HIGHER ONLY
HIGHER TIER

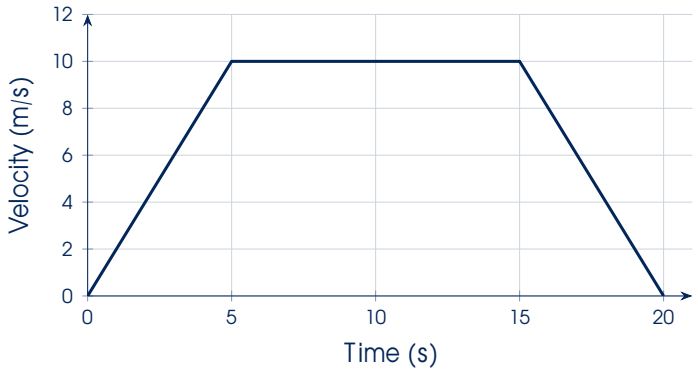
Name ..... Class .....

A15: Gradients and areas

Interpret gradients and areas under graphs

20 marks · 25 minutes · Non-calculator

1) The velocity–time graph shows a journey.



(a) Show that the acceleration in the first 5 seconds is 2 m/s^2.

(2)

(b) Show that the total distance travelled is 150 m.

(3)

(c) Explain what the area under a velocity–time graph represents.

.....

(1)

[Question 1: 6 marks]

2) Explain why you need to draw a tangent to find the gradient at a point on a curve.

.....

.....

[Question 2: 2 marks]

---

3) Trapeziums are used to estimate the area under a curve that bends upwards. Explain why the estimate is too big.

.....

.....

[Question 3: 2 marks]

---

4) The distance travelled is $d = t^2$. Show that the average speed between $t = 1$ and $t = 3$ is 4

[Question 4: 2 marks]

---

5) Explain what a negative gradient on a velocity–time graph means.

.....

[Question 5: 1 marks]

---

6) Kim says the area under a distance–time graph gives the speed. Explain her mistake.

.....

.....

[Question 6: 2 marks]

7) Show that the gradient of the chord from $(2, 4)$ to $(4, 16)$ on $y = x^2$ is 6

[Question 7: 2 marks]

8) Explain why two students might get slightly different estimates of the gradient at a point on a curve.

.....

[Question 8: 1 marks]

9) A graph shows money in a savings account over time. Explain what the gradient represents.

.....

.....

[Question 9: 2 marks]

End of paper – 20 marks in total

Answers and brief mark scheme

Q	Answer	Method / notes
1	(a) Shown (b) Shown (c) Distance	(a) $\frac{10}{5}$ (M1); C1. (b) 25 + 100 + 25 (M2); C1. (c) C1.
2	Explanation	A curve's steepness changes (C1); the tangent shows the steepness at that point (C1).
3	Explanation	Straight tops of trapeziums lie above the curve (C2).
4	Shown	$\frac{9-1}{2}$ (M1); C1.
5	Deceleration	C1.
6	Explanation	Speed is the gradient of a distance–time graph (C2).
7	Shown	$\frac{16-4}{4-2}$ (M1); C1.
8	Explanation	Tangents are drawn by eye (C1).
9	Rate of saving	Money added per unit of time (C2).