



ACHIEVE ACADEMY

GCSE Maths — Higher Tier

Direct & Inverse Proportion · Practice Booklet

NAME: _____

CLASS: _____

DATE: _____

☐ Developing

☒ Secure

☐ Greater Depth

Answer every question in the working space provided. Method marks are available for correct working even if the final answer is wrong. Check the time allowed with your tutor before you start.

Direct & Inverse Proportion

Total marks available: 115

● Direct & Inverse Proportion

✓ $y = 27/x$; $y = 9$ when $x = 3$

Q1 · ● Developing · 4 marks

METHOD

$$k = xy = 9 \times 3 = 27$$

$$y = 27/x$$

$$y = 27 \div 3 = 9$$

✓ $y = (3/2)x$; $y = 21$ when $x = 14$

Q2 · ● Developing · 4 marks

METHOD

$$k = y/x = 15/10 = 3/2$$

$$y = (3/2)x$$

$$y = (3/2) \times 14 = 21$$

✓ $y = (6/5)x$; $y = 18$ when $x = 15$

Q3 · ● Developing · 4 marks

METHOD

$$k = y/x = 24/20 = 6/5$$

$$y = (6/5)x$$

$$y = (6/5) \times 15 = 18$$

✓ $y = (3/2)x$; $y = 21$ when $x = 14$

Q4 · ● Developing · 4 marks

METHOD

$$k = y/x = 12/8 = 3/2$$

$$y = (3/2)x$$

$$y = (3/2) \times 14 = 21$$

✓ $y = 32/x$; $y = 4$ when $x = 8$

Q5 · ● Developing · 4 marks

METHOD

$$k = xy = 4 \times 8 = 32$$

$$y = 32/x$$

$$y = 32 \div 8 = 4$$

✓ $y = 18/x$; $y = 1$ when $x = 18$

Q6 · ● Developing · 4 marks

METHOD

$$k = xy = 9 \times 2 = 18$$

$$y = 18/x$$

$$y = 18 \div 18 = 1$$

✓ $y = 42/x$; $y = 7$ when $x = 6$

Q7 · ● Developing · 4 marks

METHOD

$$k = xy = 7 \times 6 = 42$$

$$y = 42/x$$

$$y = 42 \div 6 = 7$$

✓ $y = 8/x$; $y = 1$ when $x = 8$

Q8 · ● Developing · 4 marks

METHOD

$$k = xy = 2 \times 4 = 8$$

$$y = 8/x$$

$$y = 8 \div 8 = 1$$

✓ $y = 12/x$; $y = 1$ when $x = 12$

Q9 · ● Developing · 4 marks

METHOD

$$k = xy = 2 \times 6 = 12$$

$$y = 12/x$$

$$y = 12 \div 12 = 1$$

✓ $y = (3/4)x$; $y = 15$ when $x = 20$

Q10 · ● Developing · 4 marks

METHOD

$$k = y/x = 9/12 = 3/4$$

$$y = (3/4)x$$

$$y = (3/4) \times 20 = 15$$

✓27

Q11 · ● Secure · 4 marks

METHOD

$$k = yx^2 = 3 \times 3^2 = 3 \times 9 = 27$$

$$y = 27 \div 1^2 = 27 \div 1 = 27$$

✓A: 2 · B: 3 · C: 4 · D: 1

Q12 · ● Secure · 3 marks

METHOD

A: curve through the origin, getting steeper

B: straight line through the origin

C: curve that falls as x increases (never meets the axes)

D: flattest near the origin, then the steepest of the curves

✓£13.52

Q13 · ● Secure · 4 marks

METHOD

$$C = kd^2$$

$$£2.88 = k \times 6^2 = 36k \rightarrow k = £0.08$$

$$C = 0.08 \times 13^2 = 0.08 \times 169 = £13.52$$

✓A: 3 · B: 1 · C: 2 · D: 4

Q14 · ● Secure · 3 marks

METHOD

A: curve through the origin, getting steeper

B: straight line through the origin

C: flattest near the origin, then the steepest of the curves

D: curve that falls as x increases (never meets the axes)

✓A: 3 · B: 4 · C: 2 · D: 1

Q15 · ● Secure · 3 marks

METHOD

A: curve through the origin, getting steeper

B: flattest near the origin, then the steepest of the curves

C: straight line through the origin

D: curve that falls as x increases (never meets the axes)

