STUDY FORMULA BOOKLET

IB MYP Mathematics formula booklet: Standard and Extended

The IB publishes no formula booklet for MYP mathematics. The exam prints a formula inside a question only when it needs one, so most formulas must be remembered. This booklet lists what past papers needed, and which were given.

GIVEN given in the exam when needed LEARN IT not given: students recalled it

Built by CuratedPrep from the IB MYP eAssessment papers 2016 to 2025; the IB publishes no formula booklet for MYP, and the exam shows formulas in the question or on screen.

Number: indices, surds and standard form

Branch 1 of 4. None of the index laws or surd rules was printed in a question.

Multiplying powers

Add the indices when the base is the same. Nov 2020 Std Q1(c); May 2021 Std Q2(b).

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

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Dividing powers

Subtract the indices. Nov 2020 Std Q1(c), where $a^2 \times a^7 \div a^3 = a^6$.

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

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Power of a power

Used in Extended papers only so far. Nov 2020 Ext Q1(c), $(e^{2x})^3 = e^{6x}$; Q1(b) rewrites 9^x as 3^{2x}.

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

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Zero index

Nov 2018 Std Q1, where the value $10x^0$ had to be matched to a number.

$$a^0 = 1$$

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Negative index

May 2021 Std Q2(b), with b^{-2} and b^{-1} in a multiplication grid; May 2025 Std Q1(b), $3/8 \times 32/9 = 2^b \times 3^c$, where c is negative.

$$a^{-n} = \frac{1}{a^n}$$

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Fractional index

Used in Extended papers only so far. Nov 2020 Ext Q1(a), $x^2/3$ as $\sqrt[3]{(x^2)}$; Nov 2018 Ext Q1, $8^1/3$) and $25^1/2$); May 2025 Ext Q2(b).

$$a^{\frac{m}{n}} = \sqrt[n]{a^m}$$

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Simplifying a surd

Take out square factors, for example $\sqrt{27} = 3\sqrt{3}$. Nov 2020 Std Q1(e); May 2025 Std Q1(c); May 2024 Std Q1(c), answer in the form $a\sqrt{b}$.

$$\sqrt{ab} = \sqrt{a} \times \sqrt{b}$$

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Standard form

Nov 2020 Std Q1(b), 1.08×10^4 matched to 108×100; Nov 2019 Ext Q6(d) and Std Q6(e), answers in standard form to 2 significant figures.

$$a \times 10^n, \quad 1 \leq a < 10, \ n \in \mathbb{Z}$$

LEARN IT

Number: logarithms and exponential equations

Every use found was in an Extended paper.

Meaning of a logarithm

Used in Extended papers only so far. Nov 2018 Ext Q1, $\log_2 16$; Nov 2019 Ext Q5(b), $\log_4(3x - 2y) = 2$.

$$\log_a b = c \iff a^c = b$$

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Adding logarithms

Used in Extended papers only so far. May 2021 Ext Q2(a), a grid of logarithms; Nov 2021 Ext Q4(b), two logarithms joined into one, $\log_3(5x^2 + 2x - 7)$; Nov 2023 Ext Q3(b).

$$\log a + \log b = \log(ab)$$

LEARN IT

Subtracting logarithms

Used in Extended papers only so far. Nov 2019 Ext Q5(a), log 2x = log 12y - log 3 gives x = 2y; Nov 2020 Ext Q1(e); May 2025 Ext Q2(a).

$$\log a - \log b = \log \frac{a}{b}$$

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Power of a logarithm

Used in Extended papers only so far. Nov 2020 Ext Q1(e); Nov 2023 Ext Q3(a), log 4 = 2 log 2 and log 16 = 4 log 2, so the ratio is 2; May 2021 Ext Q3(b).

$$\log a^n = n \log a$$

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Equal logarithms

Used in Extended papers only so far. Nov 2019 Ext Q5(a); May 2025 Ext Q2(a), log 49 - log a = log a.

$$\log A = \log B \Rightarrow A = B$$

LEARN IT

Solving a power equation

Used in Extended papers only so far. Take logarithms of both sides. Nov 2018 Ext Q6(c), $108 = 70 \times 1.04^t$; May 2021 Ext Q3(b), $3^5 - x) = 2$.

$$a^x = b \Rightarrow x = \log_a b$$

LEARN IT

Number: ratio, percentages and rates

Percentage error, the percentage difference K and density were printed in the question; the rest were recalled.

