AQA GCSE Physics | 8463

SPECIFICATION POINT 4.5.6.1.1

Distance and displacement

Past-paper questions

Tier	**Foundation**
Question groups	**3**
Available paper years	**2021–2024**

Using this booklet

1. Answer the questions in order and show your working.
2. Original question numbers and marks are retained.
3. Print at actual size (100%) for measuring questions.
4. Use the companion answer booklet to check your work.

Name: _____ **Date:** _____

Whole questions are retained for context, so some parts assess other specification points. Current and legacy sources are labelled. Continue on extra paper if needed.

4.5.6.1.1 Distance and displacement

Question 01

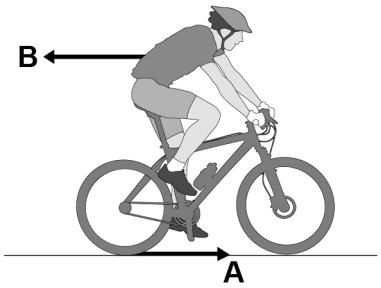
November 2021 | 8463/2F | Original Q2

0 2 **Figure 3** shows a cyclist on a bicycle.

The cyclist is moving at a constant velocity.

Arrows **A** and **B** represent the horizontal forces acting on the bicycle and cyclist.

Figure 3



0 2 . 1 What is force **A**?

[1 mark]

Tick (✓) **one** box.

- Air resistance ☐
- Friction ☐
- Tension ☐
- Upthrust ☐

4.5.6.1.1 Distance and displacement

Question 01 · continued

0 2 . 2 What is force **B**?

[1 mark]

Tick (✓) **one** box.

- Air resistance ☐
- Magnetic ☐
- Tension ☐
- Upthrust ☐

0 2 . 3 What is the relationship between force **A** and force **B** when the cyclist travels at a constant velocity?

[1 mark]

Tick (✓) **one** box.

- **A = B** ☐
- **A > B** ☐
- **A < B** ☐

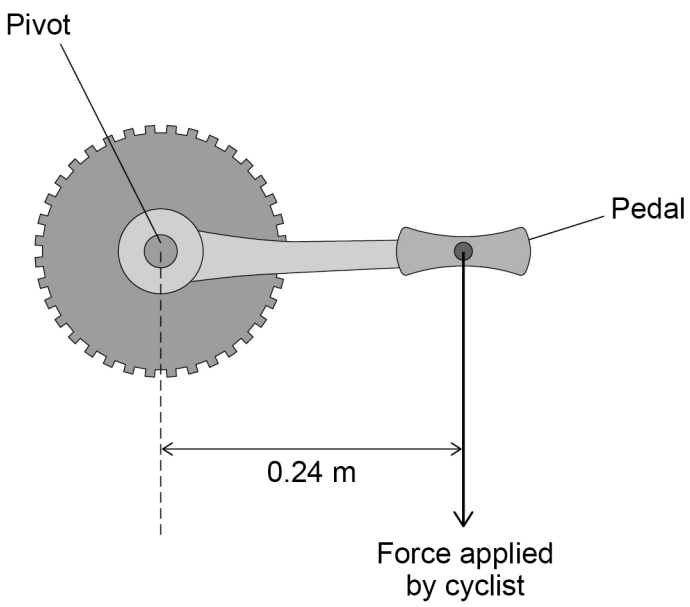
Question 2 continues on the next page

4.5.6.1.1 Distance and displacement

0 2 . 4 The cyclist applies a force of 150 N to one of the bicycle pedals.

Figure 4 shows the distance between the force applied and the pivot.

Figure 4



Calculate the moment about the pivot caused by the force applied to the pedal in **Figure 4**.

