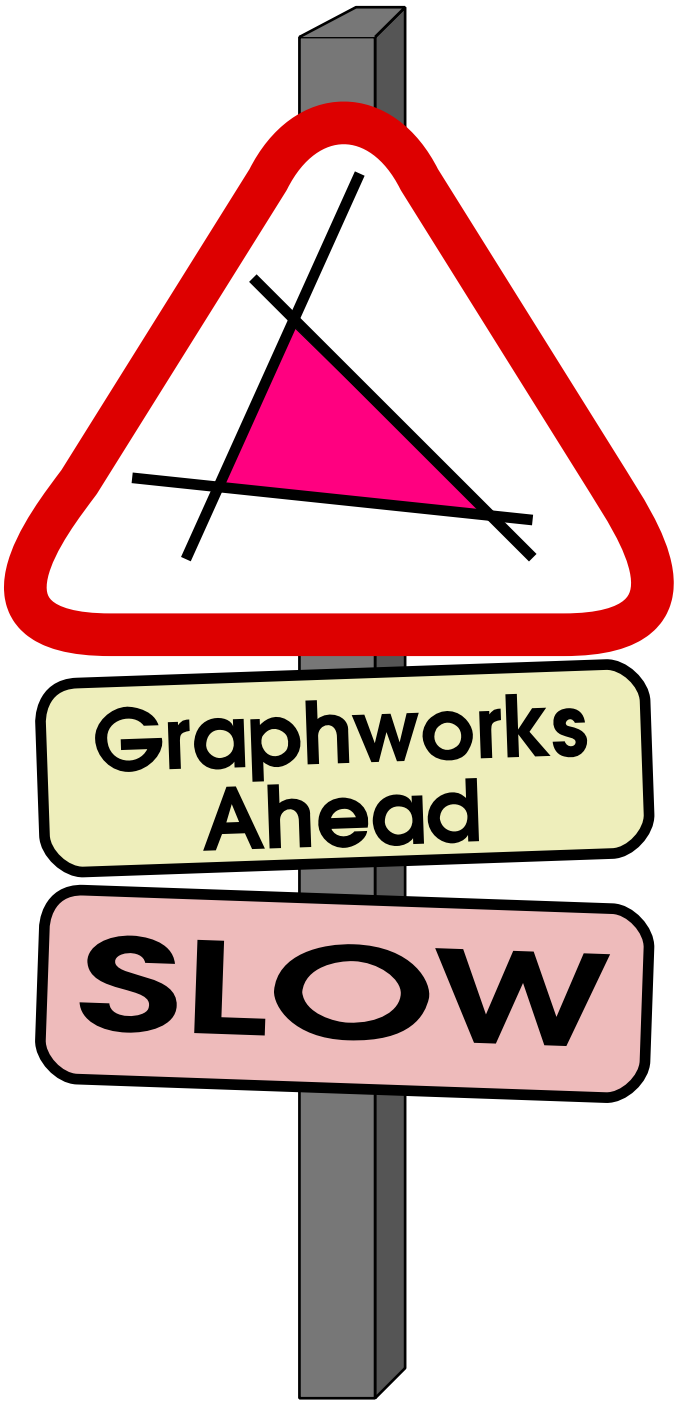
GRAPHWORKS

GCSE Mathematics



Lesson 1

GCSE Mathematics
Graphworks

1.1 Tell It To Me Straight

Initially, the straight line seems to be a geometric object of great simplicity.
Euclid famously defined it as that which has length without breadth.
And yet, we are already dealing with something that can only exist in our mind; for how can we see something in "the real world" that is infinitely thin, even if it is infinitely long ?

Although the straight line is a *geometric* object we describe "where it is" and "how it is orientated" using *algebra.*

Here are some examples of straight lines described using algebra;

