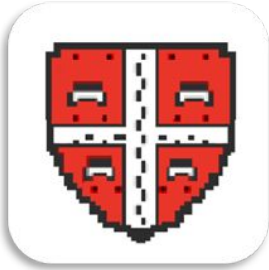


r/IGCSE Resources

Formula flashcards for Pearson Edexcel iGCSE
Mathematics (4MA1) and Further Pure Mathematics (4PM1)

by Kirsty

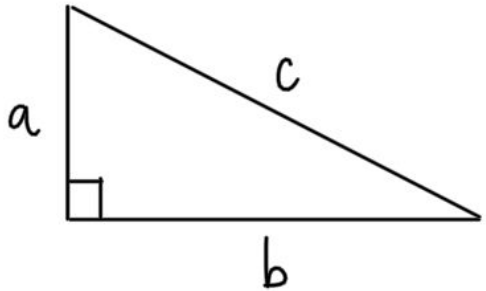
Table of Contents

Foundation Tier (4MA1)

Formula not given in exam

Pythagoras Theorem

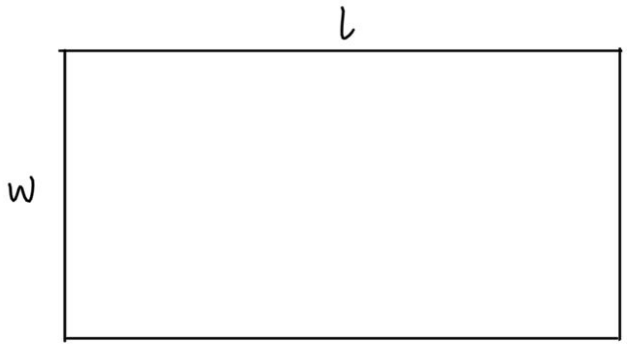
$$a^2 + b^2 = c^2$$



- only applies to right angle triangles
- used to find the length of sides

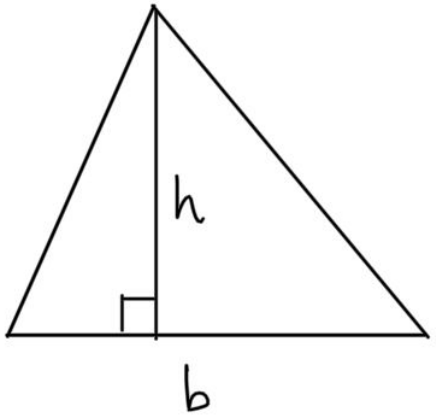
Area of a rectangle

$$l \times w$$



Area of triangle

$$\frac{1}{2}\mathrm{b}\times\mathrm{h}$$

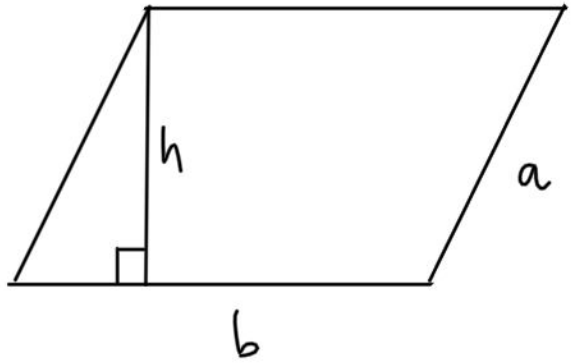


- sometimes, the diagonal is given so you can use pythagoras theorem to find h

Area of parallelogram

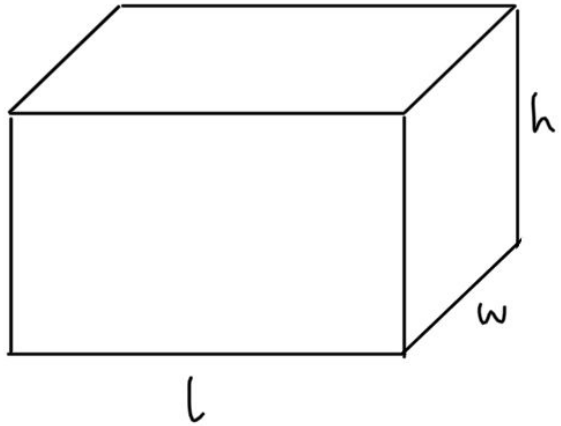
$$b \times h$$

- use pythagoras theorem to find h



Volume of cuboid

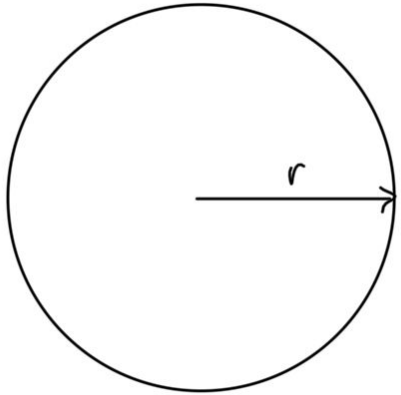
$$l \times w \times h$$



Circumference of a circle

$$2\pi r$$

