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 1 – Non-Calculator

Additional Sample

Time allowed: 1 hour 45 minutes

Materials

For this paper you must have:

- mathematical instruments

You may **not** 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

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

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

1 Work out the value of $\sqrt{\frac{r-49}{r+39}}$ when $r = 1.3 \times 10^2$

[2 marks]

Answer _____

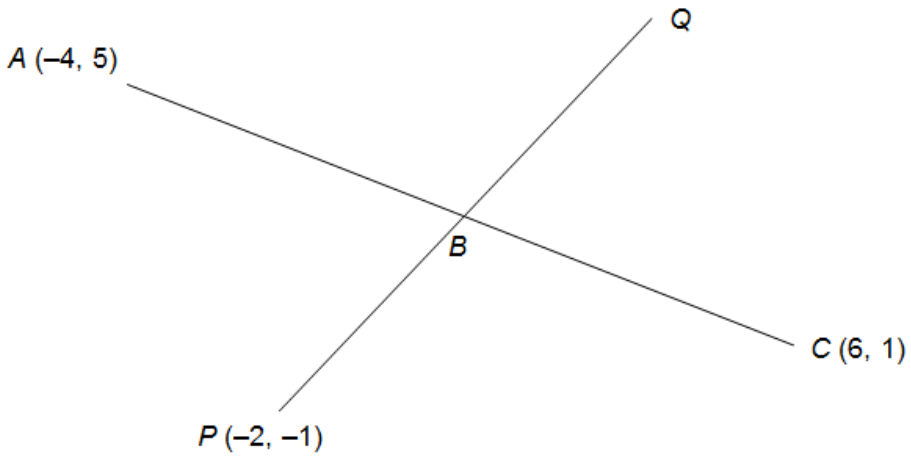
2 $\frac{1}{5}$ of $3a$ = 35% of $(a + 6)$

Work out the value of a.

[3 marks]

Answer _____

3 Lines *AC* and *PQ* bisect each other at *B*.



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Work out the coordinates of *Q*.

[3 marks]

Answer (_____ , _____)

4 (a) Factorise fully $x^4y + 3x^2y^3$

[2 marks]

Answer _____

4 (b) Simplify fully $\dfrac{10x - 2y}{3y - 15x}$

[2 marks]

Answer _____

5 *O* is the point (0, 0) and *P* is the point (2, 3)

OP is a radius of a circle.

Work out the equations of the **two** possible circles.

[3 marks]

Answer _____

and

_____

6 The nth term of a sequence is T_n

$$T_n = \frac{32n}{3n-7}$$

6 (a) Work out the largest value of n for which $T_n > 11$

[3 marks]

Answer _____

6 (b) Write down the limiting value of T_n as $n \to \infty$

[1 mark]

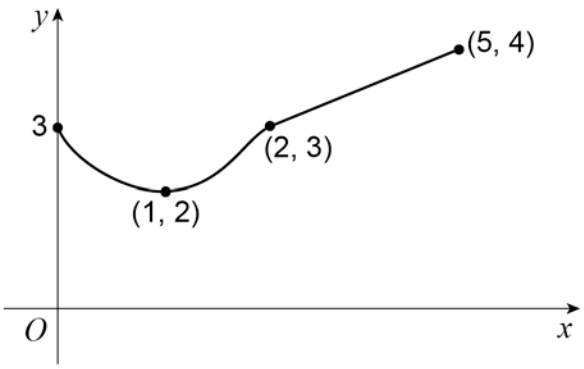
Answer _____

7 $f(x) = (x - a)^2 + b \quad 0 \leqslant x < 2$

$= cx + d \quad 2 \leqslant x \leqslant 5$

a, b, c and d are constants.

A sketch of $y = f(x)$ is shown.



Work out the values of a, b, c and d.

[4 marks]

$a =$ _____ $b =$ _____

$c =$ _____ $d =$ _____

8 (a) $f(x) = (x + 4)^3$

Work out $f^{-1}(-8)$

[2 marks]

Answer _____

8 (b) $g(x) = \frac{6}{x}$ $h(x) = x - 5$

Solve $gh(x) = x$

[4 marks]

Answer _____

9 $y = \dfrac{a^{\frac{3}{4}} \times a^{\frac{7}{12}}}{\sqrt{a}}$

Show that y^6 can be written in the form a^k where k is an integer.

[3 marks]

10 Simplify $(n + 2)^3 - n^2(n - 5)$

Give your answer in the form $an^2 + bn + c$ where a, b and c are integers.