$y = 4x + 8$ $\qquad$ $y = -3x + 12$ $\qquad$ $y = 4$

$y = 0.5x - 9$ $\qquad$ $y = 7x$

Line Algebra

Almost all straight lines have equations of the form

$$y = mx + c$$

where m is a measure of the amount of gradient (slope) of the line

and c is where the line cur the y-axis

1.2 Question

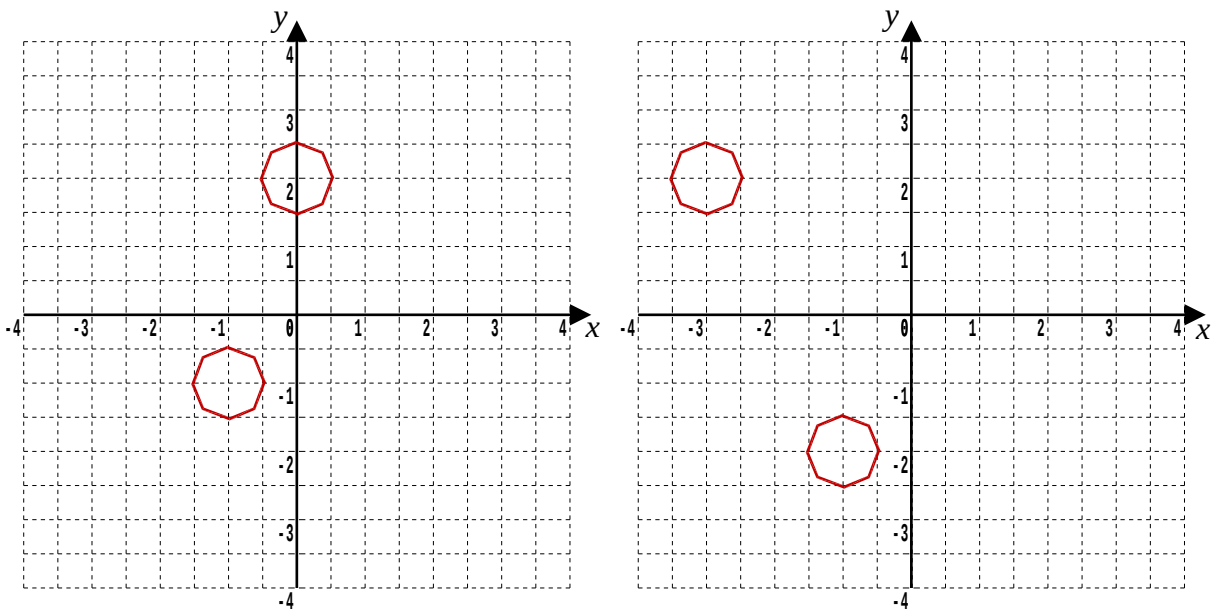
Two of the above examples may be causing you stress !
Write $y = 4$ and $y = 7x$ more obviously in the form $y = mx + c$

[2 marks]

1.3 Example

Given a straight line, drawn on the page, how do we find its algebraic description ?

Teaching Video: http://www.NumberWonder.co.uk/v9005/1.mp4



[2, 2 marks]

The Four Steps

STEP 1 : Carefully draw the line that passes exactly through the two points at the centre of the octagons.

STEP 2 : Look at where the line *cuts* the *y* axis. This is the *c* part of $y = mx + c$.

STEP 3 : Ask yourself, "For every one I move across, what do I move up/down ? This is the gradient measure, the *m* part, of $y = mx + c$.

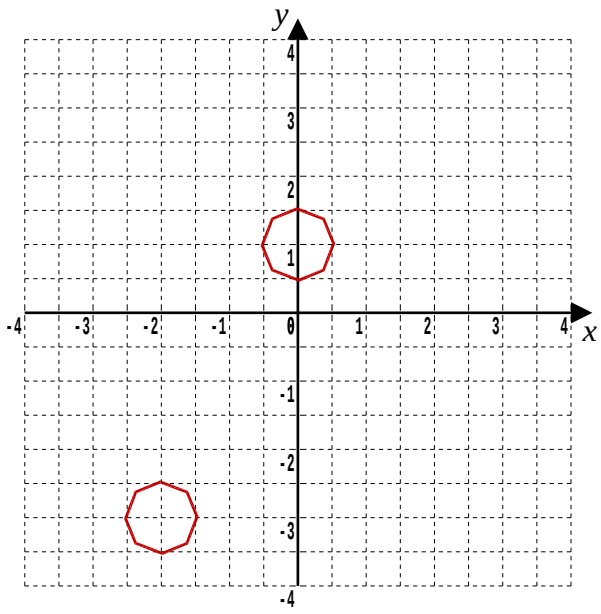
STEP 4 : Write down the equation of the line in the form $y = mx + c$ with *c* and *m* replaced with the numbers observed in steps 2 and 3.

