

# Edexcel Unit 3 Higher

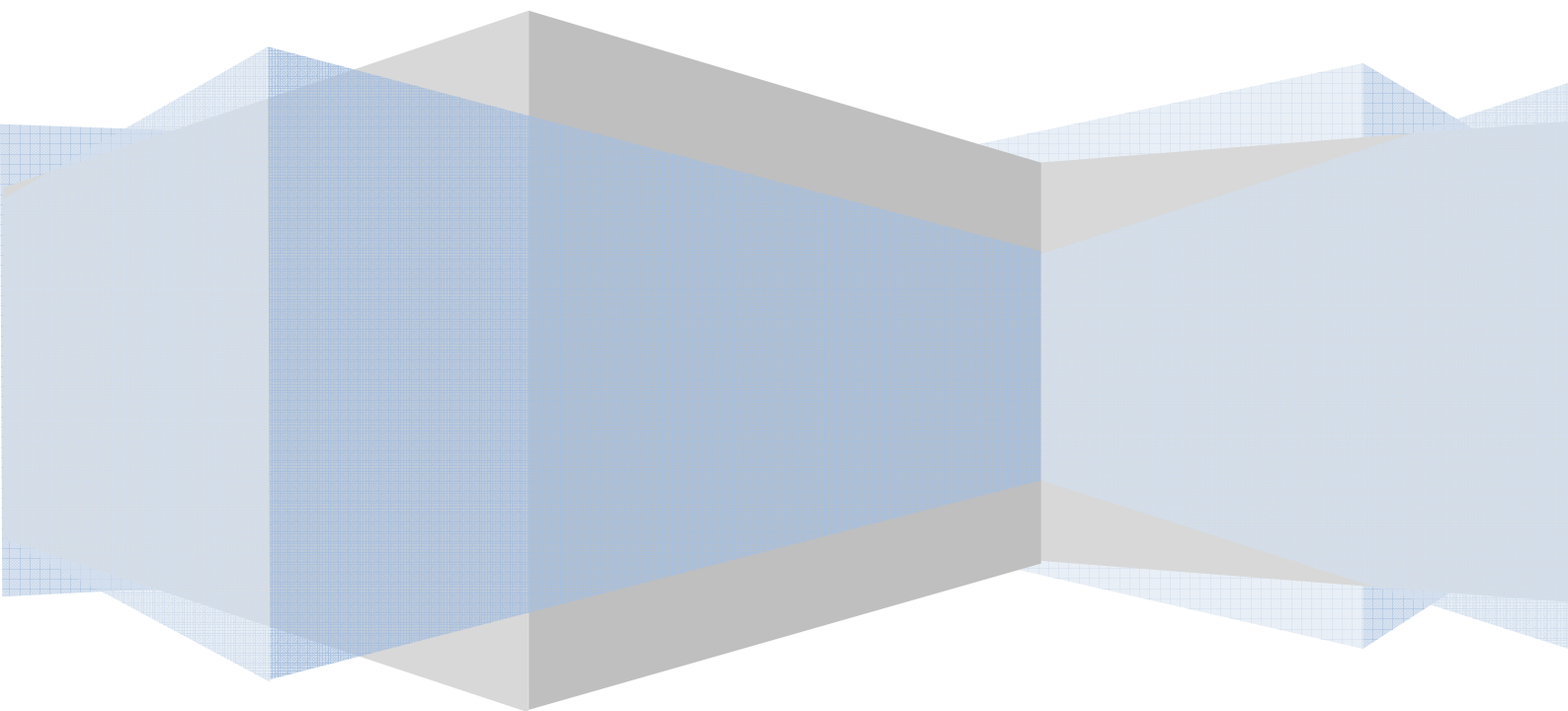
## Non-Calculator Questions

2003-2007 Papers

Number            Questions 1 – 11

Algebra            Questions 12 – 26

Shape              Questions 27 - 43



1. (a) Express  $0.\dot{2}7$  as a fraction in its simplest form.

.....

(3)

$x$  is an integer such that  $1 \leq x \leq 9$

(b) Prove that  $0.\dot{0}\dot{x} = \frac{x}{99}$

(2)

(Total 5 marks)

2. Find the value of

(i)  $36^{\frac{1}{2}}$

.....

(ii)  $3^{-2}$

.....

(Total 2 marks)

3. (a) Work out  $1\frac{7}{8} \times 5\frac{1}{3}$

..... (2)

(b) Work out  $3\frac{1}{2} \div 2\frac{4}{5}$

..... (2)  
**(Total 4 marks)**

4. A field is in the shape of a rectangle.

The length of the field is 340 m, to the nearest metre.

The width of the field is 117 m, to the nearest metre.

Calculate the upper bound for the perimeter of the field.

..... m  
**(Total 2 marks)**

5. Convert the recurring decimal  $0.\dot{0}1\dot{3}$  to a fraction.

.....  
(Total 3 marks)

6. (a) Write down the value of  $36^{\frac{1}{2}}$

..... (1)

(b)  $4n^{\frac{3}{2}} = 8^{-\frac{1}{3}}$

Find the value of  $n$ .

$n = \dots\dots\dots$   
(3)  
(Total 4 marks)

7. (i) Convert the recurring decimal  $0.\dot{3}\dot{6}$  to a fraction.

.....

(ii) Convert the recurring decimal  $2.1\dot{3}\dot{6}$  to a mixed number.  
Give your answer in its simplest form.

.....  
(Total 5 marks)

8. Express the recurring decimal  $2.0\dot{6}$  as a fraction.  
Write your answer in its simplest form.

.....  
(Total 3 marks)

9.  $p$  is inversely proportional to  $m$ .  
 $p = 48$  when  $m = 9$
- Calculate the value of  $p$  when  $m = 12$

.....  
(Total 2 marks)

10. The recurring decimal  $0.\dot{7}\dot{2}$  can be written as the fraction  $\frac{8}{11}$

Write the recurring decimal  $0.5\dot{7}\dot{2}$  as a fraction.

