AQA Level 2 Certificate in **FURTHER MATHEMATICS (8365/2)**

Paper 2

Specimen 2020 Time allowed: 1 hour 45 minutes

Materials

For this paper you must have: • mathematical instruments **You may use a calculator**	

Instructions

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the bottom of this page.
- Answer **all** questions.
- You must answer the questions in the space provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work that you do not want to be marked.
- In all calculations, show clearly how you work out your answer.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 80.
- You may ask for more answer paper, graph paper and tracing paper. These must be tagged securely to this answer booklet.

Please write clearly, in block capitals, to allow character computer recognition.

Centre number ☐☐☐☐☐ Candidate number ☐☐☐☐

Surname ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

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Candidate signature _____

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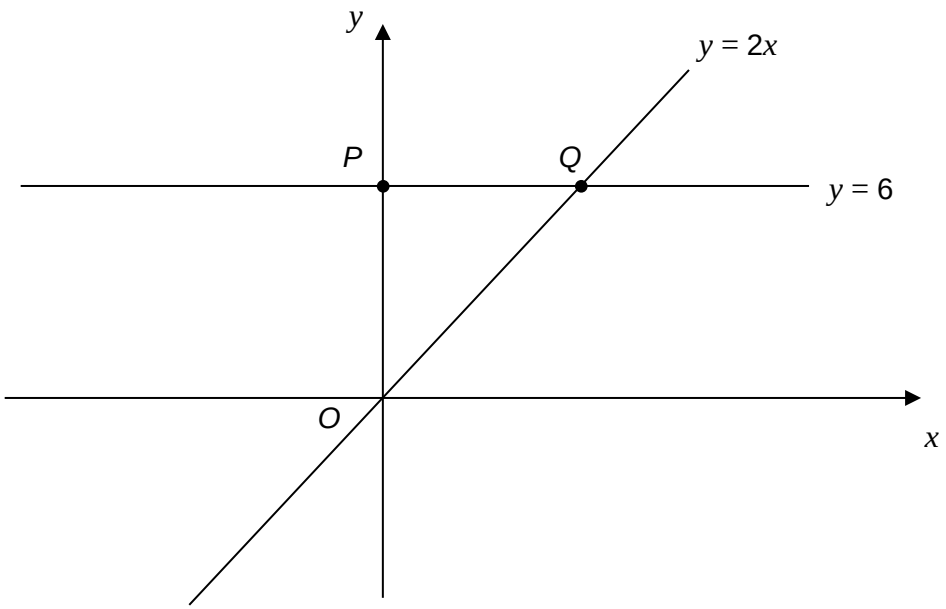
ANSWER IN THE SPACES PROVIDED

Answer **all** questions in the spaces provided.

1 A sketch of the lines $y = 2x$ and $y = 6$ is shown.



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Work out the area of triangle *OPQ*.

[3 marks]

Answer _____ units^2

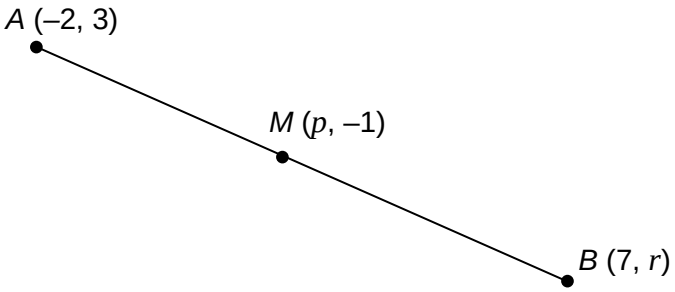
2 A circle, centre (0, 0) has circumference 20π

Work out the equation of the circle.

[2 marks]

Answer _____

3 *M* is the midpoint of the line *AB.*



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Work out the values of p and r.