- may also be written as ‘perimeter’ in exam Qs



Area of a circle

$$\pi r^2$$

Compound measures

$$\text{speed} = \frac{\text{distance}}{\text{time}}$$

$$\text{density} = \frac{\text{mass}}{\text{volume}}$$

$$\text{pressure} = \frac{\text{force}}{\text{area}}$$

- always pay attention to the units given and the units they want in your answer

Trigonometric ratios (right-angled triangles)

$$\text{sine } x = \frac{o}{h}$$

$$\cos x = \frac{a}{h}$$

$$\tan x = \frac{o}{a}$$

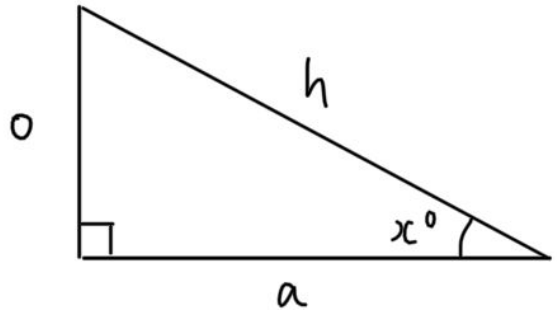
o = opposite

a = adjacent

h = hypotenuse

remember:

sOH cAH tOA



nth term (arithmetic series)

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a = first term

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n = number of terms

Formula given in exam

Area of trapezium

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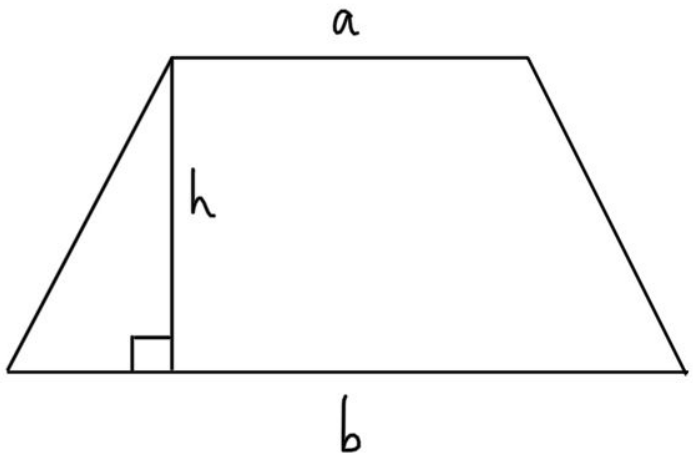
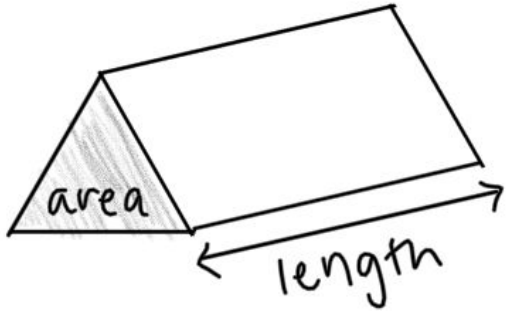
- use pythagoras theorem to find h



