

Name:

Practice Paper for AQA Level 2 Certificate
FURTHER MATHEMATICS
Paper 1 Non-Calculator

Time allowed: 1 hour 45 minutes

Materials

For this paper you must have:

- mathematical instruments.

You must **not** use a calculator.

Instructions

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).
- Do all rough work in this book. Cross through any work 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 graph paper and tracing paper. These must be tagged securely to this answer book.

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

1 Factorise fully $6a^4b - 15ab^3$

[2 marks]

Answer _____

2 Work out the values of p , q and r such that $2x^2 - 8x + p \equiv q(x + r)^2 + 19$

[3 marks]

$p =$ _____ $q =$ _____ $r =$ _____

3 Work out $\begin{pmatrix} 2 & 6 \\ 4 & 5 \end{pmatrix} \begin{pmatrix} 8 & 1 \\ 10 & 3 \end{pmatrix}$

[2 marks]

Answer _____

4 How many numbers satisfy **all** of the following conditions?

- The number is a four-digit integer..
- The second digit is 8.
- The other digits are all odd numbers.

[3 marks]

Answer _____

5 Simplify $\sqrt{8}(\sqrt{98} + \sqrt{32} - \sqrt{50})$ writing your answer as an integer.

[3 marks]

Answer _____

6 Solve $x^2 - x < 12$

[2 marks]

Answer _____

7 Use **matrix multiplication** to show that, in the x - y plane,

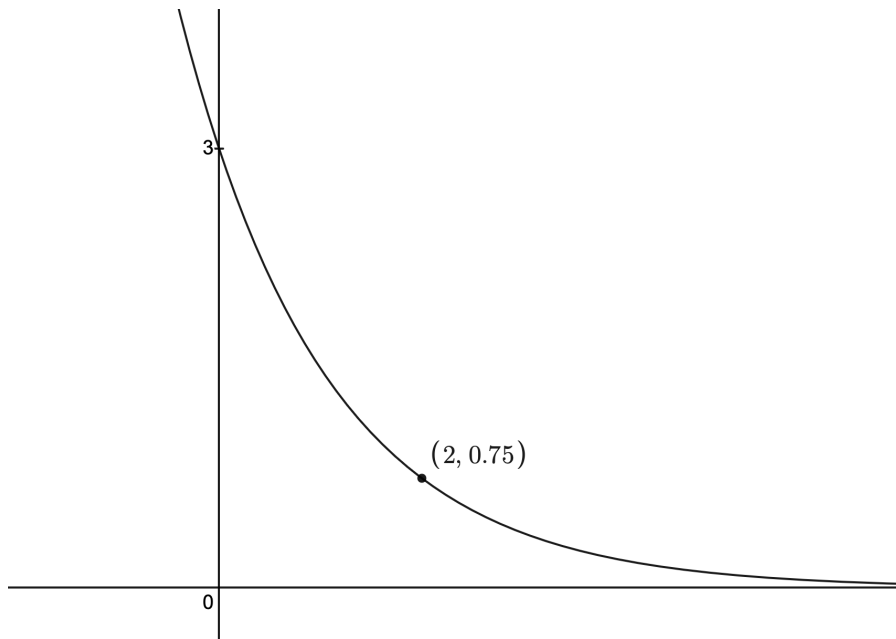
- a reflection in the line $y = x$, followed by
- a reflection in the line $y = -x$

is equivalent to a rotation of 180° about the origin.

[3 marks]

- 8 The curve shown has equation $y = ab^{-x}$ where a and b are positive integers. The point $(2, 0.75)$ lies on the curve. Find the values of a and b .

[2 marks]



$a = \underline{\hspace{2cm}}$ $b = \underline{\hspace{2cm}}$

- 9 The curve with equation $y = x^5 + 4x^3 - 6x^2 - 5x + 13$ has a turning point at $(1,7)$. Determine whether this point is a maximum or a minimum.

