ADDITIONAL SAMPLE
ASSESSMENT MATERIAL

Please write clearly, in block capitals.

Centre number | | | | | | Candidate number | | | | |

Surname _____

Forename(s) _____

Candidate signature _____

Level 2 Certificate
FURTHER MATHEMATICS

Paper 2 - Calculator

Additional Sample

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.

There are no questions printed on this page

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ANSWER IN THE SPACES PROVIDED

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

1 (a) $3\begin{pmatrix} 2 & 1 \\ -5 & 0 \end{pmatrix}\begin{pmatrix} 4 \\ -3 \end{pmatrix} = \begin{pmatrix} a \\ b \end{pmatrix}$

Work out the values of a and b.

[3 marks]

a = _____ b = _____

1 (b) Work out $\begin{pmatrix} 5 & -3 \\ 1 & 2 \end{pmatrix}\begin{pmatrix} 2 & -3 \\ -1 & 5 \end{pmatrix}$

[2 marks]

Answer _____

2 (a) Write $\frac{5}{2m} \div \frac{10}{3m^2}$ as a single fraction in its simplest form.

[3 marks]

Answer _____

2 (b) Write $\frac{7}{4x} + \frac{5}{6y}$ as a single fraction in its simplest form.

[2 marks]

Answer _____

3 $y = x^5 + x$

Work out the positive value of x at which the rate of change of y with respect to x is 81

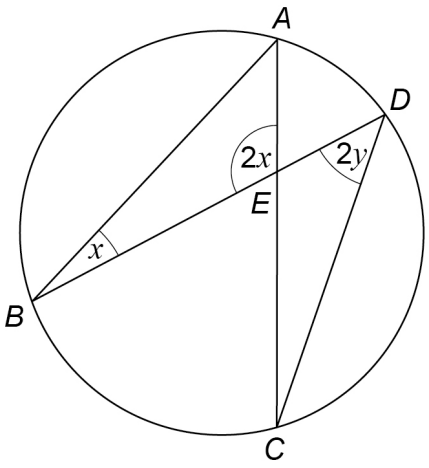
[3 marks]

Answer _____

Turn over for the next question

4 *A*, *B*, *C* and *D* are points on a circle.

AC and *BD* intersect at *E*.



Not drawn accurately

Prove that $y = 90° - \frac{3}{2}x$

[3 marks]

5 (a) $f(x) = \dfrac{x-3}{6x-5}$

Which value of x can **not** be in the domain of $f(x)$?

Circle your answer.

[1 mark]

0 $\quad \frac{5}{6} \quad \frac{6}{5} \quad$ 3

5 (b) $g(x) = 32 - 3x$ with domain $-5 \leqslant x \leqslant 2$

Work out the range of $g(x)$.

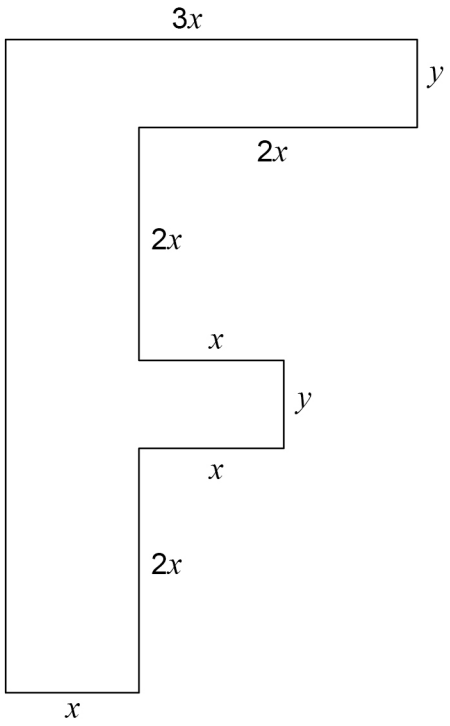
Give your answer as an inequality.

[2 marks]

Answer _____

6 This F shape is made from rectangles.

All lengths are in centimetres.



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6 (a) The perimeter of the F shape is 64 cm

Show that $y = 16 - 4x$

[2 marks]

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

Show that $A = 80x - 16x^2$

[3 marks]

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

[3 marks]

Answer _____ cm^2

7 Rearrange $c = \sqrt{\frac{d+4}{3d}}$ to make d the subject.

[4 marks]

Answer _____

8 (a) Factorise fully $2(a+3)^9 - 8(a+3)^8$

[3 marks]

Answer _____

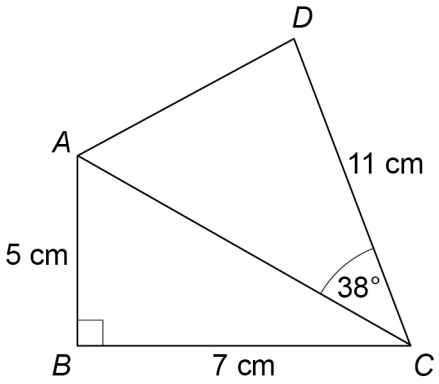
8 (b) Factorise fully $x^6 - 9x^4$

[2 marks]

Answer _____

Turn over for the next question

9 Quadrilateral *ABCD* is made from two triangles.



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Work out the area of *ABCD*.