.....  
(Total 2 marks)

11. Express  $0.3\dot{2}\dot{8}$  as a fraction in its simplest form.

.....  
(Total 3 marks)

12. (a) Expand and simplify

$$(x - 6)(x + 4)$$

..... (2)

(b) Factorise completely

$$12x^2 - 18xy$$

..... (2)  
(Total 4 marks)

13. Solve  $4 < x - 2 \leq 7$

..... (Total 3 marks)

14. Solve  $x^2 - 3x - 18 = 0$

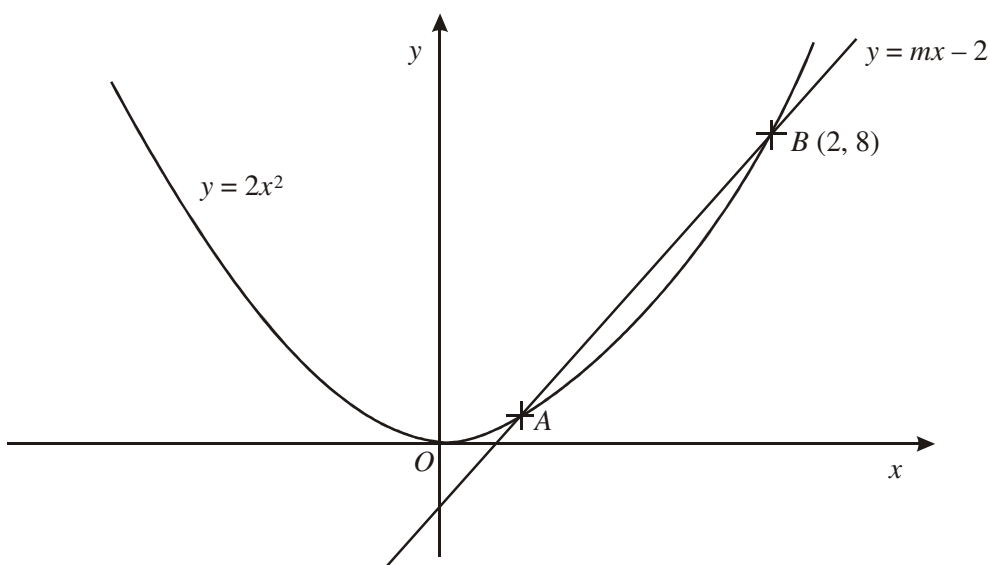
..... (Total 3 marks)

15. (a) Find the equation of the straight line which passes through the point  $(0, 3)$  and is perpendicular to the straight line with equation  $y = 2x$ .

.....

(2)

The graphs of  $y = 2x^2$  and  $y = mx - 2$  intersect at the points  $A$  and  $B$ . The point  $B$  has coordinates  $(2, 8)$ .



- (b) Find the coordinates of the point  $A$ .

(....., .....) )

(Total 4 marks)

16. Solve  $7(x + 2) = \frac{5x + 1}{2}$

$x = \dots\dots\dots$   
(Total 4 marks)

17. Solve  $2x + 1 = \frac{5x}{3}$

$x = \dots\dots\dots$   
(Total 2 marks)

18.

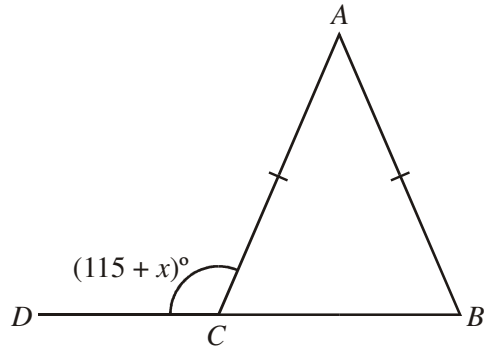


Diagram **NOT** accurately drawn

$AB = AC$ .

$BCD$  is a straight line.

Angle  $ACD = (115 + x)^\circ$ .

Find, in terms of  $x$ , the size of angle  $BAC$ .

Give your answer in its simplest form.

Angle  $BAC = \dots\dots\dots^\circ$   
(Total 3 marks)

19. Solve  $x^2 + 6x = 4$

Give your answers in the form  $p \pm \sqrt{q}$ , where  $p$  and  $q$  are integers.

.....  
(Total 3 marks)

20.

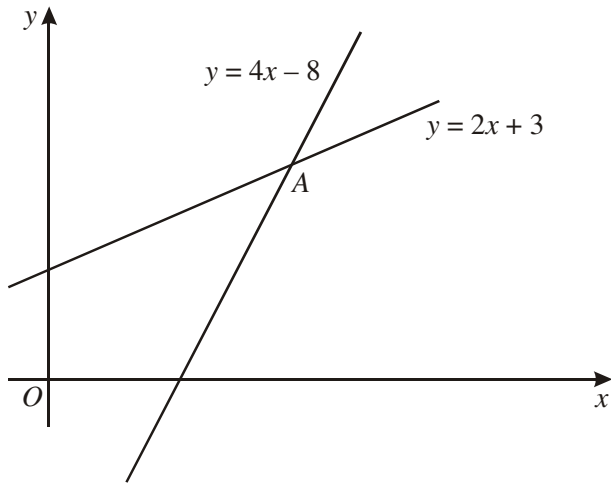


Diagram **NOT** accurately drawn

The diagram shows two straight lines intersecting at point A.  
The equations of the lines are

$$y = 4x - 8$$
$$y = 2x + 3$$

Work out the coordinates of A.

(....., .....)  
(Total 3 marks)

21.

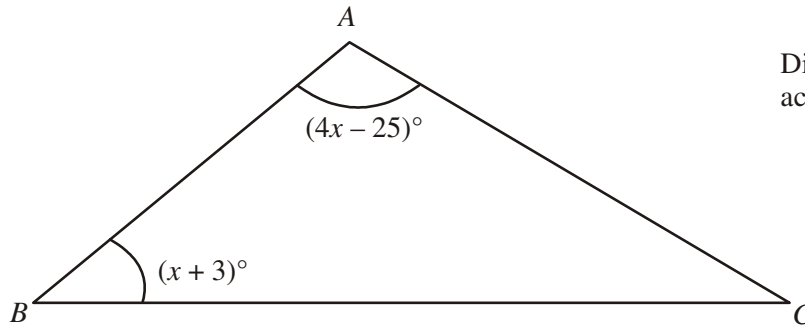


Diagram **NOT**  
accurately drawn

$ABC$  is a triangle.

Angle  $A = (4x - 25)^\circ$ .

Angle  $B = (x + 3)^\circ$ .

