STUDY FORMULA BOOKLET

IB MYP Sciences list of formulas

The IB publishes no formula booklet for MYP. This booklet lists every formula, relationship and constant that past MYP 5 science eAssessment papers needed, marked given (printed or on the formula sheet) or recalled.

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

Built by CuratedPrep from the IB MYP eAssessment papers 2018 to 2025; the IB publishes no formula booklet for MYP, and the exam shows formulas in the question or on screen.

Physics: motion, forces and pressure

Used in the Physics and Integrated Sciences papers. Rows marked given are ones a question printed or sent students to the on-screen formula sheet for.

Distance, speed and time

d distance (m), v speed (m s^{-1}, t time (s). Integrated Sciences: May 2024 Q6(b) printed distance = speed x time (GPS signal, 0.09 s, answer in km); May 2025 Q8(a) sent students to the formula sheet (radar pulse of 15 ns that travels to the pedestrian and back, so the distance to the pedestrian is half of the total).

$$d = vt$$

GIVEN

Speed, distance and time

Rearrange for d or t. Physics: Nov 2018 Q1(d) (storm speed in km h^{-1}, Nov 2019 Q5 (echo: the sound goes to the wall and back), Nov 2020 Q3 (satellite time delay), May 2021 Q1 and May 2022 Q7(b) (radio signal time, speed printed), Nov 2022 Q8(a) (ultrasound echo, halve the round trip), May 2023 Q1(a) (3 km in 45 minutes). Integrated Sciences: Nov 2020 Q2(d) and Q3(a), May 2021 Q6(c), May 2023 Q1(e).

$$v = \frac{d}{t}$$

LEARN IT

Acceleration

a acceleration (m s^{-2}, u starting speed, v final speed, t time (s). Integrated Sciences Nov 2020 Q1(b) sent students to the formula sheet (dog from rest to 4 m s^{-1} in 2 s; the markscheme divides the change in speed by the time). The exact layout on the sheet is not shown in our papers.

$$a = \frac{v - u}{t}$$

GIVEN

Distance with constant acceleration

s distance (m), u starting speed, a acceleration, t time. From rest u = 0, so s = (1/2)at^2. Physics: May 2021 Q4(d) printed both forms; May 2024 Q5(b) sent students to the formula sheet (rod from rest moves 16 cm in 1.70 s, markscheme uses s = (1/2)at^2.

$$s = ut + \tfrac{1}{2}at^2$$

GIVEN

Final speed and distance

Physics: Nov 2019 Q7(a) (braking distance when the deceleration changes; markscheme v^2 = u^2 + 2as), May 2021 Q3(b) (average deceleration of a braking car; markscheme v^2 = u^2 + 2as, or loss in kinetic energy = work done).

$$v^2 = u^2 + 2as$$

LEARN IT

Motion graphs

Physics: May 2022 Q1(a) (length of a tunnel from a speed-time graph), May 2025 Q4 (gradient of a velocity-time line; state what the gradient represents). Integrated Sciences: Nov 2020 Q3(d) (distance in a stage; markscheme half base x height), Nov 2023 Q1(c) (distance from a graph).

s = area under the speed-time graph, a = gradient of the speed-time graph

LEARN IT

Weight

Physics: May 2022 Q5(a) (tension from a 300 g hanging mass, markscheme W = mg), May 2023 Q1(c) (weights of two horses, g = 10 N kg^{-1} printed). Integrated Sciences May 2022 Q2(e) (weight of a barbell inside a work calculation). Given in: Physics May 2019 Q3(e) sent students to the formula sheet (force of attraction on Oumuamua, g = 0.1 N kg^{-1}. Integrated Sciences Nov 2021 Q3(c) (rocket, 50 000 kg, g = 10 N kg^{-1}; the markscheme accepts W = mg or F = mg) and May 2024 Q1(c) (Bebionic hand, 45 kg, g = 10 N kg^{-1}.

$$W = mg$$

LEARN IT

Resultant (net) force

Subtract forces that act in opposite directions and state the direction of the larger one. Integrated Sciences: Nov 2021 Q3(c) (engine force minus weight), May 2022 Q2(b) (sled), May 2023 Q2(f) (child swimming).