Volume of prism

$$\text{cross section area} \times \text{length}$$

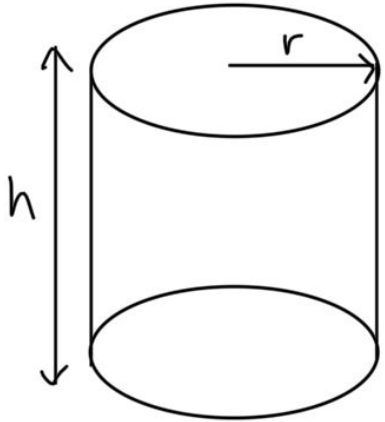
- applicable to any prism



Curved surface area of cylinder

$$2\pi rh$$

- curved area + area of 2 circle (top + base) = total surface area



Volume of cylinder

$$\pi r^2 h$$

Higher Tier (4MA1)

Formula not given in exam

Pythagoras Theorem

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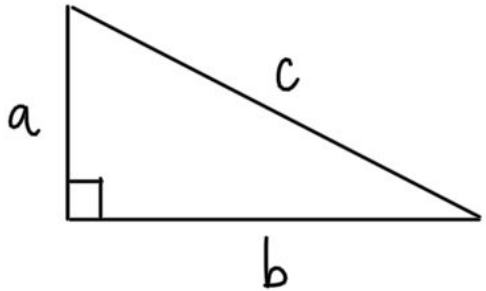

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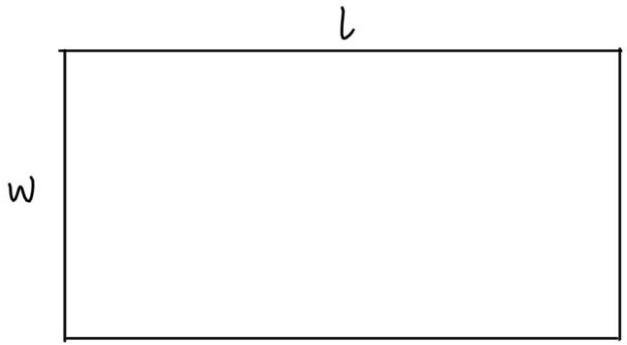

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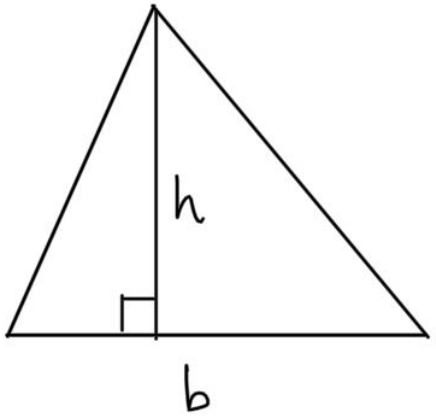

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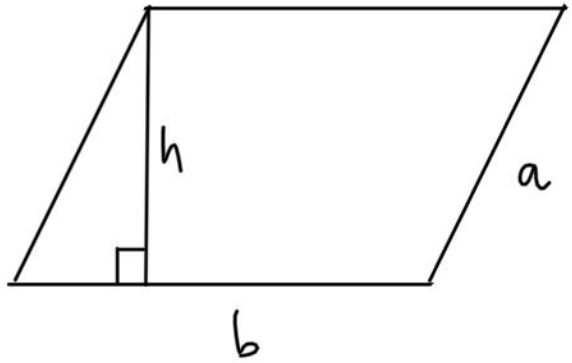

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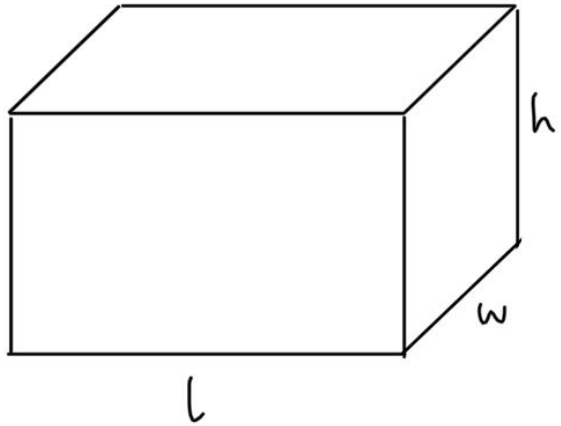

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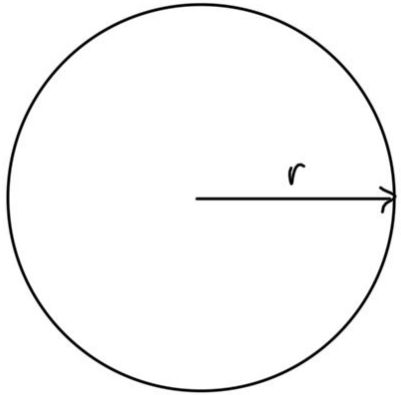