Percentage of an amount

May 2019 Std Q6(b), the share of 120 litres used for showering; Nov 2023 Ext Q5(a), non-recyclable share of 4500 t.

$$\text{amount} = \frac{p}{100} \times \text{total}$$

LEARN IT

Increase or decrease by p%

A 20% reduction is a multiplier of 0.8. Nov 2019 Std Q7(a) and Ext Q7(a), vehicle cost reduced by 20%; May 2019 Std Q6(e), water reduced by 5%.

$$\text{new} = \text{old} \times \left(1 \pm \frac{p}{100}\right)$$

LEARN IT

Percentage change

Divide by the original value. Nov 2019 Ext Q7(c), percentage saving of vehicle A against vehicle B; May 2025 Ext Q6(e) and Std Q6(f), percentage increase in E.

$$\frac{\text{new} - \text{old}}{\text{old}} \times 100\%$$

LEARN IT

One quantity as a percentage of another

Nov 2020 Std Q5(e) and Ext Q5(e), percentage of cardboard wasted; Nov 2017 Std Q7(f), percentage of the flag that is blue.

$$\frac{\text{part}}{\text{whole}} \times 100\%$$

LEARN IT

Percentage error

Printed in the question: Nov 2016 Std Q6(b).

$$\text{percentage error} = \left|\frac{\text{rounded value} - \text{actual value}}{\text{actual value}}\right| \times 100\%$$

GIVEN

Sharing in a ratio

Nov 2019 Std Q4(c), coins in the ratio 2 : 4 : 3 with a total value of 1760; May 2023 Ext Q5(b), waste in the ratio 15 : 8 : 3.

$$\text{one share} = \frac{\text{total}}{\text{sum of the ratio parts}}$$

LEARN IT

Speed, distance and time

Rearrange for time or distance. Nov 2021 Std Q6(b) and Ext Q5(b), flight time; Nov 2023 Std Q3(b), 33 km at 10 km/h; Nov 2025 Std Q7, pigeon speed 90 km/h.

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

LEARN IT

Time taken at a given rate

Nov 2020 Std Q4(b), a pump removing 11 200 L per hour; May 2019 Std Q6(c), a shower flowing at 8 L per minute; May 2024 Std Q6(f), rate of production per minute.

$$\text{time} = \frac{\text{amount}}{\text{rate}}$$

LEARN IT

Density

Printed in the question: Nov 2022 Ext Q5(a); Nov 2025 Std and Ext Q6(a).

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

GIVEN

Lower and upper bounds

Used in Extended papers only so far. u is the unit the value was rounded to. Nov 2023 Ext Q5(d), 15 500 to 3 significant figures; Nov 2024 Ext Q6(c), upper bound of a total cost; May 2025 Ext Q6(d), A to 2 significant figures and d to the nearest metre.

$$\text{lower} = x - \tfrac{1}{2}u, \qquad \text{upper} = x + \tfrac{1}{2}u$$

LEARN IT

Algebra: expressions and quadratics

Branch 2 of 4. The quadratic formula was never printed, and factorising was always accepted instead.

Expanding two brackets

Nov 2020 Std Q1(g), (2x + 1)(5x - 2); the reverse gives the factorisation in Q1(f), $4x^2 - 11x - 3 = (x - 3)(4x + 1)$.

$$(ax + b)(cx + d) = acx^2 + (ad + bc)x + bd$$

LEARN IT

Squaring a bracket

Nov 2024 Ext Q4(c) and Std Q5(b), expand $\tfrac{1}{2}(x - 4)^2 - 1$ to $\tfrac{1}{2}x^2 - 4x + 7$.

$$(x - p)^2 = x^2 - 2px + p^2$$

LEARN IT

Quadratic formula

Solves $ax^2 + bx + c = 0$. The markschemes also accept factorising. May 2024 Std Q4(a) and Q5(c); Nov 2021 Std Q5(a); May 2019 Std Q5(b); May 2021 Std Q3(b); Nov 2023 Ext Q4(d).

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

LEARN IT

Completing the square

Used in Extended papers only so far. May 2025 Ext Q5(c), writing $x^2 - 10x + 21$ as $(x - h)^2 + k$.

$$x^2 + bx + c = \left(x + \frac{b}{2}\right)^2 + c - \frac{b^2}{4}$$

LEARN IT

Vertex form of a parabola

The axis of symmetry is x = h. Nov 2023 Std Q4(a) and Ext Q4(b), minimum height of a ramp $P(x) = a(x - 20)^2 + 2$; May 2024 Std Q5(b).

$$y = a(x - h)^2 + k \ \text{ has vertex } (h, k)$$

LEARN IT

Axis of symmetry from the roots

The axis is halfway between the roots p and q. Nov 2018 Std Q5(c) and Ext Q4(b), one root given, find the other; Nov 2020 Std Q2(a), maximum of $-x(x - 5)$.

$$x = \frac{p + q}{2}$$

LEARN IT

Algebra: straight lines and coordinates

None of these was printed. Nov 2025 papers were read from the screen text only.

