FREE REVISION PACK

Don’t Fall for the Trap!

A-level Physics · Theme pack · questions from AQA, OxfordAQA, Edexcel, Edexcel IAL, OCR A and OCR B

Easy | Medium | Hard | Multiple choice · past-paper questions

28	28	≈ 40 min
QUESTIONS	TOTAL MARKS	SUGGESTED TIME*

Contents

Q	LEVEL	FOCUS	SOURCE	MARKS
1	Easy	Newton’s third law pairs	Edexcel June 2023 · AS Paper 1 · Q5	1 mark
2	Easy	What equilibrium really means	OxfordAQA January 2023 · Unit 1 · Q12	1 mark
3	Easy	Two gases at the same temperature	Edexcel IAL January 2021 · Unit 5 · Q1	1 mark
4	Easy	A force at right angles to the motion	AQA June 2016 · AS Paper 2 · Q22	1 mark
5	Easy	Drift velocity in two wires in series	Edexcel IAL October 2020 · Unit 2 · Q9	1 mark
6	Easy	Time constant from a halving time	OxfordAQA January 2026 · Unit 3 · Q14	1 mark
7	Easy	Resistance and charge carrier density	OCR A June 2024 · AS Breadth in physics · Q3	1 mark
8	Easy	Does the bob’s mass matter?	Edexcel October 2020 · A-level Paper 2 · Q7	1 mark
9	Easy	Highest order from a grating	AQA June 2019 · AS Paper 2 · Q19	1 mark
10	Easy	Total number of maxima	AQA June 2025 · A-level Paper 1 · Q20	1 mark
11	Medium	Average velocity of gas molecules	OxfordAQA June 2019 · Unit 4 · Q16	1 mark
12	Medium	Mean kinetic energy in a mixture	Edexcel IAL January 2023 · Unit 5 · Q2	1 mark
13	Medium	Effect of doubling the mass	AQA June 2023 · A-level Paper 1 · Q24	1 mark
14	Medium	Compressing a gas at constant temperature	AQA November 2021 · A-level Paper 2 · Q8	1 mark
15	Medium	Doubling the intensity	OCR A October 2020 · A-level Exploring physics · Q3	1 mark
16	Medium	What is the same for two wires in series	AQA June 2019 · A-level Paper 1 · Q25	1 mark
17	Medium	Shorter wavelength, same power	AQA June 2017 · A-level Paper 1 · Q10	1 mark
18	Medium	Double the frequency, same intensity	OCR B June 2024 · A-level Fundamentals of physics · Q11	1 mark
19	Medium	Speed after passing through two fields	AQA June 2018 · A-level Paper 2 · Q26	1 mark
20	Medium	Pendulum and spring on another planet	AQA November 2021 · A-level Paper 1 · Q30	1 mark
21	Medium	Original length of a pendulum	OxfordAQA January 2023 · Unit 2 · Q24	1 mark
22	Medium	Period doubled when the length is increased	AQA November 2020 · A-level Paper 1 · Q30	1 mark
23	Medium	Force when the distance is increased	AQA June 2023 · A-level Paper 2 · Q15	1 mark
24	Medium	Half-life with a background count	OxfordAQA June 2019 · Unit 1 · Q24	1 mark
25	Hard	Two gases in one cylinder	OCR B June 2023 · A-level Fundamentals of physics · Q20	1 mark
26	Hard	Ratio of the resistivities	OCR A June 2023 · A-level Exploring physics · Q8	1 mark
27	Hard	Drag at two terminal velocities	AQA June 2025 · A-level Paper 1 · Q21	1 mark
28	Hard	Gravitational force on two satellites	OxfordAQA January 2019 · Unit 3 · Q16	1 mark

Key ideas to have ready

- Read the wording twice: increased **by** or **to**? Height **above the surface** or distance from the centre? Charge **lost** or charge left?
- Before you calculate, ask what actually changes. Temperature fixes mean KE and r.m.s. speed; the material fixes resistivity and n; a magnetic force does no work; intensity does not change the maximum KE of photoelectrons.
- Check the answer makes sense: grating orders are whole numbers (round down, count both sides plus the zero order) and a time constant is not a half-life.

