

Name: Solutions

Year 10 Higher assessment 3

Date:

Time: 55 Minutes

Total marks available: 50

Total marks achieved: _____

Questions

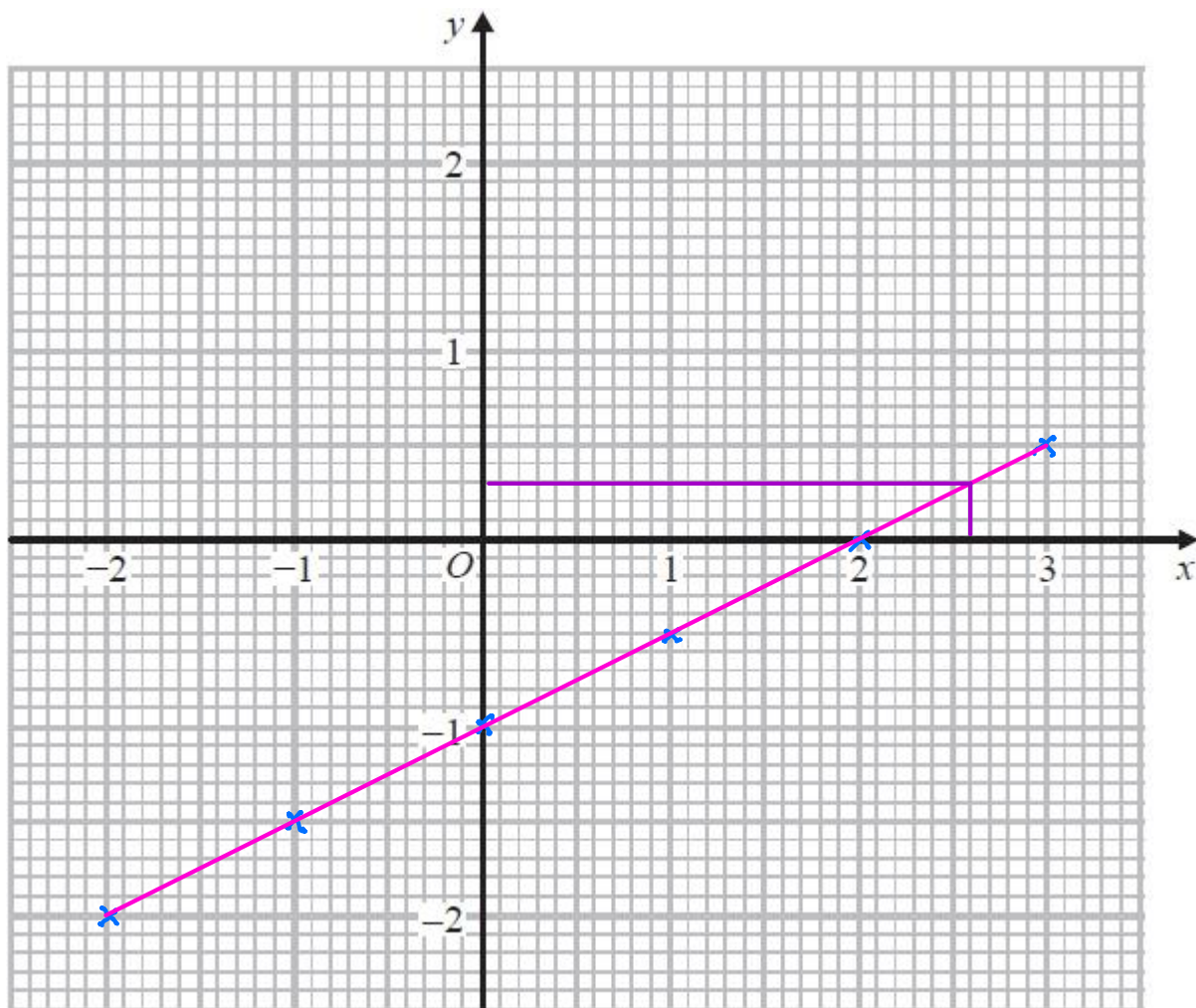
Q1.