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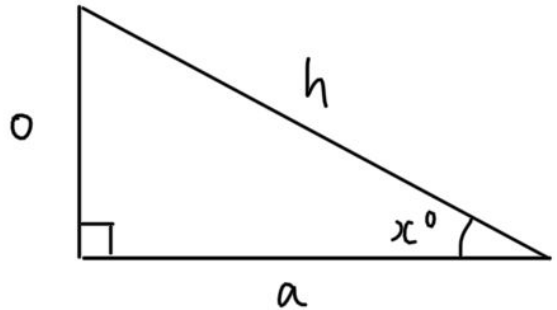


nth term (arithmetic series)

$$u_n = a + (n-1)d$$

a = first term

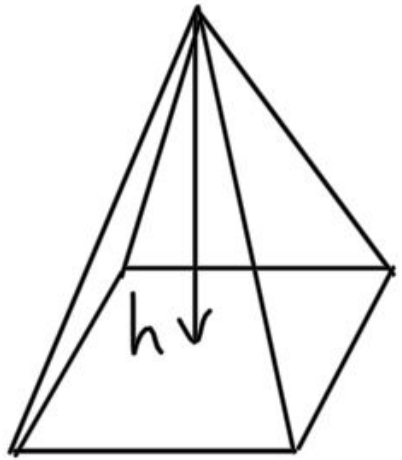
d = common difference

n = number of terms

Volume of pyramid

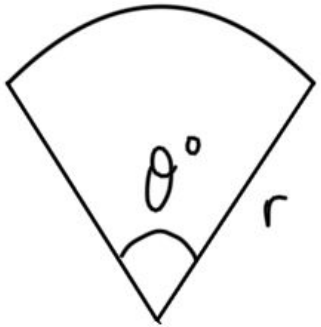
$$\frac{1}{3} \times \text{base area} \times \text{h}$$

- applicable to any pyramid



Sector arc length

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



- perimeter = arc length + 2r

Area of a sector

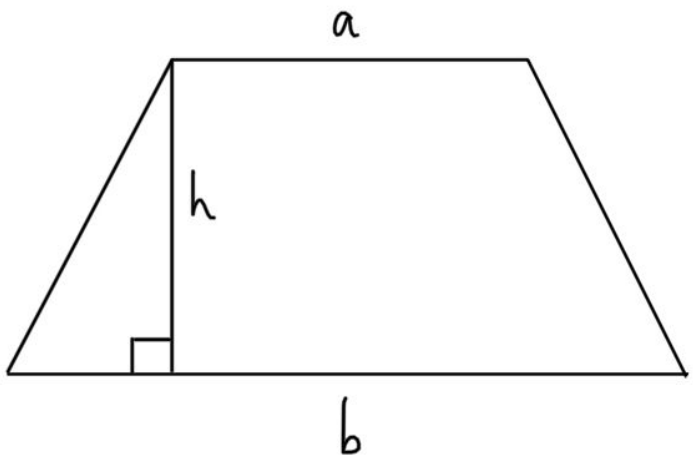
$$\pi r^2 \times \frac{\theta}{360}$$

Formula given in exam

Area of trapezium

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

- use pythagoras theorem to find h



Curved surface area of cylinder

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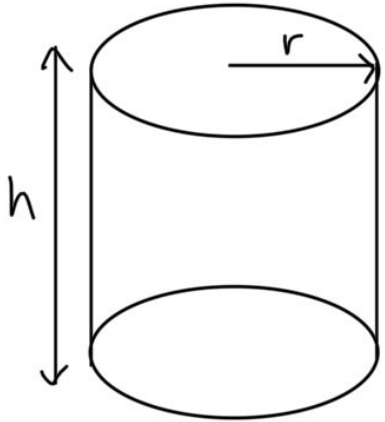