$$F_{\text{net}} = F_1 - F_2$$

LEARN IT

Newton's second law

F force (N), m mass (kg), a acceleration (m s^{-2}. Not asked as a calculation of its own: Physics May 2024 Q5(c) (the extra quantity needed to find net force from acceleration is the mass), May 2021 Q4(c) and May 2023 Q6(a) (markschemes link force to acceleration, F = ma).

$$F = ma$$

LEARN IT

Pressure

p pressure (Pa), F force (N), A area (m^2. Physics May 2023 Q4(d) sent students to the formula sheet (plunger area 7.9 × 10^{-5} m^2, mass 1.2 kg, g = 10 N kg^{-1}.

$$p = \frac{F}{A}$$

GIVEN

Total pressure on trapped gas

Atmospheric pressure was printed (100 000 Pa) but adding it to the pressure from the mass was left to the student. Physics May 2023 Q4(d) (markscheme total about 2.5 × 10^5 Pa).

$$p_{\text{total}} = p_{\text{atmosphere}} + \frac{F}{A}$$

LEARN IT

Density

ρ density (kg m^{-3}, m mass (kg), V volume (m^3. Physics: May 2019 Q3(d) (mass of Oumuamua from volume 281 000 m^3 and density 2000 kg m^{-3}, Nov 2024 Q6(a) (mass of water in a tower; density of water 1000 kg m^{-3} printed).

$$\rho = \frac{m}{V}$$

LEARN IT

Momentum

p momentum (kg m s^{-1}, m mass, v velocity. Printed in Physics Nov 2019 Q1.

$$p = mv$$

GIVEN

Physics: energy, work and power

Change in gravitational potential energy

Printed in Physics Nov 2022 Q4(c) (useful energy output of a motor lifting a mass).

$$\Delta E_p = mg\Delta h$$

GIVEN

Gravitational potential energy

m mass (kg), g field strength (N kg^{-1}, printed as 10 or 9.81), h height gained (m). Physics: May 2018 Q2(c) (skier taken uphill, answer in kJ), Nov 2020 Q2(b) (car gaining 1440 m), Nov 2022 Q6(a) (0.050 kg lifted), Nov 2024 Q6(a) (water tower; markscheme E = mgh or W = Fd).

$$E_p = mgh$$

LEARN IT

Kinetic energy

Physics: May 2021 Q3(a) (1500 kg car at 25 m s^{-1}, Nov 2021 Q2(c) (rearranged to find the child's speed, markscheme KE = (1/2)mv^2, Nov 2024 Q1(e) (wrecking ball). Given in: Physics Nov 2023 Q5(e) sent students to the formula sheet. Integrated Sciences Nov 2019 Q4(g) (javelin at 22 m s^{-1}, answer to three significant figures).

$$E_k = \tfrac{1}{2}mv^2$$

LEARN IT

Energy conserved with no losses

Physics Nov 2024 Q1(e): the kinetic energy of the falling ball equals the potential energy lost over the height fallen (markscheme).

$$\text{loss in } E_p = \text{gain in } E_k$$

LEARN IT

Work done

W work done (J), F force (N), d distance moved in the direction of the force (m). Integrated Sciences May 2022 Q2(e) (barbell lifted; markscheme W = F x d or W = m x g x d). Physics: Nov 2024 Q6(a) (markscheme accepts E = mgh or W = Fd), May 2021 Q3(b) (markscheme accepts loss in KE = work done).

$$W = Fd$$

LEARN IT

Power and work

P power (W), W work or energy (J), t time (s). Physics May 2023 Q1(e) sent students to the formula sheet and to their answer for part (c) (horse B lifts its weight 12 m in 5.50 s, answer in kW).

$$P = \frac{W}{t}$$

GIVEN

Power and energy

Physics: Nov 2020 Q2(c) (8.8 MJ in 546 s; markscheme power = energy / time), May 2023 Q1(b) (students chose energy = power x time from four printed options), Nov 2022 Q4 (markscheme: power x time = work or energy), May 2025 Q1(a) (markscheme P = W / t). Integrated Sciences May 2019 Q1(e) (3000 W bulb for one hour, answer in standard form).

$$P = \frac{E}{t}, \qquad E = Pt$$

LEARN IT

Efficiency

Printed in Physics Nov 2022 Q4 and in Integrated Sciences May 2023 Q3(a) (efficiency of each light bulb).

$$\text{efficiency} = \frac{\text{useful energy out}}{\text{total energy in}} \times 100$$