Gradient
Nov 2023 Std Q2(b) and Ext Q1(a); Nov 2025 Ext Q4(a).

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

LEARN IT

Equation of a straight line
m is the gradient and c the y-intercept. Nov 2025 Std Q4(b); May 2025 Ext and Std Q7(b), the path from P to B; Nov 2021 Std Q6(d), a flight path parallel to f(x).

$$y = mx + c$$

LEARN IT

Line through a point
Or substitute the point into y = mx + c. Nov 2025 Std Q4(c), a line through S(10, 4); Nov 2025 Ext Q4(b), a line through B.

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

LEARN IT

Parallel lines
Nov 2025 Std Q4(c); Nov 2021 Std Q6(d) and Ext Q5(d).

$$m_1 = m_2$$

LEARN IT

Perpendicular lines
Nov 2019 Std Q1(b); Nov 2023 Ext Q1(a), show AB is perpendicular to AD using gradients; Nov 2025 Ext Q4(b).

$$m_1 \times m_2 = -1$$

LEARN IT

Midpoint of a line segment
Nov 2023 Std Q2(e) and Ext Q1(d), where the diagonals of a rectangle meet.

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

LEARN IT

Distance between two points
Nov 2023 Std Q2(d), answer in simplest surd form; May 2021 Std Q3(c); Nov 2025 Ext Q4(d).

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

LEARN IT

Algebra: transformations and trigonometric graphs

The transformation options were printed as choices in May 2018, but their effects had to be recalled.

Translation up or down
Moves the graph up by k, or down if k is negative. May 2018 Std Q4(b) and Ext Q4(b), options f(x) + 2 and f(x) - 2.

$$f(x) + k$$

LEARN IT

Translation left or right
Moves the graph right by h; f(x + h) moves it left. May 2018 Std Q4(b); Nov 2017 Std Q2(a), $(x - 3)^2 + 2$ from x^2.

$$f(x - h)$$

LEARN IT

Vertical stretch
Stretch from the x-axis by scale factor a. May 2018 Std Q4(b), 2f(x) and ½f(x); Nov 2022 Ext Q2(a), $4(x - 5)^2 - 1$ from $(x - 5)^2$.

$$a\,f(x)$$

LEARN IT

Reflection in the x-axis
May 2018 Std Q4(b); Nov 2018 Std Q5(a) and Ext Q4(a), $-4(x + 2)^2 + 1$ from x^2.

$$-f(x)$$

LEARN IT

Reflection in the y-axis
May 2018 Std Q4(b); Nov 2019 Std Q5(c) and Ext Q4(c), a quadratic reflected in the y-axis.

$$f(-x)$$

LEARN IT

Horizontal stretch
Used in Extended papers only so far. Stretch from the y-axis by scale factor 1/a. May 2018 Ext Q4(b), f(2x) and f(½x).

$$f(ax)$$

LEARN IT

Composite function

Used in Extended papers only so far. Put g(x) in place of x in f. Nov 2020 Ext Q2(a), f(x) = ln x and g(x) = x - 6 give h(x) = 2 ln(x - 6).

$$f(g(x))$$

LEARN IT

Amplitude and midline

Maximum is c + |a| and minimum is c - |a|; the tidal range is 2|a|. May 2018 Std Q6(a) and (d), justify a = 8 and c = 9; May 2021 Std Q6(d) and Ext Q6(d), maximum and minimum body temperature.

$$a\sin(bt)+c: \quad \text{amplitude} = |a|,\ \ y = c \text{ is the midline}$$

LEARN IT

Period, angle in degrees

For a sine or cosine graph of bt. May 2021 Std Q6(c), cos 15t has period 24; May 2018 Std Q6(d), sin 30t has period 12.

$$\text{period} = \frac{360^\circ}{b}$$

LEARN IT

Period, angle in radians

Used in Extended papers only so far. Use radian mode. May 2021 Ext Q6(c) and (e), cos(πt/12) has period 24; May 2018 Ext Q6(c), sin(πt/6).

$$\text{period} = \frac{2\pi}{b}$$

LEARN IT

Algebra: sequences and series

Triangular numbers were printed in the question; the other formulas were recalled.

