Motion

Question Paper

Course	CIE IGCSE Physics
Section	1. Motion, Forces & Energy
Topic	Motion
Difficulty	Easy

Time Allowed 60

Score /49

Percentage /100

Question 1a

Fig. 1.1 shows the speed-time graph for a car.

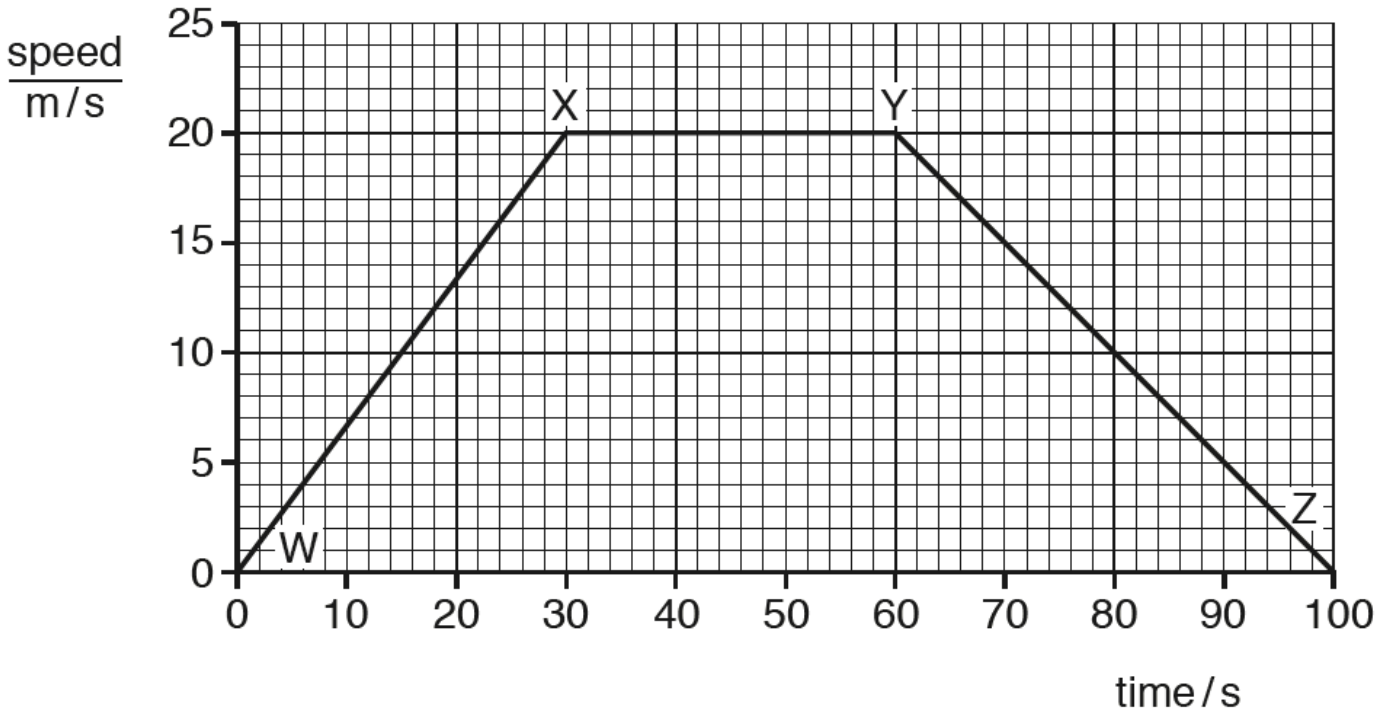

Fig. 1.1

On Fig. 1.1, the labels W, X, Y and Z show the points when the car's motion changed.

On Fig. 1.2, draw a line from each section of the graph to the correct description of the motion.