GIVEN

Efficiency and wasted energy

Efficiency itself was not printed here. Physics: May 2018 Q1(e) (real transformer, power out over power in), May 2022 Q2(c) (98% efficient), Nov 2023 Q3 (LED, markscheme 0.02 / 0.05 = 40%), May 2024 Q1(e) (28% of 26 700 MW), May 2025 Q3 (35%, find the total power in). Integrated Sciences: May 2019 Q1(d) and Nov 2019 Q6(a) (Sankey diagrams).

$$\text{useful out} = \text{total in} - \text{wasted}$$

LEARN IT

Mass-energy

E energy (J), m mass (kg), c speed of light (m s^{-1}. Printed in Physics Nov 2021 Q2 (electron and positron, c = 3.0 × 10^8 m s^{-1} and May 2025 Q3(d) (mass difference in fission).

$$E = mc^2$$

GIVEN

Physics: electricity

Includes the transformer.

Resistance

Physics: Nov 2018 Q2(b) (lightning, 500 000 V and 20 000 A, 25 ohm), May 2024 Q3(f) (markscheme R = V / I, 6.3 ohm). Integrated Sciences May 2022 Q3(b) (120 V, 2.8 A treadmill motor). Given in: Physics Nov 2021 Q4(e) (resistance of component Y from a graph) and Nov 2024 Q5(f) (30 V supply, find the missing resistance) sent students to the formula sheet. Integrated Sciences May 2021 Q4 printed V = IR (resistance of a copper wire).

$$R = \frac{V}{I}$$

LEARN IT

Electrical power

Physics: Nov 2019 Q2 (tower of 1100 W on 220 V, find the current), May 2022 Q2(c) (markscheme P = IV), May 2023 Q1(f) (2.0 hp at 746 W per hp on 230 V, 6.5 A). Given in: Physics Nov 2023 Q3(c) (LED, 0.05 A at 1 V) and May 2025 Q6(g) (motor, 0.397 V and 0.11 A, unit required) sent students to the formula sheet.

$$P = IV, \qquad I = \frac{P}{V}$$

LEARN IT

Electrical energy

Physics: Nov 2022 Q6(d) (total energy used by the motor, markscheme E = V x I x t), May 2025 Q1(a) (defibrillator 150 J at 300 V in 30 ms; the markscheme uses 150 = 300 x I x 0.03, so I = 16.7 A).

$$E = VIt$$

LEARN IT

Charge and current

Physics Nov 2018 Q2(c) (charge in a lightning bolt of 30 microseconds at 20 000 A, 0.6 C). Convert microseconds first: 30 × 10^{-6} s.

$$\Delta Q = I\Delta t$$

LEARN IT

Power lost in a cable

Printed in Physics May 2022 Q2(d) (why electricity is transmitted at high voltage). Used for an explanation, not a calculation.

$$P = I^2R$$

GIVEN

Resistance of a wire

ρ resistivity, l length, A cross-sectional area. Printed in Physics Nov 2021 Q5(a) and (f).

$$R = \frac{\rho l}{A}$$

GIVEN

Transformer, no energy lost

p primary coil, s secondary coil. Physics May 2022 Q2(b) sent students to the formula sheet (secondary 240 V and 60 A, primary 1.2 A, answer 12 000 V; the markscheme says transformer equation or power in = power out). The layout on the sheet is not shown in our papers.

$$V_pI_p = V_sI_s$$

GIVEN

Transformer turns ratio

N number of turns. Physics May 2018 Q1(d): the diagram printed 110 V, 10 turns and 20 turns, so the secondary voltage is 220 V; the markscheme says use the transformer equation.

$$\frac{V_p}{V_s} = \frac{N_p}{N_s}$$

LEARN IT

Battery capacity

Printed in Integrated Sciences Nov 2024 Q2(a) (e-bike battery 2). Q2(c) then divides the capacity by the watt-hours needed per mile.

$$\text{capacity (Wh)} = V \times \text{ampere-hours}$$

GIVEN

Physics: waves, light and sound

Wave speed

Physics: Nov 2019 Q3(a) (radio waves, 134 000 Hz and 2238 m, answer in standard form), May 2025 Q2(a) (yellow light, 550 nm; markscheme f = v / λ). Convert nanometres to metres first. Given in: Physics May 2023 Q2(d) sent students to the formula sheet (red light, 750 nm, c = 3.00 × 10^8 m s^{-1}, answer in standard form).