(a) Complete the table of values for $y = \frac{1}{2}x - 1$

x	-2	-1	0	1	2	3
y	-2	$-\frac{3}{2}$	-1	$-\frac{1}{2}$	0	$\frac{1}{2}$

(2)

(b) On the grid, draw the graph of $y = \frac{1}{2}x - 1$ for values of x from -2 to 3



(2)

(c) Use your graph to find the value of x when $y = 0.3$

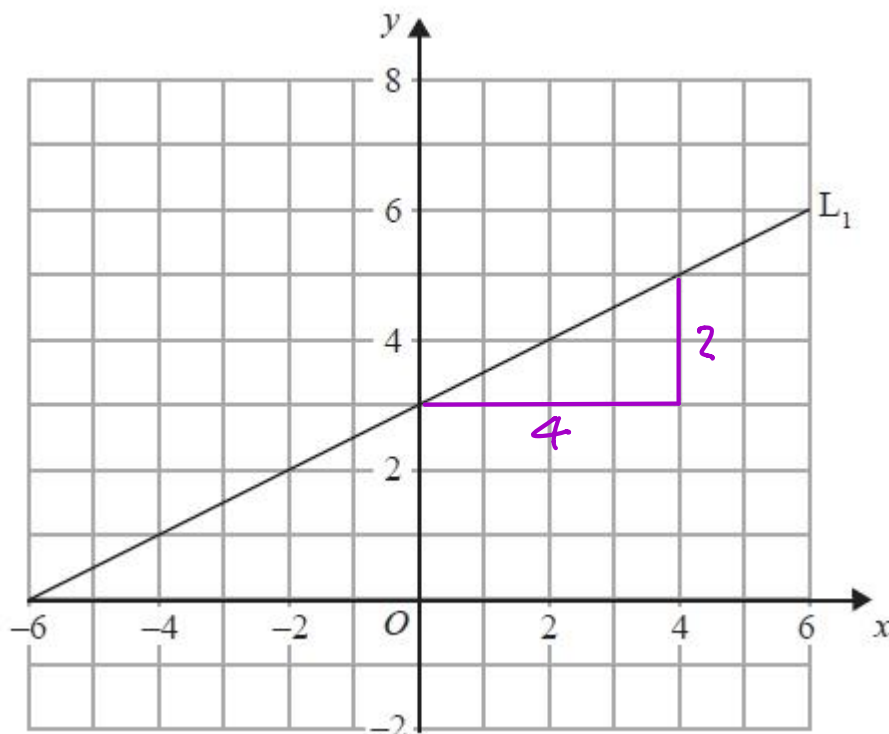
$x = 2.6$

(1)

(Total for question = 5 marks)

Q2.

The diagram shows a straight line, L_1 , drawn on a grid.



A straight line, L_2 , is parallel to the straight line L_1 and passes through the point $(0, -5)$.

Find an equation of the straight line L_2 .

$$\text{Gradient of } L_1 = \frac{2}{4} = \frac{1}{2}$$

$$\text{so gradient of } L_2 = \frac{1}{2}$$

$$y = \frac{1}{2}x + c \quad (0, -5) \text{ on line}$$

$$-5 = 0 + c$$

$$-5 = c$$

$$y = \frac{1}{2}x - 5$$

(Total for Question is 3 marks)

Q3.

The equation of the line L_1 is $y = 3x - 2$

The equation of the line L_2 is $3y - 9x + 5 = 0$

Show that these two lines are parallel.

$$y = 3x - 2$$

$$\text{gradient} = 3$$

$$3y - 9x + 5 = 0$$

$$y - 3x + \frac{5}{3} = 0$$

$$y = 3x - \frac{5}{3}$$

$$\text{gradient} = 3$$

Equal gradients so they are parallel

(Total for question = 2 marks)

Q4.

Gradient of PR

$$= \frac{-6 - -2}{-3 - 5} = \frac{-4}{-8} = +\frac{1}{2}$$

A triangle has vertices P, Q and R.

The coordinates of P are (-3, -6)

The coordinates of Q are (1, 4)

The coordinates of R are (5, -2)

M is the midpoint of PQ.

