Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Pages	Mark
3	
4 - 5	
6 - 7	
8 - 9	
10 - 11	
12 - 13	
TOTAL	

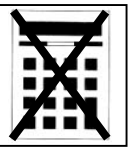
Certificate in Further Mathematics
Level 2

Further Mathematics 8360/1

Level 2

Specimen Paper 1

Non-Calculator

For this paper you must have: • mathematical instruments. You may **not** use a calculator.	

Time allowed
1 hour 30 minutes

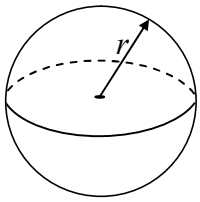
Instructions
- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the space provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. 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 70.
- You may ask for more answer paper, graph paper and tracing paper. These must be tagged securely to this answer booklet.

Formulae Sheet

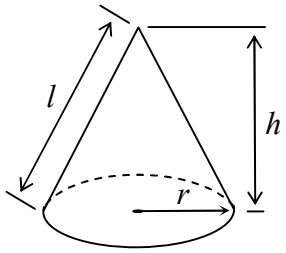
Volume of sphere $= \frac{4}{3}\pi r^3$

Surface area of sphere $= 4\pi r^2$



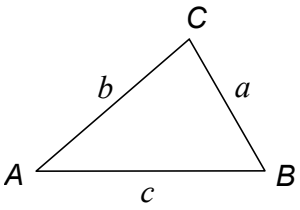
Volume of cone $= \frac{1}{3}\pi r^2 h$

Curved surface area of cone $= \pi r l$



In any triangle *ABC*

Area of triangle $= \frac{1}{2}ab \sin C$



Sine rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine rule $a^2 = b^2 + c^2 - 2bc \cos A$

$$\cos A = \frac{b^2 + c^2 - a^2}{2bc}$$

The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are given by $x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$

Trigonometric Identities

$\tan \theta \equiv \frac{\sin \theta}{\cos \theta}$ $\qquad \sin^2 \theta + \cos^2 \theta \equiv 1$

Do not write outside the box

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

1 (a) Solve $7(3x - 1) + 2(x + 7) = 3(6x - 1)$

.....

.....

.....

.....

.....

.....

Answer $x =$ ..... *(4 marks)*

1 (b) Solve $\sqrt{3x + 10} = 4$

.....

.....

.....

Answer $x =$ ..... *(2 marks)*

Turn over for the next question

6

Do not write outside the box

2 (a) The nth terms of two sequences are $4n + 13$ and $6n - 21$

Which term has the same value in each sequence?

……

……

……

Answer ..... *(3 marks)*

2 (b) The first five terms of a quadratic sequence are 4 10 18 28 40

Work out an expression for the nth term.

……

……

……

……

……

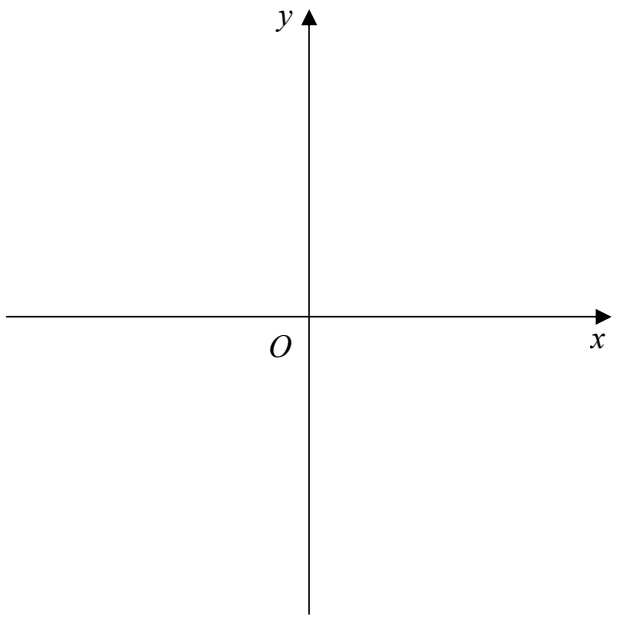
……

Answer ..... *(5 marks)*

Do not write outside the box

3 (a) On the axes below sketch the graph of $y = x^2 - 9$

Label clearly any points of intersection with the x-axis.



