y = mx AND DIRECT PROPORTION

BUILDING BLOCKS

NAME _____ CLASS _____ DATE _____

KEY IDEA

1 pen costs £2. To find the cost of more pens, multiply by 2 every time.

0 pens cost £0. Double the pens, double the cost.

Pens	1	2	3	4
Cost £	2	4	6	8

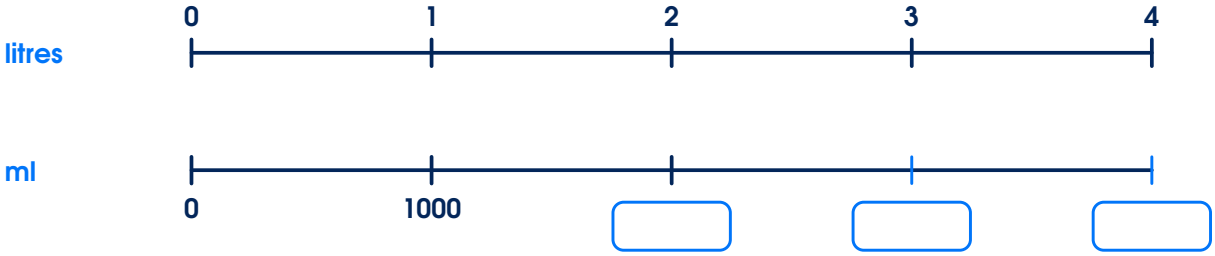
× 2

1 One cinema ticket costs £3. Complete the table.

Tickets	1	2	3	4	5
Cost (£)	3				

Multiply the number of tickets by 3.

2 1 litre = 1000 ml. Fill in the boxes.



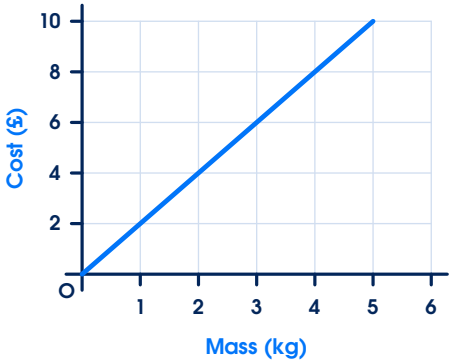
3 This graph shows the cost of apples.

a) How much do 3 kg of apples cost? £ ____

b) How many kg can you buy for £8? ____

c) How much do 0 kg cost? £ ____

Go up from the x-axis to the line, then across.



4 Tick the tables where you multiply x by the same number every time to get y.

A

x	1	2	3
y	4	8	12

☐

B

x	1	2	3
y	3	5	7

☐

C

x	2	4	6
y	10	20	30

☐

y = mx AND DIRECT PROPORTION

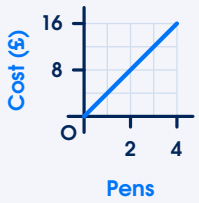
SUPPORT

NAME _____ CLASS _____ DATE _____

KEY IDEA

y is directly proportional to x when y = mx.
The graph is a straight line through (0, 0).

Pens cost £4 each: cost = 4 × number, so y = 4x.

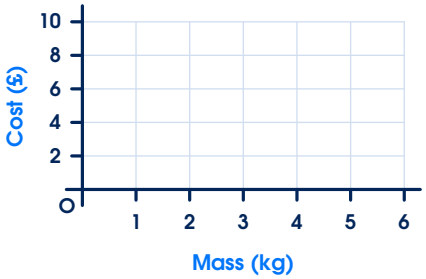


1 a) Apples cost £2 per kg. Complete the table.

kg	0	1	2	3	4
Cost £					

b) The equation is y = ____ **x**

c) Plot the points and draw the line on the grid.

