https://isaacscience.org/question_decks#ipts25_sat_2a_ks3

Using Isaac with 11-14

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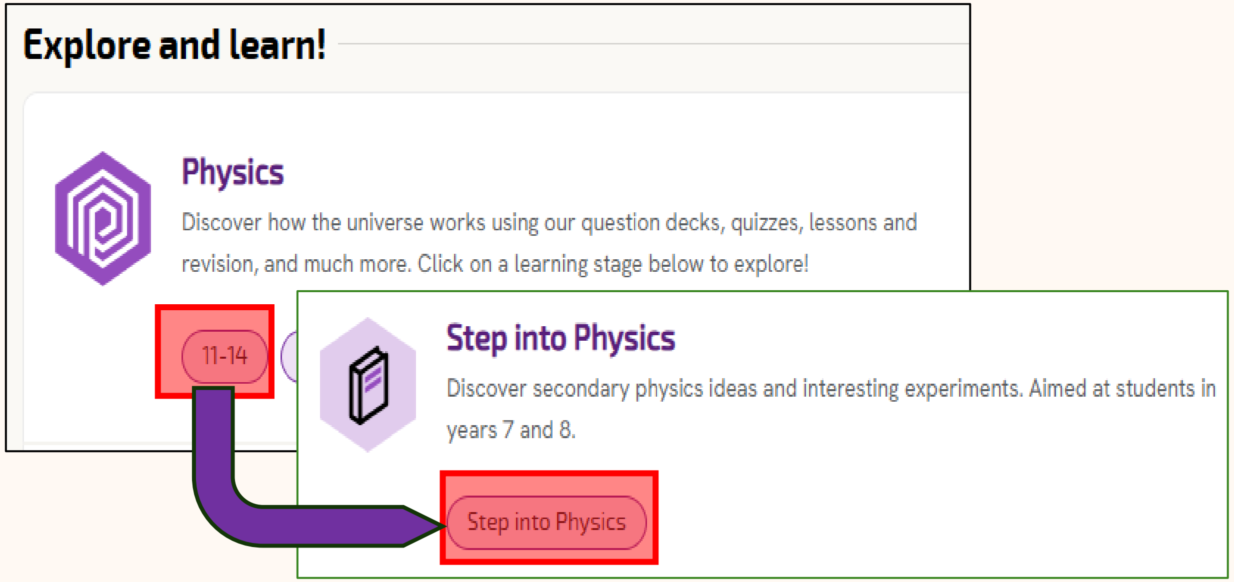
The Teacher Quarter

15 minute CPD session on the lesson, its concepts and how to handle student questions



Then choose topic, and scroll to bottom

If asked to organize a 45min CPD session for your department, ask your teachers to do 3!

The Teacher Quarter

Resources

Velocity (full text PDF)	Velocity Practice (full text PDF)
Velocity (cloze text PDF)	Velocity Practice (cloze text PDF)

Teacher Quarter

The Teacher Quarters are 15-minute video-based CPD sessions giving you a quick introduction to the concepts and content of each lesson. These are primarily intended for teachers new to teaching physics. Here you will find:

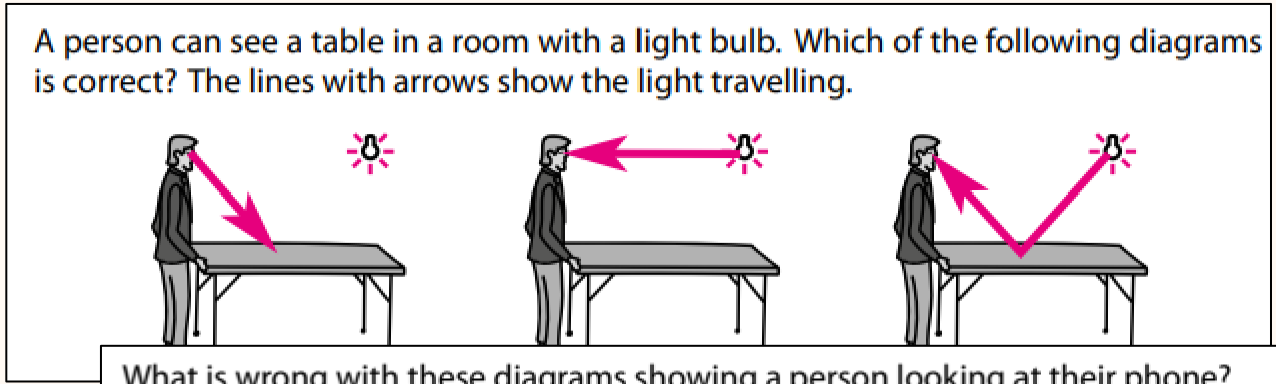
- an introductory video
- a selection of questions to practise the idea
- a video which reviews those questions and how they might be tackled in class

