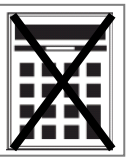
AQA Level 2 Certificate in **FURTHER MATHEMATICS (8365/1)**

Paper 1

Specimen 2020

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.

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 **all** questions in the spaces provided.

1 (a) $\dfrac{y^6 \times y}{y^m} = y^4$

Circle the value of m.

[1 mark]

– 2 1.5 2 3

1 (b) $a^n \times a^5 = a^5$

Work out the value of n.

[1 mark]

Answer _____

1 (c) $(c^5)^p = (c^2)^6$

Work out the value of p.

[2 marks]

Answer _____

2 Solve $\sqrt[3]{7x-13} = 2$

[2 marks]

$x =$ _____

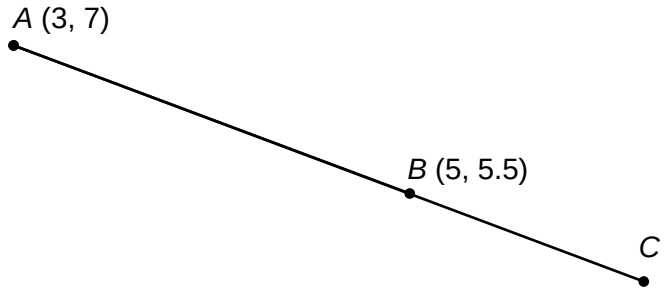
3 $3a(2x - 1) + 4(ax + 5) \equiv 60x + b$

Work out the values of a and b.

[4 marks]

$a =$ _____ $b =$ _____

4 *ABC* is a straight line with *AB* : *BC* = 5 : 2



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Work out the coordinates of *C*.

[4 marks]

Answer (_____ , _____)

5 $y = 2x^{10} - \frac{3}{x^2}$

Work out $\frac{dy}{dx}$

[3 marks]

Answer _____

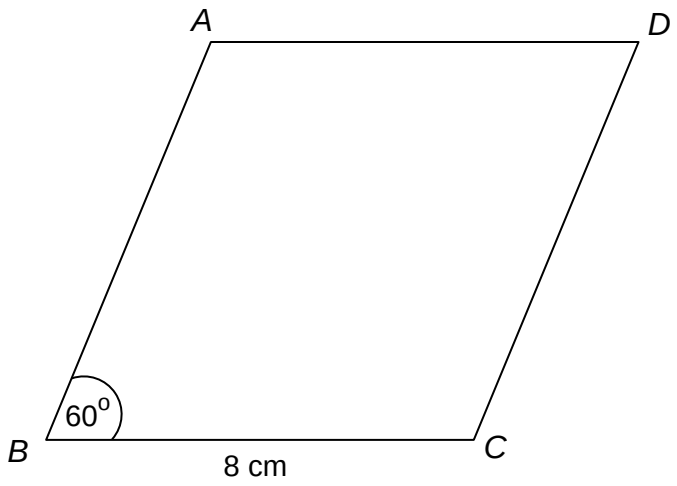
6 Simplify fully $\frac{15x^2y - 5xy^2}{12x - 4y}$

[3 marks]

Answer _____

7 *ABCD* is a rhombus with side length 8 cm

Angle *ABC* = 60^o



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Work out the area of the rhombus.

Give your answer in the form $a\sqrt{b}$ cm^2 where a and b are integers.

[3 marks]

Answer _____ cm^2

8 The curve $y = 2x^3 - 3x^2 - 12x + 6$

has a maximum point at L (–1, 13)

has a minimum point at M (2, –14)

