



7.3.3 Relative motion

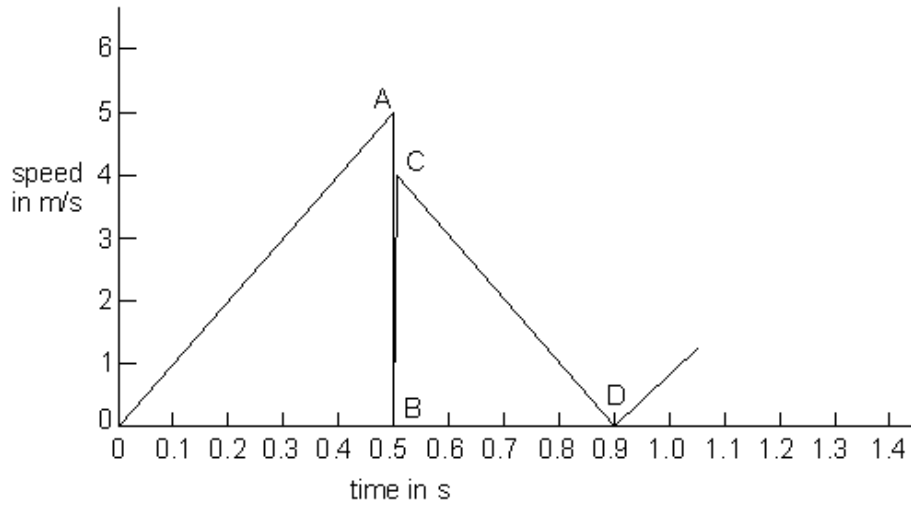


14 minutes



17 marks

Q1. The graph shows the speed of a ball as it falls from a height and bounces from the floor.



(a) The ball starts to fall and speeds up until it hits the floor.

(i) For how many seconds does the ball fall before it first hits the floor?

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1 mark

(ii) Calculate the average speed of the ball during its fall.

.....

1 mark

(iii) Calculate the height above the floor from which the ball was dropped.

.....

1 mark

(b) (i) What is happening to the ball in the time between points A and C on the graph?

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1 mark

(ii) In which direction is the ball moving between points C and D?

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1 mark

(c) Calculate how high the ball bounces back up from the floor.

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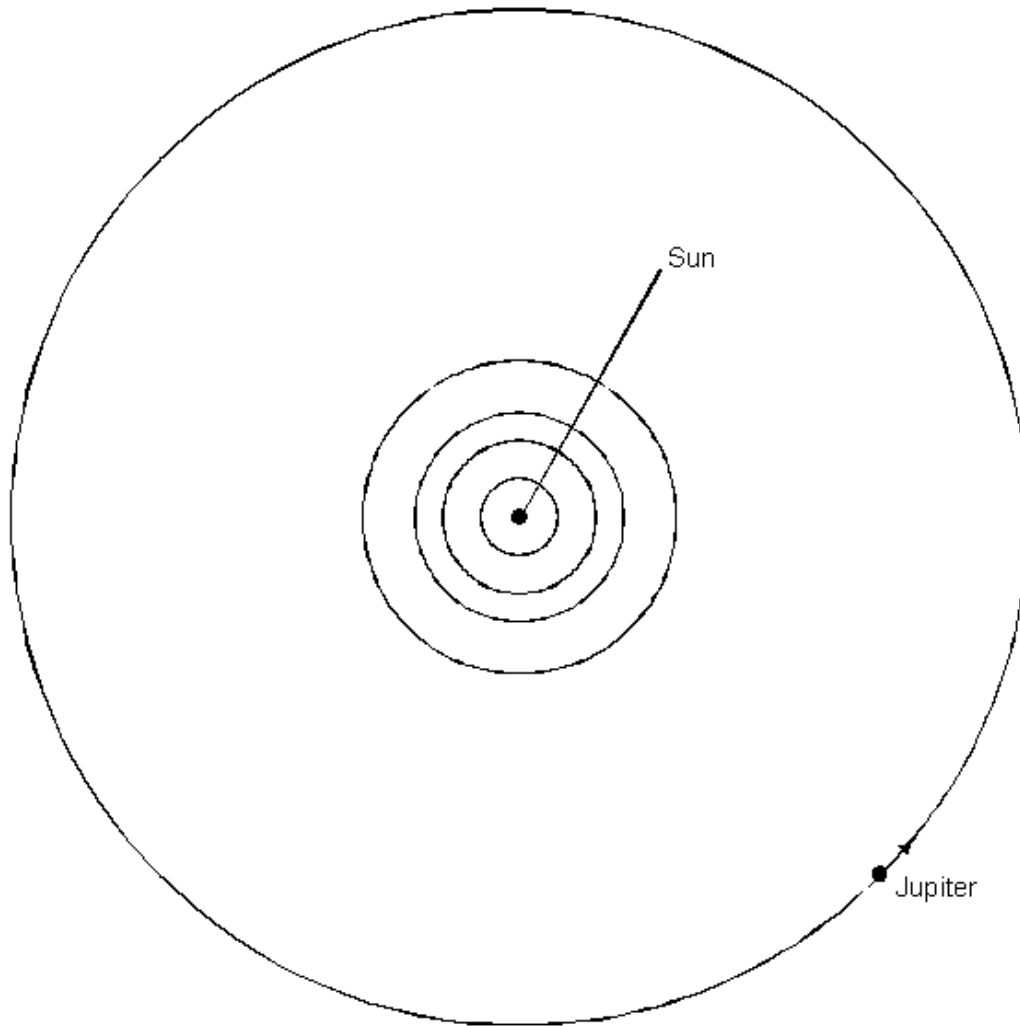
1 mark

- (d) How long after the ball was dropped would you expect it to hit the floor for the second bounce?