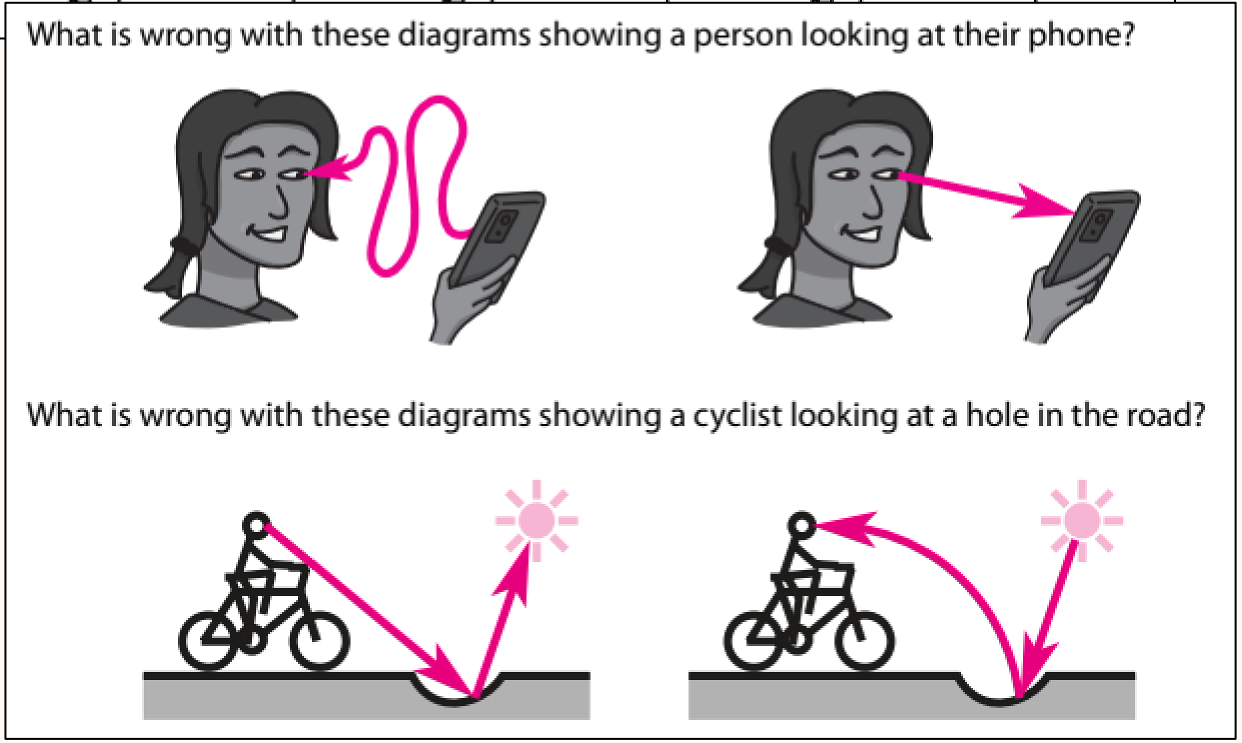
Introductory video | Question selection | Question review video | Guidance notes

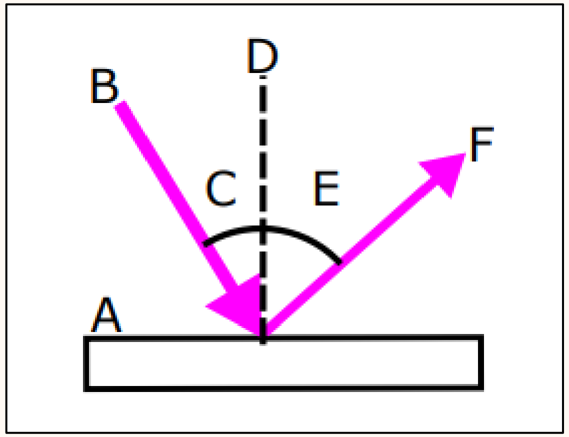
Ongoing developments

- Resource development for all physics KS3 concepts
- Particular focus on waves
- Draft class worksheets available for you to try as PDF

