FREE REVISION PACK

Power & Efficiency

AQA A-level Physics · 7407 / 7408 · Specification 3.4.1.7

Easy Medium Hard Multiple choice · past-paper questions

5	5	≈ 10 min
QUESTIONS	TOTAL MARKS	SUGGESTED TIME*

Contents

Q	LEVEL	FOCUS	SOURCE	MARKS
1	Easy	Facts about mechanical power	AQA November 2020 · A-level Paper 1 · Q6	1 mark
2	Medium	Car driving up a hill	AQA June 2018 · AS Paper 2 · Q21	1 mark
3	Medium	Which is not a unit of power?	AQA June 2016 · AS Paper 2 · Q25	1 mark
4	Medium	Climber descending on a brake	AQA June 2022 · AS Paper 2 · Q27	1 mark
5	Hard	Extra power needed on a hill	AQA June 2025 · AS Paper 2 · Q34	1 mark

Key ideas to have ready

- Power = rate of doing work (or transferring energy): $P = W / t$. Unit: watt, $W = J\ s^{-1} = kg\ m^2\ s^{-3}$.
- For a force moving at constant velocity, $P = Fv$.
- Efficiency = useful output power ÷ input power (or useful energy out ÷ energy in).
- Lifting at steady speed v: the rate of gaining potential energy is mgv.

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 AQA's examiner reports where that information exists, plus our own difficulty rating. *About 1.5 minutes per question.

Questions are reproduced from AQA past papers; AQA material is © AQA. Question numbers have been changed to suit this pack. Get Better At Physics is an independent tutor and is not affiliated with or endorsed by AQA. Free for personal revision and classroom use.

Easy

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

Question 1

Only **one** answer per question is allowed. For each question, completely fill in the circle alongside the appropriate answer.

AQA November 2020 · A-level Paper 1 · Q6

1 Mechanical power

[1 mark]

A is a vector quantity. ⬭

B is measured in J. ⬭

C has base units of $\mathrm{kg\ m^2\ s^{-3}}$. ⬭

D can be calculated from force × distance moved. ⬭

Medium

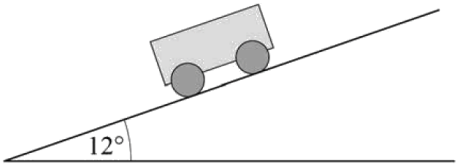
Two or three steps. Roughly a third to a half of students get these right.

Questions 2–4

AQA June 2018 · AS Paper 2 · Q21

2 A car's engine produces a useful output power of 6.5×10^4 W

The car of mass 950 kg is moving up a hill at a steady speed.
The slope of the hill is 12° to the horizontal. Resistive forces on the car are negligible.



What is the steady speed of the car?

[1 mark]

A $7.0\ \text{m s}^{-1}$ ⬭

B $12\ \text{m s}^{-1}$ ⬭

C $34\ \text{m s}^{-1}$ ⬭

D $68\ \text{m s}^{-1}$ ⬭

AQA June 2016 · AS Paper 2 · Q25

3 Which of the following is **not** a unit of power?

[1 mark]

A N m s^{-1} ⬭

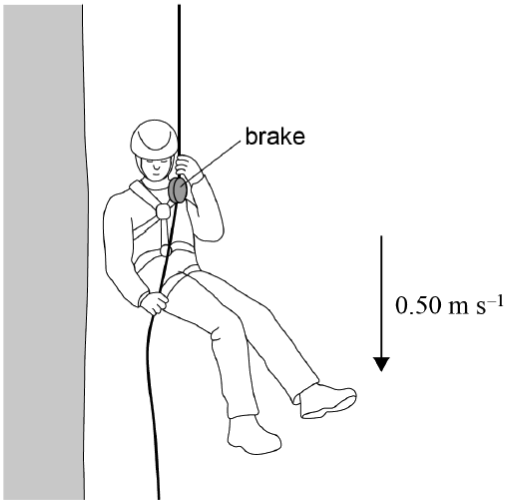
B J s ⬭

C W ⬭

D $\text{kg m}^2\ \text{s}^{-3}$ ⬭

AQA June 2022 · AS Paper 2 · Q27

4 A climber wears a harness attached to a rope. The rope passes through a brake. There is friction between the rope and the brake.



The climber uses the brake to descend at a steady speed of $0.50\ \text{m s}^{-1}$.
The combined mass of the climber, the harness and the brake is $60\ \text{kg}$.

What is the rate of energy transfer to the brake and rope?

[1 mark]

A 15 W ⬭

B 29 W ⬭

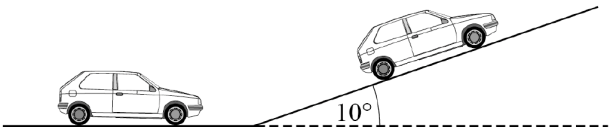
C 150 W ⬭

D 290 W ⬭

Hard Several steps, often with a trap built in. Fewer than 3 in 10 students get these right. **Question 5**

AQA June 2025 · AS Paper 2 · Q34

5 A car moves along a horizontal road at a constant speed of $15\ \text{m s}^{-1}$.
The car's engine provides a constant thrust of $3800\ \text{N}$.
The car then travels up a hill. The slope of the hill is $10°$ to the horizontal.
The power of the car's engine increases so that the car continues at a constant speed of $15\ \text{m s}^{-1}$.



The weight of the car is $12\ 000\ \text{N}$.
Assume that resistive forces are constant.

What is the minimum power output of the engine as the car goes up the hill?

[1 mark]

A $31\ \text{kW}$ ⬭

B $57\ \text{kW}$ ⬭

C $88\ \text{kW}$ ⬭

D $230\ \text{kW}$ ⬭

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