N is the midpoint of QR.

$$M = \left(\frac{-3+1}{2}, \frac{-6+4}{2} \right) = \left(\frac{-2}{2}, \frac{-2}{2} \right) = (-1, -1)$$

$$N = \left(\frac{1+5}{2}, \frac{4+(-2)}{2} \right) = \left(\frac{6}{2}, \frac{2}{2} \right) = (3, 1)$$

Prove that MN is parallel to PR.

You must show each stage of your working.

Gradient of MN

$$= \frac{1 - -1}{3 - -1} = \frac{2}{4} = \frac{1}{2}$$

Equal gradients so parallel

(Total for question = 4 marks)

Q5.

The straight line **L** has equation $4x + y = 7$

Find an equation of the straight line perpendicular to **L** that passes through $(-8, 3)$.

$$L \quad y = -4x + 7 \quad \text{gradient} = -4$$

$$\text{Perpendicular gradient} = +\frac{1}{4}$$

$$y = \frac{1}{4}x + c \quad \text{through } (-8, 3)$$

$$3 = \frac{1}{4}(-8) + c$$

$$3 = -2 + c$$

$$3 + 2 = c$$

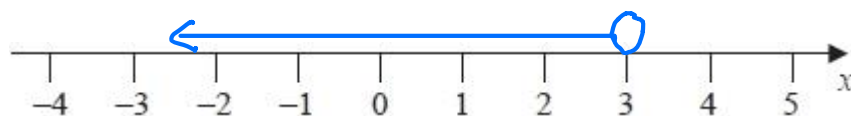
$$5 = c$$

$$y = \frac{1}{4}x + 5$$

.....
(Total for question = 4 marks)

Q6.

(a) Show the inequality $x < 3$ on the number line below.



(2)

(b) Solve the inequality $4x - 7 \geq 13$

$$4x \geq 13 + 7$$

$$4x \geq 20$$

$$x \geq \frac{20}{4}$$

$$x \geq 5$$

$$x \geq 5$$

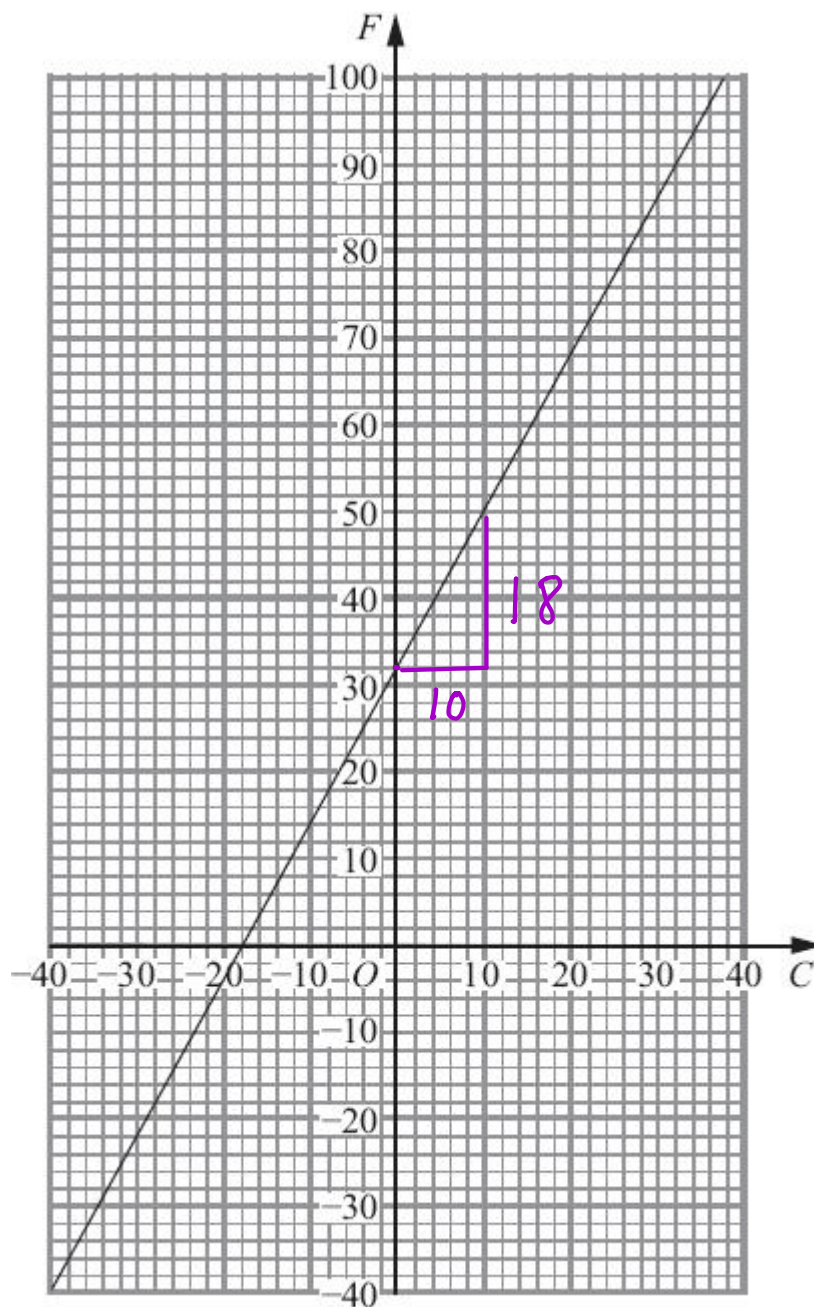
.....

