FREE REVISION PACK

Impulse & Force–Time Graphs

Pearson Edexcel International Advanced Level Physics · Unit 4 (WPH14) · Specification points 81–82

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

6	6	≈ 10 min
QUESTIONS	TOTAL MARKS	SUGGESTED TIME*

Contents

Q	LEVEL	FOCUS	SOURCE	MARKS
1	Easy	Area under a force–time graph	Edexcel IAL June 2024 · Unit 4 · Q8	1 mark
2	Easy	Change in momentum from force and time	Edexcel IAL October 2023 · Unit 4 · Q2	1 mark
3	Easy	Force from a molecule hitting a wall at an angle	Edexcel IAL October 2020 · Unit 4 · Q5	1 mark
4	Medium	Force on an atom that rebounds	Edexcel IAL January 2024 · Unit 4 · Q9	1 mark
5	Medium	Average force on a wall from a rebounding ball	Edexcel IAL January 2023 · Unit 4 · Q9	1 mark
6	Hard	Impulse on a wall from a rebounding ball	Edexcel IAL January 2020 · Unit 4 · Q3	1 mark

Key ideas to have ready

- Impulse = FΔt = change in momentum (N s).
- The area under a force–time graph is the impulse.
- When an object rebounds, its momentum reverses: the change is m(u + v), or 2mv for the same speed.
- Only the component of velocity perpendicular to a wall changes in an angled bounce.

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 Pearson's 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.

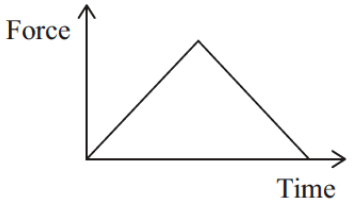
Questions 1–3

Choose **one** answer for each question and put a cross in the box next to it.

Edexcel IAL June 2024 · Unit 4 · Q8

1 A ball collides with a wall and moves off in the opposite direction. The wall exerts a force on the ball during the collision.

The force-time graph for the collision is shown.



Which of the following is given by the area under the graph?

☒ **A** acceleration of the ball

☒ **B** average force acting on the ball

☒ **C** change in momentum of the ball

☒ **D** distance travelled by the ball

Edexcel IAL October 2023 · Unit 4 · Q2

2 A car travels along a straight horizontal road. A drag force of 150 N acts for 15 s causing the speed of the car to decrease.

Which of the following is the change in momentum of the car due to the drag force?

☒ **A** $10\,\text{kg m s}^{-1}$

☒ **B** $1125\,\text{kg m s}^{-1}$

☒ **C** $2250\,\text{kg m s}^{-1}$

☒ **D** $16875\,\text{kg m s}^{-1}$

Edexcel IAL October 2020 · Unit 4 · Q5

3 A gas molecule of mass m travelling at speed v strikes the side of a gas cylinder at an angle θ. The collision takes time t.



What is the average force acting on the side of the gas cylinder?

☒ **A** $\frac{mv}{t}$

☒ **B** $\frac{2mv}{t}$

☒ **C** $\frac{mv\sin\theta}{t}$

☒ **D** $\frac{2mv\sin\theta}{t}$

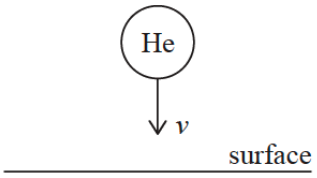
Medium

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

Questions 4–5

Edexcel IAL January 2024 · Unit 4 · Q9

4 A helium atom of mass m and velocity v collides at right angles with a surface, as shown.



The atom bounces off the surface with the same speed but in the opposite direction. The collision takes time Δt.

Which of the following is the mean force acting on the atom during the collision?

☒ **A** $\frac{mv}{\Delta t}$

☒ **B** $\frac{2mv}{\Delta t}$

☒ **C** $\frac{-mv}{\Delta t}$

☒ **D** $\frac{-2mv}{\Delta t}$

Edexcel IAL January 2023 · Unit 4 · Q9

5 A ball travelling at speed u towards a wall collides with the wall at right angles. The ball bounces off the wall at speed v in the opposite direction. The time for the collision is t.

Which of the following expressions gives the average force on the wall during the collision?

☒ **A** $\frac{m(u+v)}{t}$

☒ **B** $\frac{m(u+v)}{2t}$

☒ **C** $\frac{m(u-v)}{t}$

☒ **D** $\frac{m(u-v)}{2t}$

Hard Several steps, often with a trap built in. Fewer than 3 in 10 students get these right. **Question 6**

Edexcel IAL January 2020 · Unit 4 · Q3

6 A ball of mass m travelling with velocity v strikes a wall at right angles. It bounces off the wall in the opposite direction at the same speed.

Which of the following is the impulse on the wall?

☒ **A** mv

☒ **B** $2mv$

☒ **C** $-mv$

☒ **D** $-2mv$

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