Use the equation:

moment of a force = force × distance

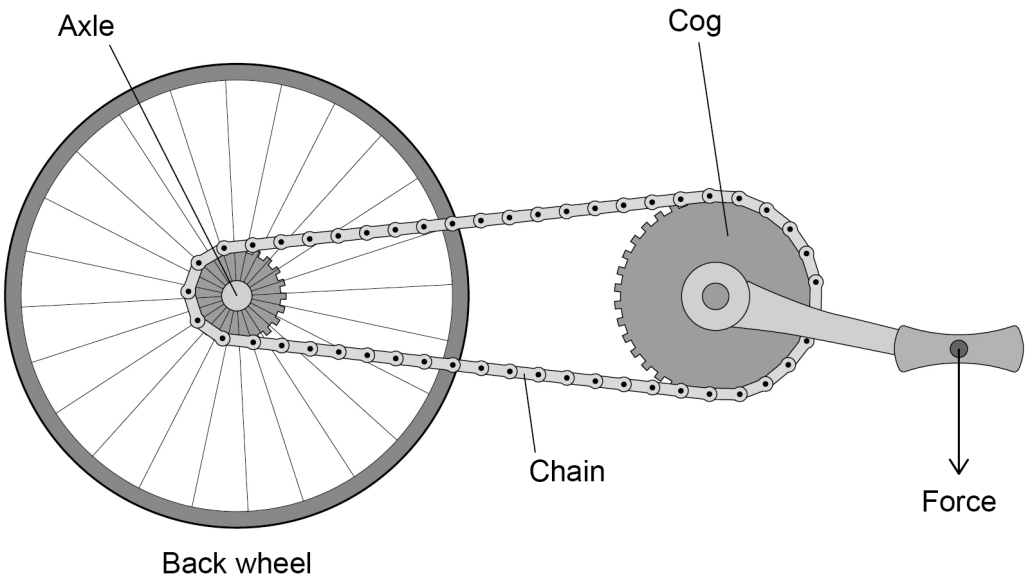
[2 marks]

Moment = _____ N m

4.5.6.1.1 Distance and displacement

0 2 . 5 **Figure 5** shows how the pedal is connected to the back wheel of the bicycle.

Figure 5



Complete the sentence.

Choose the answer from the box.

[1 mark]

axle	**chain**	**cog**

The force from the cyclist pushing down on the pedal is transmitted to the back wheel by the _____ .

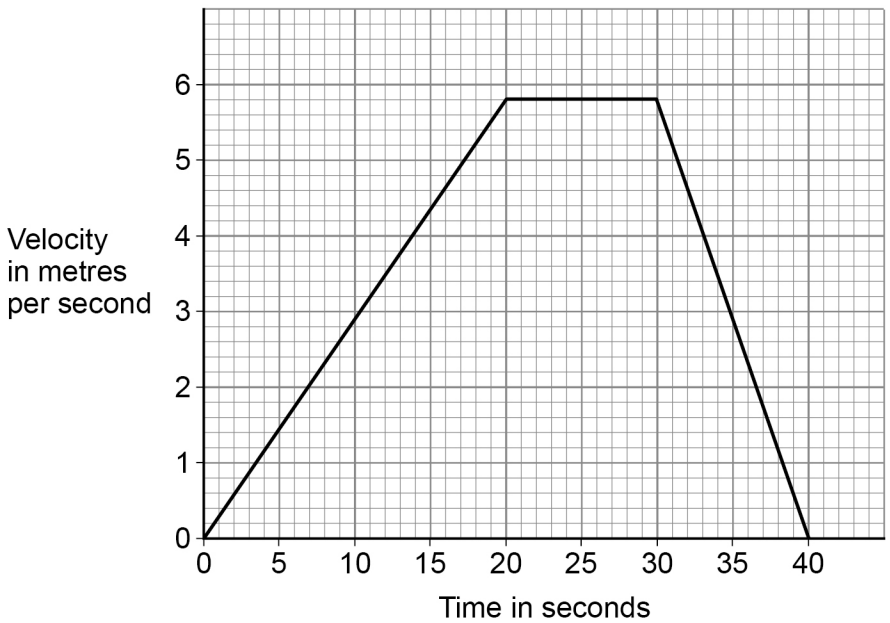
Question 2 continues on the next page

4.5.6.1.1 Distance and displacement

Question 01 · continued

Figure 6 shows how the velocity of the cyclist changes during a journey.