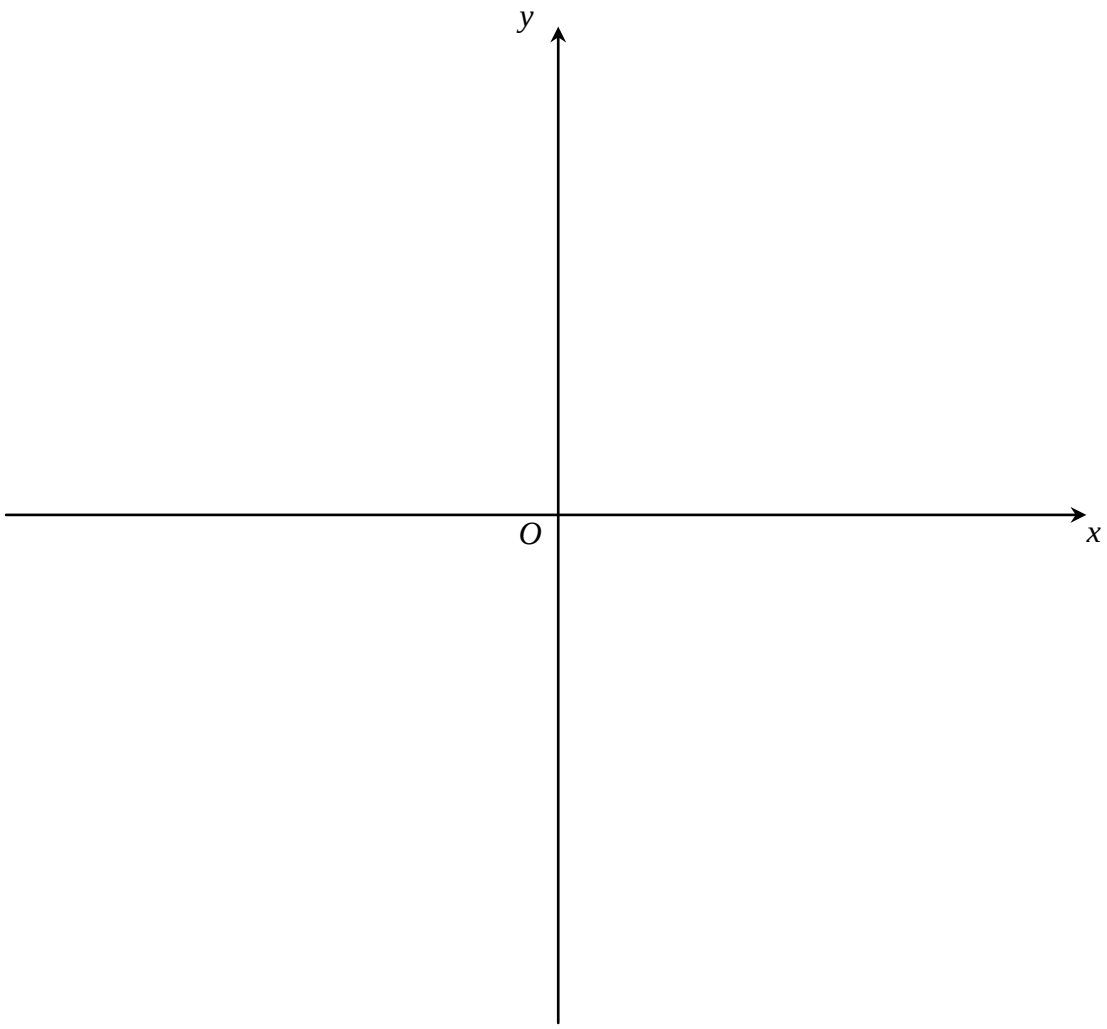
intersects the y-axis at N.

The curve crosses the x-axis at three distinct points.

On the axes below, sketch the curve.

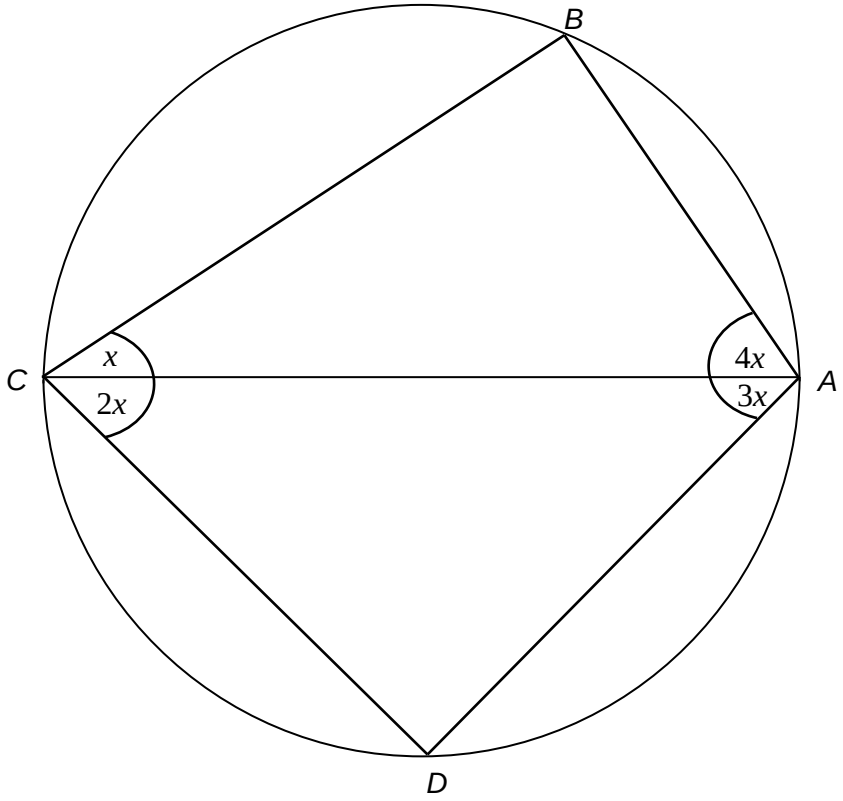
Label the points L, M and N on your sketch.

[3 marks]



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

$\angle BCA = x$ $\angle ACD = 2x$ $\angle CAD = 3x$ $\angle CAB = 4x$



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Prove that AC is a diameter.