$$v = f\lambda, \qquad f = \frac{v}{\lambda}$$

LEARN IT

Frequency and period

T period (s). Physics May 2023 Q7(a) sent students to the formula sheet: read the period from the wave graph (1.6 to 1.8 s accepted) and give the frequency to two significant figures with a unit.

$$f = \frac{1}{T}$$

GIVEN

Speed of sound in air

v in m s^{-1} and T the air temperature in °C, for temperatures near room temperature. Printed in Physics Nov 2019 Q5(g).

$$v = 330 + 0.6T$$

GIVEN

Closed tube

L length of the tube, v speed of sound. Printed in Physics May 2022 Q4(e) and (g) (the gradient of f against 1/(4L) is v).

$$f = \frac{v}{4L}$$

GIVEN

Thin lens

f focal length, d_o object distance, d_i image distance. Printed in Physics May 2021 Q6 (processing 1/d_o, 1/d_i and 1/f; the intercept of the graph of 1/d_i against 1/d_o is 1/f).

$$\frac{1}{f} = \frac{1}{d_o} + \frac{1}{d_i}$$

GIVEN

Physics: other relationships printed in questions

Investigation questions printed these relationships and then asked students to process data with them.

Pendulum

T period (s), L length (m), g field strength. Printed in Physics Nov 2024 Q1(c) (find g from the period 1.71 s; markscheme 9.79 m s^{-2}.

$$T^2 = 4\pi^2 \frac{L}{g}$$

GIVEN

Coefficient of restitution

v_1 speed before and v_2 speed after the bounce, h_1 drop height and h_2 first bounce height. Printed in Physics Nov 2023 Q5(a), (c) and (e).

$$e = \frac{v_2}{v_1} = \sqrt{\frac{h_2}{h_1}}$$

GIVEN

Values and conversions the questions needed

Values the questions printed are marked given. A recalled value or conversion is one the question did not supply.

Value or conversion	Status	Where it appeared
Gravitational field strength $g = 10\ \mathrm{N\ kg^{-1}}$ (or 9.81)	given	Printed in each calculation that needed it, for example Physics May 2018 Q2(c), May 2023 Q1(c) and Nov 2022 Q6(a) (9.81)
Speed of light $3.0 \times 10^8\ \mathrm{m\ s^{-1}}$	given	Physics Nov 2020 Q3, May 2021 Q1, May 2022 Q7(b), May 2023 Q2(d), May 2025 Q2(a); Integrated Sciences May 2024 Q6, May 2025 Q8(a)
Speed of light and of sound in air: $3 \times 10^8\ \mathrm{m\ s^{-1}}$ and $330\ \mathrm{m\ s^{-1}}$	recalled	Physics Nov 2018 Q1(a) (chosen from three printed values)
Atmospheric pressure $100\,000\ \mathrm{Pa}$	given	Physics May 2023 Q4(d)
Density of water $1000\ \mathrm{kg\ m^{-3}}$	given	Physics Nov 2024 Q6(a)
$1.0\ \mathrm{hp} = 746\ \mathrm{W}$	given	Physics May 2023 Q1(f)
$1\ \mathrm{mile} = 1.6\ \mathrm{km}$	given	Integrated Sciences Nov 2024 Q2(c)
Metric prefixes: $\mu = 10^{-6}$, $n = 10^{-9}$, $k = 10^3$, $M = 10^6$, $G = 10^9$	recalled	Physics Nov 2018 Q2(c) (30 microseconds), May 2025 Q3(b) (GJ), Nov 2022 Q1(d) (MJ), May 2023 Q2(d) (nm); Integrated Sciences May 2025 Q8(a) (15 ns)

Value or conversion	Status	Where it appeared
Time and mass units: $1\ \text{h} = 60\ \text{min} = 3600\ \text{s}$, $1\ \text{kg} = 1000\ \text{g}$	recalled	Physics May 2023 Q1(a) (minutes to hours); Integrated Sciences Nov 2020 Q2(d) (30 min to km h^{-1}, May 2019 Q1(e) (3000 W for one hour); Chemistry Nov 2021 Q8(b) and Nov 2024 Q2(c) (kg to g)

Chemistry

Used in the Chemistry papers; Integrated Sciences used the same ideas where marked. The periodic table follows the rows.

