

GCSE 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 hours is $10^6 \times 2^{-t}$

- (a) Work out an estimate for the number of errors on the computer at the end of 8 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 $(9, 1)$

Find the coordinates of point P .

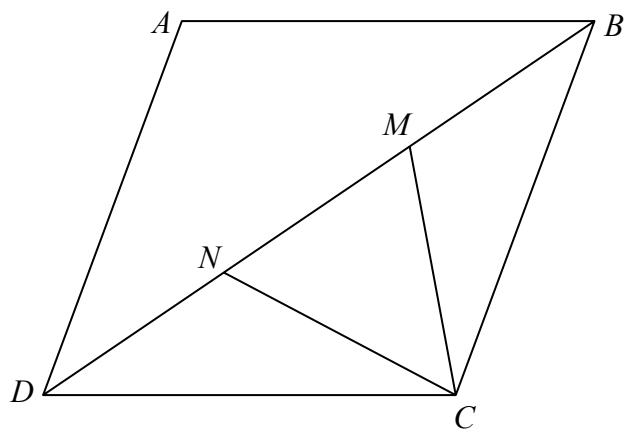
(.....,)

(Total for Question 2 is 2 marks)



S 4 9 8 2 0 A 0 1 5 2 0

3 $ABCD$ is a rhombus.



M and N are points on BD such that $DN = MB$.

Prove that triangle DNC is congruent to triangle BMC .

(Total for Question 3 is 3 marks)

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

(2)

(b) Show that the equation $x^3 + 4x = 1$ can be arranged to give $x = \frac{1}{4} - \frac{x^3}{4}$

(1)

(c) Starting with $x_0 = 0$, use the iteration formula $x_{n+1} = \frac{1}{4} - \frac{x_n^3}{4}$ twice,
to find an estimate for the solution of $x^3 + 4x = 1$

(3)

(Total for Question 4 is 6 marks)

- 5 There are 17 men and 26 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 136

Mark thinks the number of different pairs that can be chosen is 272

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

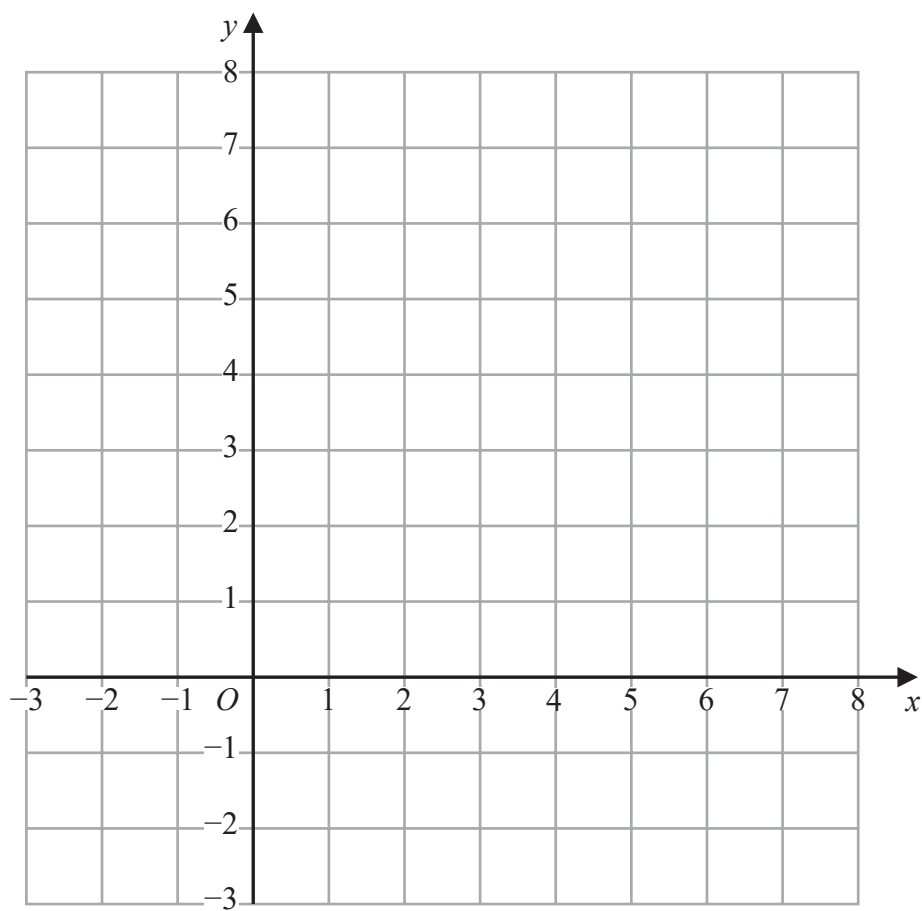
.....
.....
(1)

(Total for Question 5 is 3 marks)

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

$$x \geq 0 \quad x \leq 2 \quad y \leq x + 3 \quad 2x + 3y \geq 6$$

Label the region **R**.

