# Test - Rates of change and areas under graphs

Year: Year 11 · Duration: 45 minutes · /20

| Name: | Date: | **Mark: /20** |
|---|---|---|

| Question | 1 | 2 | 3 | 4 | 5 | Total |
|---|---|---|---|---|---|---|
| marks | 4 | 4 | 4 | 4 | 4 | **20** |
| Mark | | | | | | |

Show your working.

## Question 1 (4 marks)

**Question 1 – Distance-time graph**

A graph has corner points $(0, 0)$, $(1.5, 45)$, $(2, 45)$, $(3.5, 90)$ with time in hours and distance in km.

a. Find the speed in the first section. (1 mark)
b. What happens between 1.5 and 2 hours? (1 mark)
c. Find the average speed for the whole journey. (2 marks)

## Question 2 (4 marks)

**Question 2 – Units**

Convert and calculate.

a. 90 km/h into m/s. (2 marks)
b. 12 m/s into km/h. (2 marks)

## Question 3 (4 marks)

**Question 3 – Area under a graph**

A velocity-time graph has corner points $(0, 0)$, $(6, 18)$, $(14, 18)$, $(20, 0)$ with time in seconds and velocity in m/s.

a. Find the acceleration in the first 6 seconds. (1 mark)
b. Find the total distance travelled. (3 marks)

## Question 4 (4 marks)

**Question 4 – Rate**

A graph shows that 150 litres flow into a tank in 5 minutes at a steady rate.

a. Find the rate in litres per minute. (1 mark)
b. How long does a 600-litre tank take to fill? (1 mark)
c. What does a steeper line mean? (2 marks)

## Question 5 (4 marks)

**Question 5 – Trapezium estimate (Higher)**

A particle has speed 0, 8, 11, 12 m/s at times 0, 3, 6, 9 seconds.

a. Use trapezia to estimate the distance travelled. (3 marks)
b. State whether it is an under- or overestimate and why. (1 mark)