FOUNDATION & HIGHER

SAME AT BOTH TIERS

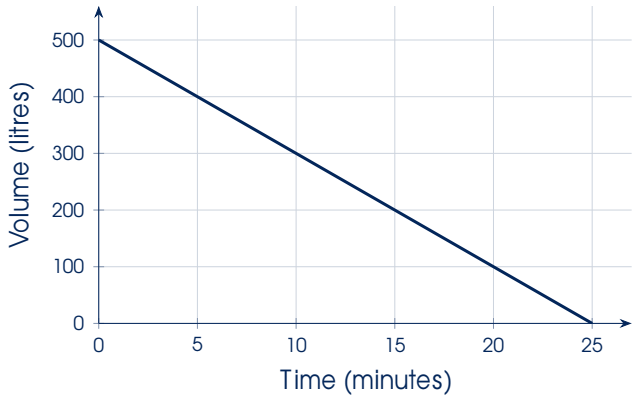
Name ..... Class .....

R14: Rates of change and proportion graphs

Gradient as a rate of change; graphs of direct and inverse proportion

20 marks · 25 minutes · Non-calculator

1) Water drains from a tank at a steady rate. The graph shows the volume left in the tank.



(a) Find the gradient of the line.

.....

(2)

(b) What does the gradient tell you?

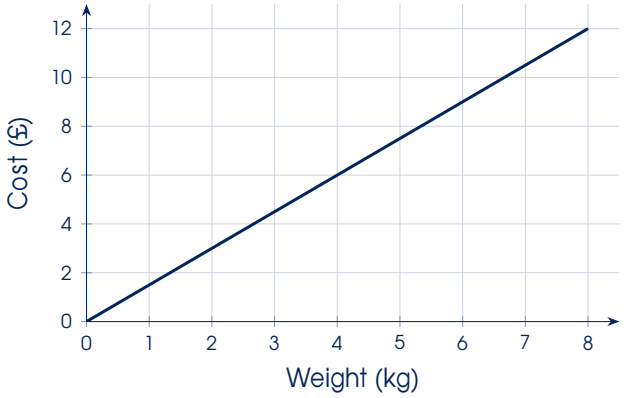
(1)

(c) What does the intercept on the volume axis tell you?

(1)

[Question 1: 4 marks]

2) The graph shows the cost of buying apples by weight.



(a) Find the cost per kilogram.

£ .....

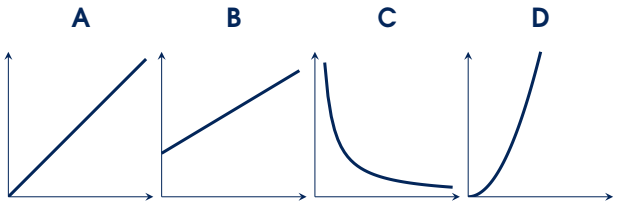
(2)

(b) Does the graph show that cost is directly proportional to weight? Give a reason.

(1)

[Question 2: 3 marks]

3) Here are four sketch graphs.



(a) Which graph shows y directly proportional to x?

.....

(1)

(b) Which graph shows y inversely proportional to x?

.....

(1)

[Question 3: 2 marks]

4) The height of a plant, h cm, after t weeks is given by $h = 2t + 5$

(a) How fast is the plant growing?

..... cm per week

(1)

(b) What was its height at the start?

..... cm

(1)

[Question 4: 2 marks]

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5) A distance–time graph for a train is a straight line from (0, 0) to (4, 300), where time is in hours and distance is in km. Find the speed of the train.

..... km/h

[Question 5: 2 marks]

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6) The temperature in an oven rises steadily from 18 °C to 30 °C in 6 minutes. Find the rate of increase.

..... °C per minute

[Question 6: 2 marks]

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7) For the line $y = 3 - 0.5x$, describe how y changes as x increases by 1

[Question 7: 1 marks]

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8) y is directly proportional to x and its graph passes through $(5, 35)$. Find y when $x = 2$

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[Question 8: 2 marks]

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9) A phone battery drops steadily from 80% to 20% in 4 hours.

(a) Find the rate at which the charge drops.

..... % per hour

(1)

(b) At the same rate, how long will the remaining 20% last? Give your answer in hours and minutes.

.....

(1)

[Question 9: 2 marks]

End of paper – 20 marks in total

Answers and brief mark scheme

Q	Answer	Method / notes
1	(a) −20 (b) 20 litres leave each minute (c) 500 litres at the start	(a) $-\frac{500}{25}$ (M1); A1. (b) B1. (c) B1.
2	(a) £1.50 (b) Yes	(a) 12 ÷ 8 (M1); A1. (b) Straight line through the origin (B1).
3	(a) A (b) C	B1 each.
4	(a) 2 (b) 5	B1 each.
5	75	300 ÷ 4 (M1); A1.
6	2	12 ÷ 6 (M1); A1.
7	y falls by 0.5	B1.
8	14	$y = 7x$ (M1); A1.
9	(a) 15 (b) 1 h 20 min	B1 each.