[2 marks]

p = _____ r = _____

4 (a) Circle the solution of $-3x < -18$

[1 mark]

$x > -6$ $x < -6$ $x > 6$ $x < 6$

4 (b) Circle the solution of $x^2 \geqslant 16$

[1 mark]

$x \geqslant -4$ or $x \leqslant 4$ $x \leqslant -4$ or $x \geqslant 4$

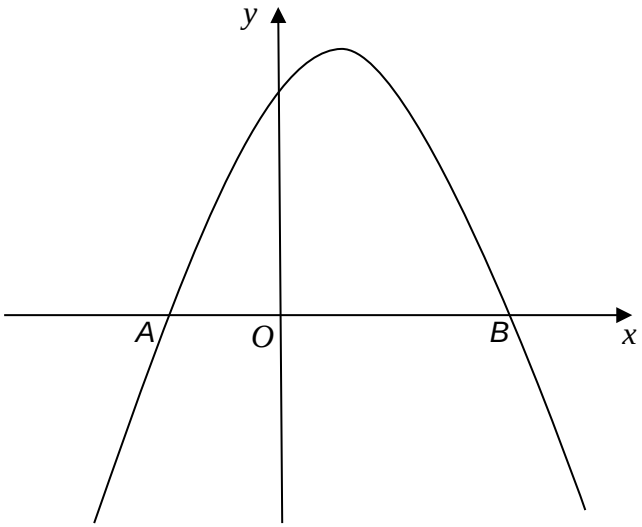
$x \geqslant -4$ or $x \geqslant 4$ $x \leqslant -4$ or $x \leqslant 4$

5 Here is a sketch of $y = f(x)$ where $f(x)$ is a quadratic function.

The graph

intersects the x-axis at A (–1, 0) and B

has a maximum point at (0.5, 6)



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5 (a) Work out the coordinates of B.

[1 mark]

Answer (_____ , _____)

5 (b) The equation $f(x) = k$ has exactly **one** solution.

Write down the value of k.

[1 mark]

Answer _____

6 $\mathbf{A} = \begin{pmatrix} 4 & -1 \\ -7 & 2 \end{pmatrix}$ $\mathbf{B} = \begin{pmatrix} s \\ -5 \end{pmatrix}$ $\mathbf{C} = \begin{pmatrix} -1 \\ t \end{pmatrix}$ $\mathbf{D} = \begin{pmatrix} 2 & 1 \\ 7 & u \end{pmatrix}$

s, t and u are constants.

6 (a) $\mathbf{AB} = \mathbf{C}$

Work out the values of s and t.

[3 marks]

$s =$ _____

$t =$ _____

6 (b) **AD** = **l**

Work out the value of u.

[1 mark]

u = _____

7 Work out the equation of the straight line that is

parallel to the line $2y = x$

and

intersects the x-axis at (4, 0)

[3 marks]

Answer _____

8 (a) Work out $\frac{ab}{cd} \div \frac{bc}{ad}$

Give your answer as a single fraction in its simplest form.

[2 marks]

Answer _____

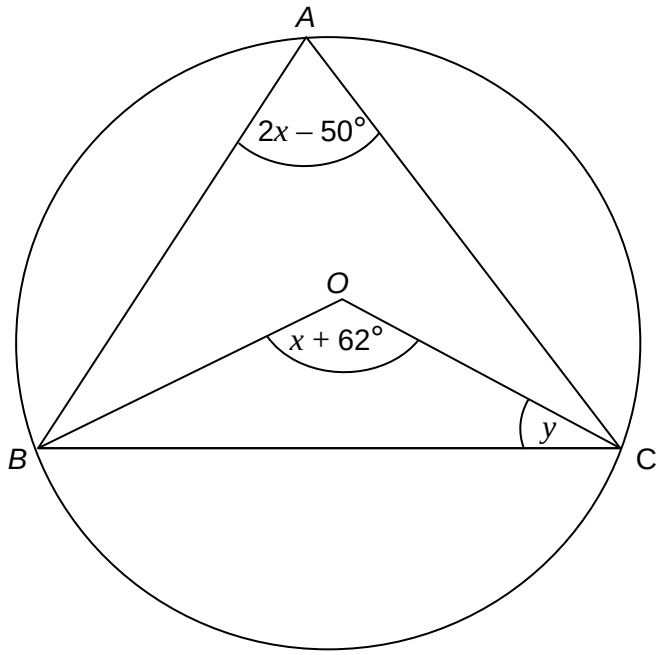
8 (b) Work out $\frac{7}{2x^2} + \frac{4}{3x}$

Give your answer as a single fraction in its simplest form.