https://tinyurl.com/itsp25wavesks3

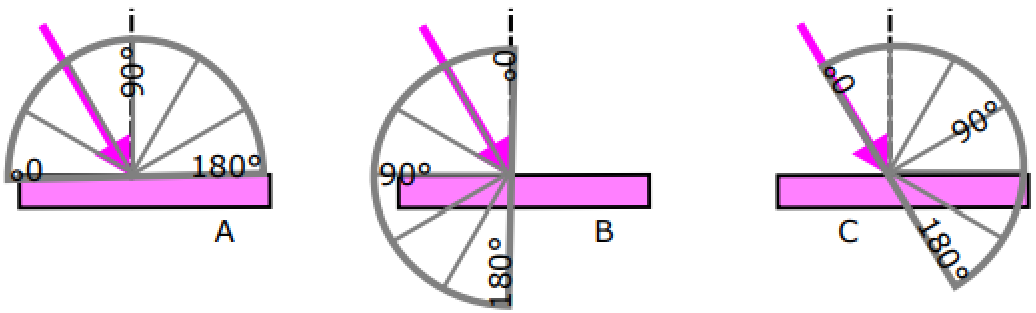






More waves

The diagrams below show three attempts to measure an angle of incidence.

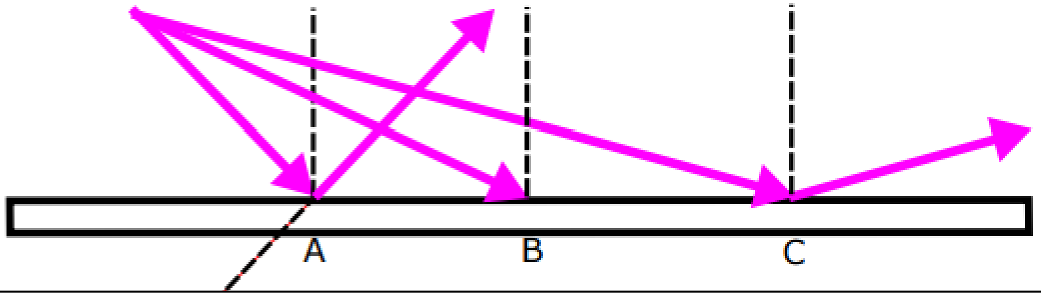


(a) From which of these protractors could we read off the correct angle?

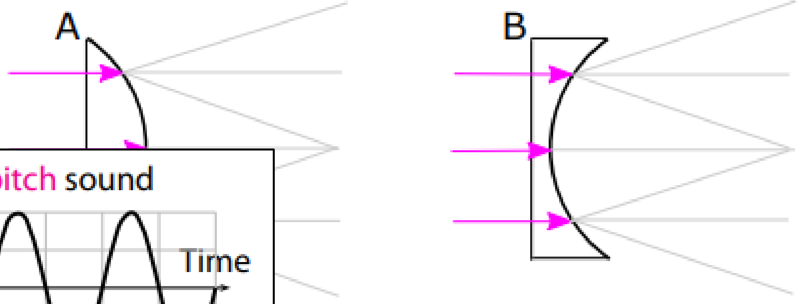
(b) State the angle of incidence of the ray.

(c) What do we line the centre of the protractor up with?

The diagram below shows three rays from the same point striking a mirror.



The diagrams below show rays passing into pieces of glass with a curved surface.