(2)

(Total for question = 4 marks)

Q7.

This graph can be used to convert between degrees Celsius (C) and degrees Fahrenheit (F).



Find the values of m and k such that

$$F = mC + k$$

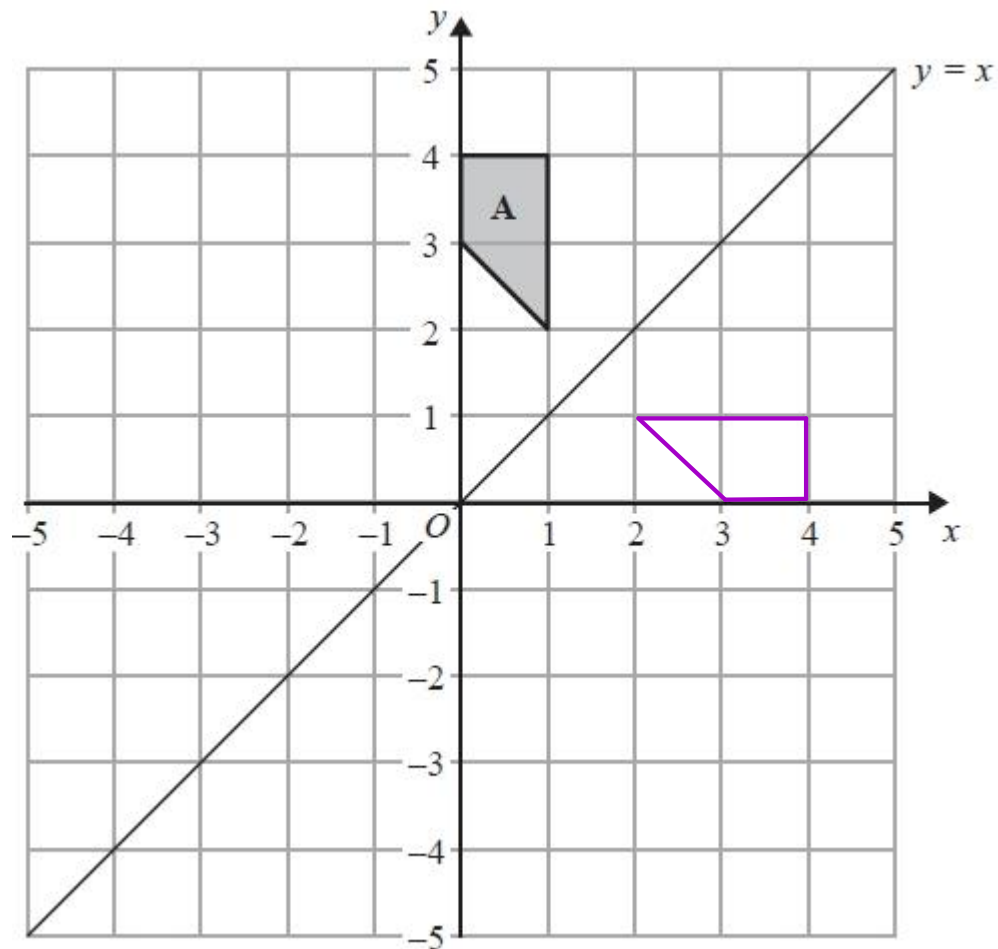
$$\text{gradient} = \frac{18}{10} = \frac{9}{5}$$