(2 marks)

3 (b) Write down all the integer solutions to $x^2 - 9 < 0$

.....

.....

Answer ..... *(2 marks)*

Turn over for the next question

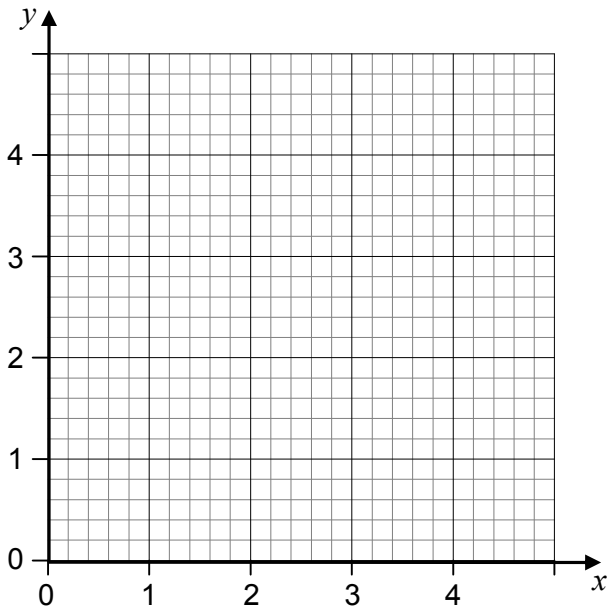
12

Do not write outside the box

4 A function f(x) is defined as

$$\begin{aligned} f(x) &= 3x & 0 \leqslant x < 1 \\ &= 3 & 1 \leqslant x < 3 \\ &= 12 - 3x & 3 \leqslant x \leqslant 4 \end{aligned}$$

Calculate the area enclosed by the graph of $y = f(x)$ and the x-axis.



.....

.....

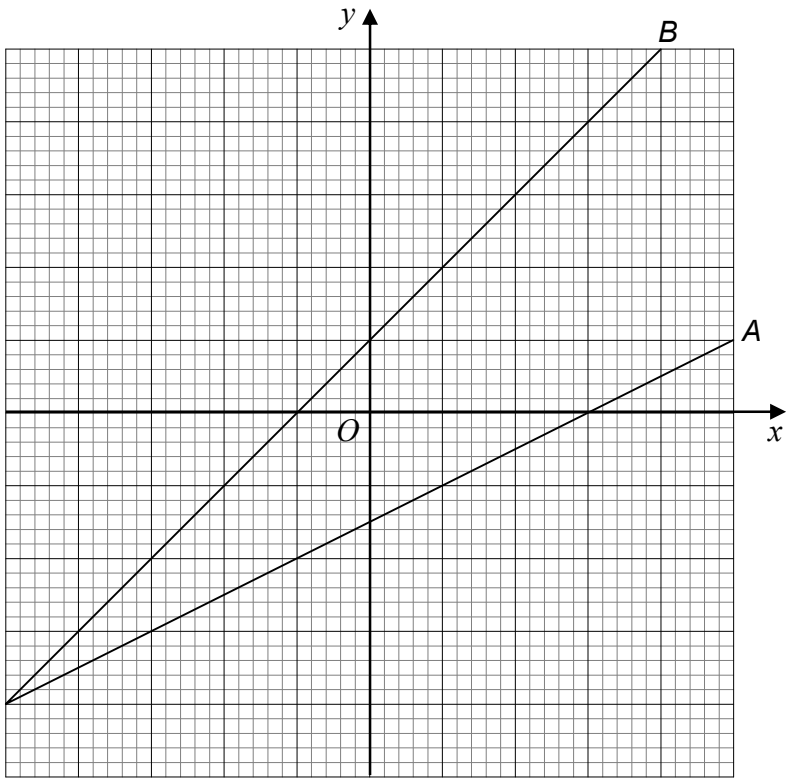
.....