Moles from mass

n amount (mol), m mass (g), M molar mass (g mol^{-1}. Chemistry: Nov 2018 Q2(d), Nov 2019 Q2(c) (moles of iron in a Slinky), Nov 2021 Q8(b) (12 kg of lithium), May 2022 Q2(c), Nov 2022 Q2(d) (markscheme n = m / MM), May 2023 Q3(c), Nov 2023 Q2(b), Nov 2024 Q2(c), May 2025 Q1(b). Convert kg to g first.

$$n = \frac{m}{M}$$

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Mass from moles

Chemistry: May 2022 Q1(e) (5 mol of CaSO4.2H2O contains 10 mol of water, then mass of water), Nov 2024 Q2(c) (320 000 g of methanol from 10 000 mol).

$$m = nM$$

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Mole ratio from the balanced equation

Chemistry: May 2018 Q2(f) (0.5 mol of MgSO4.5H2O gives 2.5 mol of water), Nov 2022 Q2(d) (iron and oxygen, 3 mol of oxygen per 4 mol of iron), May 2023 Q3(c) (1 mol of methane gives 3 mol of hydrogen), Nov 2024 Q2(c) (1 : 1). May 2022 Q1(e) printed that the formula CaSO4.2H2O means 2 mol of water per mole of salt.

$$\frac{n_A}{n_B} = \frac{\text{coefficient of A}}{\text{coefficient of B}}$$

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Relative formula (molar) mass

Add the relative atomic masses of every atom in the formula; the unit of molar mass is g mol^{-1}. Chemistry: Nov 2018 Q2(c), May 2019 Q2(e) (H2SO4), May 2021 Q2(c) (CO2 with one O-16 and one O-18), Nov 2021 Q3(d), Nov 2023 Q2(a) (H3PO4, unit asked), May 2024 Q2(c), Nov 2024 Q1(e) (FeSO4 = 152). Integrated Sciences May 2019 Q3(d). The questions say to use the periodic table, which the exam shows on screen.

$$M_r = \sum A_r$$

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Percentage by mass

Chemistry: May 2018 Q4(b) (CaCO3 in a 9.71 g bone sample, 24.7%, then identify the animal), Nov 2020 Q1(d) (SiO2 in a rock sample, 1.16 g in 2.00 g, 58.0%).

$$\% = \frac{\text{mass of part}}{\text{mass of whole}} \times 100$$

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Mass number and particles in an atom

A mass number, Z atomic number (protons), n neutrons, e electrons in a neutral atom. Chemistry: May 2019 Q1, Nov 2019 Q3(d) (Po-210 and Pb-210), Nov 2020 Q2(b), May 2021 Q2(a) (markscheme A = p + n), May 2022 Q1(d), Nov 2022 Q1(d), May 2025 Q3(d) (krypton isotopes).

$$A = p + n, \qquad n = A - Z, \qquad e = p$$

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Rate of reaction

Printed in Chemistry May 2018 Q5(c) and (d) (total volume of gas produced / total time taken, $\text{cm}^3\ \text{s}^{-1}$ and in Integrated Sciences Nov 2022 Q5(b) (mass of CO2 lost / time, first five minutes for solution D).