$$\text{vertical intercept} = 32$$

$$m = \frac{9}{5}$$
$$k = 32$$

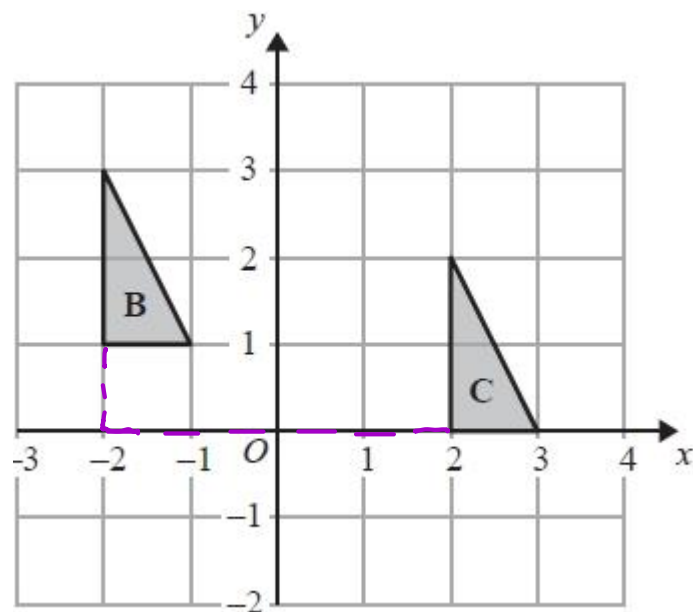
(Total for Question is 3 marks)

Q8.



(a) On the grid, reflect shape **A** in the line $y = x$.

(2)



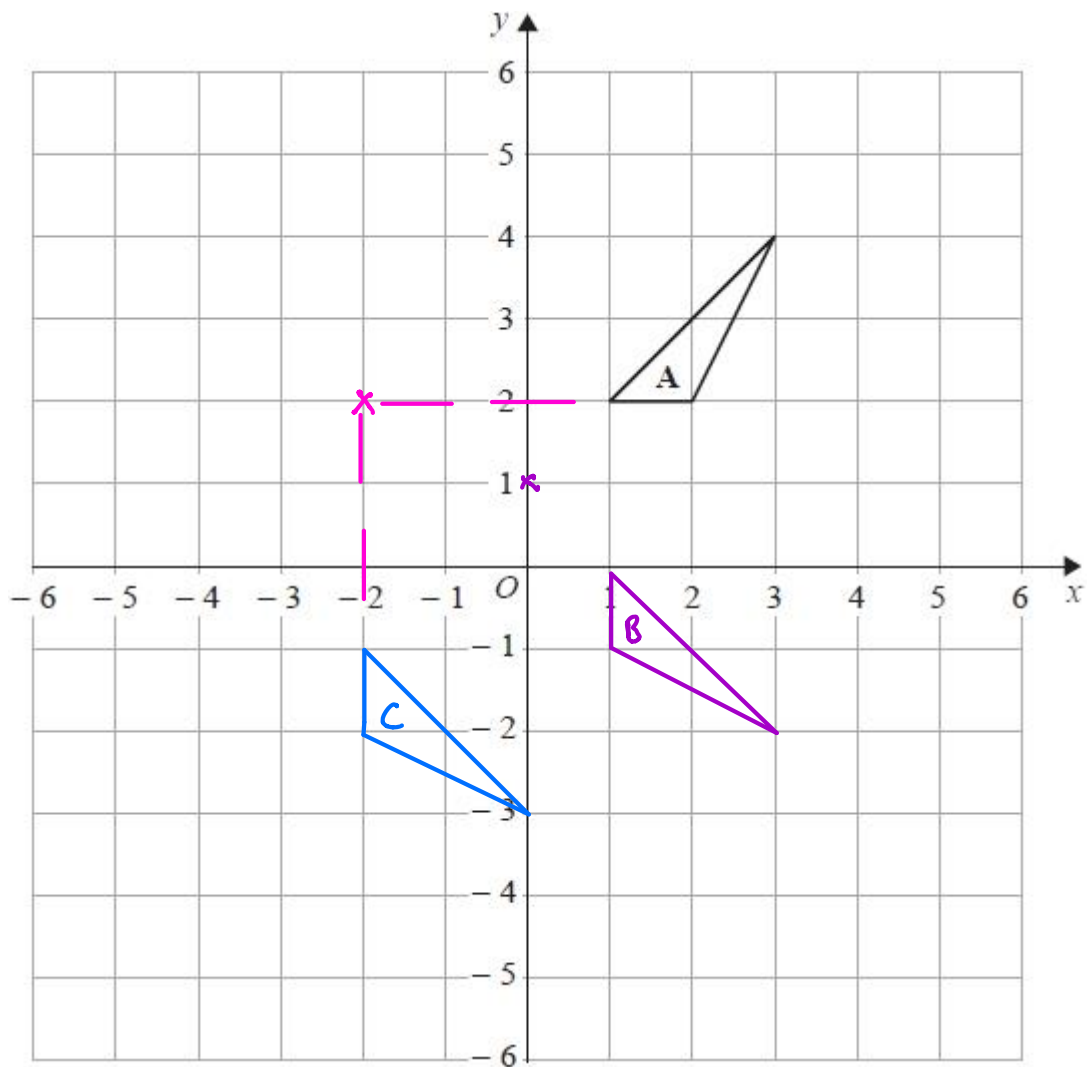
(b) Describe fully the single transformation that maps triangle **B** onto triangle **C**.