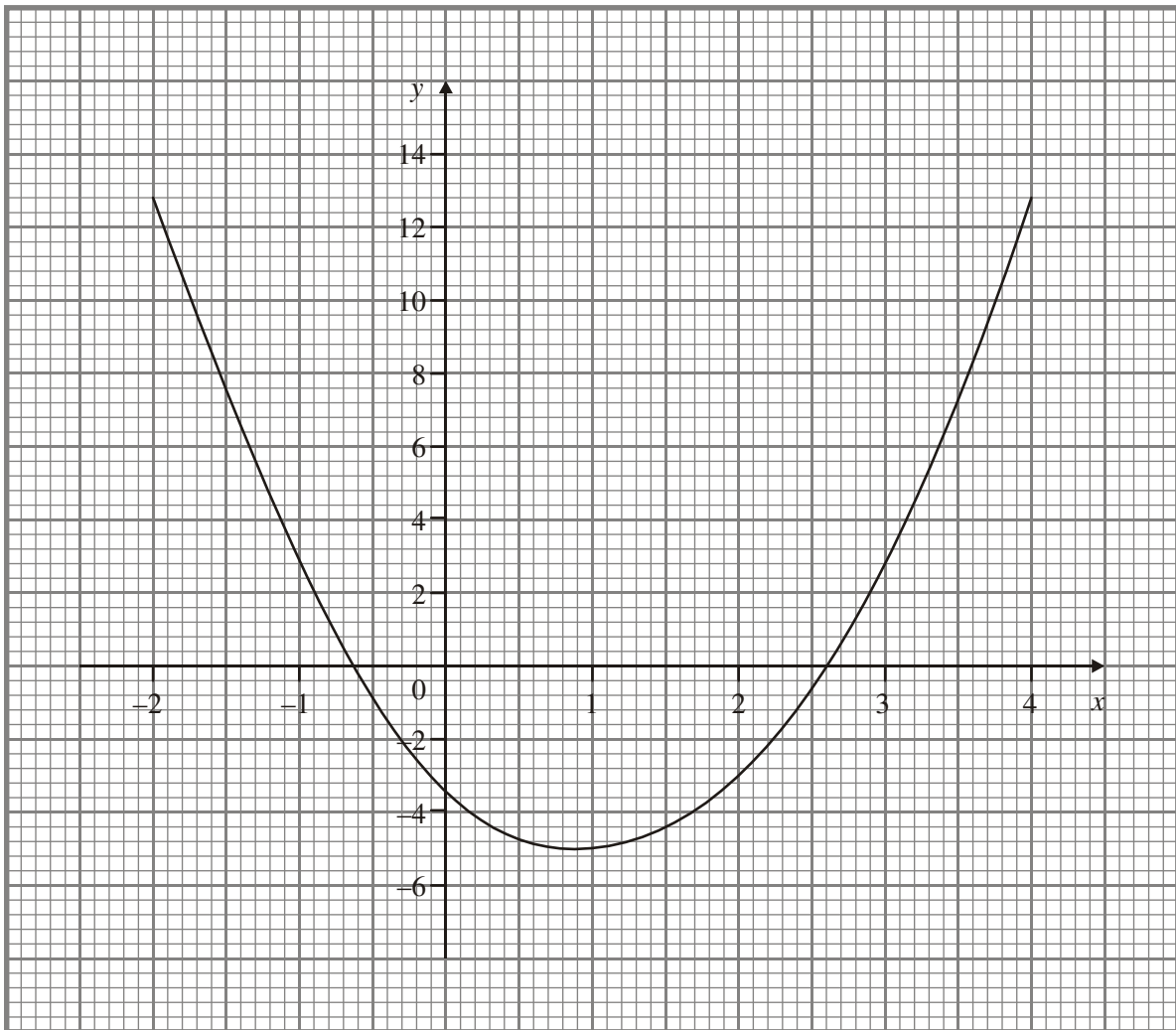
The size of angle  $A$  is **three** times the size of angle  $B$ .

Work out the value of  $x$ .

$x = \dots\dots\dots$

(Total 3 marks)

22.



The diagram shows the graph of the equation  $y = 2x^2 - 4x - 3$

Use the graph to find the approximate values of  $x$  when  $2x^2 - 4x - 3 = 0$

$x = \dots\dots\dots$  Or  $x = \dots\dots\dots$

**(Total 2 marks)**

**23.** Solve the simultaneous equations

$$3x + y = 1$$

$$x - 2y = 19$$

$$x = \dots\dots\dots$$

$$y = \dots\dots\dots$$

**(Total 3 marks)**

24. Given that

$$x^2 - 14x + a = (x + b)^2 \text{ for all values of } x,$$

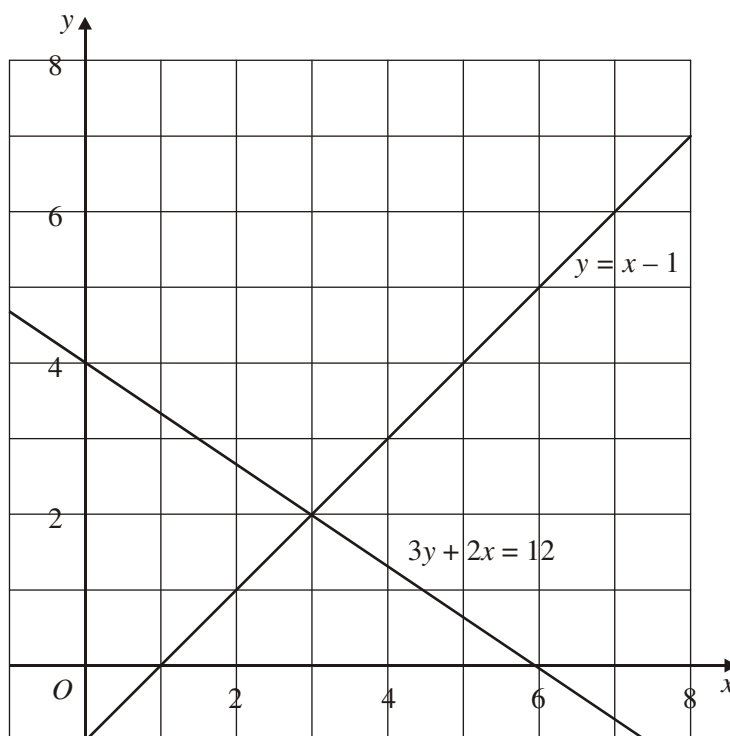
find the value of  $a$  and the value of  $b$ .

$a = \dots\dots\dots$

$b = \dots\dots\dots$

**(Total 3 marks)**

25. The graphs of the straight lines with equations  $3y + 2x = 12$  and  $y = x - 1$  have been drawn on the grid.



$$3y + 2x > 12$$

$$y < x - 1$$

$$x < 6$$

$x$  and  $y$  are integers.

On the grid, mark with a cross ( $\times$ ), each of the **four** points which satisfies **all** 3 inequalities.