1.4 Exercise

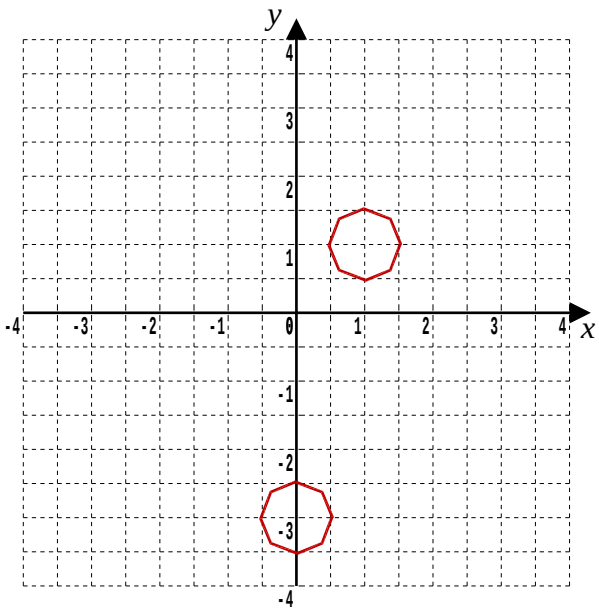
Marks Available : 47

Question 1

On each of the following graphs, work through four steps to get the equation of the straight line between the ring centres.

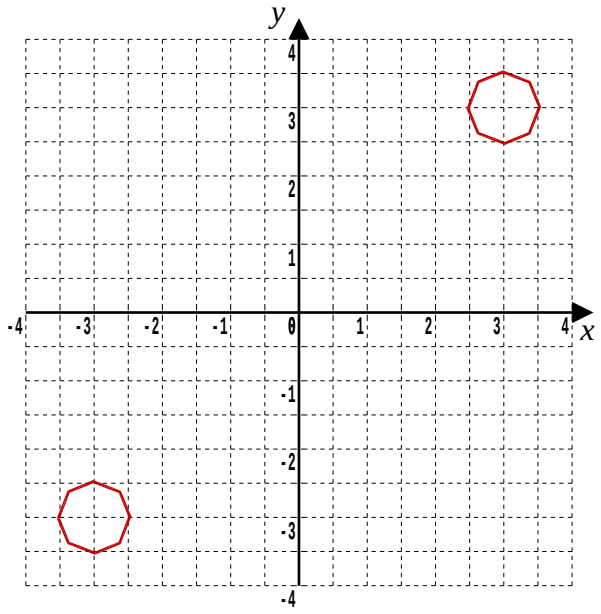


(i)

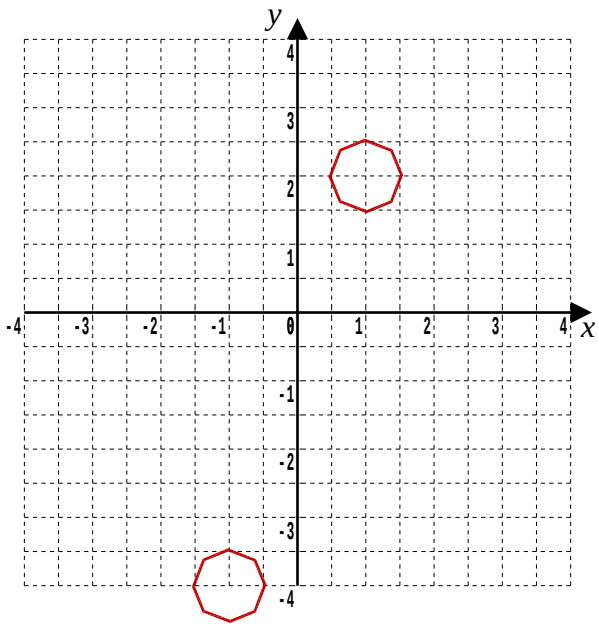


(ii)

[2, 2 marks]