Arithmetic sequence, nth term

Used in Extended papers only so far. d is the common difference. May 2022 Ext Q7(a) and (b), tier heights 1.5 m and 3.5 m; Nov 2023 Ext Q7(e) and (f), 2 + (n - 1) × 3; Nov 2024 Ext Q3(a).

$$u_n = u_1 + (n-1)d$$

LEARN IT

Common ratio

Used in Extended papers only so far. May 2021 Ext Q4(a); May 2024 Ext Q5(a), show the bounce heights are geometric with r = 0.8; Nov 2023 Ext Q3(a).

$$r = \frac{u_{n+1}}{u_n}$$

LEARN IT

Geometric sequence, nth term

Used in Extended papers only so far. May 2021 Ext Q4(c), $U_{21} = 2^k$; May 2024 Ext Q5(b), the tenth bounce height; Nov 2024 Ext Q3(b), atoms halving each half-life.

$$u_n = u_1\, r^{\,n-1}$$

LEARN IT

Sum of a geometric series

Used in Extended papers only so far. Nov 2023 Ext Q3(c), the sum of the first 6 terms is 63 log 2.

$$S_n = \frac{u_1\,(r^n - 1)}{r - 1}$$

LEARN IT

Sum to infinity

Used in Extended papers only so far. May 2021 Ext Q4(d), 4 + 2√2 + 2 + ... written as a + b√2.

$$S_\infty = \frac{u_1}{1-r}, \quad |r| < 1$$

LEARN IT

Triangular numbers

Used in Extended papers only so far. Printed in the question: Nov 2018 Ext Q8(a) and (b).

$$T_n = \frac{n(n+1)}{2}$$

GIVEN

Geometry and trigonometry: right-angled triangles

Branch 3 of 4. None of these was printed in a question.

Pythagoras' theorem

c is the hypotenuse. Nov 2018 Std Q3(a) and (b); Nov 2021 Std Q5(a), $x^2 + (x + 7)^2 = 17^2$; May 2024 Ext Q1(c).

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

LEARN IT

Sine, cosine and tangent May 2024 Std Q3(a) and (b), lamp and building heights from an angle of elevation; Nov 2018 Std Q3(c), angle DAE.	$\sin\theta = \frac{\text{opp}}{\text{hyp}}, \quad \cos\theta = \frac{\text{adj}}{\text{hyp}}, \quad \tan\theta = \frac{\text{opp}}{\text{adj}}$	LEARN IT
Area of a triangle h is the perpendicular height. Nov 2021 Std Q5(b); Nov 2024 Std Q4(b).	$A = \frac{1}{2}bh$	LEARN IT

Geometry and trigonometry: triangles that are not right-angled

The sine rule and cosine rule are in the Standard markschemes too.

Sine rule Sides a, b, c lie opposite angles A, B, C. May 2018 Std Q5(b); May 2021 Std Q5(a); Nov 2018 Ext Q3(a); Nov 2023 Ext Q4(a).	$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$	LEARN IT
Cosine rule for a side May 2021 Std Q5(a), $5.4^2 = 2r^2 - 2r^2\cos 150°$; Nov 2018 Ext Q3(b); May 2022 Ext Q5(b); Nov 2021 Ext Q6(c); May 2023 Ext Q3(c).	$a^2 = b^2 + c^2 - 2bc\cos A$	LEARN IT
Cosine rule for an angle Used in Extended papers only so far. Use it when all three sides are known. Nov 2024 Ext Q5(a), sides 28, 20 and 12; May 2025 Ext Q6(a).	$\cos A = \frac{b^2 + c^2 - a^2}{2bc}$	LEARN IT
Area of a triangle using sine Used in Extended papers only so far. C is the angle between sides a and b. Nov 2018 Ext Q5(c); May 2022 Ext Q6(a).	$A = \frac{1}{2}ab\sin C$	LEARN IT

Geometry and trigonometry: circles, sectors and radians

Arc length and sector area in radians were printed in the question; the degree forms had to be recalled.