How to use this pack

1. The questions are grouped into levels (Easy, Medium and Hard). Work through them in order, and check your answers at the end of each level before moving on.
2. Every question is multiple choice with one correct answer. Write down your working anyway; that is how you find mistakes.
3. The separate mark scheme uses the same numbers and explains every answer.

Levels are based on how students did in the exam boards’ examiner reports where that information exists, plus our own difficulty rating.
*About 1.5 minutes per question.

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Easy

Definitions and one-step ideas. Most students get these right.

Questions 1–10

Choose **one** answer for each question. The questions come from different exam boards, so the answer boxes look different: just mark the letter you choose. Every question hides a trap, so read each one twice.

Edexcel June 2023 · AS Paper 1 · Q5

1 A car is travelling at a constant speed in a straight line along a horizontal road.

Which row of the table gives a Newton's third law pair of forces?

	Force 1	Force 2
☒ **A**	normal force of car on road	friction between wheels and road
☒ **B**	normal force of car on road	normal force of road on car
☒ **C**	weight of car	normal force of car on road
☒ **D**	weight of car	normal force of road on car

OxfordAQA January 2023 · Unit 1 · Q12

2 Which is in equilibrium?

[1 mark]

A a car moving round a bend at constant speed ⬭

B a rocket moving vertically with constant acceleration ⬭

C a ball falling vertically at terminal speed ⬭

D a train moving horizontally with constant acceleration ⬭

Edexcel IAL January 2021 · Unit 5 · Q1

3 A mixture of oxygen gas and nitrogen gas is kept at room temperature. Oxygen molecules are more massive than nitrogen molecules.

Which of the following is correct?

☒ **A** The mean velocity of the oxygen molecules is greater than the mean velocity of the nitrogen molecules.

☒ **B** The mean speed of the oxygen molecules is the same as the mean speed of the nitrogen molecules.

☒ **C** The mean kinetic energy of the oxygen molecules is greater than the mean kinetic energy of the nitrogen molecules.

☒ **D** The mean kinetic energy of the oxygen molecules is the same as the mean kinetic energy of the nitrogen molecules.

AQA June 2016 · AS Paper 2 · Q22

4 A deep-space probe travelling forward at constant speed is briefly acted on by a force at right angles to its motion.

What is the effect of this force on the forward speed and sideways speed of this probe?

[1 mark]

A Its forward speed increases and sideways speed increases. ⬭

B Its forward speed decreases and sideways speed increases. ⬭

C Its forward speed is unchanged and sideways speed increases. ⬭

D Its forward speed decreases and sideways speed is unchanged. ⬭

Edexcel IAL October 2020 · Unit 2 · Q9

5 Two copper wires are placed in series in a complete circuit. The electrons in the two wires have different values of drift velocity.

Which of the following must be different for the two wires?

☒ **A** charge carrier density

☒ **B** cross-sectional area

☒ **C** current

☒ **D** length

OxfordAQA January 2026 · Unit 3 · Q14

6 A capacitor is discharged through a resistor and loses 50% of its charge in a time of 10 s.

What is the time constant of the circuit?

[1 mark]

A 5 s ⬭

B 7 s ⬭

C 10 s ⬭

D 14 s ⬭

OCR A June 2024 · AS Breadth in physics · Q3

7 A copper wire **P** has electrical resistance R and number density of charge carriers n.

A copper wire **Q** has:

- area of cross section equal to **P**
- twice the length of **P**.

Which row gives the correct values of resistance and number density of charge carriers for **Q**?