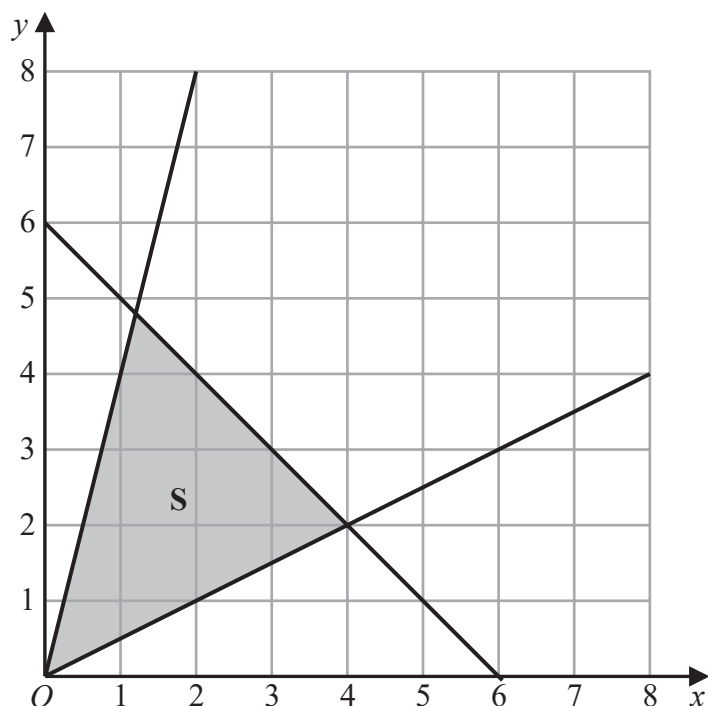


(4)



(b) The diagram below shows the region S that satisfies the inequalities

$$y \leq 4x \quad y \geq \frac{1}{2}x \quad x + y \leq 6$$



Geoffrey says that the point with coordinates (2, 4) does not satisfy all the inequalities because it does not lie in the shaded region.

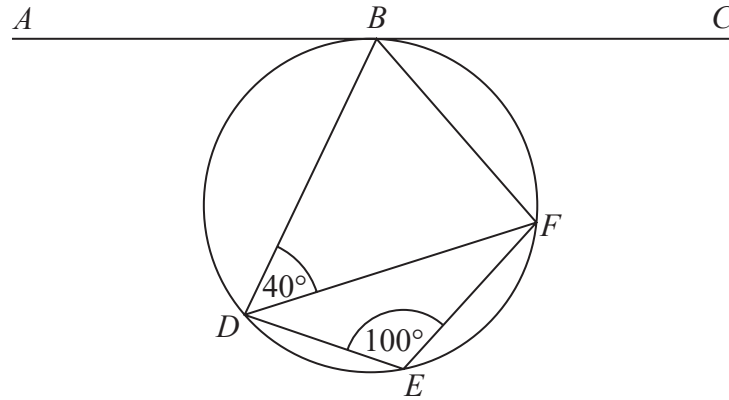
Is Geoffrey correct?

You must give a reason for your answer.

(1)

(Total for Question 6 is 5 marks)





Points B , D , E and F lie on a circle.
 ABC is the tangent to the circle at B .

Find the size of angle ABD .
 You must give a reason for each stage of your working.

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DO NOT WRITE IN THIS AREA

(Total for Question 7 is 4 marks)



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DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

8 Prove algebraically that $0.7\dot{3}$ can be written as $\frac{11}{15}$

(Total for Question 8 is 2 marks)



P 6 2 2 7 9 A 0 1 7 2 4

9 (a) Simplify $\frac{x^2 - 16}{2x^2 - 5x - 12}$

.....
(3)

(b) Make v the subject of the formula $w = \frac{15(t - 2v)}{v}$

.....
(3)

(Total for Question 14 is 6 marks)