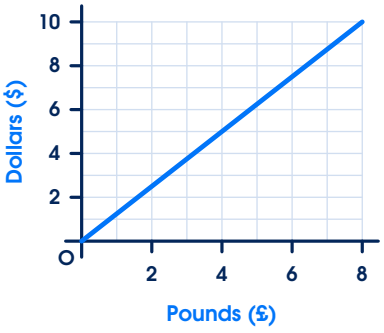


2 This graph changes pounds (£) into US dollars ($).

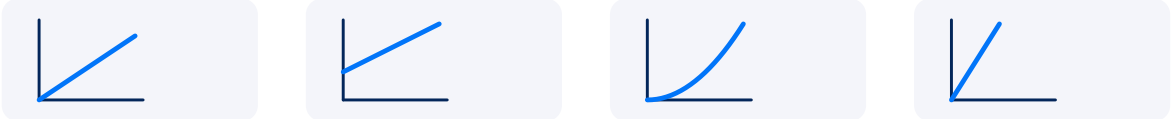
a) Change £4 into dollars. $ ____

b) Change $10 into pounds. £ ____

c) Change £2 into dollars. $ ____



3 Tick the graphs that show direct proportion.



☐ ☐ ☐ ☐

4 Each table shows direct proportion. Write the equation in the form y = mx.

x	1	2	3
y	7	14	21

y = ____

x	2	4	6
y	3	6	9

y = ____

y = mx AND DIRECT PROPORTION

CORE

NAME _____ CLASS _____ DATE _____

KEY IDEA

y is directly proportional to x if y = mx. Its graph is a straight line through the origin.

FLUENCY

1 This conversion graph changes pounds (£) into US dollars ($).



a) Change £6 into dollars. $ ____

b) Change $7.50 into pounds. £ ____

c) Write the equation: y = ____

d) Use it to change £30 into dollars. $ ____

2 a) A train travels at a steady speed. Complete the table.

Time (h)	1	2	3	5	0.5
Distance (km)	60				

b) Write an equation for distance y after x hours: y = ____

REASONING

3 A taxi charges £4 plus £2 for every mile. The graph shows the cost.



Is the cost directly proportional to the number of miles? Explain how you know.

.....

.....

4 y is directly proportional to x. When x = 4, y = 12

a) Find the equation. y = ____

b) Find y when x = 10. ____

c) Find x when y = 51. ____

y = mx AND DIRECT PROPORTION

GREATER DEPTH

NAME _____ CLASS _____ DATE _____

REASONING

1 Is each statement always, sometimes or never true? Circle your answer.

If it is sometimes true, give an example of when it is true and when it is not.

a) A direct proportion graph passes through (0, 0). ALWAYS SOMETIMES NEVER

b) A straight-line graph shows direct proportion. ALWAYS SOMETIMES NEVER

c) In a direct proportion, if x doubles then y doubles. ALWAYS SOMETIMES NEVER

d) The equation y = x + 5 shows direct proportion. ALWAYS SOMETIMES NEVER

PROBLEM SOLVING

2 5 miles is the same distance as 8 km.

a) How many km is 35 miles? ☐ **b)** How many miles is 100 km? ☐

c) Write an equation linking km (k) and miles (m): k = ☐

3 Phone plan A costs 8p per minute. Plan B costs £1.50 plus 5p per minute.

a) Which plan shows direct proportion? ☐

b) After how many minutes do the plans cost the same? ☐

c) Which plan is cheaper for 80 minutes? Show your working. ☐

★ CHALLENGE FOR ALL

4 y is directly proportional to x. The graph of y against x passes through (6, 15).

a) Write the equation. y = ☐

b) Write every point on the line with whole-number coordinates and $0 < x \leq 10$

c) If x is multiplied by 3, what happens to y? ☐

y = mx AND DIRECT PROPORTION

ANSWERS

BUILDING BLOCKS

1. 6, 9, 12, 15
2. 2000, 3000, 4000
3. a) £6 · b) 4 kg · c) £0
4. Tick A (× 4) and C (× 5). B does not: 1 × 3 = 3 but 2 × 3 ≠ 5

SUPPORT

1. a) 0, 2, 4, 6, 8 · b) y = 2x · c) straight line through (0, 0) and (4, 8)
2. a) $5 · b) £8 · c) $2.50
3. Tick the 1st and 4th graphs (straight lines through the origin)
4. y = 7x · y = 1.5x

CORE

1. a) $7.50 · b) £6 · c) y = 1.25x · d) $37.50
2. a) 120, 180, 300, 30 · b) y = 60x
3. No. The graph is a straight line but it does not go through the origin: 0 miles costs £4. Doubling the miles does not double the cost.
4. a) y = 3x · b) 30 · c) 17

GREATER DEPTH

1. a) Always · b) Sometimes: y = 3x yes, but y = 3x + 1 is straight and not proportional · c) Always · d) Never: it does not pass through (0, 0)
2. a) 56 km · b) 62.5 miles · c) k = 1.6m
3. a) Plan A · b) 8x = 150 + 5x, so 50 minutes · c) A costs £6.40, B costs £5.50, so plan B
4. a) y = 2.5x · b) (2, 5), (4, 10), (6, 15), (8, 20), (10, 25) · c) y is multiplied by 3