[4 marks]

Answer _____ cm^2

10 $y = 3x^4 - \frac{6}{x}$

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

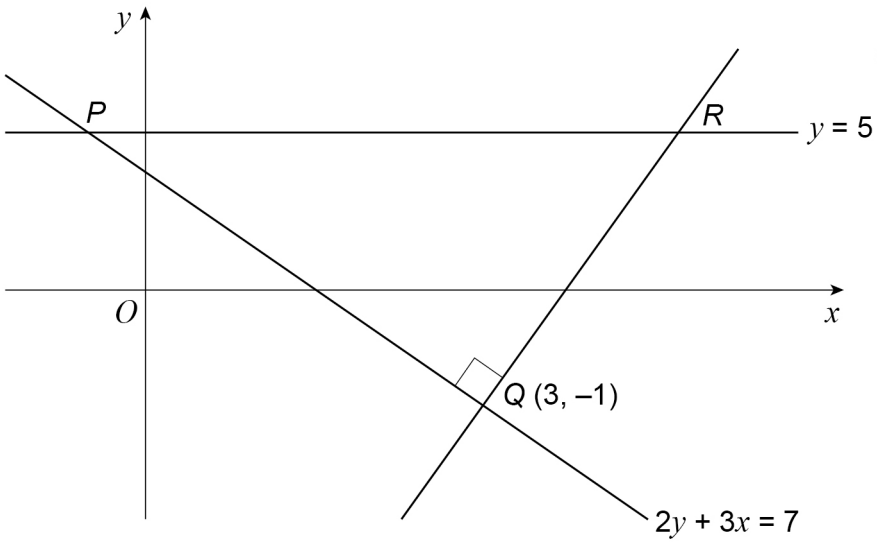
[4 marks]

Answer _____

Turn over for the next question

11 Triangle PQR is bounded by the lines shown.

Angle $PQR = 90°$



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Work out the x-coordinate of R.

[5 marks]

Answer _____

12 (a) Use the factor theorem to show that $(2x - 1)$ is a factor of $4x^3 + 28x^2 + 21x - 18$

[2 marks]

12 (b) Hence, factorise fully $4x^3 + 28x^2 + 21x - 18$

[3 marks]

Answer _____

13 Integers are made using some or all of the digits 1, 2, 3, 4, 5 and 6

Each integer made

is greater than 50000

has no digit repeated.

How many integers can be made?

[3 marks]

Answer _____

14 The coefficient of x^2 in the expansion of $(3 + ax)^4$ is 150

Work out the **two** possible values of a.

[3 marks]

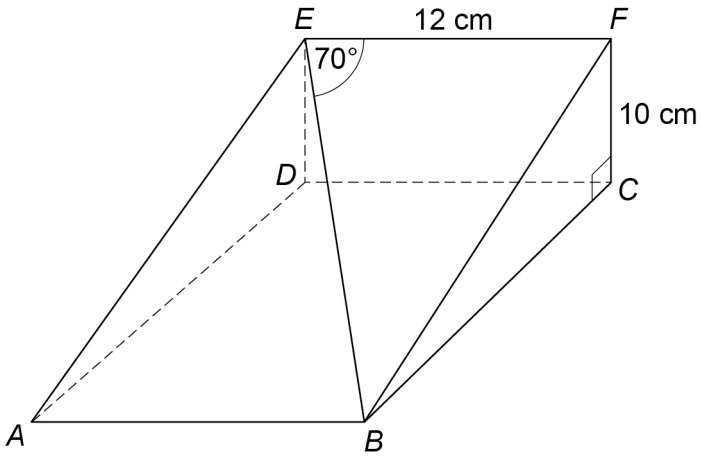
Answer _____

15 *ABCDEF* is a triangular prism with a right-angled triangle as cross section.

ABCD and *ABFE* are rectangles.

Angle *BEF* = 70°

EF = 12 cm *FC* = 10 cm



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Work out the size of angle *FBC*.

[4 marks]

Answer _____ degrees

16 $h(x) = 5x(x - 4)$

Solve $3h(x) = h(2x)$

[4 marks]

Answer _____

17 Solve the simultaneous equations

$$10x^2 + 5xy - 7y^2 + 23 = 0$$

$$x - y = 2$$

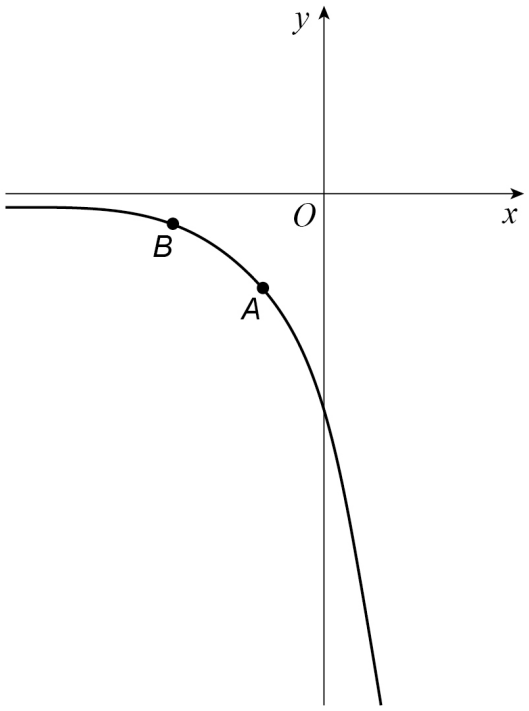
Do **not** use trial and improvement.

You **must** show your working.

[5 marks]

Answer _____

18 The points A (–1, –4) and $B\left(-2, -\frac{4}{3}\right)$ lie on the curve $y = ab^x$ as shown.



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Work out the values of a and b.

[4 marks]

$a =$ _____ $b =$ _____

19 Show that $\dfrac{\sin^3 x + \cos x - \cos^3 x}{\sin x + \cos x}$

can be written in the form $\sin^k x$ where k is an integer.

[3 marks]

END OF QUESTIONS

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