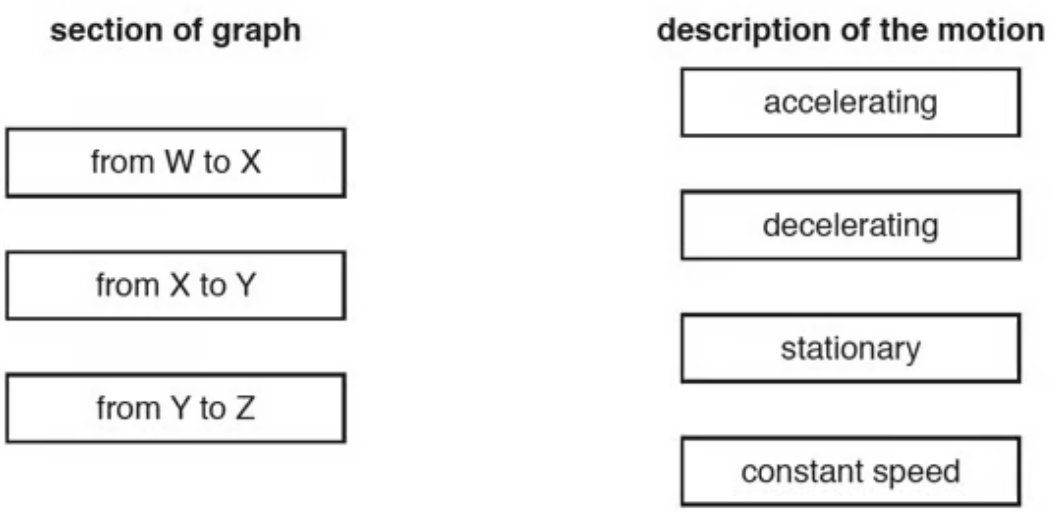

Fig. 1.2

[3 marks]

Question 1b

Calculate the distance that the car travels between 30 s and 60 s.

distance travelled = ... m

[3 marks]

Question 1c

State, using Fig. 1.1, whether the acceleration or deceleration of the car is greater.

[1 mark]

Question 2a

During part of a race, a skier travels a distance of 200 m in a time of 6.4 s.

Calculate the average speed of the skier.

average speed = ... m/s

[3 marks]

Question 2b

Fig. 4.1 shows a speed–time graph for the skier in another part of the race.