**(Total 3 marks)**

26. By eliminating  $y$ , find the solutions to the simultaneous equations

$$y - 2x = 3$$

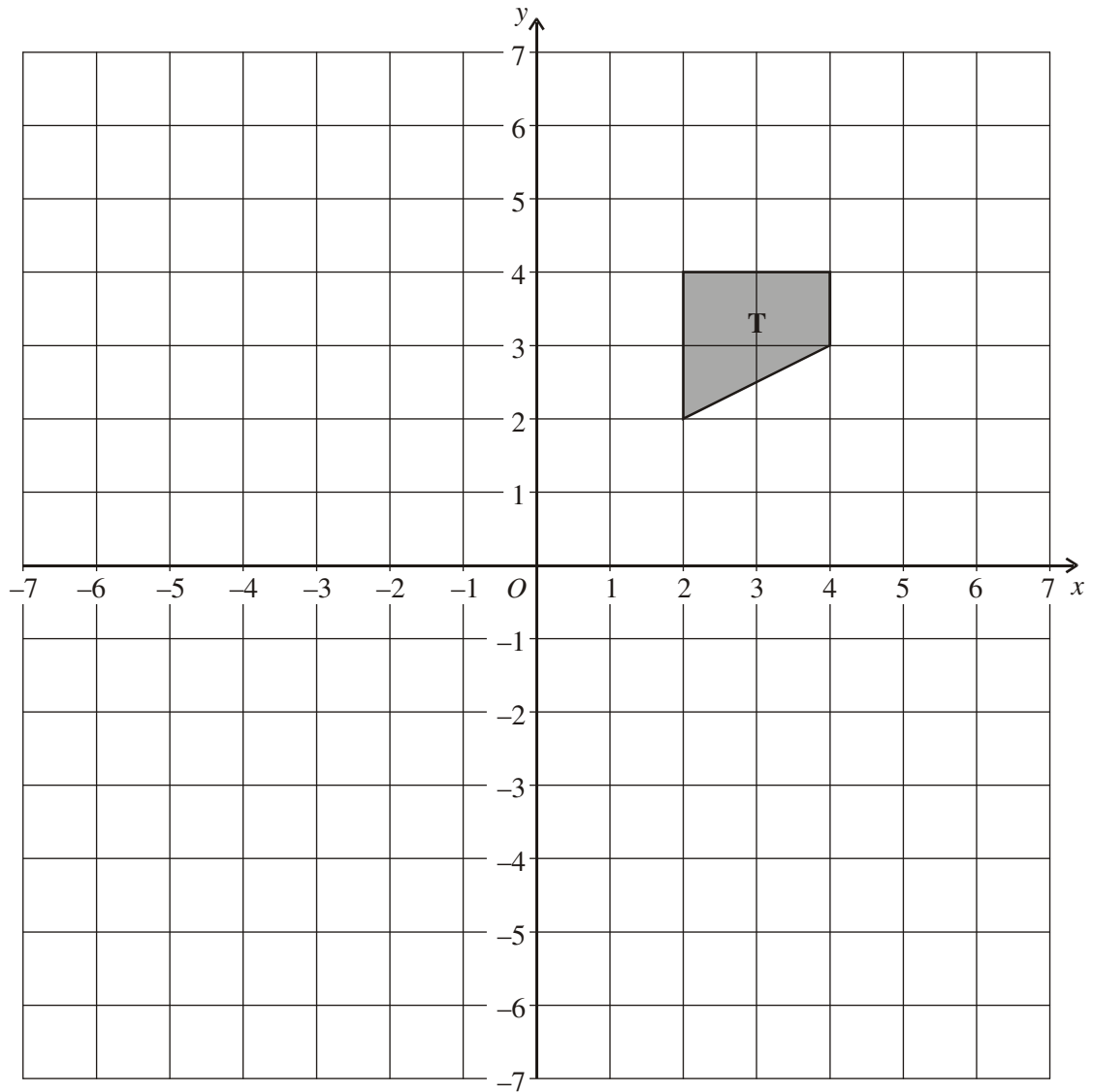
$$x^2 + y^2 = 18$$

$$x = \dots\dots\dots y = \dots\dots\dots$$

$$\text{or } x = \dots\dots\dots y = \dots\dots\dots$$

**(Total 7 marks)**

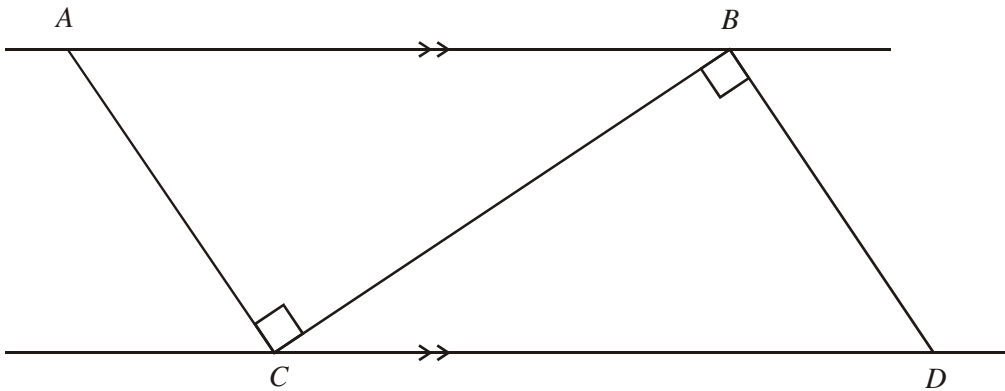
27.



Enlarge shape **T** with scale factor  $-1.5$ , centre  $(0, 2)$ .

**(Total 3 marks)**

28.



$AB$  is parallel to  $CD$ .

Angle  $ACB = \text{angle } CBD = 90^\circ$ .

Prove that triangle  $ABC$  is congruent to triangle  $DCB$ .

(Total 3 marks)

29.

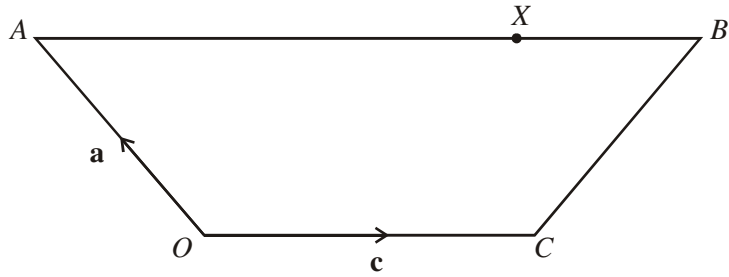


Diagram **NOT** accurately drawn

$OABC$  is a trapezium.

$OC$  is parallel to  $AB$ .

$\overrightarrow{OA} = \mathbf{a}$ ,  $\overrightarrow{OC} = \mathbf{c}$

$AB = 2OC$ .

$X$  is the point on  $AB$  such that  $AX:XB = 3:1$ .

Express  $\overrightarrow{XC}$  in terms of  $\mathbf{a}$  and  $\mathbf{c}$ .

$\overrightarrow{XC} = \dots\dots\dots$   
(Total 3 marks)

30.

