

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

Forename(s)

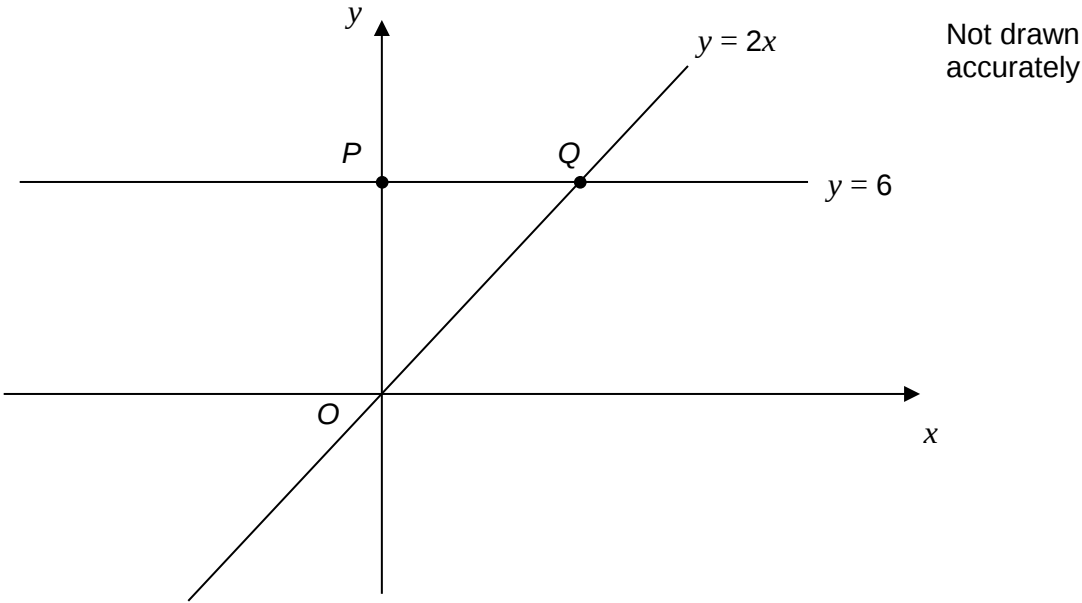
Candidate signature

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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.



Work out the area of triangle OPQ .

[3 marks]

Answer _____ units²

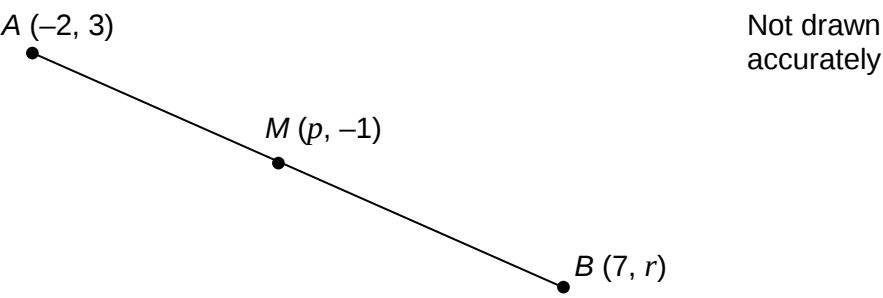
- 2** A circle, centre $(0, 0)$ has circumference 20π

Work out the equation of the circle.

[2 marks]

Answer _____

3 M is the midpoint of the line AB .



Work out the values of p and r . [2 marks]

$p =$ _____ $r =$ _____

4 (a) Circle the solution of $-3x < -18$ [1 mark]

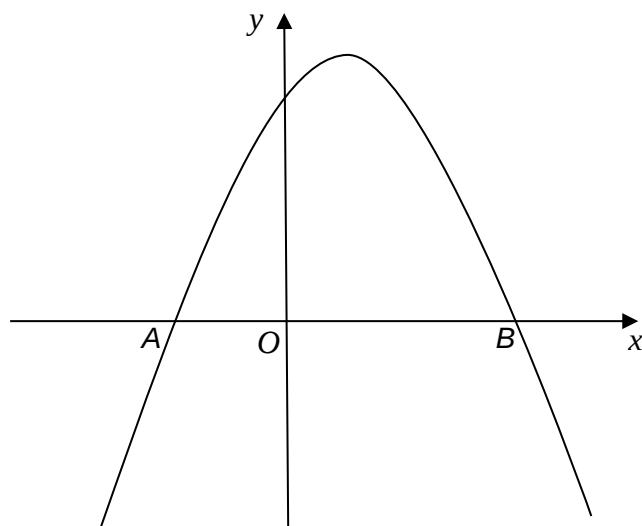
$x > -6$ $x < -6$ $x > 6$ $x < 6$

4 (b) Circle the solution of $x^2 \geq 16$ [1 mark]

$x \geq -4$ or $x \leq 4$ $x \leq -4$ or $x \geq 4$

$x \geq -4$ or $x \geq 4$ $x \leq -4$ or $x \leq 4$

- 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 $(0.5, 6)$



Not drawn
accurately

- 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 _____

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

s , t and u are constants.