	Resistance of Q	Number density of charge carriers in Q
A	$\frac{R}{2}$	n
B	$\frac{R}{2}$	$2n$
C	$2R$	n
D	$2R$	$2n$

Your answer ☐ **[1]**

Edexcel October 2020 · A-level Paper 2 · Q7

8 A pendulum of length l with a bob of mass m oscillates with frequency f.

What is the frequency of a pendulum of length $4l$ with a bob of mass $2m$?

☒ **A** $4f$

☒ **B** $2f$

☒ **C** f

☒ **D** $\frac{f}{2}$

AQA June 2019 · AS Paper 2 · Q19

9 Monochromatic electromagnetic radiation of wavelength 5.8×10^{-7} m is incident normally on a diffraction grating with 3.0×10^{5} lines per metre.

What is the highest order maximum produced?

[1 mark]

A 5 ⬭

B 6 ⬭

C 10 ⬭

D 13 ⬭

AQA June 2025 · A-level Paper 1 · Q20

10 Monochromatic light of wavelength $420\ \text{nm}$ is incident normally on a plane transmission diffraction grating that has a slit separation of $3.6\ \mu\text{m}$.

What is the total number of maxima produced by the grating?

[1 mark]

A 8 ⬭

B 9 ⬭

C 16 ⬭

D 17 ⬭

Medium

Two or three steps. Roughly a third to a half of students get these right.

Questions 11–24

OxfordAQA June 2019 · Unit 4 · Q16

11 The average molecular kinetic energy of the molecules in a sample of gas is $\frac{1}{2}m\left(c_{\text{rms}}^2\right)$ where m is the mass of one molecule.

What is the magnitude of the average velocity of the molecules in the sample of gas?

[1 mark]

A $\sqrt{2} \times c_{\text{rms}}$ ⬭

B c_{rms} ⬭

C $\frac{c_{\text{rms}}}{\sqrt{2}}$ ⬭

D 0 ⬭

Edexcel IAL January 2023 · Unit 5 · Q2

12 A cylinder contains a mixture of gas X and gas Y. The mean kinetic energy of the molecules of gas X is E_{X} and the mean kinetic energy of the molecules of gas Y is E_{Y}.

The molecules of gas X have twice the mass of the molecules of gas Y.

Which of the following equations is correct?

☒ **A** $E_{\text{X}} = \frac{1}{2}E_{\text{Y}}$

☒ **B** $E_{\text{X}} = E_{\text{Y}}$

☒ **C** $E_{\text{X}} = 2E_{\text{Y}}$

☒ **D** $E_{\text{X}} = 4E_{\text{Y}}$

AQA June 2023 · A-level Paper 1 · Q24

13 A trolley moves down a slope with constant acceleration.
The mass of the trolley is doubled and the trolley moves down the same slope again.
Air resistance and friction are negligible.

Which is correct?

[1 mark]

A The accelerating force is unchanged. ⬭

B The accelerating force is halved. ⬭

C The acceleration is unchanged. ⬭

D The acceleration is halved. ⬭

AQA November 2021 · A-level Paper 2 · Q8

14 A gas occupies a volume V. Its particles have a root mean square speed (c_{rms}) of u.
The gas is compressed at constant temperature to a volume $0.5V$.

What is the root mean square speed of the gas particles after compression?

[1 mark]

A $\frac{u}{2}$ ⬭

B u ⬭

C $2u$ ⬭

D $4u$ ⬭

OCR A October 2020 · A-level Exploring physics · Q3

15 Electromagnetic radiation is incident on a metal of work function 2.3 eV.
The maximum kinetic energy (KE) of the photoelectrons is 1.7 eV.

The frequency of this incident electromagnetic radiation is kept the same but its intensity is doubled.

What is the maximum KE of the photoelectrons now?