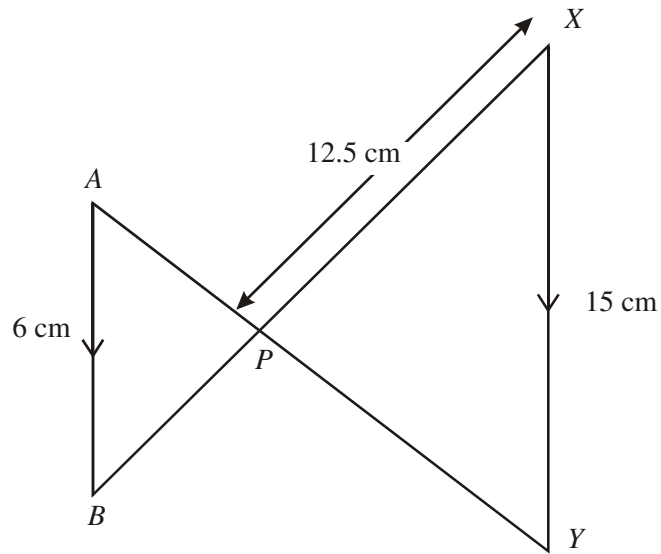


Diagram **NOT** accurately drawn

$AB$  is parallel to  $XY$ .

The lines  $AY$  and  $BX$  intersect at  $P$ .

$AB = 6$  cm.

$XP = 12.5$  cm.

$XY = 15$  cm.

Work out the length of  $BP$ .

..... cm  
(Total 3 marks)

31.

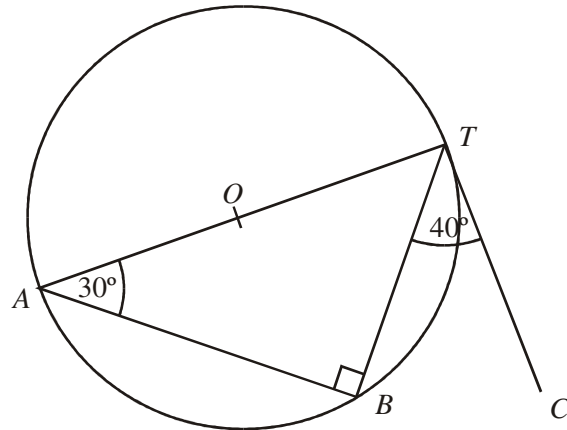


Diagram **NOT** accurately drawn

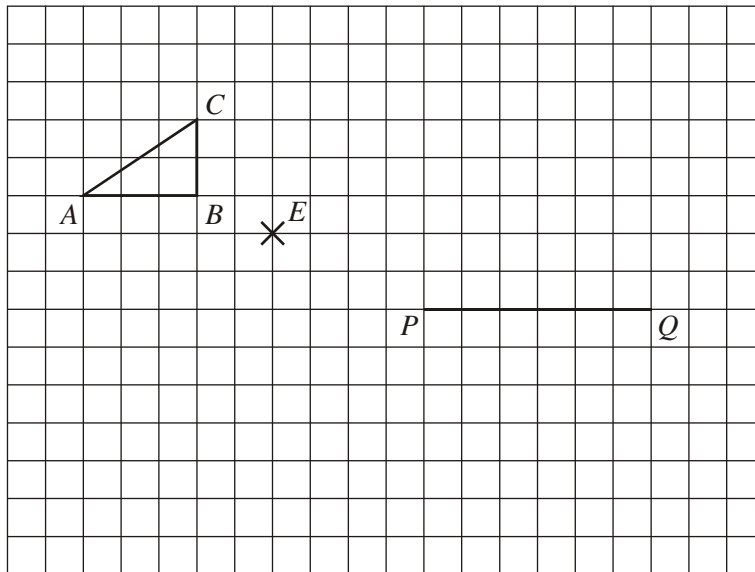
$T, A$  and  $B$  are points on the circumference of the circle, centre  $O$ .  
 $AT$  is a diameter of the circle.  
Angle  $BTC = 40^\circ$   
Angle  $TAB = 30^\circ$

Explain why  $TC$  cannot be a tangent to the circle.

.....  
.....  
.....  
.....

(Total 2 marks)

32. The triangle  $ABC$  is to be enlarged, using  $E$  as the centre, to give the triangle  $PQR$ . The line  $PQ$  is the image of the line  $BA$ .



- (a) Write down the scale factor of the enlargement.

.....

(1)

- (b) Complete the triangle  $PQR$ .

(1)

(Total 2 marks)

33.

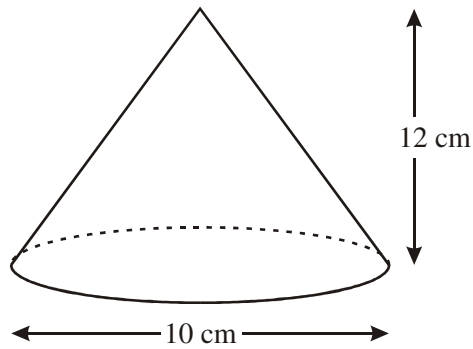


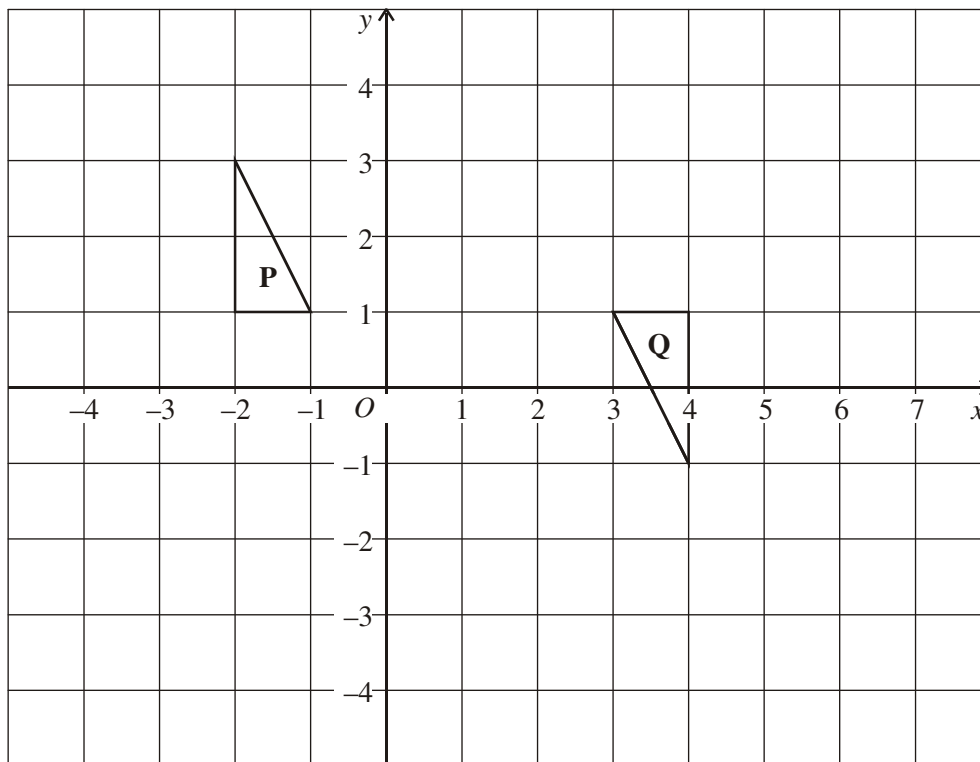
Diagram **NOT** accurately drawn

The diagram represents a cone.  
The height of the cone is 12 cm.  
The diameter of the base of the cone is 10 cm.