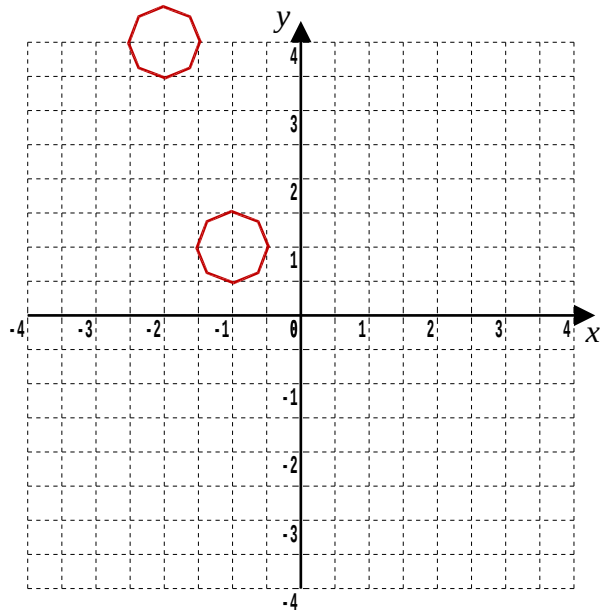


(iii)

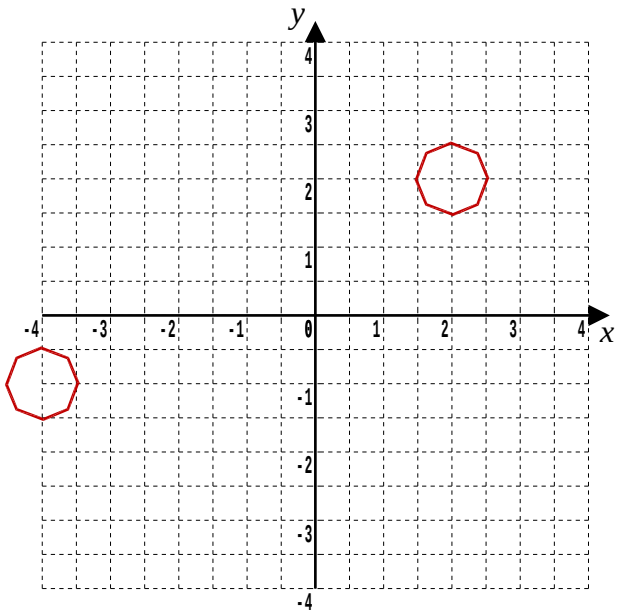


(iv)

[2, 2 marks]

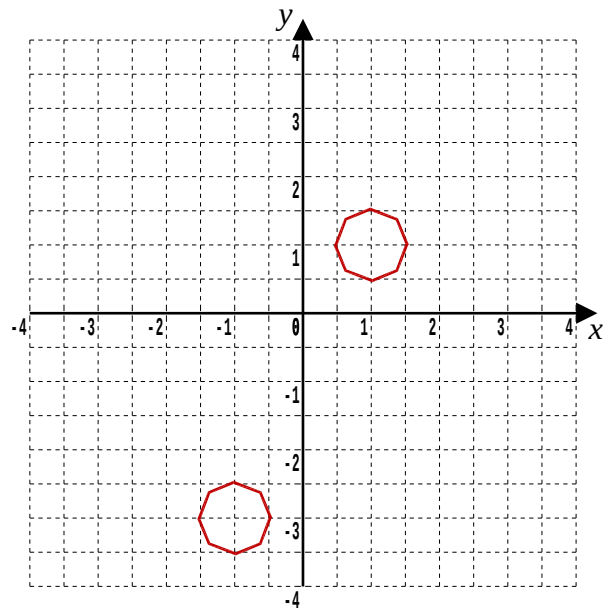


(v)

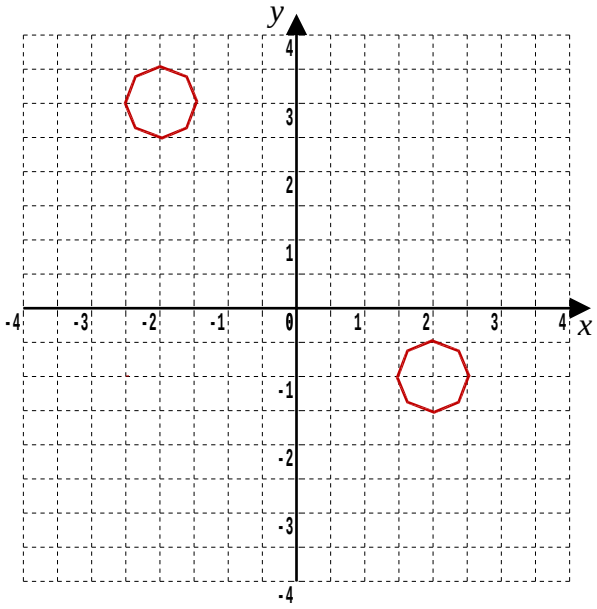


(vi)