[2 marks]

Answer _____

9 *A*, *B* and *C* are points on a circle, centre *O*.



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Work out the size of angle *y*.

[5 marks]

Answer _____ degrees

10 $y = \dfrac{6x^9 + x^8}{2x^4}$

Work out the value of $\dfrac{\mathrm{d}^2y}{\mathrm{d}x^2}$ when $x = 0.5$

[5 marks]

Answer _____

11 For sequence A, nth term $= \dfrac{n}{14n + 30}$

For sequence B, nth term $= \dfrac{2}{n}$

The kth term of sequence A equals the kth term of sequence B.

Work out the value of k.

You **must** show your working.

[4 marks]

Answer _____

12 This shape is made from two rectangles.

All dimensions are in centimetres.

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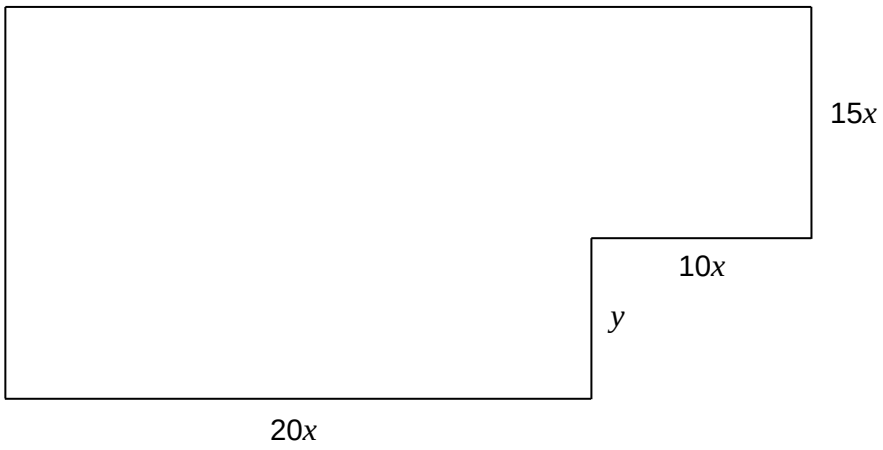

12 (a) The perimeter of the shape is 252 cm

Show that $y = 126 - 45x$

[2 marks]

12 (b) The area of the shape is A cm^2

Show that $A = 2520x - 450x^2$

[2 marks]

12 (c) Use differentiation to work out the maximum value of A as x varies.

[3 marks]

Answer _____

13 $f(x) = 3x^2 + 6$ for all x

$g(x) = \sqrt{x-5}$ $x \geqslant 5$

13 (a) Work out the value of $gf(4)$

[2 marks]

Answer _____

13 (b) Show that $fg(x)$ can be written in the form $a(x-a)$ where a is an integer.

[2 marks]

Answer _____

14 Use the sine rule to work out the size of obtuse angle x.

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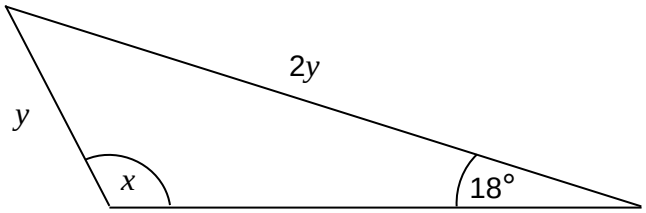
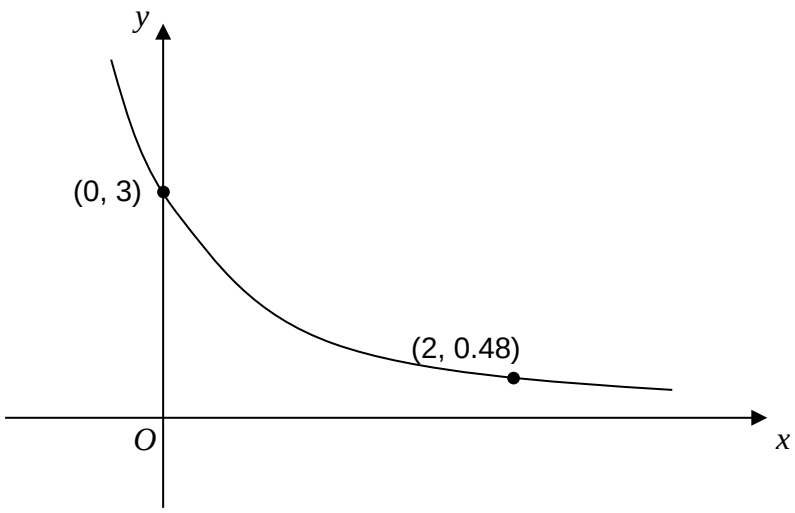