[2 marks]

Answer _____

- 10 $f(x) = 2x - 1$
 $g(x) = x^2 + 3$

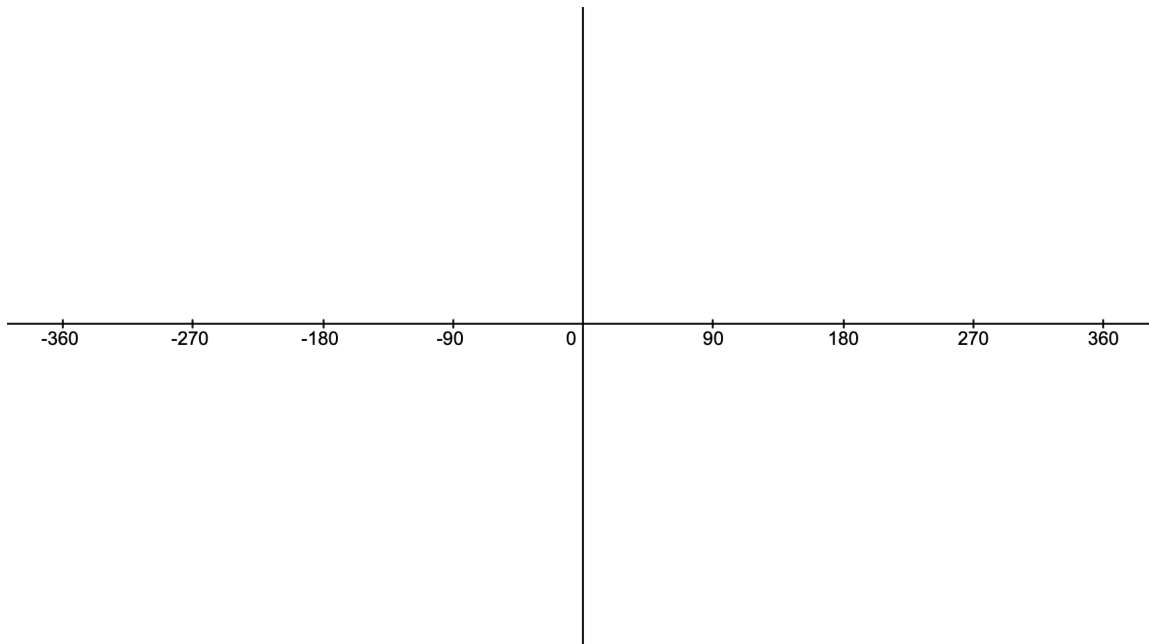
Work out $fg(x)$

[2 marks]

Answer _____

11 (a) On the axes, sketch $y = \cos x$ for $-360^\circ \leq x \leq 360^\circ$

[3 marks]



(b) You are given that $180^\circ < u < 360^\circ$ and that $\tan u = 1$.
Find the value of u .

[1 mark]

Answer _____

12 The n th term of a sequence is U_n

$$U_n = \frac{4n - 11}{5n}$$

(a) Work out the least value of n for which $U_n \geq 0.7$

[3 marks]

Answer _____

(b) Write down the limiting value of U_n as $n \rightarrow \infty$

[1 mark]

Answer _____

- 14** The table lists the equations of three straight lines.

Equation of line	Gradient	y-intercept
$y = 7 - 3x$		
$5x + 2y = 20$		
$\frac{y - 21}{x - 5} = 3$		

Fill in the gradients and y-intercepts of each line.

[6 marks]

- 15 (a)** The circle with equation $(x + 5)^2 + (y - 3)^2 = 25$ has three points of intersection with the coordinate axes. Find the coordinates of these three points.

[3 marks]

Answer _____, _____, _____

- (b)** The three points of intersection are joined to form a triangle. Work out the ratio of the length of this triangle's shortest side to its longest side. Write your answer in the form $1:n$, where n is an integer.

[4 marks]

Answer _____

- 19 This circle has radius 7 cm.
You are given that $a : b : c : d = 6 : 2 : 3 : 1$

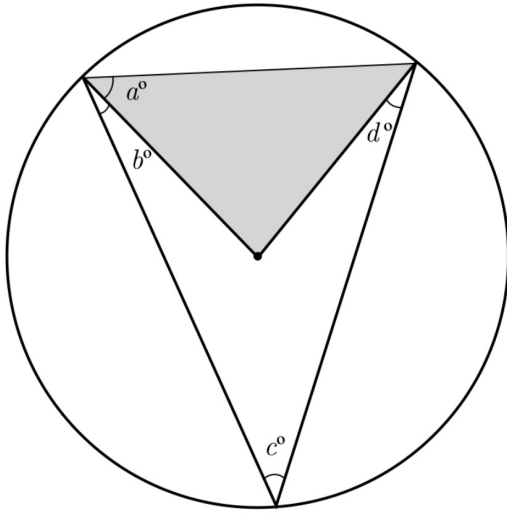


Diagram not drawn accurately.

Find the shaded area in cm^2 , giving your answer in the form $\frac{u\sqrt{v}}{w}$, where u , v , and w are integers.

[5 marks]

Answer _____