A 1.7 eV

B 2.9 eV

C 3.4 eV

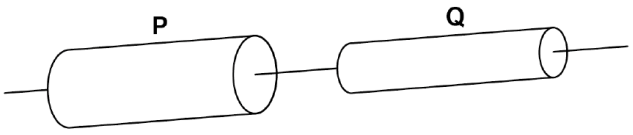
D 4.0 eV

Your answer ☐ **[1]**

AQA June 2019 · A-level Paper 1 · Q25

16 Two cylindrical wires **P** and **Q** are of equal length and made of the same material. The diameter of **P** is greater than that of **Q**.

P and **Q** are connected in series and the ends of this arrangement are connected to a power supply.



Which two quantities are the same for **P** and **Q**?

[1 mark]

A	potential difference across wire	resistivity	⬭
B	resistivity	current	⬭
C	current	resistance	⬭
D	resistance	potential difference across wire	⬭

AQA June 2017 · A-level Paper 1 · Q10

17 A beam of light of wavelength λ is incident on a clean metal surface and photoelectrons are emitted. The wavelength of the light is halved but energy incident per second is kept the same.

Which row in the table is correct?

[1 mark]

	Maximum kinetic energy of the emitted photoelectrons	**Number of photoelectrons emitted per second**	
A	Increases	Unchanged	⬭
B	Decreases	Increases	⬭
C	Increases	Decreases	⬭
D	Decreases	Unchanged	⬭

OCR B June 2024 · A-level Fundamentals of physics · Q11

18 A monochromatic beam of light is incident on a clean metal surface, and the frequency of the light is greater than the threshold frequency of the metal.

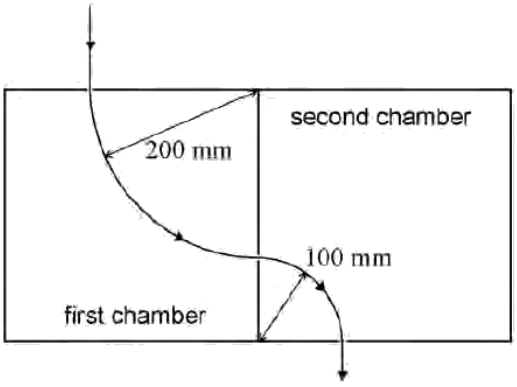
What happens if the original light source is replaced with one with double the frequency but the same intensity?

	Rate of emission of photoelectrons	Maximum kinetic energy of photoelectrons
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

Your answer ☐ **[1]**

AQA June 2018 · A-level Paper 2 · Q26

19 Different magnetic fields are present in the two chambers shown. A particle enters the first chamber at a velocity of $80\ \text{m s}^{-1}$ and is deflected into a circular path of radius $200\ \text{mm}$
In the second chamber it follows a circular path of radius $100\ \text{mm}$



The particle leaves the second chamber at a speed of

[1 mark]

A $20\ \text{m s}^{-1}$ ⬭

B $40\ \text{m s}^{-1}$ ⬭

C $80\ \text{m s}^{-1}$ ⬭

D $160\ \text{m s}^{-1}$ ⬭

AQA November 2021 · A-level Paper 1 · Q30

20 A simple pendulum and a mass–spring system each have a time period T on the Earth.

They are taken to the surface of a planet where the acceleration due to gravity is $\frac{g}{4}$.

What are the time periods of the pendulum and the mass–spring system on this planet?

[1 mark]

	Simple pendulum	Mass–spring system	
A	$\frac{T}{2}$	T	⬭
B	$2T$	T	⬭
C	$\frac{T}{2}$	$2T$	⬭
D	$2T$	$2T$	⬭

OxfordAQA January 2023 · Unit 2 · Q24

21 A pendulum has length L and period T.
When L is increased by 1.5 m the period becomes $2T$.

What is L?

[1 mark]

A 0.30 m ⬭

B 0.38 m ⬭

C 0.50 m ⬭

D 0.75 m ⬭

AQA November 2020 · A-level Paper 1 · Q30

22 The period of a simple pendulum is doubled when the pendulum length is increased by 1.8 m.

What is the original length of the pendulum?