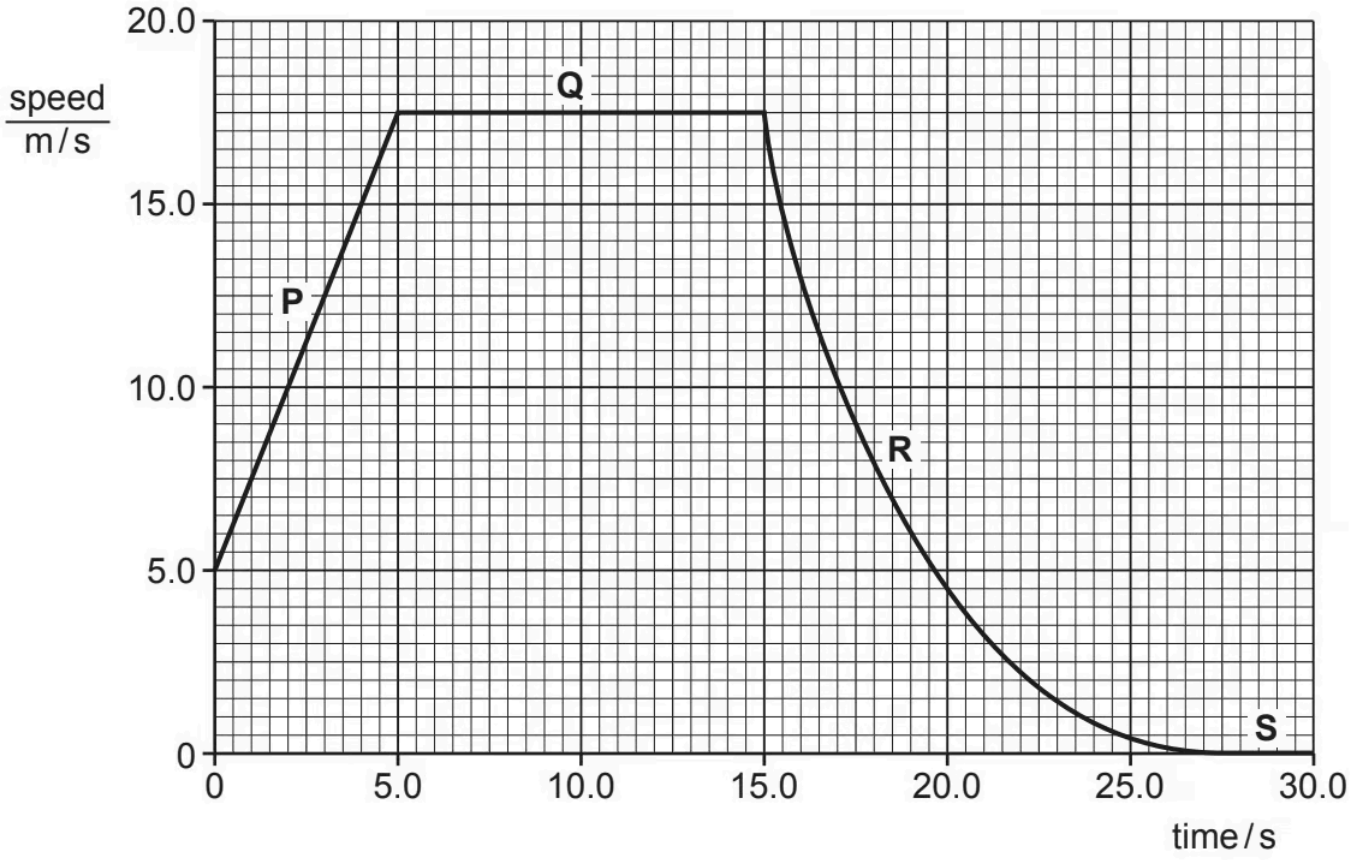

Fig. 4.1

Describe the motion of the skier at each point **P**, **Q**, **R** and **S** on the graph.

[4 marks]

Question 2c

Skis are strapped to a skier's feet and are longer and wider than the skier's feet.

Explain how the skis prevent the skier from sinking into soft snow.

[2 marks]

Question 3a

During a training flight, a fighter jet travelling at 300 m/s makes a turn to avoid bad weather.

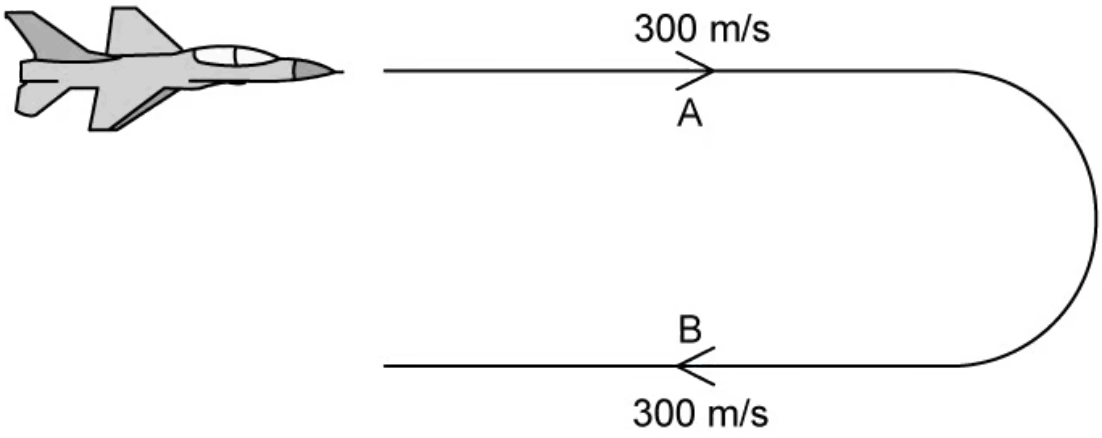

Fig. 1.1

Compare the speed and velocity between points A and B in Fig. 1.1.

[3 marks]

Question 3b

The speed-time graph of a different test flight is presented to an analyst.

State how she uses the graph to determine the distance travelled during the test flight.

[1 mark]

Question 3c

The speed-time graph for the initial part of the fighter jet's test flight is shown in Fig 1.2:

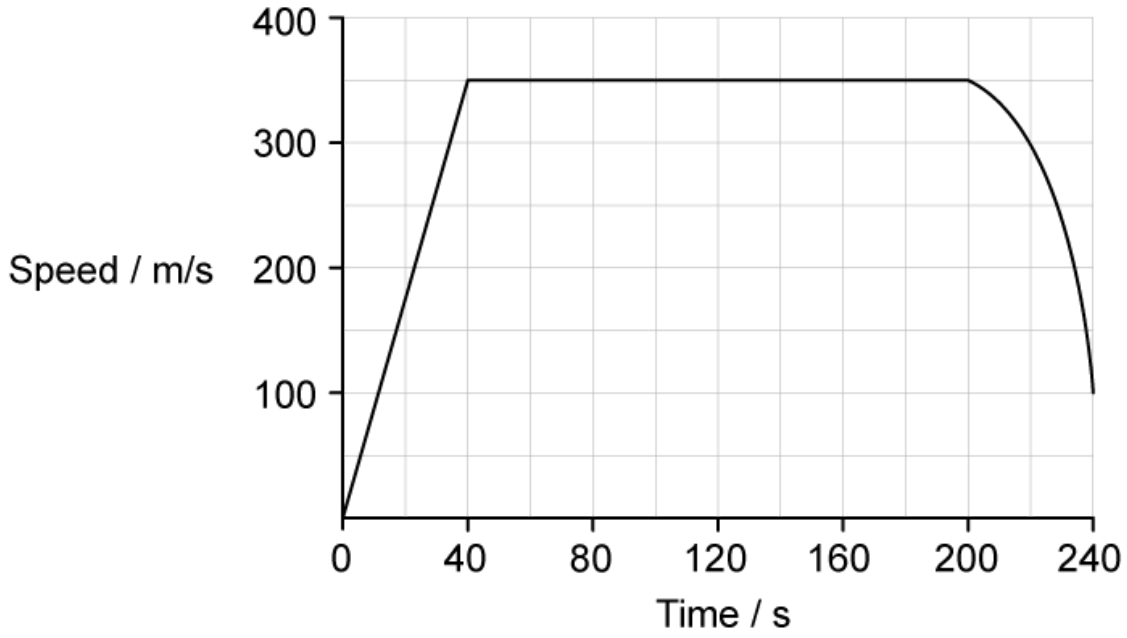

Fig. 1.2

(i) State the length of time for which the jet is travelling at constant speed.

[1]

(ii) Calculate the distance covered by the jet during this time.

[2]

[3 marks]

Question 3d

Extended tier only

For a brief time, the engine cuts out and the jet is in free fall.

Describe the shape and the gradient of the speed-time graph during this time.

[2 marks]

Question 4a

An elevator in the Empire State Building is travelling at constant speed downward as it passes three levels.

This takes 5.0 seconds and each level has a height of 4.0 m. Calculate the speed of the elevator. State the correct units in your answer.

[5 marks]

Question 4b

Extended tier only

From this constant speed, it takes the elevator 1.5 s to come to rest.

Calculate the deceleration of the elevator.

deceleration = ... m/s^2

[3 marks]

Question 4c

Extended tier only

Once everyone has left the elevator, the cable breaks. A device which measures speed over time was found in the elevator when a team investigated the incident.

The data from this are shown in Fig. 1.1.