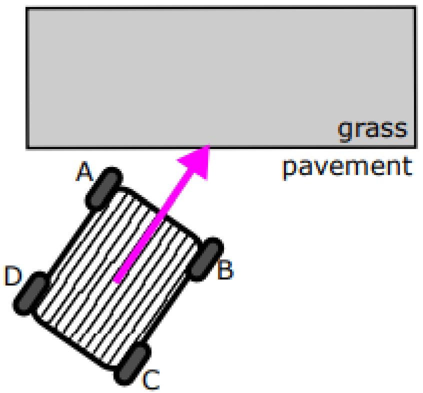


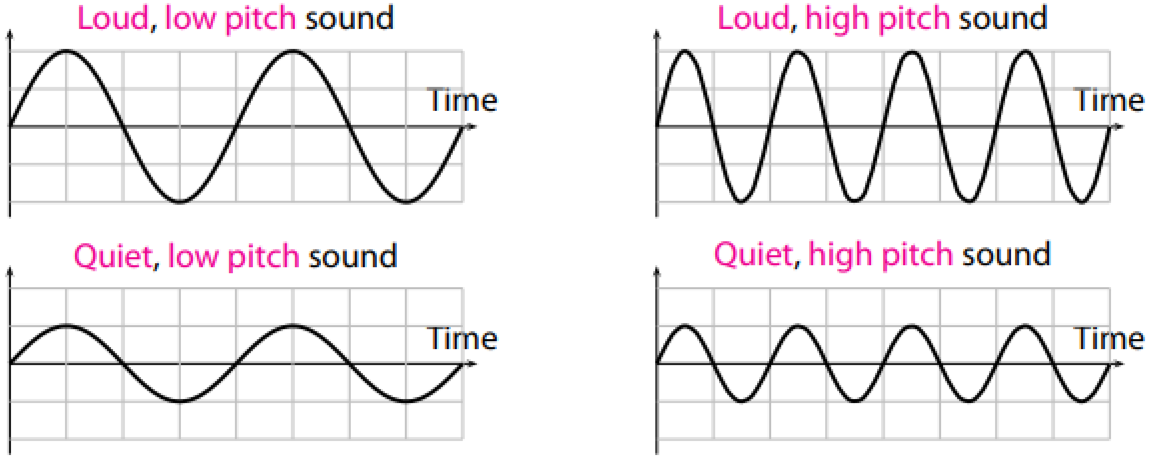
laces where light reaches the curved surface.

how light leaves the glass. Each refracted ray follows
will need to choose which one to use.

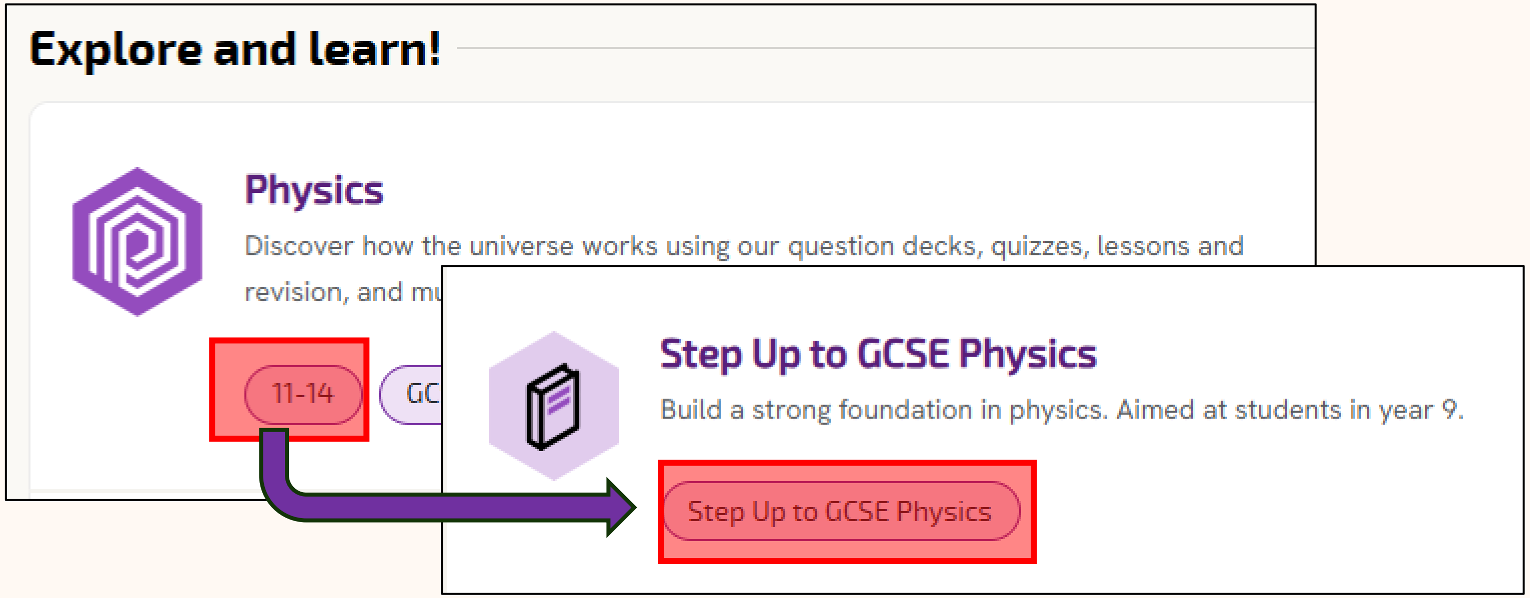
. A convex lens is thicker in the middle than at the
s? Write A or B.