Answer ..... units^2 *(5 marks)*

Do not write outside the box

5 The graph shows two lines *A* and *B*.

The equation of line *B* is $y = 2x + 2$



Work out the equation of line *A*.

.....

.....

.....

.....

.....

.....

.....

.....

Answer ..... *(4 marks)*

9

6 Work out $2\frac{2}{3} - 1\frac{3}{4} \div 1\frac{1}{8}$

Give your answer as a fraction in its simplest form.

……

……

……

……

……

……

Answer ..... *(5 marks)*

7 (a) Solve $x^{\frac{2}{3}} = 9$

……

……

Answer $x =$ ..... *(2 marks)*

7 (b) The reciprocal of $y^{\frac{1}{2}}$ is 5

Work out the value of y.

……

……

Answer ..... *(2 marks)*

Do not write outside the box

8 Make d the subject of $c = \dfrac{8(c - d)}{d}$

.....

.....

.....

.....

.....

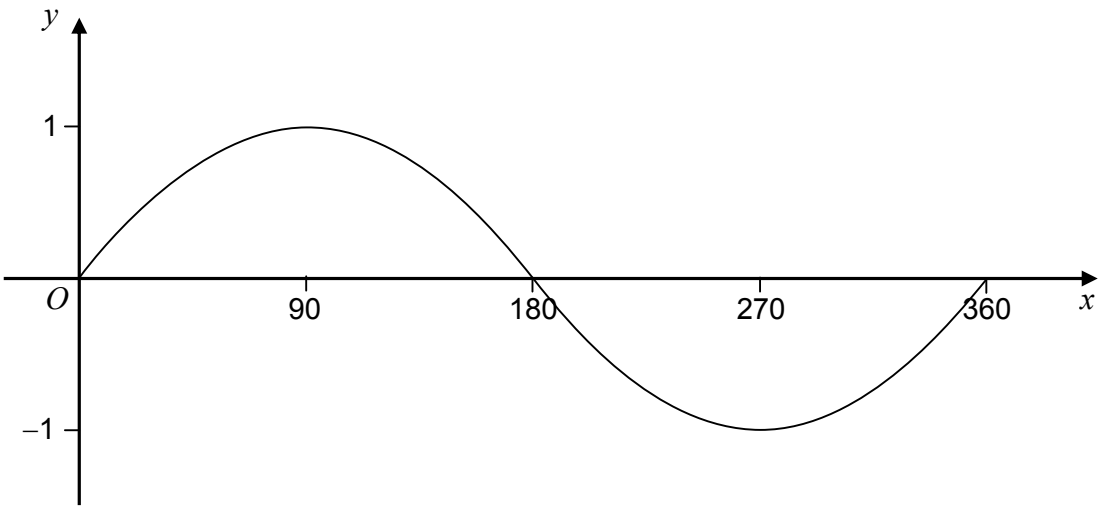
.....

.....

.....

Answer ..... *(4 marks)*

9 The sketch shows $y = \sin x$ for $0° \leqslant x \leqslant 360°$



The value of sin 73° = 0.956 to 3 significant figures.

Use the sketch to find **two** angles between 0° and 360° for which $\sin x = -0.956$

.....

.....

Answer ..... and ..... *(2 marks)*

15

Do not write outside the box

10 (a) Write $\sqrt{75} + \sqrt{12}$ in the form $a\sqrt{b}$ where a and b are integers.

……

……

Answer ..... *(2 marks)*

10 (b) Rationalise and simplify $\dfrac{2\sqrt{2}+1}{\sqrt{2}-3}$

……

……

……

……

Answer ..... *(5 marks)*

11 The points $A(-1, -7)$ and $B(24, 23)$ are on a straight line ACB.

$AC : CB = 2 : 3$

Work out the coordinates of C.