[1 mark]

A 0.45 m ⬭

B 0.60 m ⬭

C 0.90 m ⬭

D 3.6 m ⬭

AQA June 2023 · A-level Paper 2 · Q15

23 Two point charges are separated by a distance of 200 mm.
The force of attraction between them is 180 μN.
The distance between the point charges is increased by 400 mm.

What is the new force of attraction?

[1 mark]

A 20 μN ⬭

B 45 μN ⬭

C 60 μN ⬭

D 90 μN ⬭

OxfordAQA June 2019 · Unit 1 · Q24

24 The half-life of a radioactive isotope is 2.0 hours.
The count rate measured from a freshly prepared sample of the isotope is 140 counts per minute.
The background count rate is 20 counts per minute.

What will be the measured count rate after 4.0 hours?

[1 mark]

A 30 counts per minute ⬭

B 35 counts per minute ⬭

C 50 counts per minute ⬭

D 55 counts per minute ⬭

Hard Several steps, often with a trap built in. Fewer than 3 in 10 students get these right. **Questions 25–28**

OCR B June 2023 · A-level Fundamentals of physics · Q20

25 A closed cylinder contains equal numbers of particles of two ideal gases, **X** and **Y**.

Particles of gas **X** have twice the mass of particles of gas **Y**.

Which is the correct statement?

A Both gases make the same number of collisions with the walls of the cylinder each second.

B Gas **Y** particles have the same average kinetic energy as gas **X** particles.

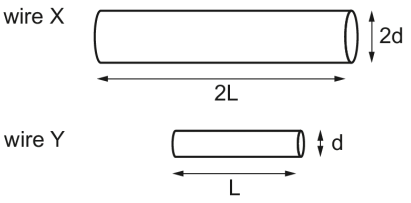
C Gas **Y** particles have twice the r.m.s. speed of gas **X** particles.

D The particles of gas **X** exert twice the pressure on the walls of the cylinder as the particles of gas **Y**.

Your answer ☐ **[1]**

OCR A June 2023 · A-level Exploring physics · Q8

26 The diagram shows the relative lengths and diameters of two copper wires, labelled wire X and wire Y.



What is the ratio of the resistivity of wire Y to wire X?

A 1 : 1

B 1 : 2

C 1 : 4

D 1 : 8

Your answer ☐ **[1]**

AQA June 2025 · A-level Paper 1 · Q21

27 A skydiver is falling at a terminal velocity v_1.
When she is at a height h_1 she opens her parachute.
When she is at a height h_2 she reaches a new terminal velocity v_2.

Which is true?

[1 mark]

A The increased air resistance when her height is h_1 causes her initially to move upwards. ⬭

B The drag force when her velocity is v_2 is equal to the drag force when her velocity is v_1. ⬭

C At v_1, her weight and the drag force are an action–reaction pair according to Newton's third law. ⬭

D Between h_1 and h_2, the work done by the drag force is equal to the change in the kinetic energy of the parachute and skydiver. ⬭

OxfordAQA January 2019 · Unit 3 · Q16

28 Satellites **P** and **Q** orbit the Earth.

For **P**, the height of the orbit above the surface of the Earth is equal to the radius of the Earth.
For **Q**, the height of the orbit above the surface of the Earth is equal to $3 \times$ the radius of the Earth.
The mass of **Q** is $3 \times$ the mass of **P**.
P experiences a gravitational attraction of $600\ \text{N}$ towards the Earth.

What is the gravitational attraction experienced by **Q**?

[1 mark]

A $150\ \text{N}$ ⬭

B $200\ \text{N}$ ⬭

C $450\ \text{N}$ ⬭

D $900\ \text{N}$ ⬭

End of questions. Check your answers with the matching mark scheme. More free packs and 1-to-1 tuition:
www.getbetteratphysics.co.uk