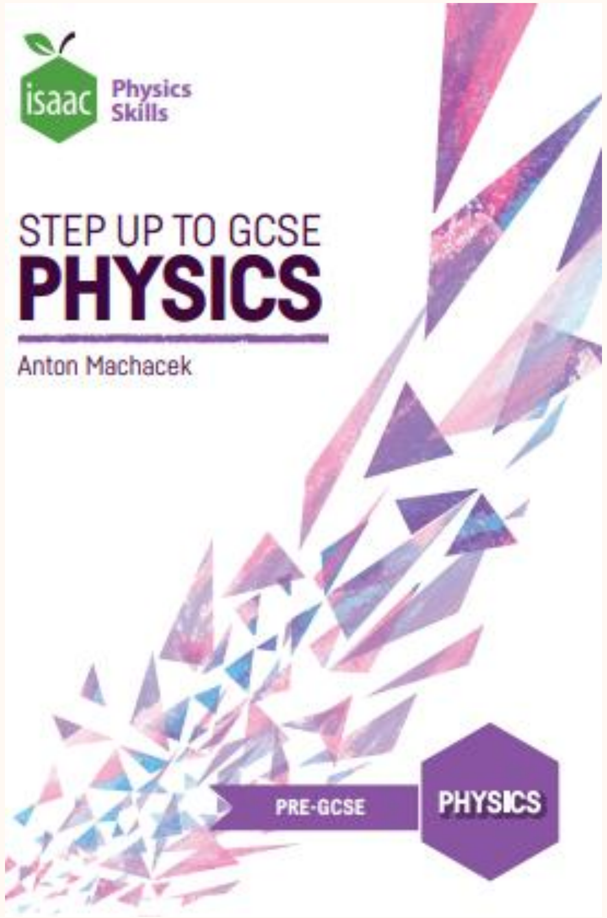
ex lens causes a parallel beam of light to





The next stage – we step up!





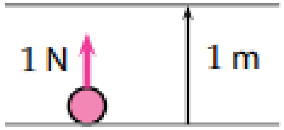
- Gives quantitative detail to KS3 previous coverage
- Designed for flexible usage
- Can be used by Y10/Y11 students gaining confidence
- Can be used by Y7/Y8 students for extension learning
- Teacher CPD: The principal resource for ‘further learning’ from the Step into Physics Teacher Quarters

Scope

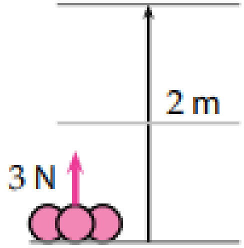
- **Mechanics**: displacement, units and conversion, s-t and v-t graphs and how to read them, velocity, acceleration, weight, resultant force, force & acceleration, momentum and impulse
- **Electricity**: Current and voltage in circuits, energy & voltage, charge & current, large & small numbers, resistance, power, sharing voltage
- **Energy**: Work, gravitational potential energy, power, energy flow, energy & temperature, balancing & moments
- **Materials & Forces**: Density, floating, friction, springs, pressure
- **Extra resources**: summary questions, challenge, secret key

You choose!

Examples



A small apple weighs 1 N. We lift it 1 m.
This needs 1 J of energy.



Three small apples weigh 3 N.
Lifting them 1 m would need 3 J of energy.
Lifting them 2 m, requires 6 J of energy.