Calculate the curved surface area of the cone.  
Give your answer as a multiple of  $\pi$ .

.....  $\text{cm}^2$   
(Total 3 marks)

34.



Triangle **P** has been rotated  $180^\circ$  about the point  $(1, 1)$  to give triangle **Q**.

- (a) Rotate triangle **Q**  $180^\circ$  about the point  $(3, -1)$ .  
Label the triangle **R**.

(2)

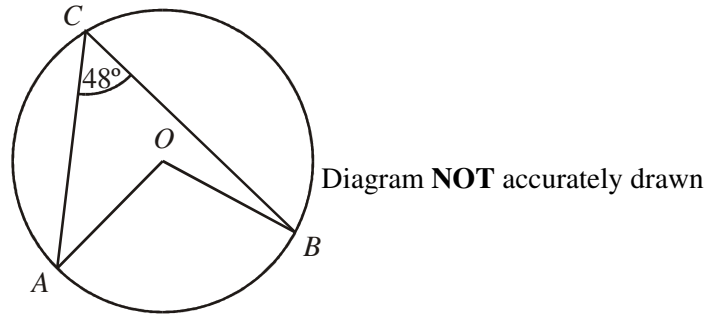
- (b) Describe the **single** transformation that takes triangle **P** to triangle **R**.

.....  
.....

(2)

(Total 4 marks)

35.

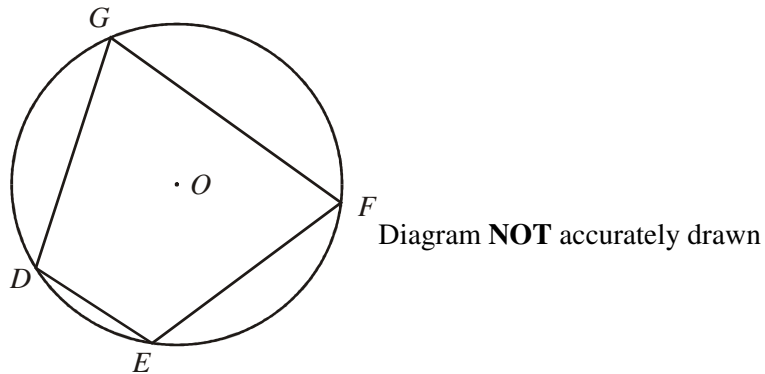


$A, B$  and  $C$  are points on the circumference of a circle, centre  $O$ .  
 Angle  $ACB = 48^\circ$

- (a) Write down the size of angle  $AOB$ .  
 Give a reason for your answer.

..... $^\circ$

(2)



$D, E, F$  and  $G$  are points on the circumference of a circle, centre  $O$ .

- (b) **Prove** that, in the cyclic quadrilateral  $DEFG$ ,

$$\text{angle } DEF + \text{angle } DGF = 180^\circ$$

*You may use, without proof, any standard theorem (fact) excluding those that refer to a cyclic quadrilateral.*

(3)  
 (Total 5 marks)

36.

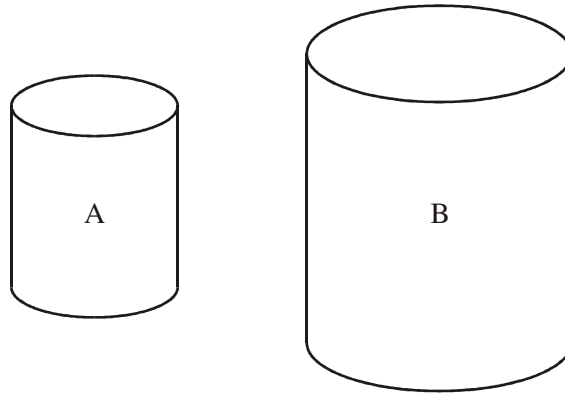


Diagram **NOT** accurately drawn

The two cylinders, A and B, are mathematically similar.  
The height of cylinder B is twice the height of cylinder A.

The total surface area of cylinder A is  $180 \text{ cm}^2$ .

Calculate the total surface area of cylinder B.

.....  
(Total 3 marks)

37.

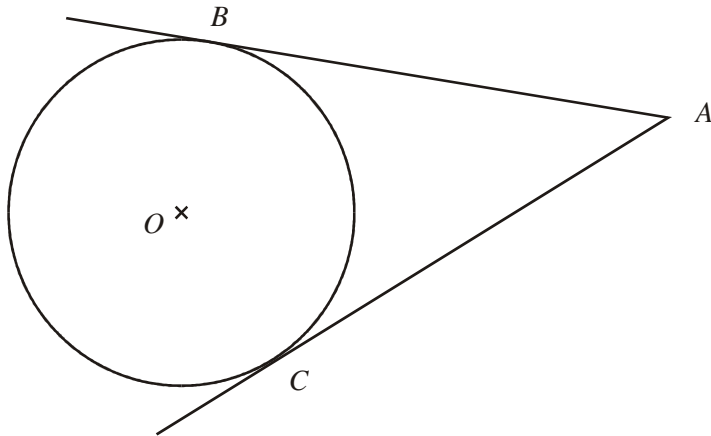


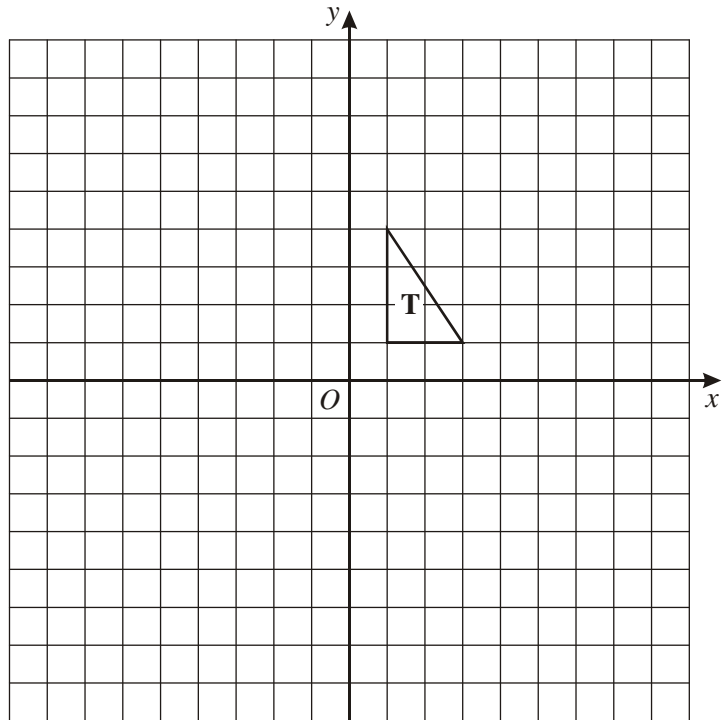
Diagram **NOT** accurately drawn

$B$  and  $C$  are points on a circle, centre  $O$ .  
 $AB$  and  $AC$  are tangents to the circle.  
Angle  $BOC = 108^\circ$ .