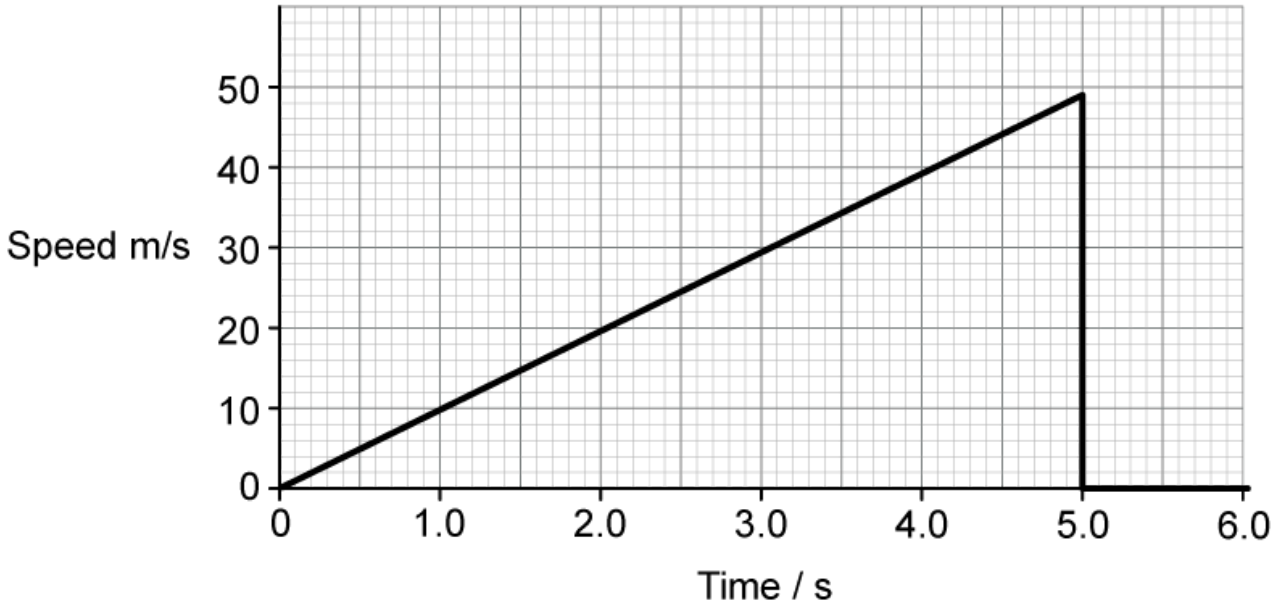

Fig 1.1

(i) Calculate the gradient of the speed-time graph.

[3]

(ii) When the elevator's cable completely snapped, the elevator is in freefall. Explain how the gradient shows this.

[1]

[4 marks]

Question 4d

Describe the motion of the elevator after 5.0 s and explain how the graph shows this.

[2 marks]

Question 5a

The UKTRA (UK tractor racing association) hold an annual race between tractors. The distance time graphs of two tractors are shown on Fig. 1.1.

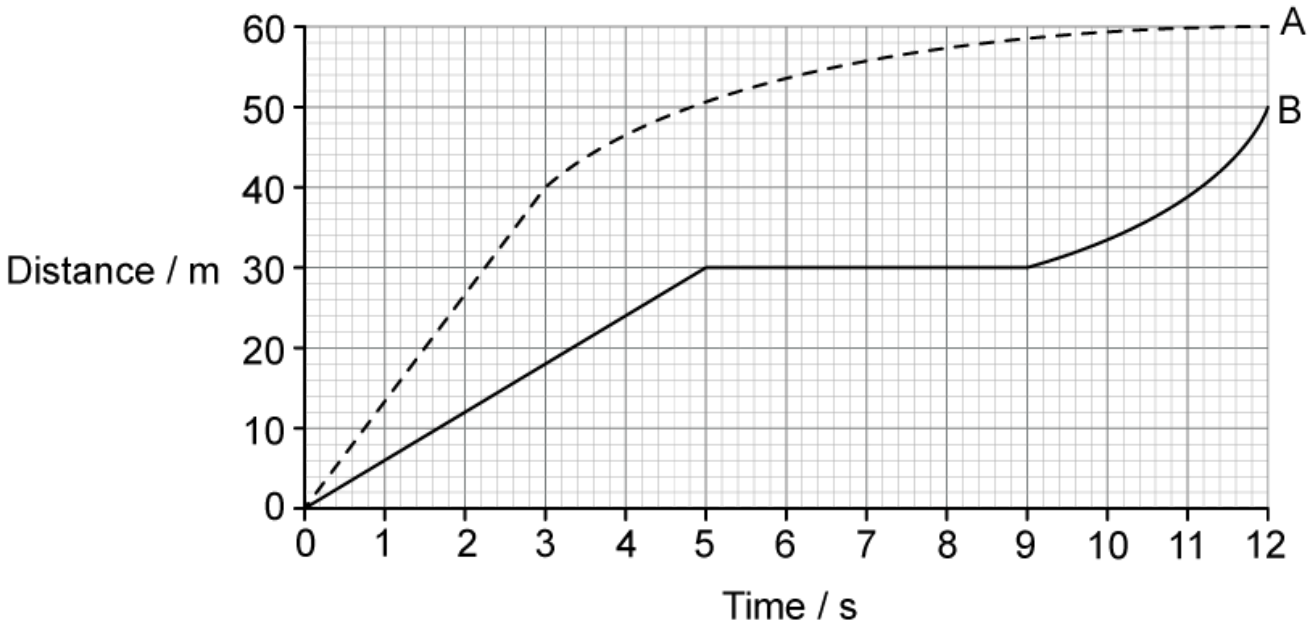

Fig 1.1

Describe the motion of tractor B from a time of 0 s to 12 s.

[4 marks]

Question 5b

State which tractor has the greatest initial speed and explain how the graph shows this.

[2 marks]

Question 5c

Calculate the initial speed of tractor B.

[3 marks]

Question 5d

This year, the UKTRA racecourse is particularly treacherous. After 12 s, tractor A drives off a steep cliff and is briefly in free fall before landing.

Describe the gradient of the distance-time graph of tractor A after 12 s and before landing.

[1 mark]