$$\text{rate} = \frac{\text{amount produced or lost}}{\text{time}}$$

GIVEN

Rf value

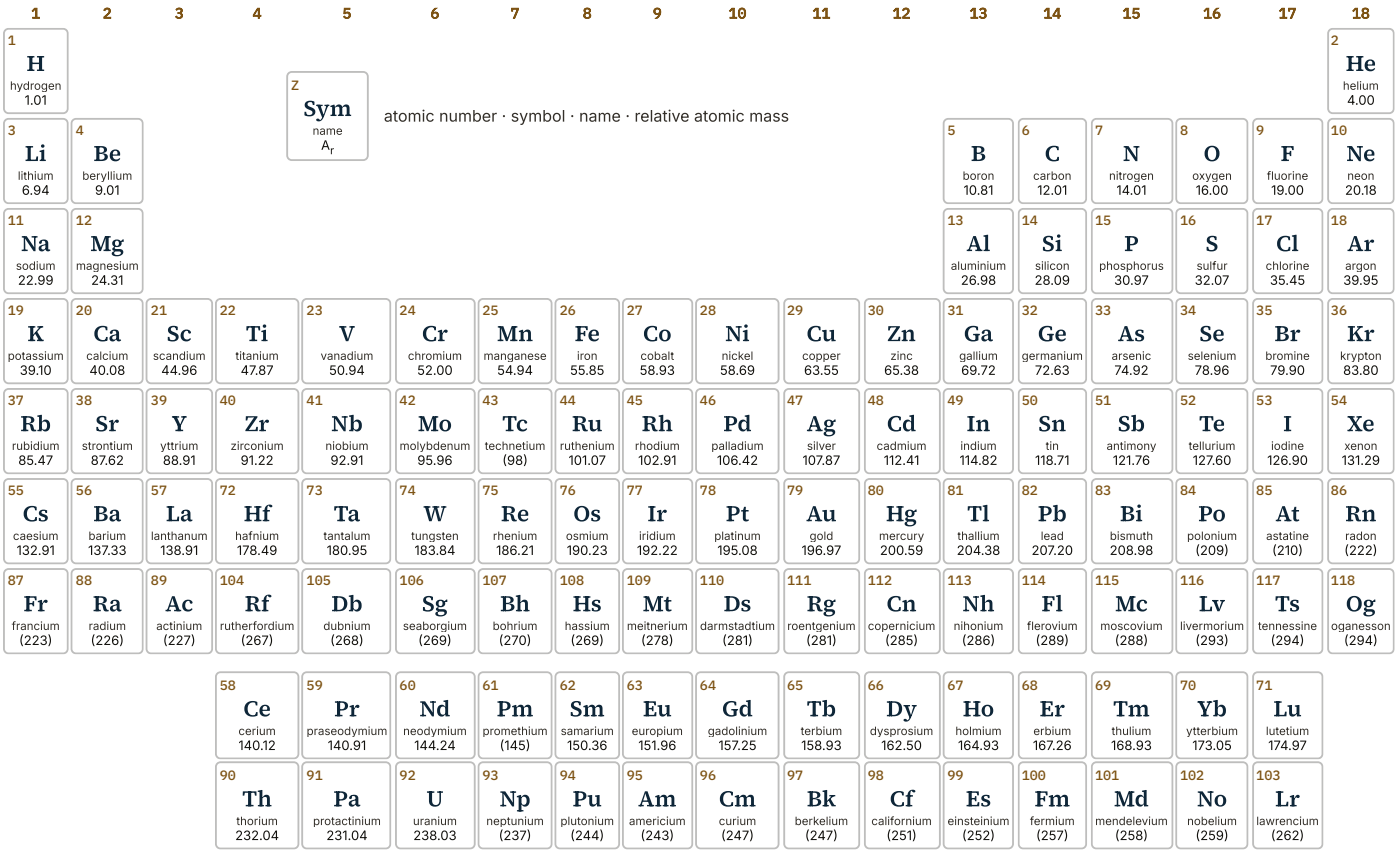
Defined in the question in Chemistry Nov 2019 Q7(c) (in words) and May 2024 Q1(f) (with a diagram and a ruler).

$$R_f = \frac{\text{distance moved by the spot}}{\text{distance moved by the solvent front}}$$

GIVEN

The periodic table

Relative atomic masses as printed in the IB Diploma Programme chemistry data booklet; the MYP exam shows its own periodic table on screen.



Biology and Integrated Sciences: living things

No Biology question in the papers asked for a magnification calculation, so none is listed.

Surface area to volume ratio

Printed in Biology May 2024 Q1(e) with the cube formulas: total surface area = height x width x number of sides, volume = height x width x length. A larger ratio is better for a cell (cubes of ratio 6, 2 and 1.2).

$$\frac{\text{surface area}}{\text{volume}}$$

GIVEN

Percentage change

Biology: Nov 2020 Q6(a) (percentage increase between the predicted and measured heart rate, three significant figures), May 2023 Q5(b) (percentage increase in a cell's diameter from 25% to 75% humidity, nearest 1%). Given in: Printed in Integrated Sciences May 2024 Q4(b) (dissolved CO2 between 2000 and 2075, to the nearest whole number).