Area of a trapezium a and b are the parallel sides. May 2019 Std Q8(a), the area of a trapezium under a line; May 2021 Std Q8(e).	$A = \frac{1}{2}(a+b)h$	LEARN IT
Area of a circle Nov 2020 Std Q4(c) and Ext Q4(b), the top of a pool cover; May 2024 Std Q1(d), area in terms of π.	$A = \pi r^2$	LEARN IT
Circumference of a circle Nov 2018 Std Q4(b), a track made of semicircles; Nov 2020 Std Q4(c); Nov 2025 Std Q3(d), from an arc length.	$C = 2\pi r = \pi d$	LEARN IT
Arc length, angle in degrees May 2019 Std Q7(b), turning arc length; Nov 2017 Std Q4(b), arc BC; Nov 2025 Std Q3(d).	$l = \frac{\theta}{360} \times 2\pi r$	LEARN IT
Sector area, angle in degrees Nov 2018 Ext Q5(b), a 90° sector; May 2025 Std Q6(c) and Ext Q6(b), a 40° sector of area 4 040 000 m².	$A = \frac{\theta}{360} \times \pi r^2$	LEARN IT
Arc length, angle in radians Used in Extended papers only so far. Printed in the question, with θ in radians: Nov 2020 Ext Q5, beside parts (c) to (e).	$L = r\theta$	GIVEN

Sector area, angle in radians Used in Extended papers only so far. Printed in the question, with θ in radians: Nov 2020 Ext Q5, beside parts (c) to (e).	$A = \frac{1}{2}r^2\theta$	GIVEN
Degrees to radians Used in Extended papers only so far. Nov 2020 Ext Q5(b), show that 40° is 2π/9 radians.	$\theta_{\text{rad}} = \theta^\circ \times \frac{\pi}{180}$	LEARN IT

Geometry and trigonometry: volume and surface area

Only the surface area of a spherical cap was printed in a question.

Volume of a cylinder A cylinder is a prism with a circular cross-section. Nov 2020 Std Q4(a) and Ext Q4(a), find the radius from the volume; Nov 2021 Std Q4(a), a silo; Nov 2025 Std Q6(c), two stems.	$V = \pi r^2 h$	LEARN IT
Volume of a cone h is the vertical height, not the slant height. Nov 2021 Std Q4(a), the cone on a silo; May 2021 Std Q5(b) and Ext Q5(b), melted ice filling a cone.	$V = \frac{1}{3}\pi r^2 h$	LEARN IT
Volume of a sphere May 2021 Std Q5(a) and (b), a sphere of ice; May 2017 Std Q5(c), a spherical water tank.	$V = \frac{4}{3}\pi r^3$	LEARN IT
Volume of a pyramid Used in Extended papers only so far. A is the area of the base. May 2023 Ext Q4(b), a square-based pyramid of height 12√2 cm.	$V = \frac{1}{3}Ah$	LEARN IT
Curved surface area of a cylinder The circumference times the height. Nov 2021 Std Q4(a), 48π for the silo wall; Nov 2020 Std Q4(c).	$A = 2\pi r h$	LEARN IT
Cylinder with one flat end Nov 2020 Std Q4(c) and Ext Q4(b), the outer surface of a pool cover: a circle plus the curved side.	$A = \pi r^2 + 2\pi r h$	LEARN IT
Curved surface area of a cone l is the slant height. Nov 2021 Std Q4(a), π × 3 × 5 = 15π.	$A = \pi r l$	LEARN IT
Surface area of a sphere Used in Extended papers only so far. Nov 2019 Ext Q6(e), the percentage of the Earth's surface the Space Station can see.	$A = 4\pi r^2$	LEARN IT
Surface area of a spherical cap Printed in the question: Nov 2019 Ext Q6(d) and Std Q6(e). r is the sphere's radius and h the height of the cap.	$A = 2\pi r h$	GIVEN

Geometry and trigonometry: similarity, transformations and vectors

Vectors were examined only in Extended papers.

Scale factor May 2018 Std Q5(c), a kite similar to a hang glider; Nov 2022 Ext Q4(a), similar triangles.	$k = \frac{\text{new length}}{\text{original length}}$	LEARN IT