Figure 6



0 2 . 6 What is the change in velocity of the cyclist in the first 20 seconds of the journey?

[1 mark]

Tick (✓) **one** box.

5.2 m/s ☐

5.4 m/s ☐

5.6 m/s ☐

5.8 m/s ☐

4.5.6.1.1 Distance and displacement

0 2 . 7 Determine the acceleration of the cyclist during the first 20 seconds of the journey.

Use your answer from Question **02.6**

Use the equation:

$$\text{acceleration} = \frac{\text{change in velocity}}{\text{time taken}}$$

[2 marks]

Acceleration of the cyclist = _____ m/s^2

0 2 . 8 Complete the sentence.

Choose the answer from the box.

[1 mark]

deceleration	**speed**	**velocity**

Between 30 and 40 seconds the cyclist moves with

a constant _____ .

Question 2 continues on the next page

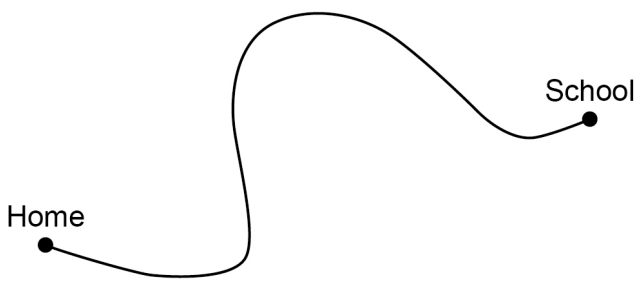
4.5.6.1.1 Distance and displacement

Question 01 · continued

0 2 . 9 The cyclist travels from home to school.

Figure 7 shows the route the cyclist followed.

Figure 7



Draw an arrow on **Figure 7** to show the displacement of the cyclist.

[1 mark]

