

Mock Grade 7

Maths

Booklet 5

Paper 3H
Calculator

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- 1** A virus on a computer is causing errors.
An antivirus program is run to remove these errors.

An estimate for the number of errors at the end of t **minutes** is $10^8 \times 2^{-\frac{t}{12}}$

- (a) Work out an estimate for the number of errors on the computer at the end of 3 **hours**.

(2)

- (b) Explain whether the number of errors on this computer ever reaches zero.

(1)

(Total for Question 1 is 3 marks)

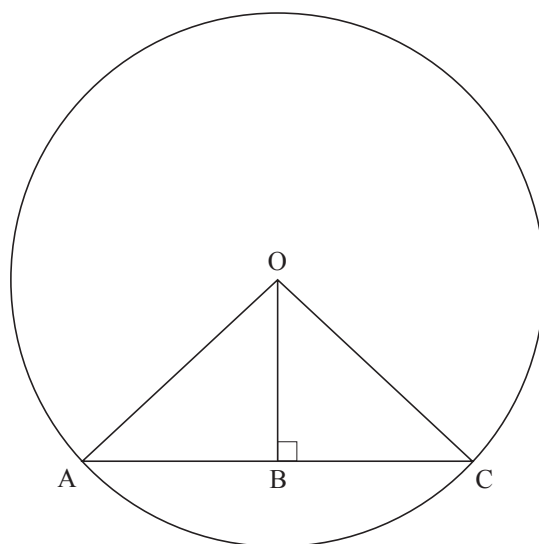
- 2** The graph of $y = f(x)$ is transformed to give the graph of $y = -f(-x + 3)$
The point A on the graph of $y = f(x)$ is mapped to the point P on the
graph of $y = -f(-x + 3)$

The coordinates of point A are (8, 2)
Find the coordinates of point P .

(..... ,)

(Total for Question 2 is 2 marks)

3 O is the centre of a circle.



Prove that the triangles OAB and OCB are congruent..

(Total for Question 3 is 3 marks)

4 (a) Show that the equation $2x^3 - x^2 - 3 = 0$ has a solution between $x = 1$ and $x = 2$.

(2)

(b) Show that the equation $2x^3 - x^2 - 3 = 0$ can be rearranged to give: $x = \sqrt{\frac{3}{2x-1}}$

(1)

(c) Starting with $x_0 = 1$, use the iteration formula $x_{n+1} = \sqrt{\frac{3}{2x_n-1}}$ twice to find an estimate for the solution to $2x^3 - x^2 - 3 = 0$

(3)

(Total for question 4 is 6 marks)

- 5** There are 11 men and 19 women in a choir.
The choir is going to sing at a concert.

One of the men and one of the women are going to be chosen to make a pair to sing the first song.

- (a) Work out the number of different pairs that can be chosen.

.....
(2)

Two of the men are to be chosen to make a pair to sing the second song.

Ben thinks the number of different pairs that can be chosen is 110

Mark thinks the number of different pairs that can be chosen is 55

- (b) Who is correct, Ben or Mark?
Give a reason for your answer.

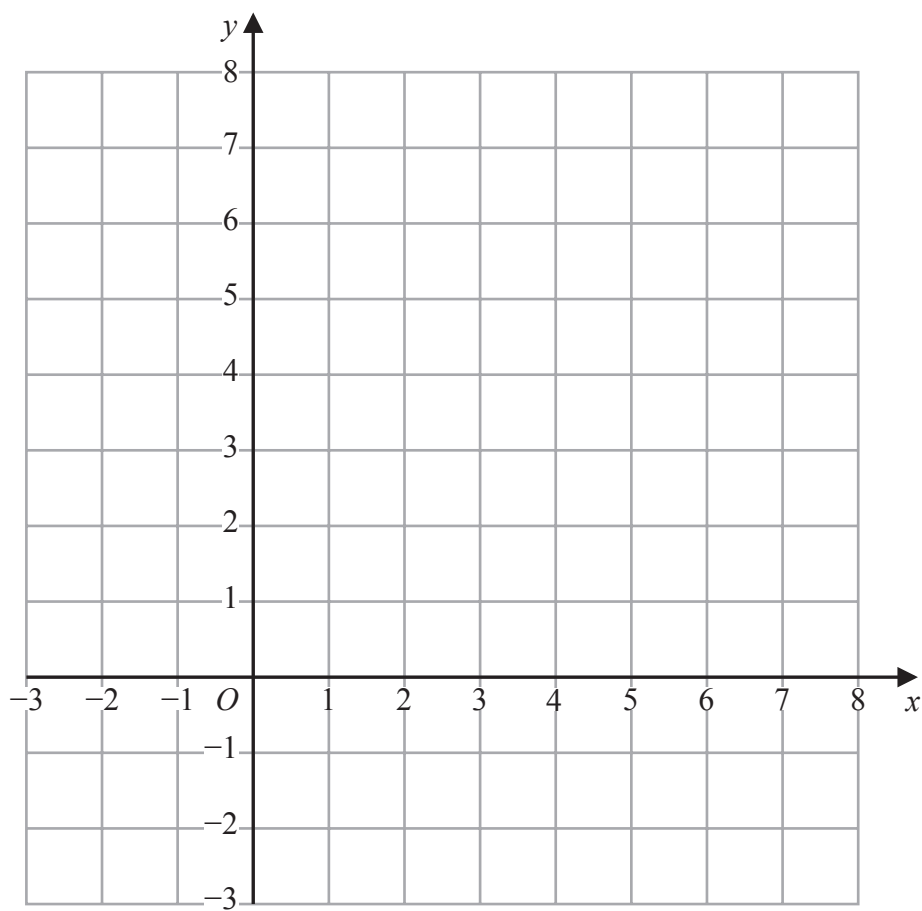
.....
.....
(1)

(Total for Question 5 is 3 marks)

6 (a) On the grid show, by shading, the region that satisfies all these inequalities.