……

……

……

……

……

Answer (....., ...) *(4 marks)*

12 Prove that $\tan^2 x - 1 \equiv \dfrac{1 - 2\cos^2 x}{\cos^2 x}$

……

……

……

……

……

……

……

……

(3 marks)

13 (a) Work out the coordinates of the stationary point for the curve $y = x^2 + 3x + 4$

……

……

……

……

……

……

……

Answer (....., ...) *(4 marks)*

13 (b) Explain why the equation $x^2 + 3x + 4 = 0$ has no real solutions.

……

……

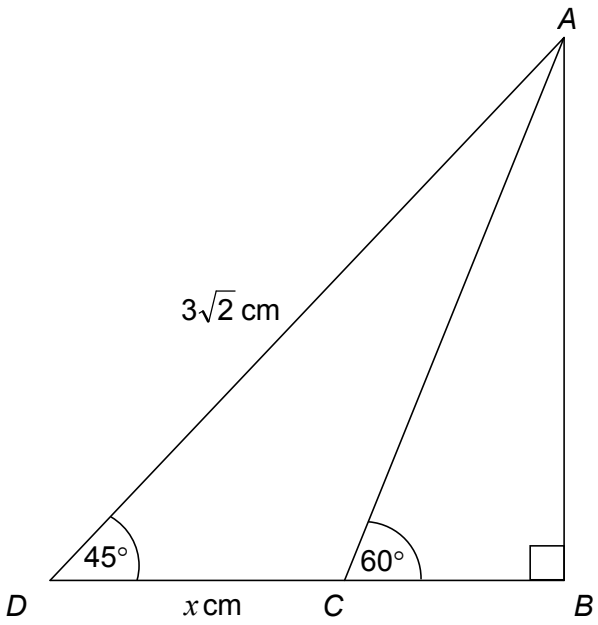
……

(2 marks)

20

Do not write outside the box

14 In the diagram, *DCB* is a straight line.



Not drawn accurately

Work out the length of *DC*, marked x on the diagram.

Write your answer in the form $a - \sqrt{b}$

……

……

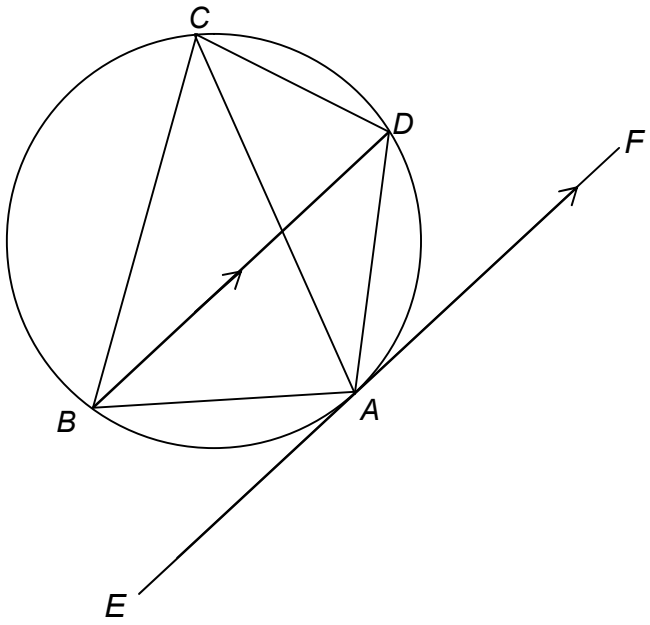
……

……

Answer ..... cm *(4 marks)*

Do not write outside the box

15 *A*, *B*, *C* and *D* are points on the circumference of a circle such that *BD* is parallel to the tangent to the circle at *A*.



Prove that *AC* bisects angle *BCD*.

Give reasons at each stage of your working.

……

……

……

……

……

……

……

……

……

(4 marks)

END OF QUESTIONS

8