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

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Whole from a percentage

Biology Nov 2018 Q1: 10 g of protein is 20% of the recommended daily intake, find the total mass needed daily.

$$\text{whole} = \frac{\text{part}}{\text{percentage}} \times 100$$

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Probability from a Punnett square

Biology: May 2021 Q1(e) (use D and d to complete the table, dimples), Nov 2023 Q1(e) (a child who does not have the disease but can pass it on).

$$P = \frac{\text{squares with the outcome}}{\text{total squares}}$$

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Mass at a lower trophic level (pyramid of biomass)

Integrated Sciences May 2019 Q2(b): the pyramid printed 1 kg of large fish, 10 kg of small fish, 100 kg of zooplankton and 1000 kg of phytoplankton, so 150 g of fish needs 15 kg of zooplankton.

$$m_{\text{lower}} = m_{\text{upper}} \times \frac{\text{lower level in the pyramid}}{\text{upper level in the pyramid}}$$

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Heart rate per minute

Biology Nov 2020 Q4(a) (Daphnia heartbeats counted for 20 s: multiply by 3). Integrated Sciences May 2021 Q5(b) (18 rotations in 15 s, rotations per minute).

$$\text{rate per minute} = \text{count} \times \frac{60}{\text{seconds counted}}$$

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Data processing used in all four sciences papers

Mean (average)

Physics: Nov 2018 Q5(b), Nov 2023 Q4(e). Chemistry: May 2018 Q5(c) (an appropriate average, justified), May 2019 Q5(b) and (f), May 2021 Q4(b), Nov 2021 Q6(c), Nov 2024 Q4(f). Biology: May 2019 Q4(f), May 2021 Q5(e), May 2022 Q6(d), Nov 2022 Q4(d), Nov 2024 Q4(b), May 2025 Q4(d). Integrated Sciences: May 2019 Q4(a), Nov 2021 Q6, May 2022 Q6(d), May 2023 Q6(b). Give the mean to a sensible number of decimal places.

$$\bar{x} = \frac{\sum x}{n}$$

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Rate of change

Give the unit as the quantity per unit time. Chemistry: Nov 2020 Q4(g) (6.58×10^5 molecules in 260 min), May 2022 Q4(e) (average of three trials, 44 cm^3 in 30 s), May 2024 Q6(c) (vitamin C over 21 days). Biology: May 2022 Q4(b) (transpiration in $cm^3\ h^{-1}$, Nov 2022 Q5 (photosynthesis in ppm O2 per minute), Nov 2023 Q4(b) (CO2 in ppm per minute). Integrated Sciences Nov 2024 Q3(e) (growth per day).

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

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Gradient of a straight line

Use two points far apart on the line of best fit and give the unit. Physics: Nov 2019 Q5(e) (speed of sound from a distance-time graph), Nov 2020 Q6 (capillary constant), Nov 2021 Q5(a), May 2022 Q4(d), Nov 2024 Q5(i), May 2025 Q4. Integrated Sciences May 2021 Q4 (resistance from the markscheme's two data points, 4 ohm).

$$\text{gradient} = \frac{\Delta y}{\Delta x}$$

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Change between two readings

Chemistry: Nov 2019 Q4(e) (400 - 60 = 340 cm^3 absorbed), May 2022 Q2(f) (temperature change after adding HF), Nov 2022 Q3(a) (change in mass of marble), May 2025 Q4(b) (volume of soap = final - initial burette reading). Biology Nov 2019 Q5(g) (difference in mass). Integrated Sciences: May 2022 Q6 and May 2024 Q3(e) (change in mass), May 2019 Q6(c) (profit = sale price - cost).

$$\text{change} = \text{final} - \text{initial}$$

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Total from a unit value

Physics: May 2018 Q7(c) (kWh per person x population), Nov 2022 Q1(d) (grams of uranium from 82 000 MJ per gram), May 2024 Q1(d) (kg of coal x J per kg), May 2025 Q3(b) (fission reactions for 9.7 GJ). Chemistry: Nov 2018 Q6(a) and Nov 2023 Q7(a) (carbon footprint = kg of food x footprint per kg). Integrated Sciences: Nov 2022 Q2(b) (cars charged from 200 tonnes of coffee grounds at 500 kWh per tonne), May 2025 Q4(f) (cysts per 100 cm^3 from a 0.05 cm^3 sample).

$$\text{total} = \text{amount} \times \text{value per unit}, \qquad \text{number needed} = \frac{\text{total}}{\text{value each}}$$

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Also learn these

Newton's laws of motion

First law: with no resultant force an object stays at rest or keeps moving at constant velocity (printed in Integrated Sciences Nov 2020 Q1(d)). Second law: F = ma. Third law: two objects exert equal and opposite forces on each other (Integrated Sciences May 2022 Q2(f); May 2023 Q2(e) asked which law applied).