[3 marks]

Answer _____ degrees

15 Here is a sketch of the curve $y = ab^{-x}$ where a and b are positive constants.

(0, 3) and (2, 0.48) lie on the curve.



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Work out the values of a and b.

[4 marks]

a = _____

b = _____

16 Simplify $\dfrac{8x^3 - 50x}{2x(6x^2 - x - 35)}$

Give your answer in the form $\dfrac{ax + b}{cx + d}$ where a, b, c and d are integers.

[5 marks]

Answer _____

17 By multiplying both sides of the equation by $x^{\frac{1}{2}}$

Solve $2x^{\frac{3}{2}} - 3x^{\frac{1}{2}} = 7x^{-\frac{1}{2}}$ for $x > 0$

Give your answer to 3 significant figures.

You **must** show your working.

[4 marks]

Answer _____

18 How many **odd** numbers greater than 30 000 can be formed from these digits

2 4 6 7 8

with no repetition of any digit?

[3 marks]

Answer _____

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19 $f(x) = 3x^3 - 2x^2 - 7x - 2$

19 (a) Use the factor theorem to show that $(3x + 1)$ is a factor of $f(x)$.

[2 marks]

19 (b) Factorise $f(x)$ fully.

[3 marks]

Answer _____

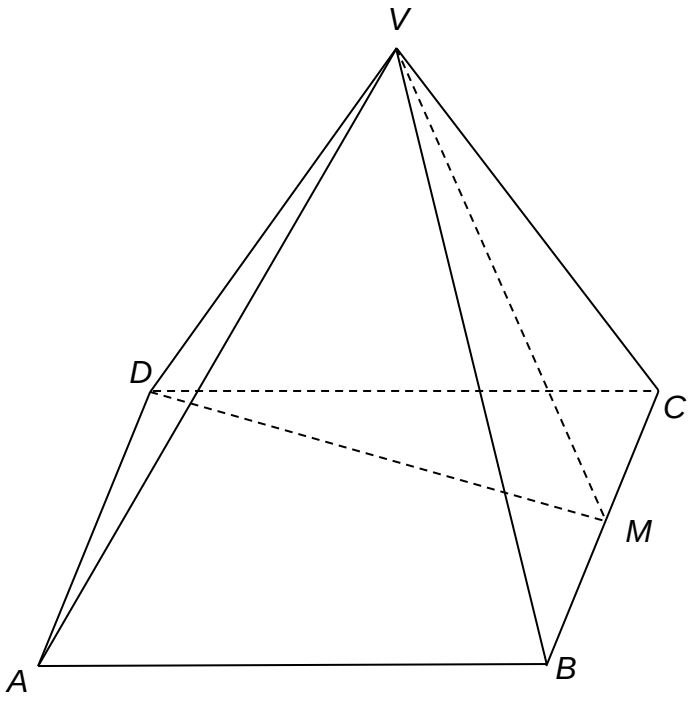
20 *VABCD* is a pyramid with a horizontal rectangular base *ABCD*.

V is directly above the centre of the base.

VA = *VB* = *VC* = *VD* = 10 cm

AB = 8 cm *BC* = 6 cm

M is the midpoint of *BC.*



Work out the size of angle *VMD*.

[5 marks]

Answer _____ degrees

21 Show that $(2n + 3)^3 + n^3$ is divisible by 9 for all integer values of n.

[4 marks]

END OF QUESTIONS