Volume of cylinder

$$\pi r^2 h$$

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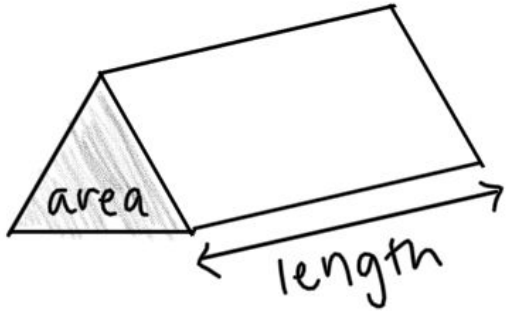
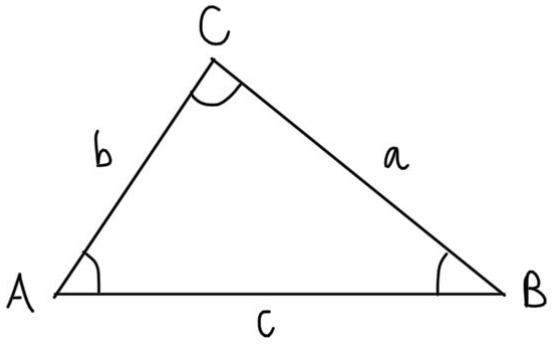


Quadratic Formula

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

- for $ax^2 + bx + c = 0$
- will give 2 values of x

Sine rule



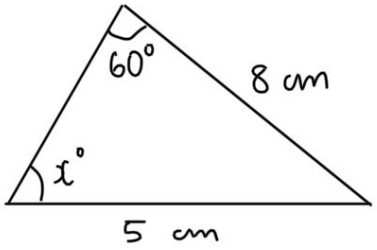
$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

OR

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

- used to find a side or angle by using its opposing angle or side respectively

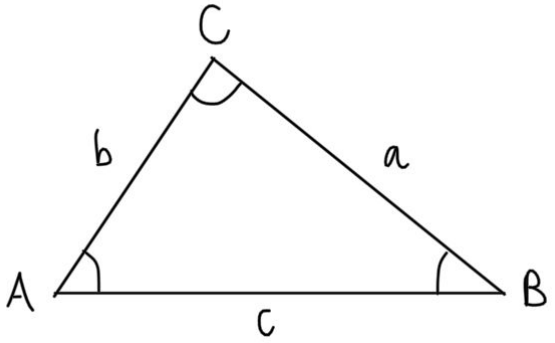
example:



$$\frac{\sin x}{8} = \frac{\sin 60^\circ}{5}$$

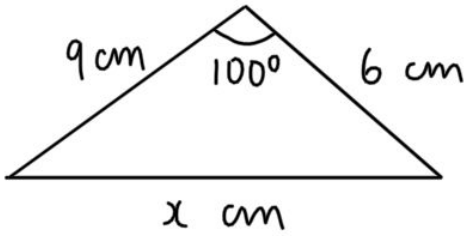
Cosine rule

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



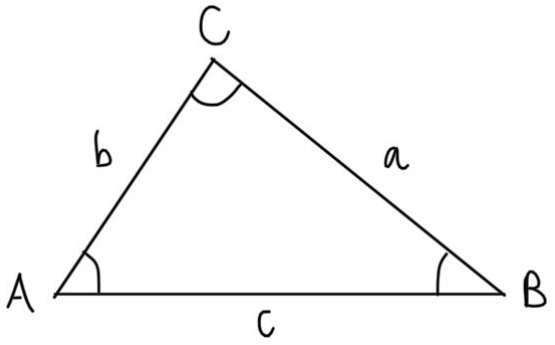
- used to find a side by using 2 given sides and its opposing angle

example:



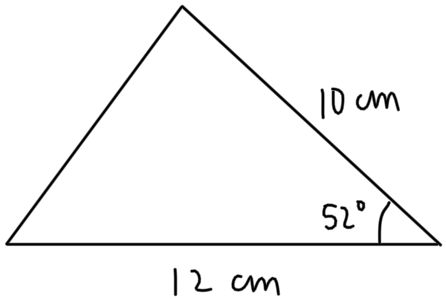
$$x^2 = 9^2 + 6^2 - 2(9)(6)\cos 100^\circ$$

Area of triangle (non-right angle)



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

- used to find the area by using 2 sides and 1 angle (not opposing any of the given sides)