Energy stores and Sankey diagrams

Name the stores for a skier, a rocket or a falling ball (gravitational potential, kinetic, thermal, sound, elastic, chemical). Physics May 2018 Q2(b) to (e), Nov 2021 Q2(b); Integrated Sciences May 2019 Q1(c).

Nuclear equations

Mass number and atomic number balance on both sides. Alpha emission removes 2 protons and 2 neutrons; beta emission turns a neutron into a proton. Physics Nov 2018 Q3, Nov 2022 Q1(b), May 2023 Q3(d), May 2025 Q3(b).

Half-life

The time for the activity or the mass of a radioactive sample to halve, read from a graph. Physics May 2021 Q2, Nov 2022 Q1(c), Nov 2023 Q2, Nov 2024 Q2(e).

Straight-line relationships

$y \propto x$: straight line through the origin

Inversely proportional: y against 1/x is a straight line through the origin. Physics May 2019 Q5(d), May 2021 Q4(d), Nov 2020 Q6, May 2022 Q4(e), Nov 2024 Q5(e).

Electron configuration from the periodic table

Sodium is 2,8,1, potassium 2,8,8,1, aluminium 2,8,3 and carbon 2,4. Integrated Sciences Nov 2019 Q1(b), Nov 2023 Q2(b), Nov 2024 Q2(e).

Balancing chemical equations

Write a number in front of each formula until every element has the same count on both sides. Asked for combustion, decomposition, neutralisation and respiration equations in Chemistry (May 2018 to May 2025) and Integrated Sciences papers.

Formula of an ionic compound

Balance the ion charges, for example magnesium phosphate from the table of ions in Chemistry May 2018 Q2(b), and Chemistry Nov 2019 Q3 and May 2024 Q2(e) (calcium sulfate).

Oxidation and reduction

Oxidation is loss of electrons; reduction is gain of electrons. Chemistry May 2019 Q3 (aluminium ion, reduced or oxidised).

Photosynthesis and respiration

Photosynthesis: carbon dioxide + water to glucose + oxygen, using light. Aerobic respiration: glucose + oxygen to carbon dioxide + water, releasing energy. Biology Nov 2023 Q3(b); Chemistry Nov 2020 Q7(a) and May 2024 Q1(a); Integrated Sciences Nov 2020 Q2(a), May 2021 Q1(b), Nov 2021 Q1(a).

Key biology terms

Homeostasis: keeping internal conditions steady (Biology Nov 2019 Q6(a), Nov 2020 Q2(a), Nov 2023 Q2(c)). Gene: a section of DNA with the instructions for a characteristic (Nov 2018 Q7(c), Nov 2023 Q4(f)). Allele: a different form of the same gene (Nov 2023 Q1(c)). Phenotype: the observable characteristics (May 2023 Q3(c)). Ecosystem (Nov 2020 Q1(c)), pathogen (Nov 2018 Q2(a)) and natural selection (May 2018 Q1(b)) were also asked.

Using the booklet in the exam

- Read the question before opening anything on screen: if it says using the formula sheet, the relationship is given, but you still choose the right quantities and the unit.
- Convert units before substituting: nanometres to metres, minutes to hours or seconds, kilograms to grams for moles.
- Give the unit the question asks for (kW, km h^{-1}, standard form) and the number of significant figures it names.
- For a rate or a gradient, show the change in each quantity and divide, then write the unit as one divided by the other.
- For echoes and radar the wave travels there and back, so halve the total distance (Physics Nov 2022 Q8(a), Integrated Sciences May 2025 Q8(a)).
- Efficiency and percentage questions are recall: write the formula first, then substitute.
- Questions often print a relationship you have never met, such as a Seebeck coefficient, the age of a tree from its girth or the force on a ball in an air stream. Read it carefully and use it exactly as given: it is the point of the question.

Built by CuratedPrep from the IB MYP eAssessment papers 2018 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.