FOUNDATION & HIGHER

SAME AT BOTH TIERS

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

R14: Rates of change

Solve problems involving gradients as rates of change

20 marks · 25 minutes · Non-calculator

1) A tank contains 50 litres. Water flows in steadily, and after 4 minutes it contains 210 litres. It holds 450 litres when full. When will it be full?

..... minutes

[Question 1: 3 marks]

2) Plan A costs £10 plus 50p per GB. Plan B costs £2 per GB. Which plan is cheaper for 5 GB? For how many GB do they cost the same?

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[Question 2: 3 marks]

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3) At 6 pm the temperature is 15 °C. It falls steadily by 3 °C per hour. At what time does it reach −3 °C?

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[Question 3: 2 marks]

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4) A distance–time graph for a car is a straight line through $(0, 0)$ and $(2.5, 200)$, with time in hours and distance in km. Find the speed and the time taken to travel 320 km.

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[Question 4: 3 marks]

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5) A car's value falls in a straight line from £16 000 to £4000 over 6 years. After how many years is it worth £10 000?

..... years

[Question 5: 3 marks]

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6) A pond's water level is 80 cm and falls by 2.5 cm each day. At the end of day 5, rain adds 10 cm. Find the level at the end of day 10.

..... cm

[Question 6: 3 marks]

7) A graph of inverse proportion passes through (4, 15). Find y when $x = 6$

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[Question 7: 3 marks]

End of paper – 20 marks in total

Answers and brief mark scheme

Q	Answer	Method / notes
1	10	Rate 40 litres per minute (P1); 400 ÷ 40 (P1); A1.
2	B; $6\frac{2}{3}$ GB	A £12.50, B £10 (P1); B (A1); $10 + 0.5g = 2g$ (A1).
3	Midnight	18 ÷ 3 = 6 hours (P1); A1.
4	80 km/h; 4 hours	200 ÷ 2.5 (P1); 80 (A1); 4 hours (A1).
5	3	£2000 per year (P1); 6000 ÷ 2000 (P1); A1.
6	65	Falls 25 cm over 10 days (P1); +10 (P1); A1.
7	10	$xy = 60$ (P1, P1); A1.