Work out the size of angle  $BAO$ .  
Give a reason for each stage in your working.

.....<sup>o</sup>  
(Total 3 marks)

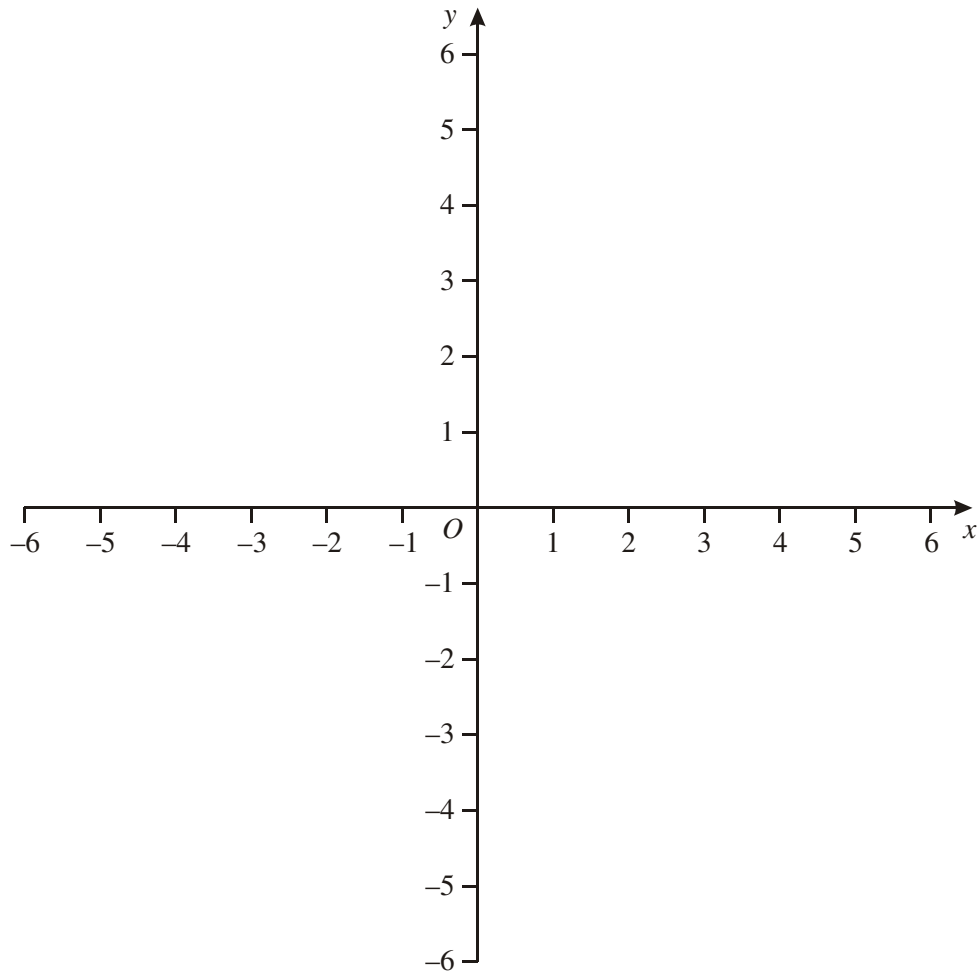
38.



Enlarge triangle **T**, scale factor  $-2$ , centre  $O$ .

**(Total 2 marks)**

39.

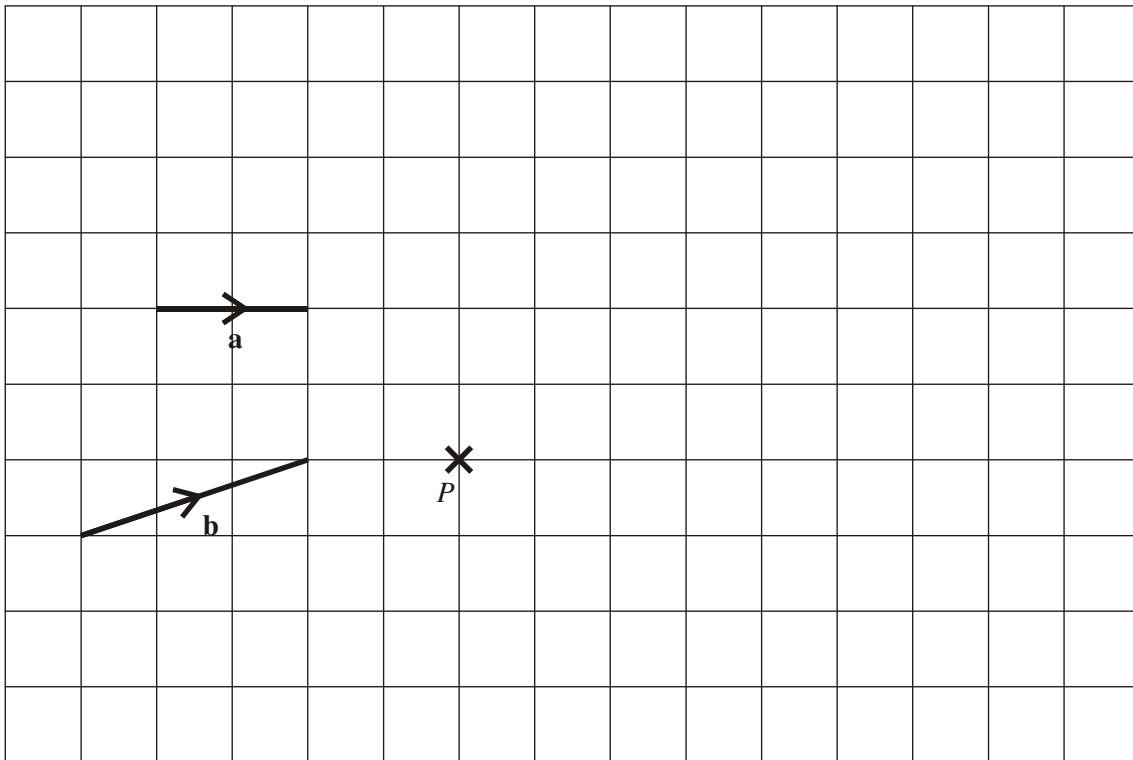


**R** is a reflection in the  $y$ -axis.  
**S** is a reflection in the line  $y = 3$

Describe fully the single transformation that is equivalent to the combined transformation of **R** followed by **S**.  
You may use the diagram to help you.