.....
.....

1 mark
Maximum 7 marks

- Q2.** The diagram shows the Sun and the orbits of the five inner planets. The distances (but **not** the sizes of the Sun and Jupiter) are to scale.



- (a) On the diagram, draw a dot to show the Earth's position when Earth and Jupiter are moving parallel to each other and in the same direction. Label the dot E.

1 mark

- (b) As Jupiter moves in its orbit, it appears to move across the pattern of stars in the background.
When Jupiter and the Earth are moving parallel to each other, Jupiter appears to move backwards across the pattern of stars. Explain why.

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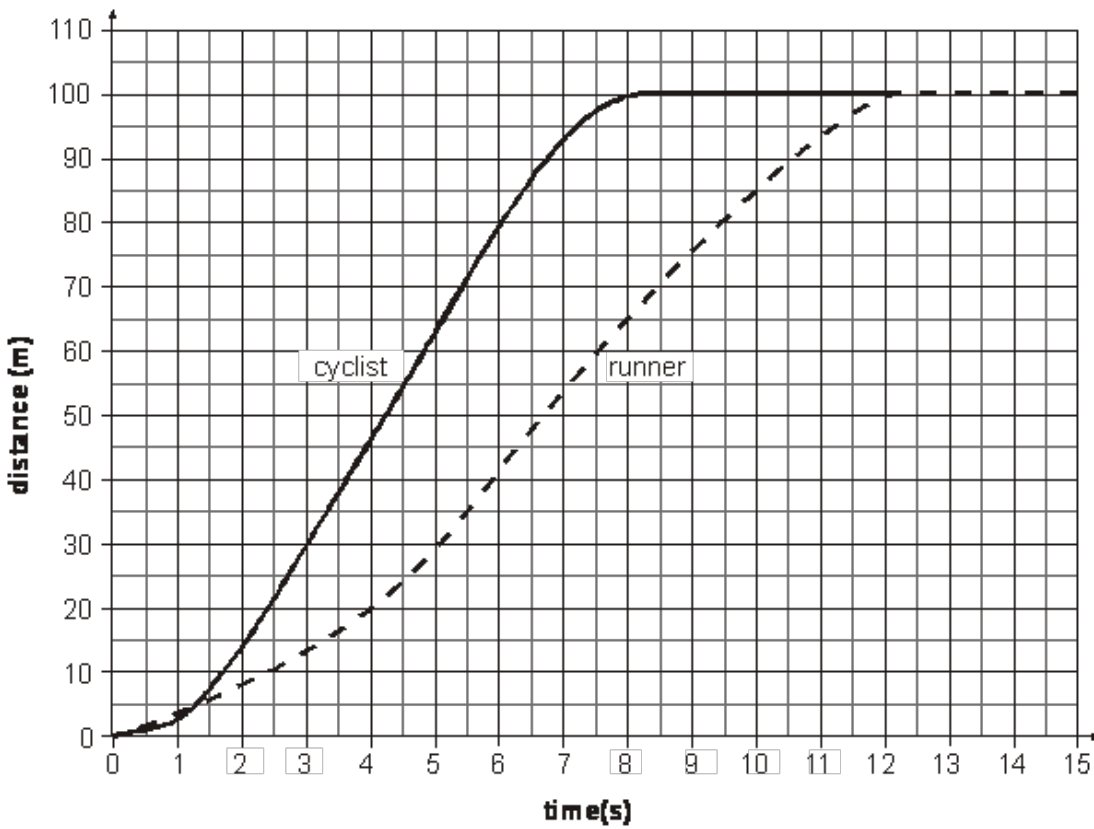
1 mark

- (c) The light from the Sun takes about 8.3 minutes to reach the Earth.
Using the diagram above, estimate how long it takes for light to travel from Jupiter to the Earth when they are the shortest possible distance apart. Show your working.

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2 marks
 Maximum 4 marks

- Q3.** A cyclist and a runner have a race.
The distance-time graph for the race is shown below.



Use the graph to answer the following questions.

- (a) (i) How much time did it take the cyclist to travel 100 m?

..... s

1 mark

- (ii) When the cyclist finished the race how far behind was the runner?

..... m

1 mark

- (iii) How much more time did the runner take compared with the cyclist to complete the race?

..... s

1 mark

- (b) The cyclist is travelling at a constant speed between 3 seconds and 6 seconds.

How does the graph show this?

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1 mark

- (c) (i) When the race started, a walker set off at a steady speed of 2m/s.

Draw a line on the graph on the opposite page to show the distance covered by the walker in the first 15 seconds. Use a ruler.

1 mark

- (ii) Calculate how much time it will take for the walker to walk 100m.

.....
..... s

1 mark

maximum 6 marks