(2)

(Total for question = 4 marks)

Translation by $\begin{pmatrix} 4 \\ -1 \end{pmatrix}$

Q9.



Triangle **A** is rotated 90° clockwise about the point $(0, 1)$ to give triangle **B**.

Triangle **B** is translated by the vector $\begin{pmatrix} -3 \\ -1 \end{pmatrix}$ to give triangle **C**.

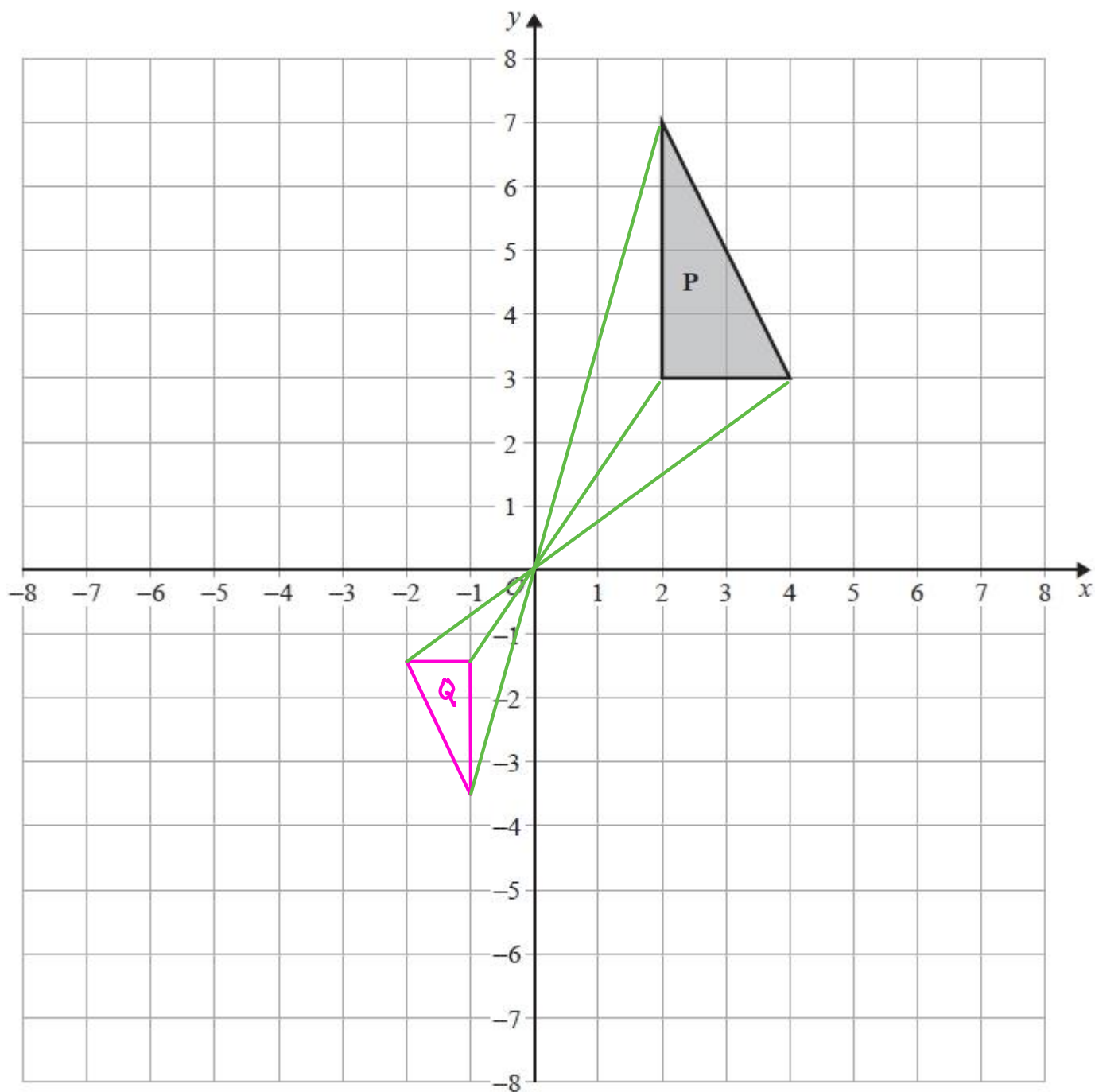
Describe fully the single transformation that maps triangle **A** onto triangle **C**.

Rotation by 90° clockwise about $(-2, 2)$

(3)

(Total for question = 3 marks)

Q10.



Enlarge shape **P** by scale factor $-\frac{1}{2}$ with centre of enlargement (0, 0).

Label your image **Q**.

(Total for question = 2 marks)

Q11.

3 teas and 2 coffees have a total cost of £7.80
5 teas and 4 coffees have a total cost of £14.20

t = price of a tea
 c = price of a coffee

Work out the cost of one tea and the cost of one coffee.

$$3t + 2c = 7.80 \quad (1)$$

$$5t + 4c = 14.20 \quad (2)$$