11

4.5.6.1.1 Distance and displacement

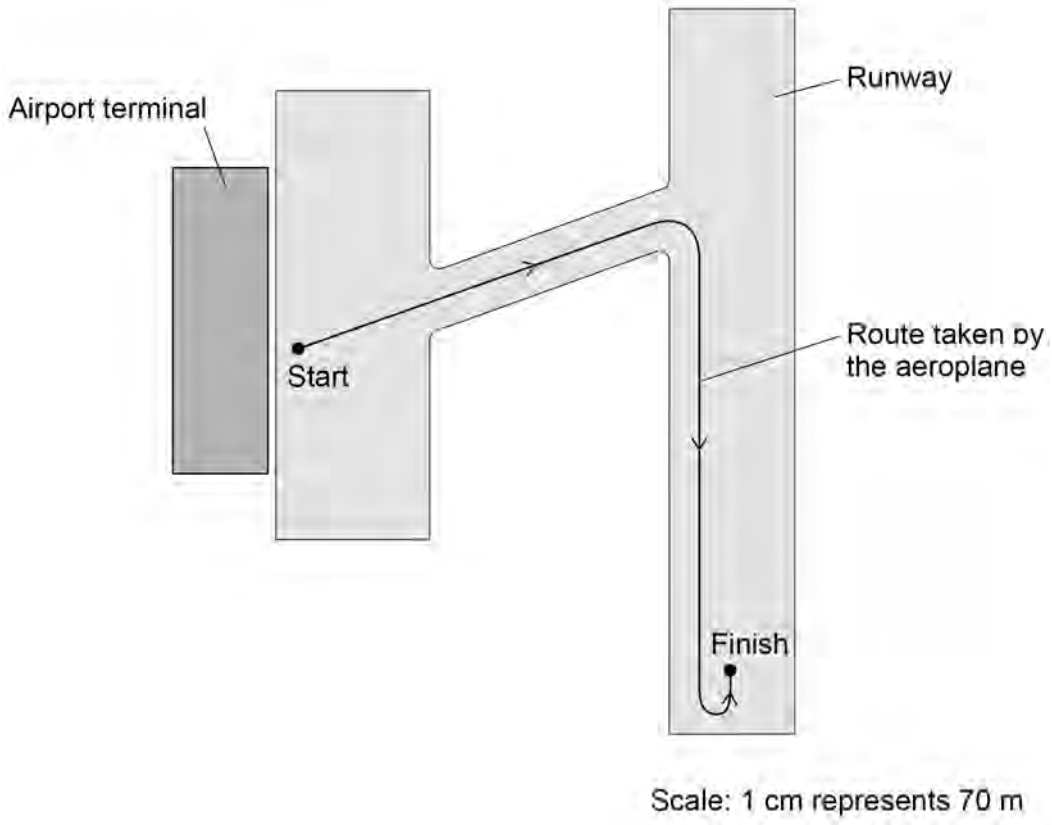
Question 02

June 2023 | 8463/2F | Original Q10

1 0 **Figure 25** shows the route an aeroplane takes as it travels from an airport terminal to the runway.

Figure 25 has been drawn to scale.

Figure 25



1 0 . 1 Determine the magnitude of the aeroplane's displacement from the start point to the finish point on **Figure 25**.

[2 marks]

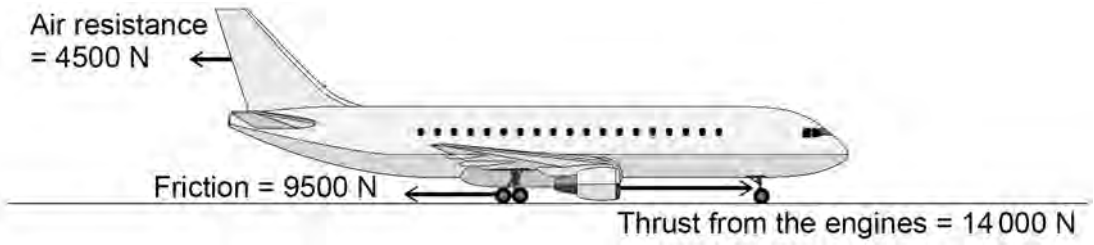
Displacement = _____ m

4.5.6.1.1 Distance and displacement

Question 02 · continued

Figure 26 shows the direction of the horizontal forces acting on the aeroplane as it moves in a straight line towards the runway.

Figure 26



1 0 . 2 Determine the magnitude of the resultant horizontal force on the aeroplane.

[1 mark]

Resultant horizontal force = _____ N

1 0 . 3 Describe the motion of the aeroplane as it moves towards the runway.

[1 mark]

1 0 . 4 Air resistance and friction are contact forces.

Give **one** other example of a contact force.

[1 mark]

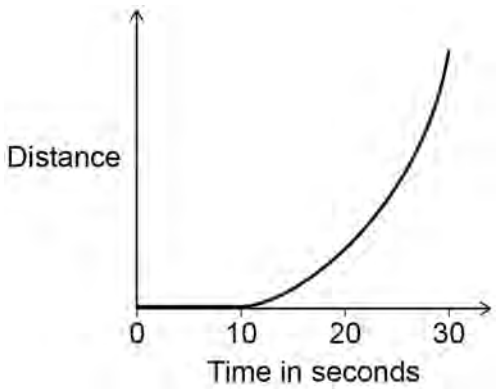
4.5.6.1.1 Distance and displacement

Question 02 · continued

1 0 . 5 The aeroplane stops for a short time and then accelerates along the runway.

Figure 27 shows a distance–time sketch-graph for this stage of the journey.

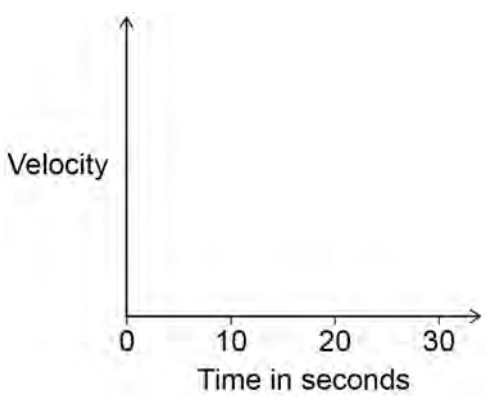
Figure 27



Draw the velocity–time sketch-graph for this stage of the journey on **Figure 28**.

