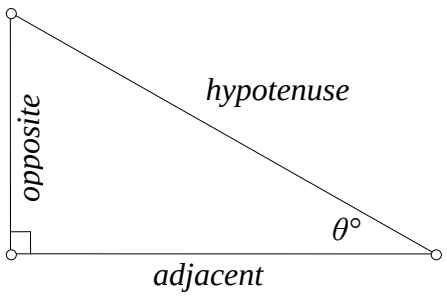
$$\sqrt{xy} = \sqrt{x} \times \sqrt{y}$$

$$\sqrt{\frac{x}{y}} = \frac{\sqrt{x}}{\sqrt{y}}$$

$$(\sqrt{x})^2 = x$$

Trigonometry

Trigonometric ratios



$$\sin\theta = \frac{opposite}{hypotenuse}$$

$$\cos\theta = \frac{adjacent}{hypotenuse}$$

$$\tan\theta = \frac{opposite}{adjacent}$$

Indices

Index laws

$$x^{-m} = \frac{1}{x^m}$$

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

$$x^{\frac{1}{3}} = \sqrt[3]{x}$$

$$x^{\frac{p}{q}} = \sqrt[q]{x^p} \text{ or } (\sqrt[q]{x})^p$$

Geometry

Angle sum of a convex polygon

$$Angle\ sum = 180(n-2)°$$

n is the number of sides

Exterior angle sum of a convex polygon

$$Exterior\ angle\ sum = 360°$$

Surface Area and Volume

Surface area of a cylinder

$$SA = 2\pi rh + 2\pi r^2$$

r is the radius
h is the height

Coordinate Geometry and Graphs

Length of an interval

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

Midpoint of an interval

$$M = (\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2})$$

Gradient of a line

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

Gradient-intercept formula

$$y = mx + b$$

m is the gradient
b is the y-intercept

Point-gradient formula

$$y - y_1 = m(x - x_1)$$

m is the gradient

Year 10

Interest and Depreciation

Simple interest

$$I = PRN$$

I	is the interest
P	is the principal invested
R	is the rate of interest
N	is the number of periods

Compound interest

$$A = P(1+r)^n$$

P	is the principal invested
r	is the rate of interest
n	is the number of periods
A	is the amount after n periods

Depreciation

$$A = P(1-r)^n$$

P	is the original value
r	is the rate of depreciation
n	is the number of periods
A	is the value after n periods

Surface Area and Volume

Surface area of a cone

$$SA = \pi rs + \pi r^2$$

r	is the radius
s	is the slant height

Surface area of a sphere

$$SA = 4\pi r^2$$

r	is the radius

Volume of a pyramid

$$V = \frac{1}{3}Ah$$

A	is the base area
h	is the height

Volume of a cone

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

r	is the radius
h	is the height

Volume of a sphere

$$V = \frac{4}{3}\pi r^3$$

r	is the radius

Equations and Logarithms

Definition of a logarithm

$$y = a^x \leftrightarrow \log_a y = x$$

Logarithm laws

$$\log_a xy = \log_a x + \log_a y$$

$$\log_a\left(\frac{x}{y}\right) = \log_a x - \log_a y$$

$$\log_a x^n = n\log_a x$$

$$\log_a 1 = 0$$

$$\log_a a = 1$$

Graphs

The parabola

$$y = ax^2 + c$$

The cubic curve

$$y = ax^3 + c$$

The hyperbola

$$y = \frac{k}{x}$$

The exponential

$$y = a^x$$

The circle

$$(x-a)^2+(y-b)^2=r^2$$

(a, b)	is the centre
r	is the radius

Trigonometry

Trigonometric relations

$$\sin A = \cos(90° - A)$$

$$\cos A = \sin(90° - A)$$

Trigonometric functions

$$\tan\theta = \frac{\sin\theta}{\cos\theta}$$

$$\sin A = \sin(180° - A)$$

$$\cos A = -\cos(180° - A)$$

$$\tan A = -\tan(180° - A)$$

Sine rule

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

Cosine rule

$$c^2 = a^2 + b^2 - 2ab\cos C$$

$$\cos C = \frac{a^2+b^2-c^2}{2ab}$$

Area rule

$$A = \frac{1}{2}ab\sin C$$

Quadratic Equations and the Parabola

Quadratic equation

$$y = ax^2 + bx + c$$

Quadratic formula

$$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$$

Axis of symmetry

$$x = -\frac{b}{2a}$$