$$(1) \times 2 \quad 6t + 4c = 15.60 \quad (3)$$

$$(3) - (2) \quad t = 1.40$$

Sub for t in (1)

$$3(1.40) + 2c = 7.80$$

$$4.20 + 2c = 7.80$$

$$2c = 7.80 - 4.20$$

$$2c = 3.60$$

$$c = \frac{3.60}{2} = 1.80$$

tea £ 1.40

coffee £ 1.80

(Total for question = 4 marks)

Q12.

Solve the equations

$$3x + 2y = 8 \quad (1)$$

$$2x + 4y = 4 \quad (2)$$

$$(1) \times 2$$

$$6x + 4y = 16 \quad (3)$$

$$(3) - (2)$$

$$4x = 12$$

$$x = \frac{12}{4}$$

$$\underline{x = 3}$$

Sub for x in (1)

$$3(3) + 2y = 8$$

$$9 + 2y = 8$$

$$2y = 8 - 9$$

$$2y = -1$$

$$\underline{y = -\frac{1}{2}}$$

$$x = 3, y = -\frac{1}{2}$$

(Total for Question is 4 marks)

Q13.

m is an integer such that $-2 < m \leq 3$

(a) Write down all the possible values of m .

$$m = -1, 0, 1, 2, 3$$

(2)

(b) Solve $7x - 9 < 3x + 4$

$$7x - 3x < 4 + 9$$

$$4x < 13$$

$$x < \frac{13}{4}$$

(2)

(Total for Question is 4 marks)

Q14.