[2 marks]

Figure 28



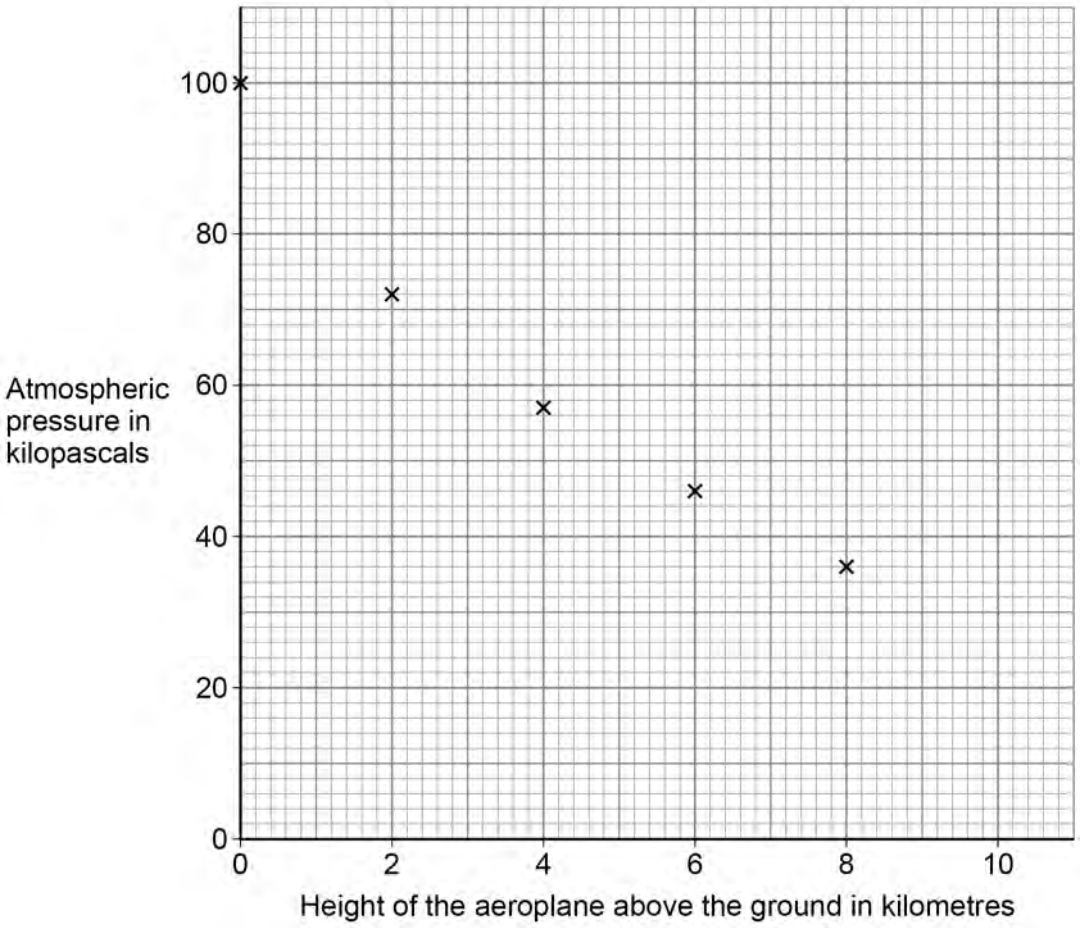
4.5.6.1.1 Distance and displacement

Question 02 · continued

1 0 . 6 The aeroplane takes off from the runway, so its height above the ground increases.

Figure 29 shows how atmospheric pressure varies with the height of the aeroplane above the ground.

Figure 29



Estimate the atmospheric pressure when the height of the aeroplane above the ground is 10 km.

[2 marks]

Atmospheric pressure = _____ kPa

Question 10 continues on the next page

4.5.6.1.1 Distance and displacement

Question 02 · continued

10.7 What happens to the air surrounding the aeroplane as the height of the aeroplane above the ground increases?

[1 mark]

Tick (✓) **one** box.