Area of similar shapes May 2018 Std Q5(d), the area of the kite; Nov 2022 Ext Q4(b), the area of a trapezium from the area of a triangle.	$\frac{A_2}{A_1} = k^2$	LEARN IT
Rotation of 90° clockwise about the origin Nov 2021 Std Q1(b), the new position of bird #5.	$(x, y) \to (y, -x)$	LEARN IT
Reflection in the y-axis Nov 2019 Std Q5(c) and Ext Q4(c), a point on a quadratic reflected in the y-axis.	$(x, y) \to (-x, y)$	LEARN IT
Magnitude of a vector Used in Extended papers only so far. May 2018 Ext Q5(a), the speed of a boat from its velocity vector.	$\left\lvert \begin{pmatrix} a \\ b \end{pmatrix} \right\rvert = \sqrt{a^2 + b^2}$	LEARN IT
Adding vectors Used in Extended papers only so far. Nov 2021 Ext Q1(a) and (b); May 2018 Ext Q5(b), resultant velocity of a boat and a current.	$\overrightarrow{AB} + \overrightarrow{BC} = \overrightarrow{AC}$	LEARN IT
Parallel vectors Used in Extended papers only so far. Nov 2021 Ext Q1(b), DC is parallel to AB and double its length.	$\overrightarrow{DC} = k\,\overrightarrow{AB}$	LEARN IT
Dot product Used in Extended papers only so far. Perpendicular vectors give 0. Nov 2021 Ext Q1(c), show AD is perpendicular to AC; May 2018 Ext Q5(c), the angle between two vectors.	$\mathbf{a} \cdot \mathbf{b} = a_1 b_1 + a_2 b_2 = \lvert\mathbf{a}\rvert\lvert\mathbf{b}\rvert \cos\theta$	LEARN IT
Angle between two vectors Used in Extended papers only so far. May 2018 Ext Q5(c), the angle between the resultant vector and the boat's vector.	$\cos\theta = \frac{\mathbf{a} \cdot \mathbf{b}}{\lvert\mathbf{a}\rvert\lvert\mathbf{b}\rvert}$	LEARN IT
Angle of a regular polygon Nov 2023 Std Q1(d), using angles to show which regular shapes tessellate: the angle must divide 360°.	$\text{interior angle} = \frac{(n-2) \times 180^\circ}{n}$	LEARN IT

Statistics and probability: averages and spread

Branch 4 of 4. None of these was printed in a question.

Mean of a list Nov 2017 Std Q3(e), the mean of a list with two unknown values; Nov 2022 Ext Q5(c), mean print time of 11 cases.	$\bar{x} = \frac{\sum x}{n}$	LEARN IT
Mean from a frequency table May 2021 Std Q7(b) and Ext Q7(b), mean reaction time of 20 sprinters.	$\bar{x} = \frac{\sum fx}{\sum f}$	LEARN IT
Estimated mean from grouped data m is the midpoint of each class. Nov 2020 Std Q6(c) and Ext Q6(c), a histogram; Nov 2023 Std Q6(b) and Ext Q6(b), mean age of residents; May 2018 Std Q7(b).	$\bar{x} \approx \frac{\sum f\,m}{\sum f}$	LEARN IT
Total from a mean Used in Extended papers only so far. Nov 2019 Ext Q1(b), the mean of the working days from the weekend mean and the weekly mean.	$\sum x = \bar{x} \times n$	LEARN IT

Range May 2024 Std Q7(c) and Ext Q7(c); Nov 2017 Std Q3(e), range 34.	$\text{range} = \text{maximum} - \text{minimum}$	LEARN IT
Interquartile range May 2024 Std Q7(c) and Ext Q7(c); Nov 2024 Std Q3(b), compare two distributions; May 2017 Std Q2(c).	$\text{IQR} = Q_3 - Q_1$	LEARN IT
Quartiles on a cumulative frequency graph Read the value at these cumulative frequencies. May 2017 Std Q2(d) and (e), 210 laureates; Nov 2024 Std Q3(a), a box plot drawn from a curve; May 2025 Std Q4(a) and (b).	Q_1 at $\frac{n}{4}$, median at $\frac{n}{2}$, Q_3 at $\frac{3n}{4}$	LEARN IT
Line of best fit a is the gradient and b the y-intercept. Nov 2020 Std Q6(d) and Ext Q6(d), E = an + b read from a graph.	$y = an + b$	LEARN IT

Statistics and probability: sets and probability

Conditional probability and independence were examined only in Extended papers.