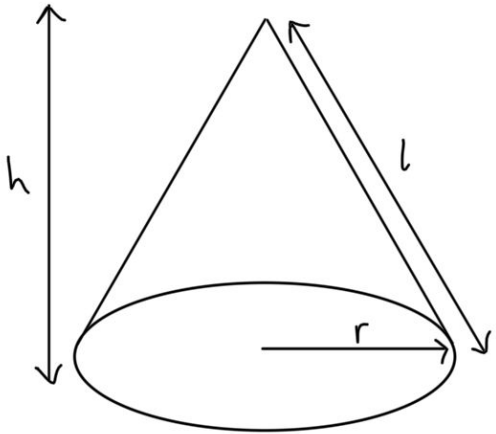


$\text{area} = \frac{1}{2}(10)(12)\sin 52^\circ$

Curved surface area of cone

$$\pi rl$$

- curved surface area + circle (base) area = total surface area



Volume of cone

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

Sum to n terms (arithmetic series)

$$S_n = \frac{n}{2}[2a + (n-1)d]$$

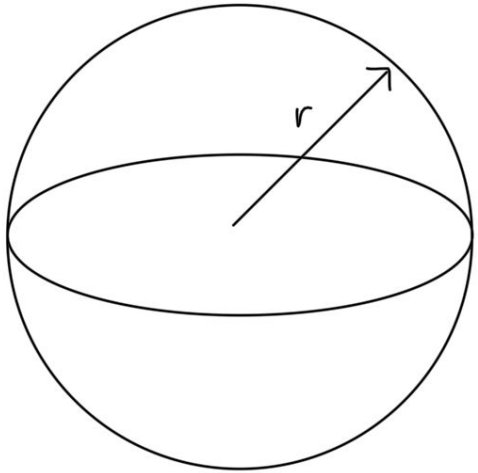
a = first term

d = common difference

n = number of terms

Surface area of sphere

$$4\pi r^2$$



Volume of sphere

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

Further Pure Mathematics (4PM1)

Formula not given in exam

Trigonometric ratios (right-angled triangles)

$$\text{sine } x = \frac{o}{h}$$

$$\cos x = \frac{a}{h}$$

$$\tan x = \frac{o}{a}$$

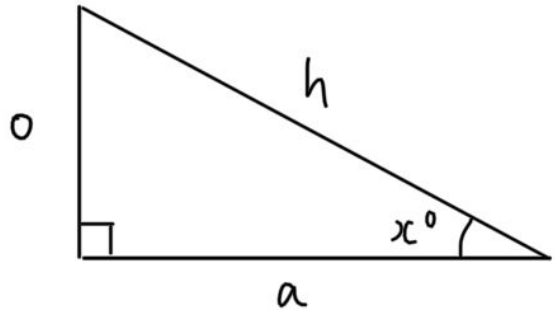
o = opposite

a = adjacent

h = hypotenuse

remember:

sOH cAH tOA



nth term (arithmetic series)

$$u_n = a + (n-1)d$$

a = first term

d = common difference

n = number of terms

nth term (geometric series)

$$u_n = ar^{n-1}$$

a = first term

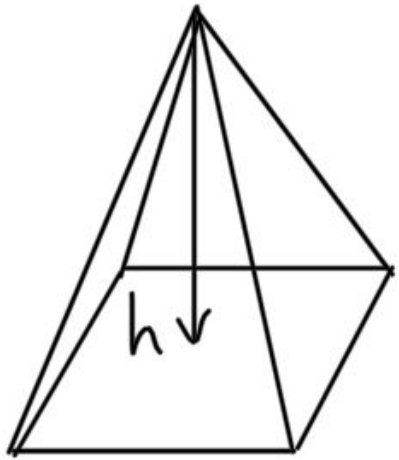
r = common ratio

n = number of terms

Volume of pyramid

$$\frac{1}{3} \times \text{base area} \times \text{h}$$

- applicable to any pyramid



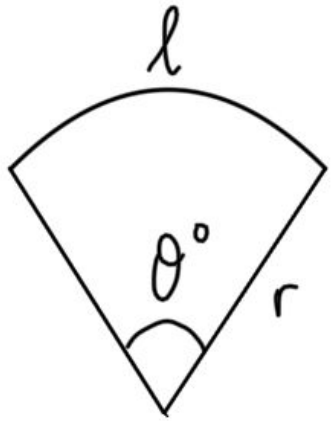
Sector arc length

degrees:

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

radians:

$$\ell = r\theta$$



$$180^{\circ} = \pi \text{ rad}$$

Area of a sector

degrees:

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

radians:

$$\frac{1}{2} r^2 \theta$$

Logarithms

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

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

$$\log_a\left(x^k\right) = k\log_a(x)$$

$$n\log_a(b) = \frac{n}{\log_b(a)}$$

Roots (quadratics)

$$\alpha + \beta = -\frac{b}{a}$$

$$\alpha\beta = \frac{c}{a}$$

$$x^2 - (\alpha + \beta) + \alpha\beta = 0$$

- for $ax^2 + bx + c$

additional:

$$\alpha^2 + \beta^2 = (\alpha^2 + \beta^2) - 2\alpha\beta$$

$$\alpha^2 - \beta^2 = (\alpha - \beta)(\alpha + \beta)$$

$$\alpha^3 + \beta^3 = (\alpha + \beta)(\alpha^2 + \alpha\beta + \beta^2)$$

$$\alpha^4 - \beta^4 = \left(\alpha^2 + \beta^2\right)^2 - 2(\alpha\beta)^2$$

$$\alpha - \beta = \sqrt{(\alpha + \beta)^2 - 4\alpha\beta}$$

Coordinate geometry

Gradient

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

Distance between 2 points

$$d^2 = (x_1 - x_2)^2 + (y_1 - y_2)^2$$

Coordinates of the point dividing the line in a given ratio

$$m : n$$

$$\left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n}\right)$$

Differentiation

$$x^n = nx^{n-1}$$

$$\sin ax = a\cos ax$$

$$\cos ax = -a\sin ax$$

$$e^{ax} = ae^{ax}$$

Chain rule

$$\int f(g(x)) = f'(g(x))g'(x)$$

Product rule

$$\frac{d}{dx}\left(\frac{f(x)}{g(x)}\right) = f'(x)g(x) + f(x)g'(x)$$

Integration

$$\int x^n = \frac{1}{n+1} x^{n+1} + c$$

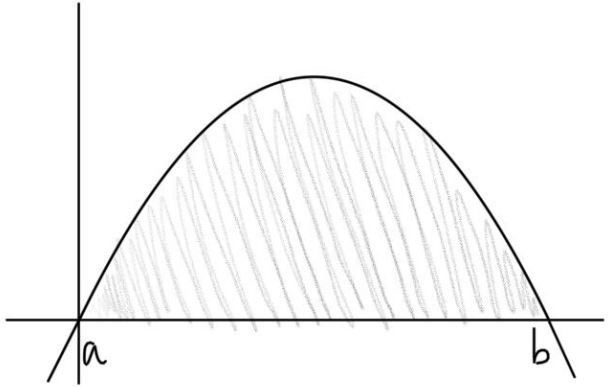
$$\int \sin\ ax = -\frac{1}{a} \cos\ ax + c$$