The energy given to an object in this way is called the work done on it :

Work (J) = Force applied (N) × Displacement change (m) , $\Delta E = F\,\Delta s$

The equation can be re-arranged (see page 9) to give

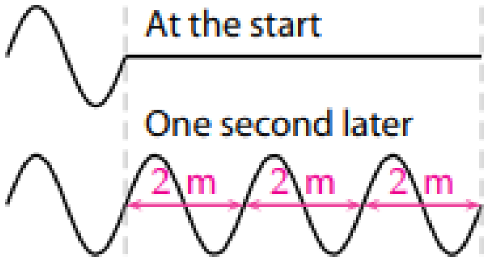
$$F = \frac{\Delta E}{\Delta s} \qquad \Delta E = F\,\Delta s \qquad \Delta s = \frac{\Delta E}{F}$$

Example 1 – *Calculate the energy given to a cart by its engine, which pulls it 25 m East with a force of 35 N in that direction.*
If we use + to mean 'East' then $F = +35$ N, and $\Delta s = +25$ m, so
$\Delta E = F\,\Delta s = 35\text{ N} \times 25\text{ m} = +875$ J so 875 J is given to the cart.

24.1 Calculate the work done on a sack which is dragged 13 m across the floor with a 45 N force.

24.2 Calculate the distance it will take for a 20 N force to do 600 J of work

If we know the wavelength and frequency of a wave, we can work out its speed. The diagram shows the front of a wave going forward for one second.



Frequency is 3 Hz, wavelength is 2 m.
In one second, 3 new waves are made.
Length of new wave is 3×2 m $= 6$ m.
The wave's front moves 6 m each second.
The wave's speed is 6 m/s.

The formula for wave speed is

$$\text{Speed (m/s)} = \text{Frequency (Hz)} \times \text{Wavelength (m)}, \text{ or } v = f\lambda.$$

This equation can be re-arranged using the methods on page 9 to give

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

Example – *A wave's speed is 20 m/s and its wavelength is 0.40 m. What is its frequency?*
We re-arrange $v = f\,\lambda$ by dividing both sides by λ to give

$$f = \frac{v}{\lambda} = \frac{20\text{ m/s}}{0.4\text{ m}} = 50\text{ Hz}.$$

Enabling and Challenge material

- Enabling
  - Positive and negative numbers (various contexts)
  - Unit conversion (proportionality)
  - Re-arranging equations
  - Large and small numbers (prefixes and standard form)
  - Repeated practice, graduated questions
  - Δ notation (or is that challenge?)
- Challenge
  - Displacement from a v-t graph
  - Momentum and impulse
  - Potential division
  - Balancing as energy conservation
  - Flotation, Friction, Internal energy, Dimensional analysis

Resources – Teacher guide

- Pedagogical approach
- Scheme of Learning Framework
- Specific Section Guidance

- 3 - Displacement-time graphs. Support for this given in
  - 1 - Displacement (representing position as a number)
- 4 - Velocity (introduced graphically)
- 6 - Calculating velocities. Support for this is given in
  - 2 - Converting units
  - 5- Rearranging equations
- 7 - Velocity-time graphs
- 8 - Acceleration. Extension for this is given in
  - 9 - Calculating accelerations
- 11 - Weight and Resultant Force
- 12 - Force and Acceleration

Section 9 - Calculating Acceleration

More challenging questions: 5,6,7,8
Questions on the 'quick' homework board: 1,2,3,6,8

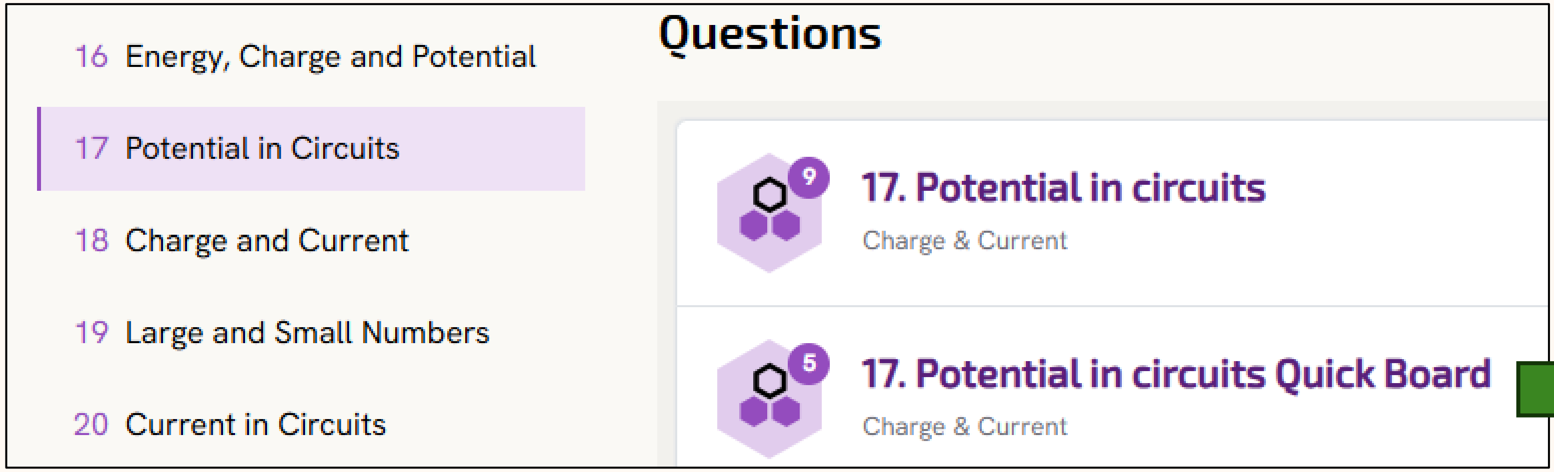
In this section, students practise using the formula Acceleration = Velocity change / Time taken. Please do not expect students to find q6-8 easy if they have not been taught how to convert units (section 2 can be used as a resource for this). If you do not want to worry about converting units, then just use q1-5.