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

Work out the values of s and t .

[3 marks]

$$s = \underline{\hspace{10cm}}$$

$$t = \underline{\hspace{10cm}}$$

6 (b) **AD = I**

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 _____

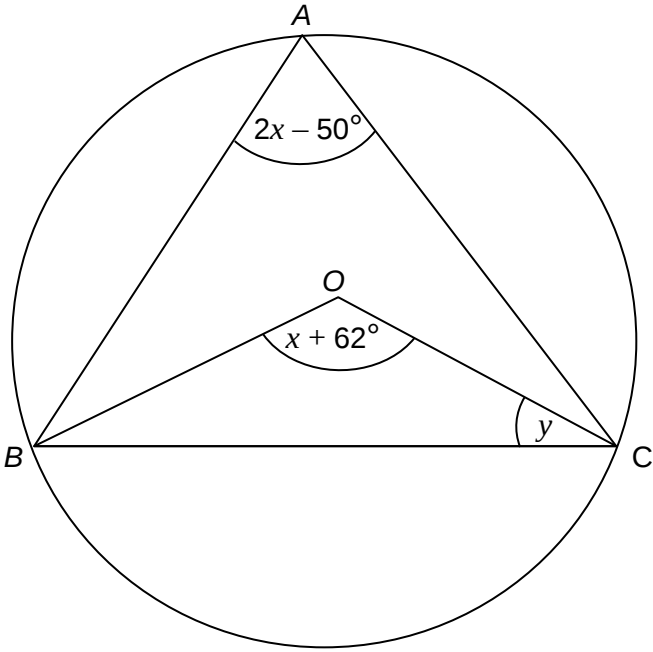
8 (b) Work out $\frac{7}{2x^2} + \frac{4}{3x}$

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 .



Not drawn
accurately

Work out the size of angle y .

[5 marks]

Answer _____ degrees

10

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

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

[5 marks]

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Answer _____

11 For sequence A, $n\text{th term} = \frac{n}{14n + 30}$

For sequence B, $n\text{th term} = \frac{2}{n}$

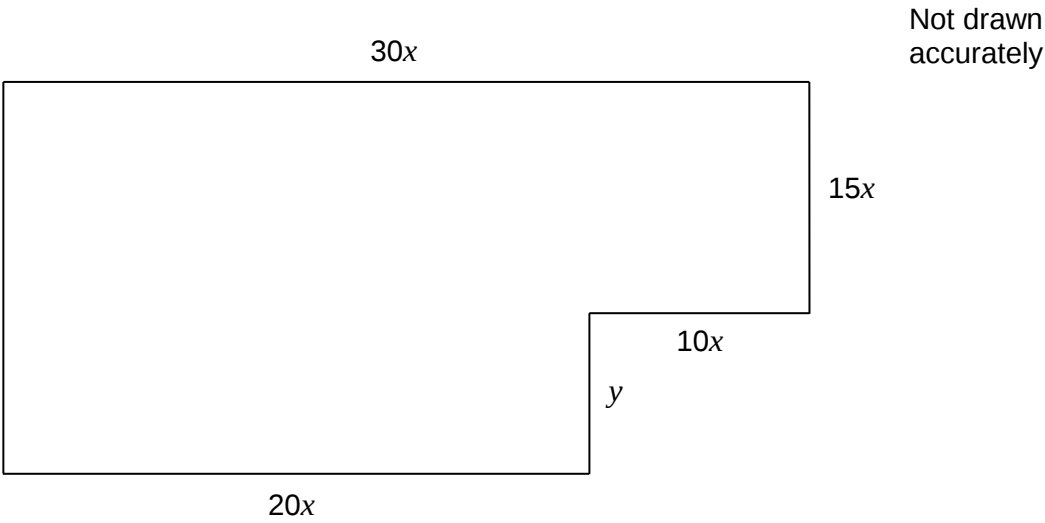
The k th term of sequence A equals the k th term of sequence B.