Probability of an event Nov 2018 Std Q2(a), a student from MYP year 5 who chose gaming; Nov 2019 Std Q3.	$P(A) = \frac{n(A)}{n(\mathcal{E})}$	LEARN IT
Probability of not A Nov 2018 Std Q2(c), a student who did not choose sport; Nov 2021 Std Q3(a), not choosing the shortest road.	$P(A') = 1 - P(A)$	LEARN IT
Overlap of two sets May 2019 Std Q3(a), 60 students and a Venn diagram; Nov 2024 Std Q2(b).	$n(A \cup B) = n(A) + n(B) - n(A \cap B)$	LEARN IT
Addition rule May 2022 Ext Q2(c); May 2025 Std Q3(c), a sum that is prime or a square.	$P(A \cup B) = P(A) + P(B) - P(A \cap B)$	LEARN IT
Mutually exclusive events The events cannot both happen. May 2025 Std Q3(d), a sum that is prime and a square; Nov 2019 Std Q3(b) and Ext Q3(b), no girl chose two pets.	$P(A \cap B) = 0$	LEARN IT
Conditional probability Used in Extended papers only so far. May 2022 Ext Q2(a), find P(B); May 2023 Ext Q2(c); Nov 2021 Ext Q3(d); May 2018 Ext Q7(e); May 2024 Ext Q2(a).	$P(A \mid B) = \frac{P(A \cap B)}{P(B)}$	LEARN IT
Independent events Used in Extended papers only so far. Show that events are not independent: May 2022 Ext Q2(b); May 2023 Ext Q2(d); Nov 2023 Ext Q5(c); May 2024 Ext Q2(c).	$P(A \cap B) = P(A) \times P(B)$	LEARN IT
Tree diagram, two events Multiply along the branches and add the branches that fit. Without replacement the second denominator falls by 1. Nov 2017 Std Q3(b) and (c); Nov 2020 Std Q3(d); Nov 2021 Std Q3(c); May 2024 Std Q2(d).	$P(A \text{ then } B) = P(A) \times P(B \mid A)$	LEARN IT

Expected number of times Nov 2020 Std Q3(b) and Ext Q3(b), 30 donors; Nov 2023 Std Q5(e), a population of 15 500.	$\text{expected number} = n \times P(A)$	LEARN IT

Unit conversions printed in questions

Each conversion below was printed in the question. Others were not, so learn the common ones.

Conversion	Printed in
1000 L = 1 m^3	Nov 2020 Std and Ext Q4; May 2017 Std Q5
1 cm^3 = 1 mL	Nov 2024 Std and Ext Q7
1 kW = 1000 W	Nov 2016 Std Q7(b)
1 GB = 1024 MB	Nov 2025 Std Q7(a)
Metric time: 1 day = 10 hours, 1 hour = 100 minutes, 1 minute = 100 seconds	May 2024 Std and Ext Q6

Exact trigonometric values

Not printed in any question. Used: sin 30° and sin 45° in Nov 2018 Ext Q3(a); cos 60° in May 2023 Ext Q3(c); tan 45° in Nov 2017 Std Q1; cos 120° = -cos 60° in Nov 2018 Std Q1.

Angle	sin	cos	tan
30°	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{3}}{3}$
45°	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{2}}{2}$	1
60°	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	$\sqrt{3}$

Also learn these

Types of number
Natural, integer, rational and real numbers, and why π and √7 are irrational. Nov 2017 Std Q1.

Factors, multiples and prime factors
Write a number as a product of primes; find the lowest common multiple. May 2017 Std Q1(a); Nov 2018 Std Q4(a), two cars with laps of 6 and 8 minutes meet again after 24 minutes.

Same base on both sides
Write both sides as powers of one base, then equate the indices. May 2025 Std Q1(a), 256 = 4^a.

Set and Venn notation
∩ means and, ∪ means or, A′ means not A. May 2021 Std Q1; Nov 2024 Std Q2(a), shade regions of a Venn diagram.

Solving simultaneous equations
Eliminate one letter, or substitute. May 2025 Std Q2; Nov 2023 Std Q3(a); Nov 2018 Std Q7(d) and (e), where the second equation had to be written first.

Where two graphs meet
Set the two expressions equal, solve for x, then substitute back for y. May 2024 Std Q4; May 2021 Std Q3(a) and (b).

Intercepts and axis lines
Put y = 0 for an x-intercept (Nov 2025 Std Q4(d); Nov 2024 Std Q5(c)). The line x = 3 is vertical and y = 3 is horizontal (Nov 2024 Std Q1(a)).

Inequalities and regions
A greatest or least value of a linear expression sits at a vertex of the shaded region, so test each vertex. May 2018 Ext Q3(c); Nov 2021 Ext Q6; Nov 2024 Ext Q6(b); May 2022 Ext Q7(e).

Quadratic inequality on a number line
g(x) < 0 is the part between the roots when the parabola opens upwards, with open circles for a strict inequality. Nov 2022 Ext Q2(b) and (c).

Order of graph transformations
Describe each step in order: a stretch, then a translation. Nov 2022 Ext Q2(a), $4(x - 5)^2 - 1$ from $(x - 5)^2$; Nov 2018 Std Q5(a).