[2, 2 marks]

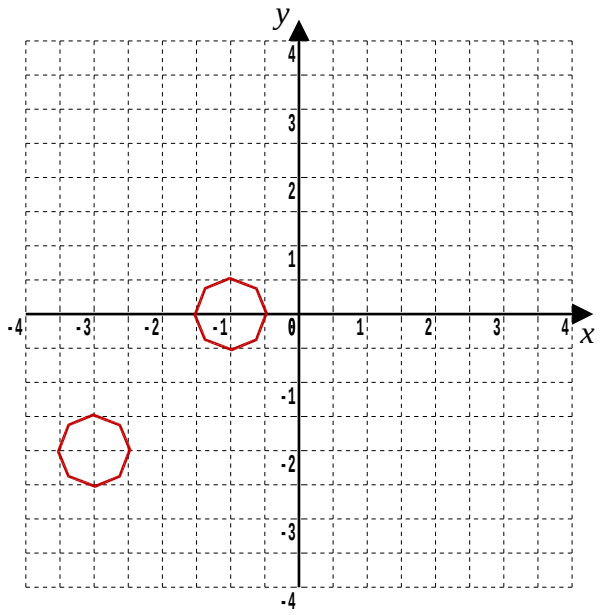


(vii)

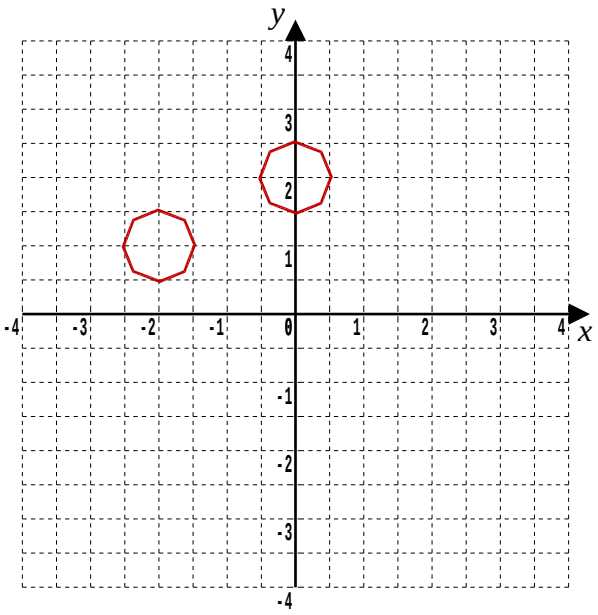


(viii)

[2, 2 marks]

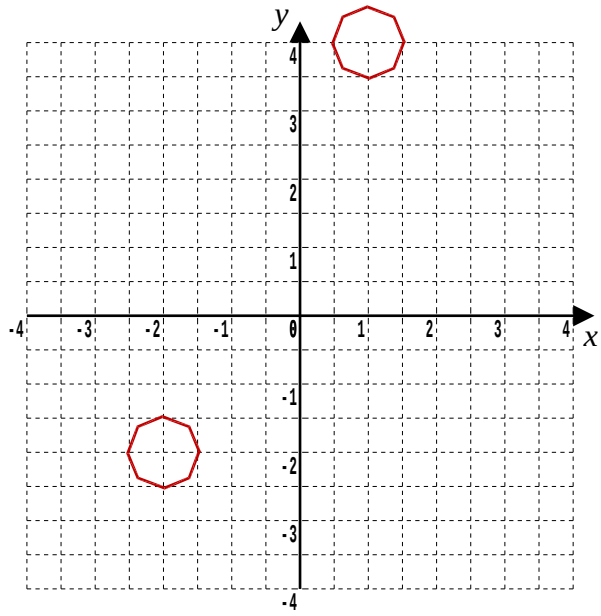


(ix)