[4 marks]

10 $f(x) = \left(\frac{9x}{2}\right)^{-1}$

$g(x) = \sqrt{1 - px^3}$ where p is a constant.

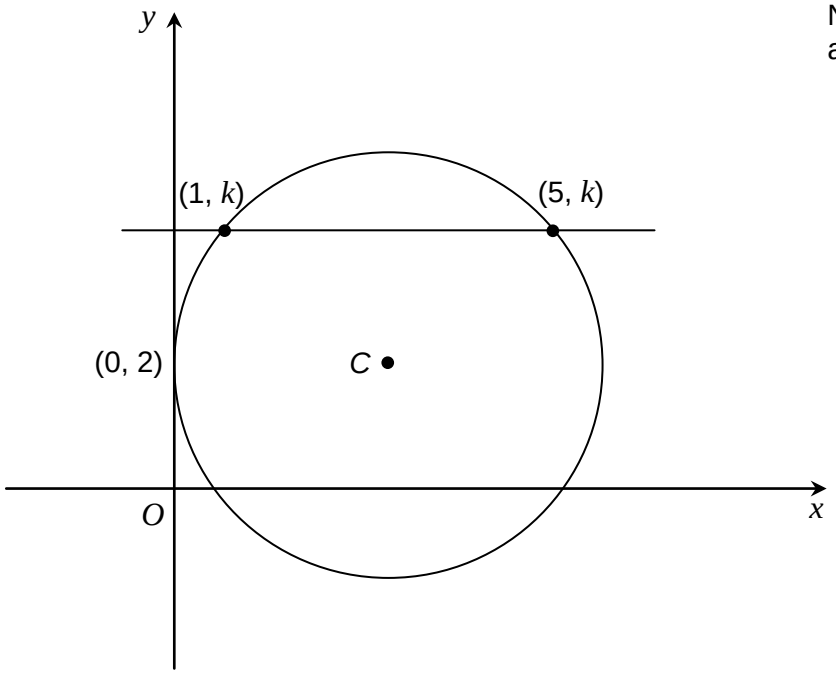
Given that $f\left(\frac{1}{3}\right) = g\left(\frac{1}{3}\right)$ work out the value of p.

[5 marks]

Answer _____

11 A circle, centre C, touches the y-axis at the point (0, 2)

The line $y = k$ intersects the circle at the points (1, k) and (5, k)



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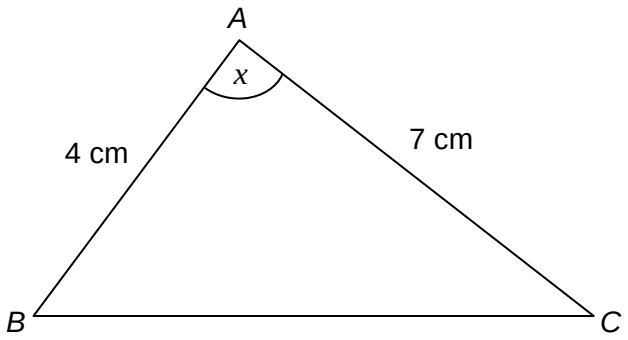
Work out the equation of the circle.

[3 marks]

Answer _____

12 $AB = 4$ cm $AC = 7$ cm $\cos x = -\frac{2}{7}$



Work out the length of BC.

[3 marks]

Answer _____ cm

13 Rearrange $t = \frac{3w^3 + a}{w^3 - 2}$ to make w the subject.

[5 marks]

Answer _____

14 Rationalise and simplify $\dfrac{\sqrt{3}-7}{\sqrt{3}+1}$

Give your answer in the form $a+b\sqrt{3}$ where a and b are integers.

[4 marks]

Answer _____

15 Point A lies on the curve $y = x^2 + 5x + 8$

The x-coordinate of A is -4

15 (a) Show that the equation of the normal to the curve at A is $3y = x + 16$

[5 marks]

15 (b) The normal at A also intersects the curve at B.

Work out the x-coordinate of B.

[4 marks]

Answer _____

16 The coefficient of the x^4 term in the expansion of $(2x + a)^6$ is 60

Work out the possible values of a.

[4 marks]

Answer _____

17 Solve the simultaneous equations

$$2a + b - c = 8$$
$$4a - 3b - 2c = -9$$
$$6a + 3b + c = 0$$

[5 marks]

$a =$ _____ $b =$ _____ $c =$ _____

18 Solve $x^{-\frac{2}{3}} = 12\frac{1}{4}$

[3 marks]

$x =$ _____

19 $f(x) = 2x^3 - 12x^2 + 25x - 11$

Use differentiation to show that $f(x)$ is an increasing function for all values of x.

[4 marks]

20 (a) Show that $2\cos^2\theta \equiv 2 - 2\sin^2\theta$

[1 mark]

20 (b) Hence, solve $2\cos^2\theta + 3\sin\theta = 3$ for $0 < \theta < 180^\circ$

[4 marks]

Answer _____

END OF QUESTIONS

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