

Aisha and Zayan's exam morning

Fill in each equation as we reach that scene. In the exam, picture the scene to recall the equation.

05:15 Zayan, before dawn

Stars fade over Malé, then the Sun rises.

orbital speed $v =$ _____

time for light to travel $t =$ _____

speed of light in a vacuum $c =$ _____

one light-year $1 \text{ ly} =$ _____

Hubble constant $H_0 =$ _____

age of the Universe $\approx$ _____

05:45 Aisha, breakfast

The kettle, hot tea and a steamed-up mirror.

electrical power $P =$ _____

electrical energy $E =$ _____

cost of electricity **cost** = _____

energy to heat something $\Delta E =$ _____

plane mirror **angle i** = _____

06:30 Zayan, getting ready

Static crackle, hairdryer, phone charger, glasses.

transformer voltages $V_p / V_s =$ _____

100% efficient transformer $I_p V_p =$ _____

left-hand rule *First* _____ *seCond* _____ *thuMb* _____

charge is measured in _____

object inside F: the image is _____

07:00 Zayan, on Dad's motorbike

Heavy bag, pulling away, braking hard.

weight $W =$ _____

spring constant $k =$ _____

speed $v =$ _____

acceleration $a =$ _____

resultant force $F =$ _____

momentum $p =$ _____

impulse $F\Delta t =$ _____

force and momentum $F =$ _____

kinetic energy $E_k =$ _____

07:10 Still on the motorbike

Bridge ramp, roundabout, tyres, side stand.

change in gravitational PE $\Delta E_p =$ _____

work done $W =$ _____

power $P =$ _____

efficiency (%) = _____

two vectors at right angles **resultant** = _____

pressure $p =$ _____

gas at constant temperature $pV =$ _____

kelvin temperature $T =$ _____

moment of a force **moment** = _____

07:30 Aisha, along the seafront

Waves, the ferry, an echo sounder, a fish.

wave speed $v =$ _____

density $\rho =$ _____

pressure change in a liquid $\Delta p =$ _____

depth from an echo **depth** = _____

refractive index $n =$ _____

critical angle $n =$ _____

07:50 Aisha and Zayan, at school

Power cut, corridor sensors, the smoke alarm.

current $I =$ _____

potential difference $V =$ _____

resistance $R =$ _____

two resistors in series $R =$ _____

two resistors in parallel $R =$ _____

potential divider $V_1 / V_2 =$ _____

power lost in a cable $P =$ _____

number of neutrons = _____

alpha decay **A and Z change by** _____

beta decay **Z changes by** _____

half-life: first subtract the _____

08:30 "You may now begin"

Paper 6, Question 1: the pendulum.

period from 10 swings $T =$ _____

gradient of a graph = _____

two values agree if within _____

Paper 6 and exam technique

Keep this side open while you do past papers. These are the points examiners give marks for.

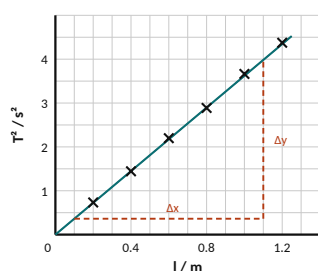
Planning and taking readings

- **Independent variable:** what you change. **Dependent variable:** what you measure. **Control variables:** what you keep the same.
- **Measure multiples:** time 10 swings and divide by 10; measure 50 sheets and divide by 50.
- **Repeat** each reading and take the mean. Use at least 5 values over a wide range.
- Read scales at **eye level** (avoids parallax), to the **nearest half** of the smallest division.
- Check for **zero error** and correct for it.
- Name a **risk** and a matching **precaution**.

Tables

- Headings are **quantity / unit**, for example **I / m** or **time / s**.
- **No units** in the body of the table.
- The **same decimal places** all the way down a column.
- Calculated values: the same **significant figures** as the least precise reading.

Graphs



- Axes labelled **quantity / unit**; the variable you changed goes on x.
- Scales use **more than half the grid**, in steps of 1, 2 or 5.
- Small **crosses**, plotted to half a small square, with a sharp pencil.
- One **thin best-fit line** with points balanced on both sides. Ignore an anomaly.
- **Gradient:** a triangle over at **least half the line**, drawn on the graph.
- Straight line through the origin means **directly proportional**.

Conclusions and evaluation

- **Conclusion:** state the relationship and quote the data or the graph shape that shows it.
- **Agreement:** two values within about **10%** agree within the limits of experimental accuracy. Show the working.
- **Sources of error:** name them for that experiment (reaction time, parallax, heat loss).
- **Improvements** must be specific: use a light gate, add a lid, take more readings. "Be more careful" scores nothing.
- **Anomalous result:** identify it, repeat it, leave it out of the best-fit line.

Precautions that score

EXPERIMENT	WRITE THIS
Cooling curve	Stir before each reading; same starting temperature; lid or insulation when comparing.
Springs	Read the pointer at eye level; check the spring returns to its original length.
Resistance of a wire	Switch off between readings so the wire does not heat up; check meters for zero error.
Optics pins	Pins at least 5 cm apart; keep them vertical; view the bases of the pins.
Lenses	Move the screen both ways to find the sharpest image; darken the room.
Density	Read the bottom of the meniscus at eye level; no air bubbles on the object.
Moments	Balance the rule before adding loads; hang masses exactly on the marks.
Pendulum	Time from the centre of the swing using a fixed marker; small starting angle.

Convert before you calculate

g → kg	÷ 1000	minutes → s	× 60
cm → m	÷ 100	hours → s	× 3600
mm → m	÷ 1000	kJ → J	× 1000
cm² → m²	÷ 10 000	kPa → Pa	× 1000
cm³ → m³	÷ 1 000 000	mA → A	÷ 1000
°C → K	+ 273	kWh → J	× 3 600 000

Command words

State	A short answer; no explanation needed.
Describe	Say what happens, step by step.
Explain	Give the reason: use "because".
Calculate	Show the equation, the substitution, the answer and the unit.
Suggest	Apply what you know to a new situation.

Exam-day checklist

- ☐ Show every step of working. Method marks count even if the answer is wrong.
- ☐ Write the unit with every answer.
- ☐ Round only at the end; give 2 or 3 significant figures.
- ☐ Use the marks as a guide: 3 marks usually means 3 points.
- ☐ Answer every multiple-choice question. There is no penalty for a wrong answer.
- ☐ Stuck? Picture the scene from Aisha and Zayan's morning.