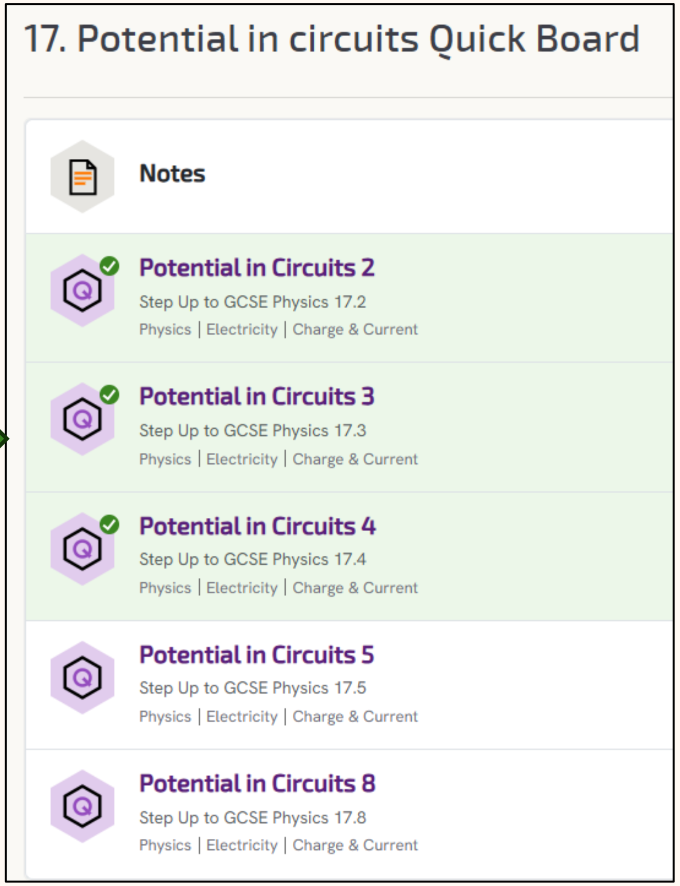
Q9.3 This is about the time taken to stop. The acceleration given is negative because the vehicle is slowing from high speed forward motion. The acceleration of -4.5m/s^2 means that it loses 4.5m/s of speed each second. So in 3.5s, it can lose 3.5 x 4.5 = 15.75m/s, which is therefore the top speed. If you went any faster, you would not be able to stop in 3.5s.

Q9.5a Change in speed = change in velocity = acceleration x time = 30 x (5 x 60) m/s - remember that the acceleration has to be in m/s^2 (so 3g = 30m/s^2) and the time has to be in seconds.

Features – Quick Boards

- A board with a few questions suitable for a short homework





Features – Summative Assessment

- Calculation practice

Use $\Delta s = v\,\Delta t$ to work out how far a $3.5\,\mathrm{m/s}$ runner will run in $15\,\mathrm{s}$.

Value ?

Unit m

- Review questions after each chapter (full & quick)
- Online summative test in matching format and style

Energy, Charge, Current and Voltage

Help

All stages

Show instructions

How much energy is gained by $72\,\mathrm{C}$ on passing a $5\,\mathrm{V}$ battery?

Value ?

Unit J