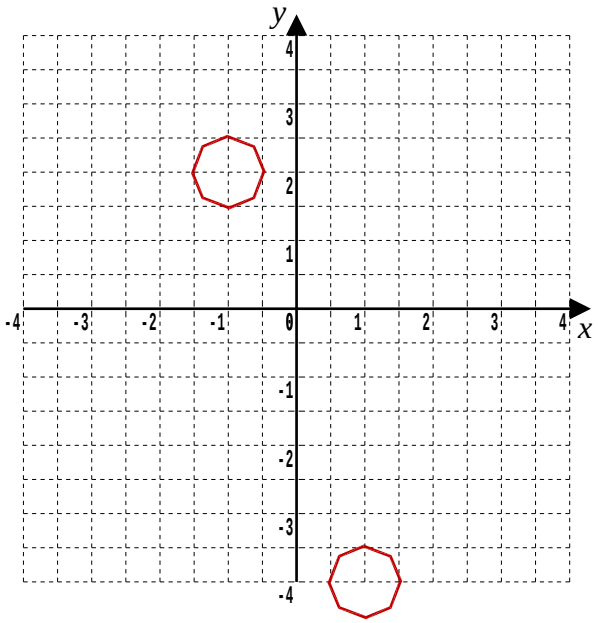


(x)

[2, 2 marks]

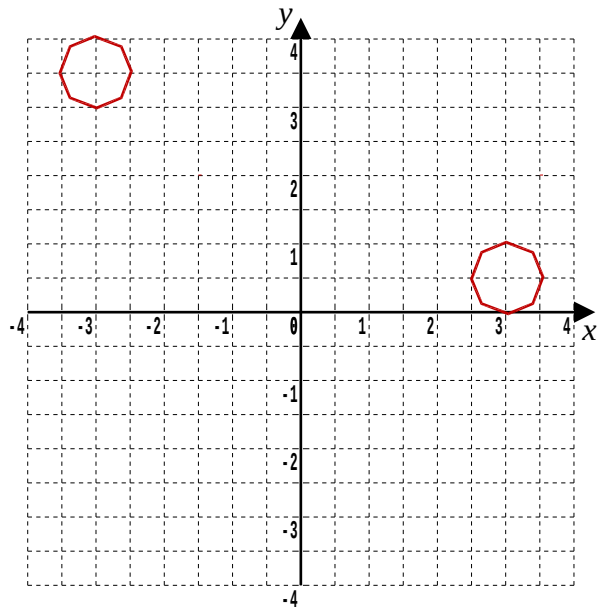


(xi)

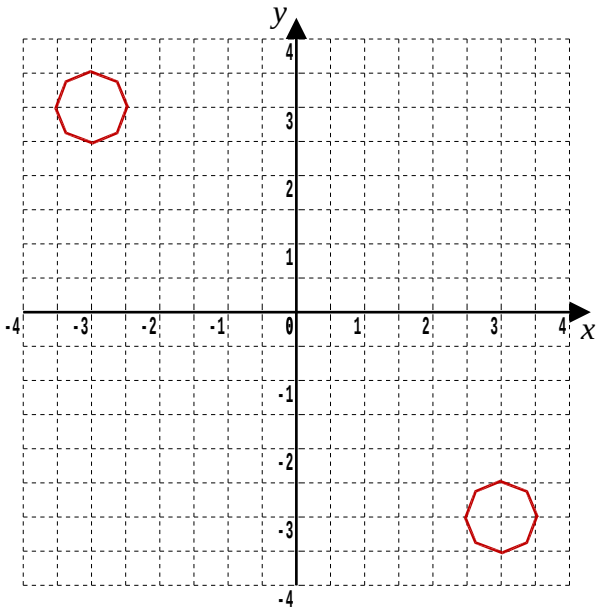


(xii)

[2, 2 marks]

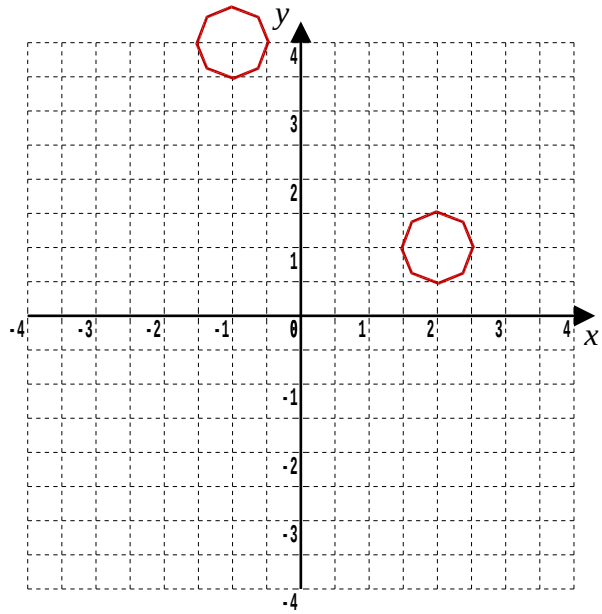


(xiii)

