Year 9 Linear and Quadratic Graphs – Challenge

ANSWER KEY HappyKids.fit

Answers and worked solutions · 8 questions

A. Think like a mathematician

1. P $3 per GB, Q $8 per GB; 2 GB

Cost per GB = gradient: P 3, Q 8
P has a fixed charge of $10
The lines cross at 2 GB

2. Bea, by 2 km/h; after 4 hours

Speed = gradient: Ali 6 km/h, Bea 8 km/h
Bea is faster by 2 km/h
The lines cross at 4 hours

3. Mistake: the second line must be divided by 2 first. Correct: they are parallel

Error: the second line must be divided by 2 first
$y = 2x - 1$
Both have gradient 2, so they are parallel

4. Mistake: $(-3)^2$ is 9, not −9. Correct: y = 6

Error: $(-3)^2$ is 9, not −9
$9 - 3 = 6$
$y = 6$

5. Yes. x^2 is smallest when x = 0, so the lowest point is (0, a).

Substitute points or rearrange
x^2 is smallest when $x = 0$, so the lowest point is (0, a).
Decide

6. through (0, 4): $y = x^2 + 4$, $y = 2x + 4$, $y = 4$; curves: $y = x^2 + 4$

An equation with x^2 gives a curve; one with only x and y gives a straight line
Rearrange to $y = mx + c$ to compare gradients and intercepts
through (0, 4): $y = x^2 + 4$, $y = 2x + 4$, $y = 4$; curves: $y = x^2 + 4$

7. 40 km/h; 30 minutes

Speed = distance ÷ time = gradient. Out: 60 km in 1.5 h = 40 km/h; back: 60 km in 2 h = 30 km/h
The flat part shows the stop: 0.5 h = 30 minutes

8. 3150 pages

Rate: $420 \div 8 = 52.5$ pages per minute
In 60 minutes: $52.5 \times 60 = 3150$ pages