

3.1 Motion

Pages 62–79 (Pearson),
22–45 (Oxford)

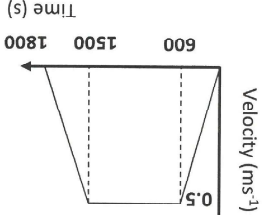


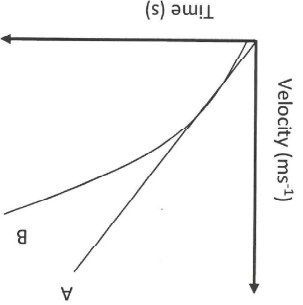
3.1.1 Kinematics		Question	Answer
		Define displacement.	
		Define instantaneous speed.	
		Define average speed.	
		Define velocity.	
		Define acceleration.	
		Define:	
	(a) Vector		
	(b) Scalar		
	(a)	Explain how you can calculate the velocity at any given time on a displacement–time graph.	
		Explain how you can work out the total displacement using a velocity–time graph.	
		Explain how you can work out the acceleration at any given point using a velocity–time graph.	

3.1.1 Kinematics		Question	Answer
		Sketch a displacement–time graph to show: (a) an object accelerating (b) an object decelerating	(a) (b)
		Sketch a velocity–time graph to show: (a) an object accelerating (b) an object decelerating constantly	(a) (b)

3.1.1 Kinematics	
Question A cyclist accelerates from rest for 2 minutes until she has travelled 500 m. She then travels another 500 m at a steady speed for 5 minutes before resting for 10 minutes. The cyclist then cycles home at a steady speed arriving there 15 minutes later. (a) Sketch a displacement–time graph of the cyclist's motion. (b) Calculate her average speed at each stage of her journey.	Answer

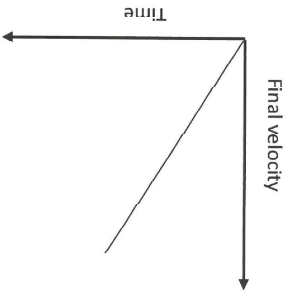
3.1.1 Kinematics	
Question below shows the motion of a runner. Describe his motion. Sketch a velocity–time graph to show: (a) an object with increasing acceleration (b) an object with decreasing acceleration	Answer

3.1.1 Kinematics	
Ross walks to work from his home. The velocity–time graph below shows his motion.  (a) Calculate the distance he walks on his way to work. (b) Calculate his acceleration in the first 600 seconds of his journey. (c) State his acceleration between 600 s and 1,500 s. (d) Describe his motion in the last 300 seconds. Include a calculation in your answer.	(a) (b) (c) (d)
Question	Answer

3.1.1 Kinematics	
A ball is thrown into the air. (a) Sketch a displacement–time graph of the ball's motion. (b) Sketch a velocity–time graph of the ball's motion. The velocity–time graph below shows the motion of two cars, A and B.  Describe and compare the motion of the two cars.	(a) (b)
Question	Answer

3.1.1 Kinematics		3.1.2 Linear Motion
Question	David was asked to explain how a distance–time graph could be used to find the instantaneous speed and the average speed. David was confused as he thought they were the same. Explain to David how you would use a distance–time graph to find these two different quantities.	Write down the four equations of motion for constant acceleration in a straight line.
	A data logger can be used to record the data required to plot a displacement–time or velocity–time graph. Explain the advantages of using a data logger.	
Answer		

3.1.2 Linear Motion	
Question	Use a velocity–time graph to derive the equation of motion: $s = ut + \frac{1}{2}at^2$
Answer	

3.1.2 Linear Motion	
If a graph was plotted of final velocity v against time t, explain how the initial velocity u and the acceleration could be found. 	Question
Answer	

3.1.2 Linear Motion	
Describe an experiment to derive the acceleration of free fall. Include in your answer the apparatus required to carry out this experiment. Suggest if this experiment can be improved in any way.	Explain why any experimental determination of the value of the acceleration of free fall would only be an estimate.
Question	
Answer	

3.1.2 Linear Motion	
Question	State a factor that affects both the thinking distance and the braking distance. In physics, the symbol $\propto$ is often used. What is meant by this symbol? If the velocity was tripled, explain how the braking distance would change. If the mass of a car was halved, explain what would happen to the car's braking distance. If a ball is thrown up into the air, state its: (a) acceleration on its way up (b) acceleration on its way down
Answer	(a) (b)

3.1.2 Linear Motion	
Question	Define thinking distance. Define braking distance. Define stopping distance. Describe the relationship between the reaction time and the thinking distance. State five factors that affect the thinking distance of a vehicle. State five factors that affect the braking distance of a vehicle.
Answer	

3.1.2 Linear Motion	
Question	A ball is thrown into the air at a speed of 5 ms^{-1}. Find how long it takes for the ball to return to its original position.
Answer	

3.1.2 Linear Motion	
Question	A car is travelling at a speed of 8 m/s when the driver sees a hazard. The driver puts on his brakes and comes to a stop in 20 s. Calculate the car's braking distance.
Answer	A lorry accelerates at 0.06 ms^{-2} from rest for 1 minute. Calculate the distance travelled by the lorry in this time.