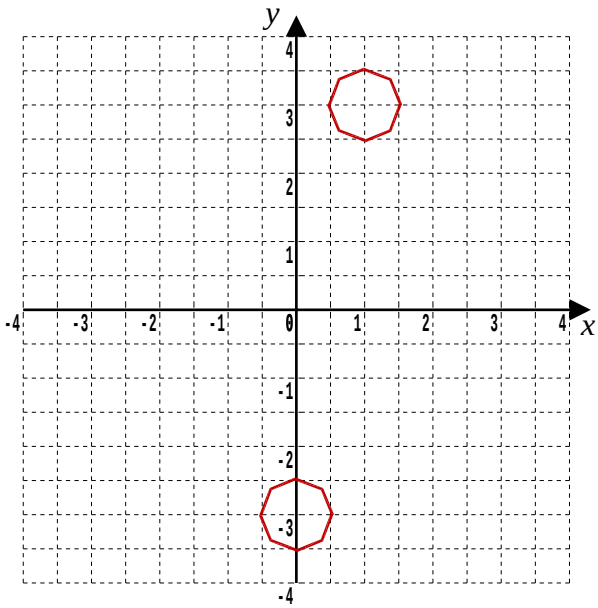


(xiv)

[2, 2 marks]



(xv)

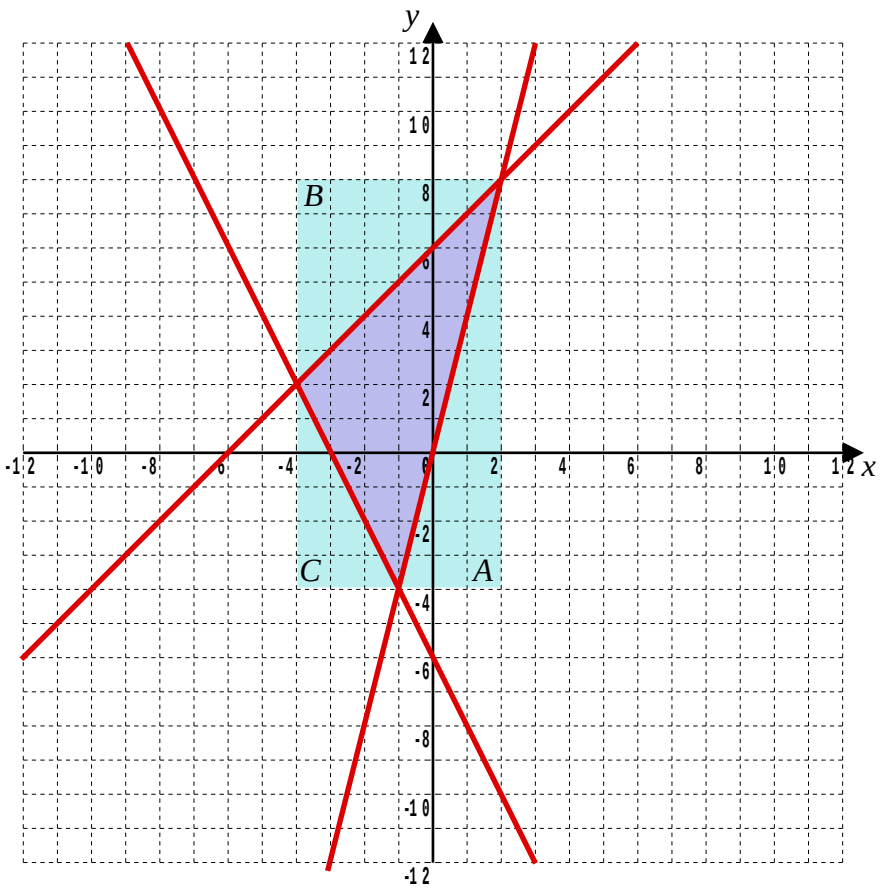


(xvi)

[2, 2 marks]

Question 2

(i) Next to each line, at a suitable place, clearly write the equations of the line.



[6 marks]

(ii) Calculate the area of triangle A.

[2 marks]

(iii) Calculate the area of triangle B.

[2 marks]

(iv) Calculate the area of triangle C.

[2 marks]

(v) Hence, or otherwise, determine the area of the purple triangle enclosed by the three lines.

[3 marks]