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.



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 $A \text{ cm}^2$
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
 $g(x) = \sqrt{x - 5}$ $x \geq 5$

13 (a) Work out the value of $gf(4)$ **[2 marks]**

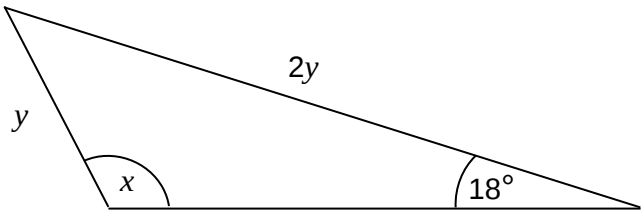
Answer _____

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 .

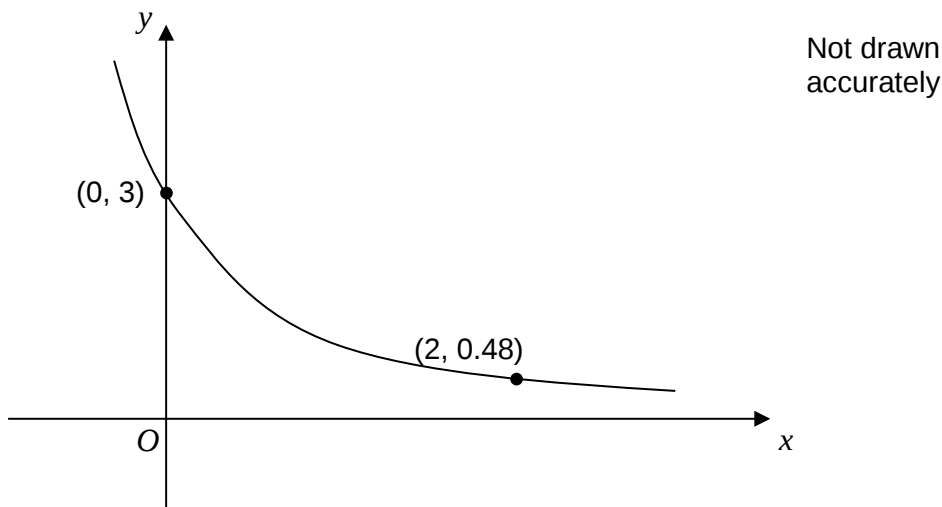
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[3 marks]

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.



Work out the values of a and b .

[4 marks]

a

=

b

=

Simplify

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

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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

24678

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

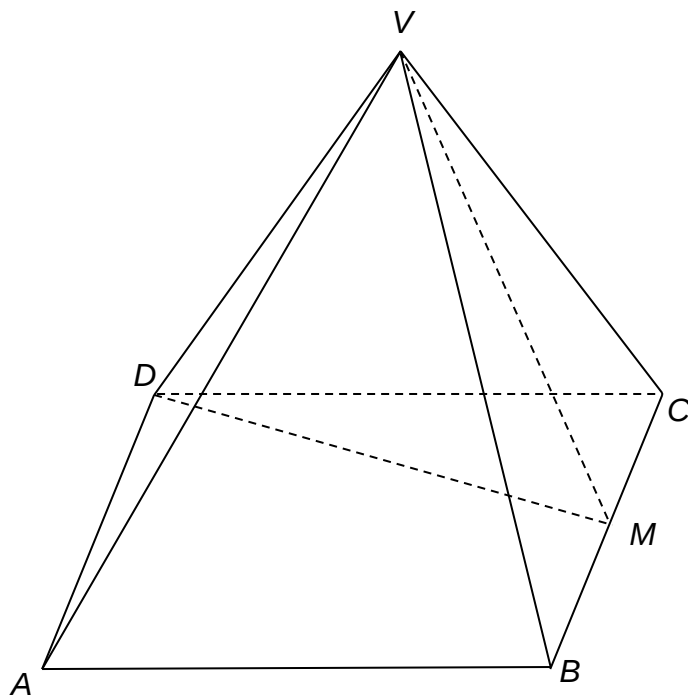
$VABCD$ is a pyramid with a horizontal rectangular base $ABCD$.

V is directly above the centre of the base.

$$VA = VB = VC = VD = 10 \text{ cm}$$

$$AB = 8 \text{ cm} \quad BC = 6 \text{ cm}$$

M is the midpoint of BC .



Work out the size of angle VMD .

[5 marks]

[illegible]

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