Kinematic Graphs

Question Paper 1

Level	A Level
Subject	Maths
Exam Board	AQA
Module	Mechanics 1
Topic	Motion
Sub Topic	Kinematics Graphs
Booklet	Question Paper - 1

Time Allowed: **54 minutes**

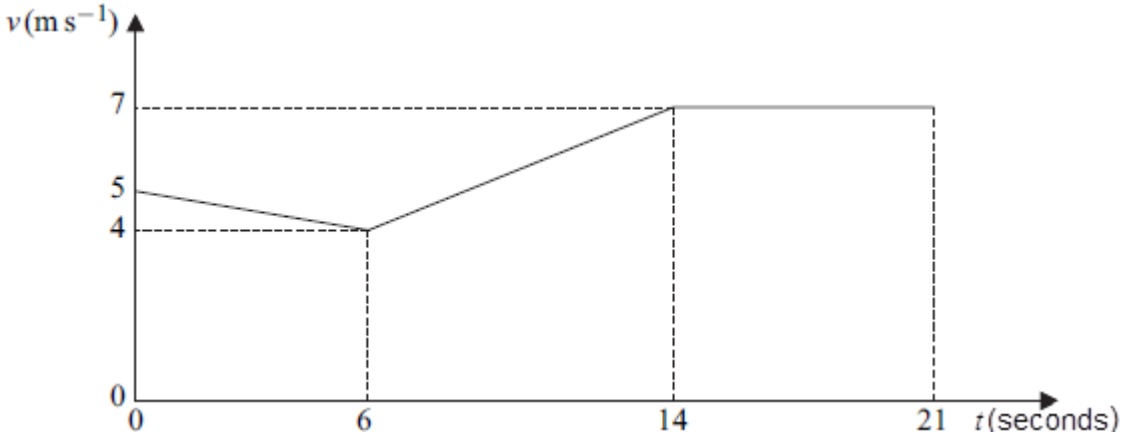
Score: **/45**

Percentage: **/100**

Grade Boundaries:

A*	A	B	C	D	E	U
>85%	'77.5%	70%	62.5%	57.5%	45%	<45%

Q1. The graph shows how the speed of a cyclist, Hannah, varies as she travels for 21 seconds along a straight horizontal road.



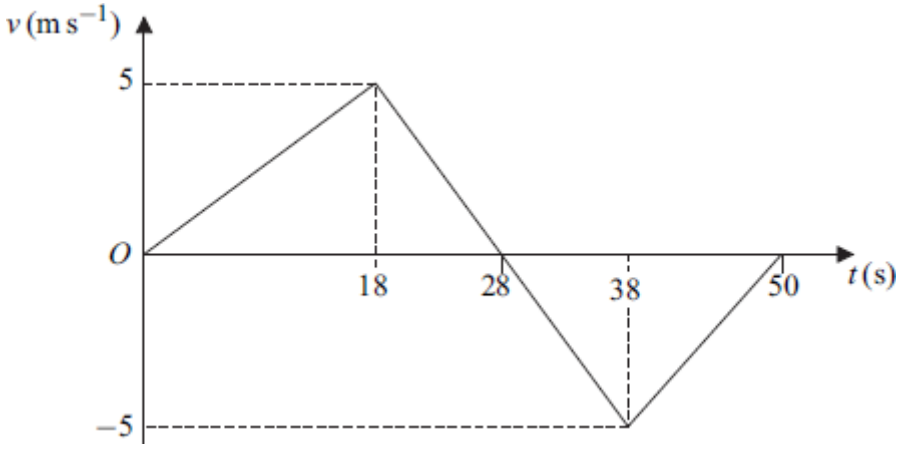
(a) Find the distance travelled by Hannah in the 21 seconds.

(4)

(b) Find Hannah's average speed during the 21 seconds.

(2)
(Total 6 marks)

Q2. The diagram shows a velocity−time graph for a train as it moves on a straight horizontal track for 50 seconds.



(a) Find the distance that the train moves in the first 28 seconds.

(2)

(b) Calculate the total distance moved by the train during the 50 seconds.

(3)

(c) Hence calculate the average speed of the train.

(2)

(d) Find the displacement of the train from its initial position when it has been moving for 50 seconds.

(1)

(e) Hence calculate the average velocity of the train.