✓ A: 3 · B: 1 · C: 4 · D: 2

Q16 · ● Secure · 3 marks

METHOD

A: curve through the origin, getting steeper

B: curve that falls as x increases (never meets the axes)

C: flattest near the origin, then the steepest of the curves

D: straight line through the origin

✓ £6.40

Q17 · ● Secure · 4 marks

METHOD

$$C = kd^2$$

$$£14.40 = k \times 12^2 = 144k \rightarrow k = £0.10$$

$$C = 0.10 \times 8^2 = 0.10 \times 64 = £6.40$$

✓ 28

Q18 · ● Secure · 4 marks

METHOD

$$k = yx^2 = 7 \times 2^2 = 7 \times 4 = 28$$

$$y = 28 \div 1^2 = 28 \div 1 = 28$$

✓ £1.08

Q19 · ● Secure · 4 marks

METHOD

$$C = kd^2$$

$$£0.48 = k \times 4^2 = 16k \rightarrow k = £0.03$$

$$C = 0.03 \times 6^2 = 0.03 \times 36 = £1.08$$

✓ A: 4 · B: 1 · C: 3 · D: 2

Q20 · ● Secure · 3 marks

METHOD

A: straight line through the origin

B: curve through the origin, getting steeper

C: flattest near the origin, then the steepest of the curves

D: curve that falls as x increases (never meets the axes)

✓ y increases by 125%

Q21 · ● Greater Depth · 4 marks

METHOD

$$\text{New } x = (1 + 50/100)x = 3/2 x$$

$$\text{New } y = (3/2)^2 \times \text{old } y = 9/4 \times \text{old } y$$

$$\text{Percentage change} = (9/4 - 1) \times 100\% = 125\%$$

✓ y increases by 700%

Q22 · ● Greater Depth · 4 marks

METHOD

$$\text{New } x = (1 + 100/100)x = 2x$$

$$\text{New } y = (2)^3 \times \text{old } y = 8 \times \text{old } y$$

$$\text{Percentage change} = (8 - 1) \times 100\% = 700\%$$

✓ 2 units

Q23 · ● Greater Depth · 4 marks

METHOD

$$k = 1d^2 = 18 \times 2^2 = 18 \times 4 = 72$$

$$1 = 72 \div 6^2 = 72 \div 36 = 2$$

✓ 27 units

Q24 · ● Greater Depth · 4 marks

METHOD

$$k = 1d^2 = 3 \times 6^2 = 3 \times 36 = 108$$

$$1 = 108 \div 2^2 = 108 \div 4 = 27$$

✓ y decreases by 75%

Q25 · ● Greater Depth · 4 marks

METHOD

$$\text{New } x = (1 - 50/100)x = 1/2 x$$

$$\text{New } y = (1/2)^2 \times \text{old } y = 1/4 \times \text{old } y$$

$$\text{Percentage change} = (1/4 - 1) \times 100\% = -75\%$$

✓50 units

Q26 · ● Greater Depth · 4 marks

METHOD

$$k = 1d^2 = 8 \times 5^2 = 8 \times 25 = 200$$

$$1 = 200 \div 2^2 = 200 \div 4 = 50$$

✓45 units

Q27 · ● Greater Depth · 4 marks

METHOD

$$k = 1d^2 = 5 \times 6^2 = 5 \times 36 = 180$$

$$1 = 180 \div 2^2 = 180 \div 4 = 45$$

✓27 units

Q28 · ● Greater Depth · 4 marks

METHOD

$$k = 1d^2 = 12 \times 3^2 = 12 \times 9 = 108$$

$$1 = 108 \div 2^2 = 108 \div 4 = 27$$

✓5 units

Q29 · ● Greater Depth · 4 marks

METHOD

$$k = 1d^2 = 20 \times 2^2 = 20 \times 4 = 80$$

$$1 = 80 \div 4^2 = 80 \div 16 = 5$$

✓y increases by 21%

Q30 · ● Greater Depth · 4 marks

METHOD

$$\text{New } x = (1 + 10/100)x = 11/10 x$$

$$\text{New } y = (11/10)^2 \times \text{old } y = 121/100 \times \text{old } y$$

$$\text{Percentage change} = (121/100 - 1) \times 100\% = 21\%$$