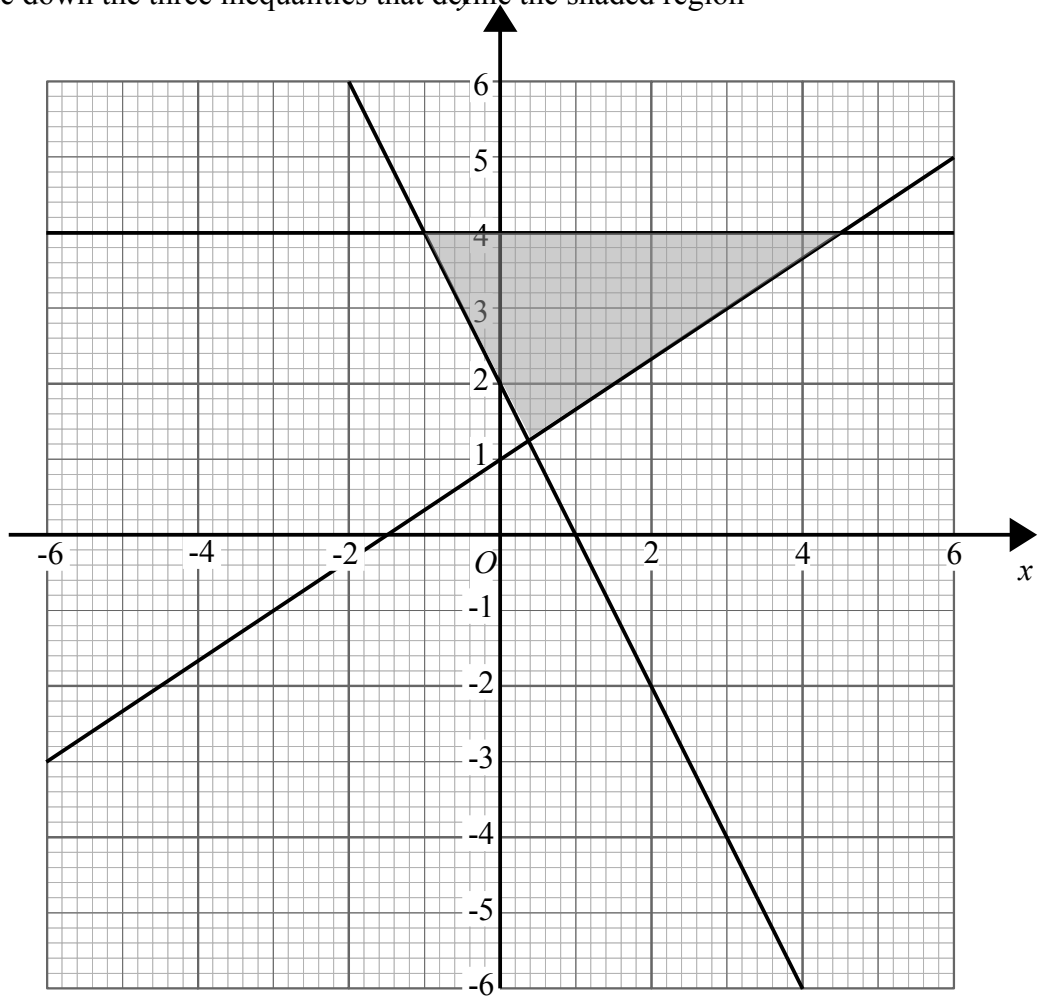
$$x \geq 2 \quad x \leq 4 \quad 2y \leq 2x + 3 \quad 3x + 4y \geq 12$$

Label the region **R**.



(4)

(b) Write down the three inequalities that define the shaded region



.....

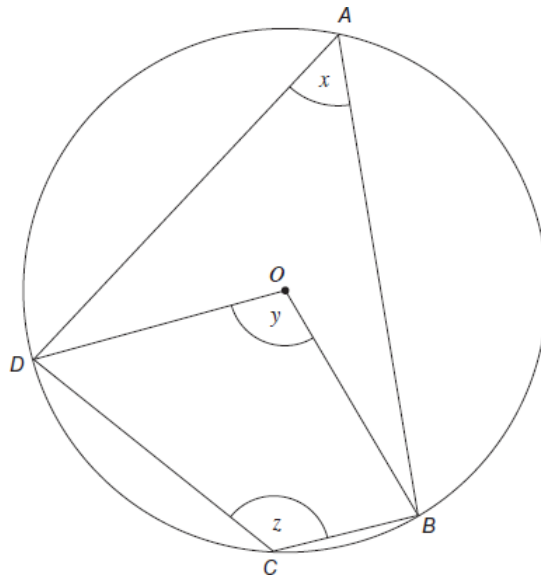
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(4)

(Total for Question 6 is 8 marks)

7



Points A , B , C and D lie on a circle with centre O .

$$x + y + z = 290^\circ$$

angle ODA : angle $OBD = 3 : 2$

Find the size of angle OBD .

You must give a reason for each stage of your working.

8 Prove algebraically that the recurring decimal $0.\dot{6}\dot{8}1$ can be written as $\frac{15}{22}$

(Total for Question 8 is 2 marks)

9 (a) Simplify $\frac{9x^2 - 4}{6x^2 + 7x + 2}$

.....
(3)

(b) Make v the subject of the formula $w = \frac{4(t - 3v)}{t + v}$

.....
(3)

(Total for Question 14 is 6 marks)