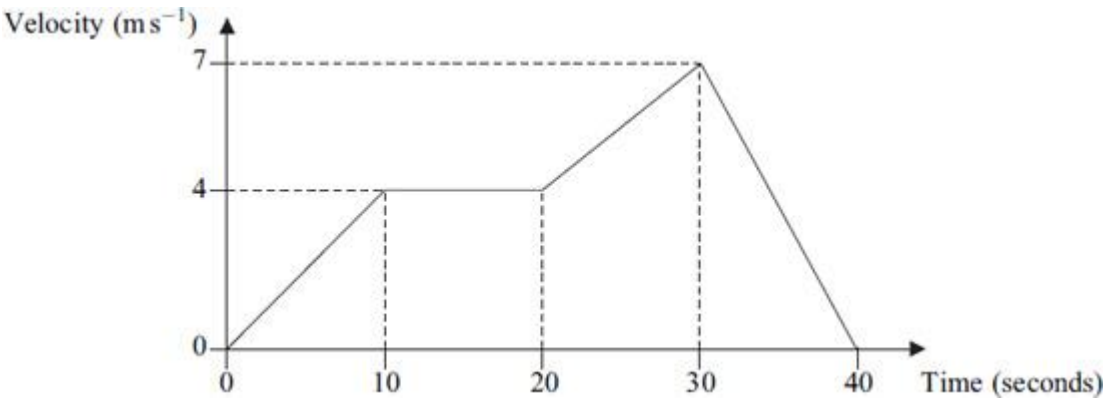
(2)

(f) Find the acceleration of the train in the first 18 seconds of its motion.

(1)

(Total 11 marks)

Q3. The graph shows how the velocity of a train varies as it moves along a straight railway line.



(a) Find the total distance travelled by the train.

(4)

(b) Find the average speed of the train.

(2)

(c) Find the acceleration of the train during the first 10 seconds of its motion.

(2)

(d) The mass of the train is 200 tonnes. Find the magnitude of the resultant force acting on the train during the first 10 seconds of its motion.

(2)

(Total 10 marks)

Q4. A pair of cameras records the time that it takes a car on a motorway to travel a distance of 2000 metres. A car passes the first camera whilst travelling at 32 m s^{-1}. The car continues at this speed for 12.5 seconds and then decelerates uniformly until it passes the second camera when its speed has decreased to 18 m s^{-1}.

(a) Calculate the distance travelled by the car in the first 12.5 seconds.

(1)

(b) Find the time for which the car is decelerating.

(3)

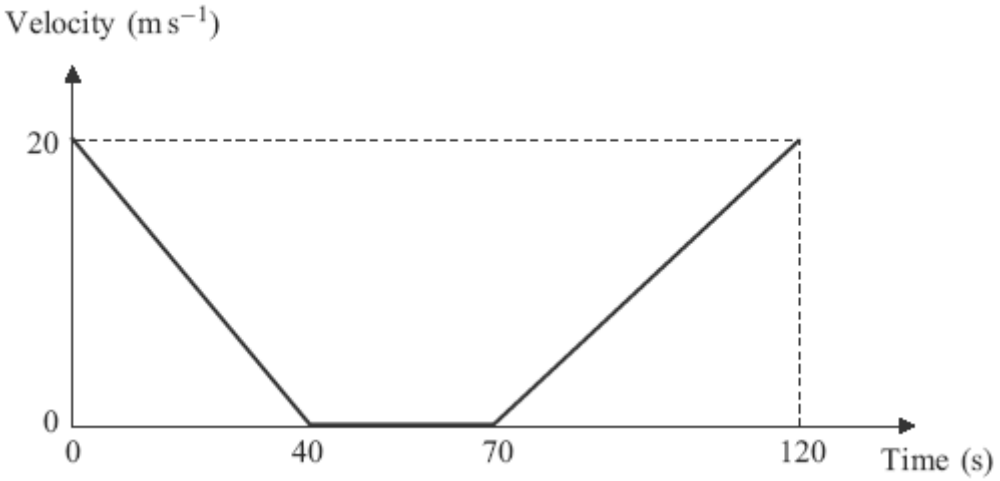
(c) Sketch a speed–time graph for the car on this 2000-metre stretch of motorway.

(3)

(d) Find the average speed of the car on this 2000-metre stretch of motorway.

(2)
(Total 9 marks)

Q5. A bus slows down as it approaches a bus stop. It stops at the bus stop and remains at rest for a short time as the passengers get on. It then accelerates away from the bus stop. The graph shows how the velocity of the bus varies.



Assume that the bus travels in a straight line during the motion described by the graph.

(a) State the length of time for which the bus is at rest.

(1)

(b) Find the distance travelled by the bus in the first 40 seconds.

(2)

(c) Find the total distance travelled by the bus in the 120-second period.

(2)

(d) Find the average speed of the bus in the 120-second period.

(2)

(e) If the bus had not stopped but had travelled at a constant 20 m s^{-1} for the 120-second period, how much further would it have travelled?

(2)
(Total 9 marks)