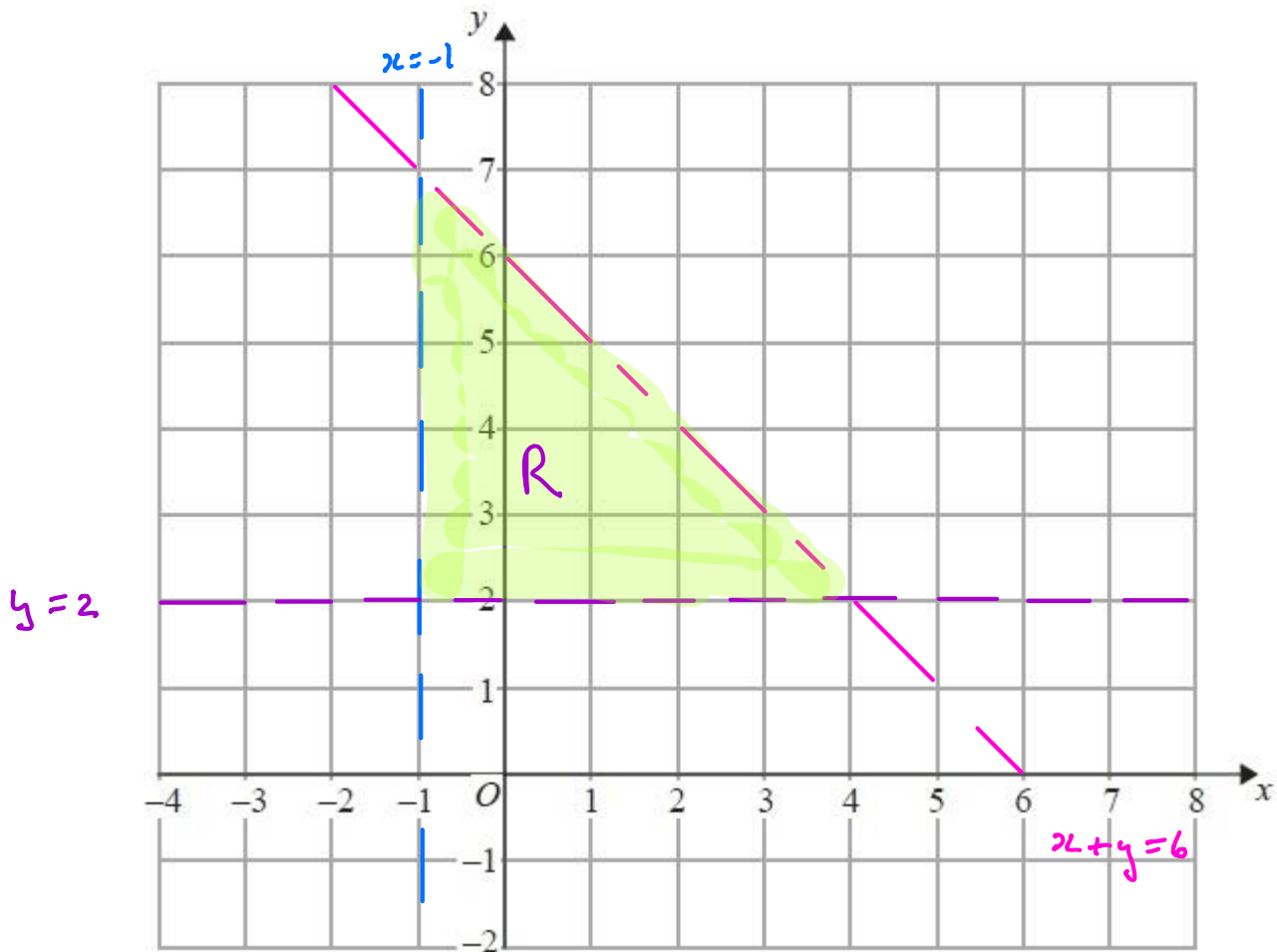
On the grid below, show by shading, the region defined by the inequalities

$$x + y < 6$$

$$x > -1$$

$$y > 2$$

Mark this region with the letter R.



(Total for Question is 4 marks)