$$\int \cos\ ax = \frac{1}{a} \sin\ ax + c$$

$$\int e^{ax} = \frac{1}{a} e^{ax} + c$$

Area under a curve

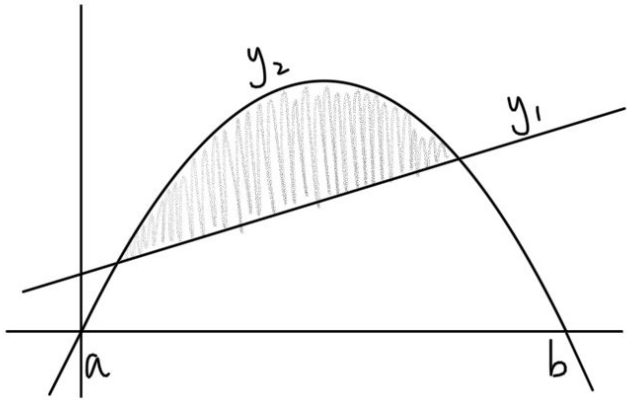
$$\int_a^b y\,dx$$



Area between two lines

$$\int_a^b y_2 - y_1\,dx$$

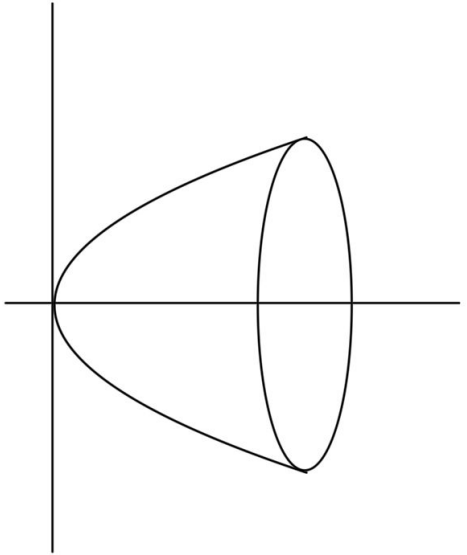
- top line - bottom line



Volume of revolution

$$\int_a^b \pi \ y^2 \, dx$$

- if a curve was rotated 360° to form a 3D shape



Trigonometry Identities

$$\sin^2\theta + \cos^2\theta = 1$$

- the rest are given in the formula sheet

Formula given in exam

Sum to n terms (arithmetic series)

$$S_n = \frac{n}{2}[2a + (n-1)d]$$

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n = number of terms

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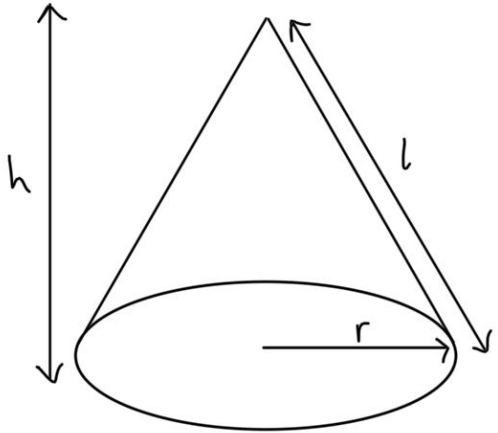
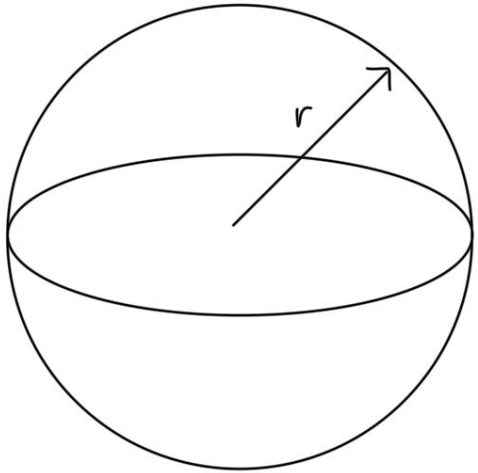
- curved surface area + circle (base) area = total surface area



Surface area of sphere

$$4\pi r^2$$



Volume of sphere

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

Sum to n terms (geometric series)

$$S_n = \frac{a(1 - r^n)}{1 - r}$$

a = first term

r = common ratio

n = number of terms

Sum to infinity

$$S_\infty = \frac{a}{1-r}$$

a = first term

r = common ratio

- when $-1 \leq r \geq 1$

Binomial series

$$(1+x)^n = 1 + nx + \frac{n(n-1)}{2!}x^2 + \frac{n(n-1)\ldots(n-r+1)}{r!} + \ldots$$

- when $-1 < x < 1$

Quotient rule (differentiation)

$$\frac{d}{dx}\left(\frac{f(x)}{g(x)}\right) = \frac{f'(x)g(x) - f(x)g'(x)}{[g(x)]^2}$$

Trigonometry identities

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

$$\sin(A+B) = \sin A\cos B + \cos A\sin B$$

$$\cos(A+B) = \cos A\cos B - \sin A\sin B$$

$$\tan(A+B) = \frac{\tan A + \tan B}{1 - \tan A\tan B}$$

$$\sin(A-B) = \sin A\cos B - \cos A\sin B$$

$$\cos(A-B) = \cos A\cos B + \sin A\sin B$$

$$\tan(A-B) = \frac{\tan A - \tan B}{1 + \tan A\tan B}$$

Logarithms

$$\log_a(x) = \frac{\log_b(x)}{\log_b(a)}$$

- b can be any number as long as b > 1

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Acknowledgements and Information:

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