[4 marks]

Answer _____

Turn over for the next question

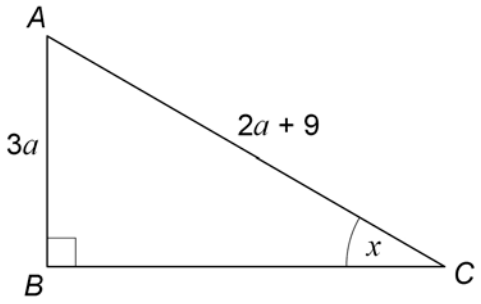
11 Simplify fully $\dfrac{\sqrt{600}-\sqrt{54}}{\sqrt{24}}$

[3 marks]

Answer _____

12 *ABC* is a right-angled triangle.

All lengths are in centimetres.



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$\sin x = \frac{3}{5}$

Work out the length *BC*.

[5 marks]

Answer _____ cm

13 A cone has

volume = $\frac{320}{9}\pi$ cm^3

$h : r = 5 : 3$

Volume of a cone $= \frac{1}{3}\pi r^2 h$

where r is the radius of the base and h is the perpendicular height.

Work out the radius of the base.

[3 marks]

Answer _____ cm

14 (a) Solve $\sin x = 0.5$ for $0° \leqslant x \leqslant 360°$

[2 marks]

Answer _____

14 (b) One solution of $\tan x = -\sqrt{3}$ is 120°

Circle another solution.

[1 mark]

210° 240° 300° 330°

Turn over for the next question

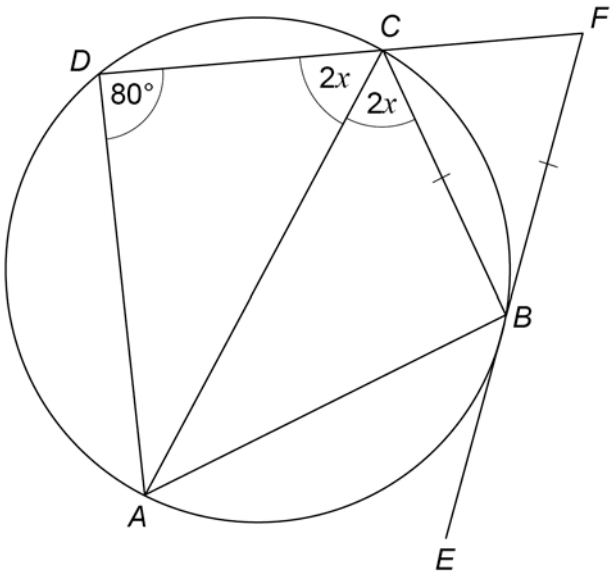
15 *A*, *B*, *C* and *D* are points on a circle.

EBF is a tangent.

DCF is a straight line.

Angle *DCA* = angle *ACB* = $2x$

BC = *BF*



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Work out the value of x.

[5 marks]

Answer _____

16 Work out the values of x for which $f(x) = \frac{2}{3}x^3 + \frac{7}{2}x^2$ is a decreasing function.

Give your answer as an inequality.

[5 marks]

Answer _____

Turn over for the next question

17 A, B and C are transformations in the x-y plane.

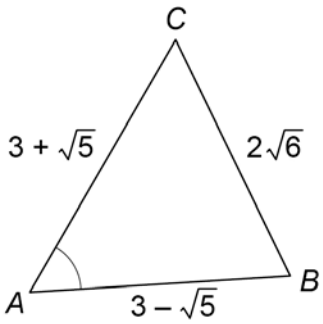
A	Rotation through 90° anticlockwise about the origin
B	Reflection in the x-axis
C	Transformation A followed by transformation B

Use **matrix multiplication** to show that C is equivalent to a single reflection.

[4 marks]

18 *ABC* is a triangle.

All lengths are in centimetres.



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Show that angle *CAB* = 60°

[5 marks]

19 By multiplying throughout by $x^{\frac{1}{3}}$, or otherwise,

solve $x^{\frac{2}{3}} + x^{-\frac{1}{3}} = 6x^{\frac{5}{3}}$

[3 marks]

Answer _____

20 A curve has equation $y = 14x + \frac{3}{2x^2}$

Work out the equation of the normal to the curve at the point $\left(\frac{1}{2}, 13\right)$

Give your answer in the form $ax + by + c = 0$ where a, b and c are integers.

[5 marks]

Answer _____

21 Write $7 - 12x - 18x^2$ in the form $a - 2(bx + c)^2$

where a, b and c are positive integers.

[3 marks]

Answer _____

END OF QUESTIONS