- The average density of the air above the aeroplane decreases. ☐
- The mass of air above the aeroplane increases. ☐
- The temperature of the air increases. ☐
- The volume of air below the aeroplane decreases. ☐

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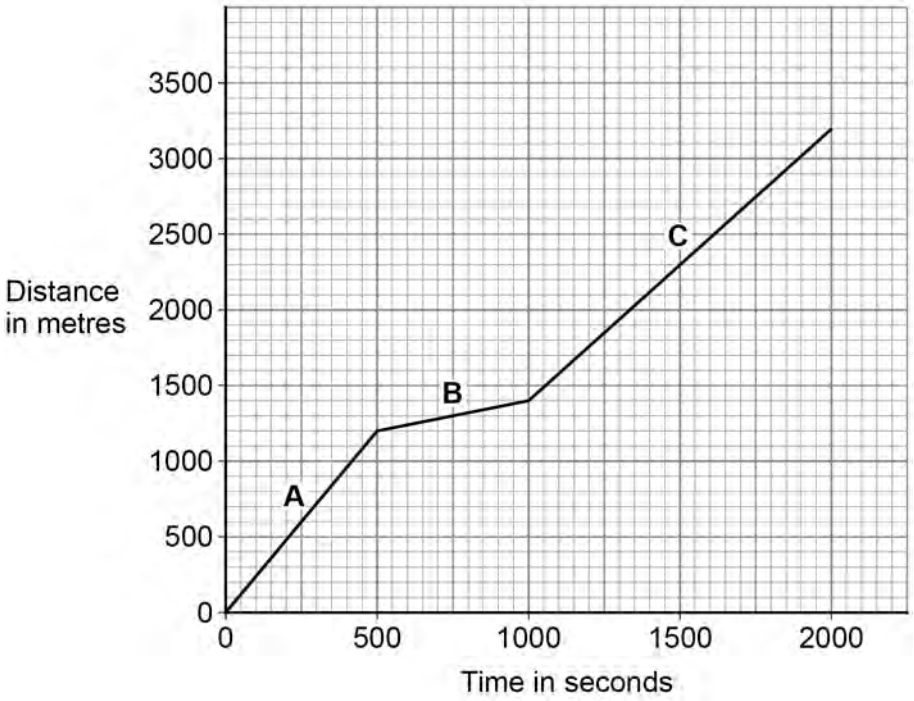
4.5.6.1.1 Distance and displacement

Question 03

0 5 A person has been for a walk.

Figure 9 shows the distance–time graph for the walk.

Figure 9



0 5 . 1 Some quantities are scalar quantities and others are vector quantities.

Which of the following are scalar quantities?

[2 marks]

Tick (✓) **two** boxes.

- Displacement ☐
- Distance ☐
- Force ☐
- Speed ☐
- Velocity ☐

4.5.6.1.1 Distance and displacement

Question 03 · continued

0 5 . 2 What was the total distance walked by the person in 2000 seconds?

[1 mark]

Total distance = _____ m

0 5 . 3 Calculate the average speed of the person during the 2000 seconds.

Use your answer to Question **05.2**

Use the equation:

$$\text{average speed} = \frac{\text{total distance}}{\text{total time}}$$

[2 marks]

_____

_____

_____

Average speed = _____ m/s

0 5 . 4 Which section of **Figure 9** shows the person walking the slowest?

Give a reason for your answer.

[2 marks]

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐

Reason _____

_____

4.5.6.1.1 Distance and displacement

Question 03 · continued

0 5 . 5 The person walked slowest when going up some steps.

Complete the sentence.

Choose the answer from the box.

[1 mark]

air resistance	**friction**	**gravity**

When walking up the steps, the person did more work against the force of _____.

0 5 . 6 On another day, the person ran the same route.

What is a typical speed for a person running?

[1 mark]

Tick (✓) **one** box.

0.3 m/s ☐

3.0 m/s ☐

30 m/s ☐

9