(Total 3 marks)

40.



The diagram shows two vectors **a** and **b**.

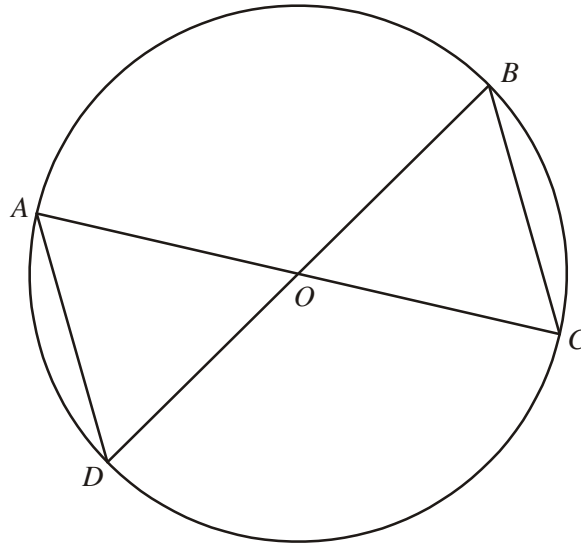
$$\overrightarrow{PQ} = \mathbf{a} + 2\mathbf{b}$$

On the grid above draw the vector  $\overrightarrow{PQ}$ .

**(Total 2 marks)**

41.

Diagram **NOT** accurately drawn

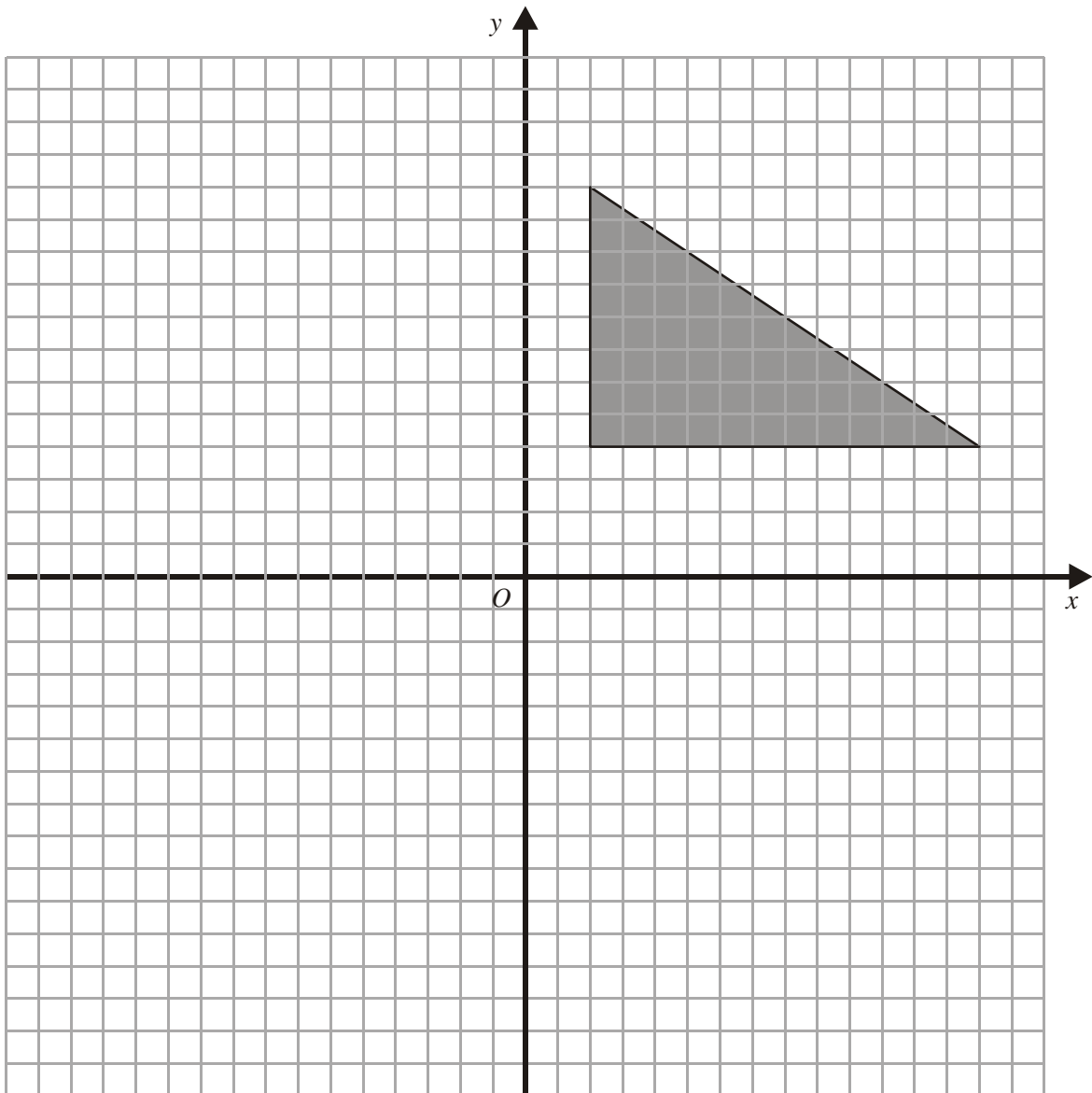


$A$ ,  $B$ ,  $C$  and  $D$  are four points on a circle, centre  $O$ .  
 $AOC$  and  $BOD$  are straight lines.

Prove that triangle  $AOD$  and triangle  $BOC$  are congruent.  
You must give reasons for each stage of your proof.

(Total 3 marks)

42.



Enlarge the triangle by a scale factor of  $-\frac{1}{2}$ , centre  $O$

**(Total 2 marks)**

43.

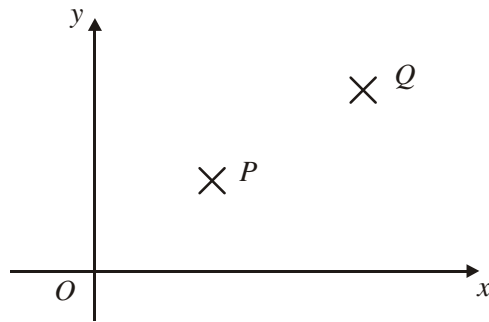


Diagram **NOT**  
accurately drawn

The diagram is a sketch.

$P$  is the point  $(2, 3)$

$Q$  is the point  $(6, 6)$

Write down the vector  $\overrightarrow{PQ}$

Write your answer as a column vector  $\begin{pmatrix} x \\ y \end{pmatrix}$

.....  $\begin{pmatrix} - \\ - \end{pmatrix}$  .....

**(Total 2 marks)**