Describing a transformation in full
Translation: a vector. Reflection: the mirror line. Rotation: centre, angle and direction. Enlargement: centre and scale factor. Nov 2023 Std Q1(c), the full transformation; May 2016 Std Q1.

Arithmetic or geometric?
A constant difference means arithmetic; a constant ratio means geometric. Nov 2020 Ext Q1(g), e^x, e^{2x}, e^{3x}, ... is geometric.

Angles in a triangle, on a line and around a point
180°, 180°, 360°
A quadrilateral adds to 360°. Nov 2019 Std Q6(a), 360 - 90 - 90 - 140 = 40.

Circle theorems
Angle in a semicircle is 90° (May 2024 Q1(b)); angles in the same segment are equal (May 2024 Q1(a), angle DCB equals angle DAB); a tangent meets the radius at 90° (Nov 2019 Std Q6(a)); two radii make an isosceles triangle (May 2024 Q1(a), angle AOD).

Congruent and similar triangles

Congruent: SSS, SAS, ASA or RHS (May 2018 Std Q5(a); Nov 2023 Std Q2(a)). Similar: matching angles (May 2022 Ext Q3(b); May 2023 Ext Q3(a); Nov 2022 Ext Q4(a)).

Inverse trigonometry

Use $\sin^{-1}$, $\cos^{-1}$ or $\tan^{-1}$ to find an angle from a ratio. Nov 2018 Std Q3(c), angle DAE; May 2025 Ext Q6(a).

Volume of a cuboid

$$V = lwh$$

Nov 2022 Ext Q3(d), a storage unit with a square base.

Frustum of a cone

$$V = V_{\text{large cone}} - V_{\text{small cone}}$$

Subtract the small cone from the large one. Nov 2024 Std and Ext Q7(a), a flower pot; the exam printed the volume of the removed cone.

Area of a segment

$$A_{\text{segment}} = A_{\text{sector}} - A_{\text{triangle}}$$

Nov 2018 Ext Q5(b), 4π - 8 = 4(π - 2); Nov 2017 Std Q4(c), perimeter of a segment.

Circle inside a square

The diagonal of the square is the diameter of the circle, so the side is the diameter divided by √2. May 2016 Std Q4(b).

Mean, median, mode and modal class

The median of an even list is the mean of the middle two values. Nov 2017 Std Q3(d); May 2018 Std Q7(a), modal class.

Reading box plots and cumulative frequency

Each quarter of a box plot holds 25% of the data (May 2019 Std Q4(a)). Compare the median and the interquartile range (Nov 2024 Std Q3(b)).

Scatter graphs

Name the correlation and draw a line of best fit through the middle of the points. May 2024 Std Q7(a); May 2018 Std Q7(f) and (g).

Sample space tables and trees

With replacement the second draw has the same total (May 2025 Std Q3); without replacement the total falls by 1 (Nov 2017 Std Q3). 'Exactly two of three' needs all three orders added (Nov 2022 Ext Q1(d); May 2023 Ext Q2(b)).

Final investigation task

The last long question asks you to describe patterns, find a general rule, test it, and prove or verify and justify it, with correct notation. Every paper has one, for example May 2024 Ext Q8 and Nov 2025 Std Q8.

Using the booklet in the exam

- There is no formula booklet. Read the question first: only the formulas marked given in this booklet appeared in the question text, and every other one had to be remembered.
- Learn the recalled formulas first. Pythagoras, the sine and cosine rules, the quadratic formula and every volume and surface area formula were never printed in the papers from 2017 onwards that we read.
- In 'show that' questions the markscheme awards each step, so write every line of working, then give the result in the form the question quotes (the markschemes note that every step must be seen).
- Keep full calculator values until the last line, then round to the accuracy asked: the nearest centimetre, 3 significant figures or 1 decimal place.
- Extended trigonometric models: check whether the angle is in degrees or radians. A printed angle such as πt/12 means radians; 15t means degrees (May 2021 Ext Q6 and Std Q6).
- Write down the formula you are about to use and label the letters from the diagram before substituting; a correct formula with correct substitution earns method marks even if the arithmetic slips.
- Many questions print a model of their own, such as a maximum heart rate H = 208 - 0.7a or the power of a wind turbine. Substitute into it exactly as printed and keep its units: you are marked on using it, not on knowing it.

Built by CuratedPrep from the IB MYP eAssessment papers 2016 to 2025 in our question bank. The IB publishes no formula booklet for MYP: check each session's on-screen tools. Updated 16 November 2026.