1st Class Maths

PREDICTED PAPER

Video Solutions

Centre Number | | | | | | Candidate Number | | | | |

Surname _____

Forename(s) _____

Signature _____

Level 2 Certificate
FURTHER MATHEMATICS
Paper 1 Non-Calculator

Wednesday 8 June 2022 Afternoon Time allowed: 1 hour 45 minutes

Student Self Reflection

Topics I need to ***revise***

Topics I need to ***learn***

Silly Mistakes?

Target mark for next time

For teacher use	
Pages	Mark
2-3	
4-5	
6-7	
8-9	
10-11	
12-13	
14-15	
16-17	
18	
TOTAL	

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

Do not write outside the box

1 Work out the distance between the points *A* (-5, 3) and *B* (3, -2)

Circle your answer.

[1 mark]

$\sqrt{5}$ $\sqrt{29}$ $\sqrt{65}$ $\sqrt{89}$

2 Rearrange $9p = \frac{m^3 + 3}{p^4}$ to make m the subject.

[3 marks]

Answer _____

Do not write outside the box

3 $(t + 10)$ is increased by 20%.
The answer is $(t + 19)$

[3 marks]

Work out the value of t.

Answer _____

4 Expand and simplify $(3x - 4)(x - 2)(2x + 3)$

[3 marks]

Answer _____

10

Do not write outside the box

5 $3(2ax - 3) + a(x + 4) \equiv 35x + b$

Work out the values of a and b. **[4 marks]**

$a =$ _____ $b =$ _____

Do not write outside the box

6 The nth term of a sequence is $\frac{3n + 1}{4n - 2}$

6 (a) A term in the sequence has the value $\frac{4}{5}$

Work out the value of n.

[2 marks]

Answer _____

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

[1 mark]

Answer _____

7

Do not write outside the box

7 Rationalise and simplify $\dfrac{5+\sqrt{5}}{3-\sqrt{5}}$

Give you answer in the form $a + b\sqrt{5}$ where a and b are integers. **[4 marks]**

Answer _____

8 The coefficient of x^3 in the expansion of $(2a + x)^5$ is 360.

Work out the two possible values of a. **[3 marks]**

Answer _____ and _____

Do not write outside the box

9 (a) $f(x) = \sqrt[3]{2x}$

Work out $f^{-1}(-4)$

[2 marks]

Answer _____

9 (b) $g(x) = 2x^2 + 3x - 19$ $h(x) = x^2 - 9$

Solve $g(x) < h(x)$

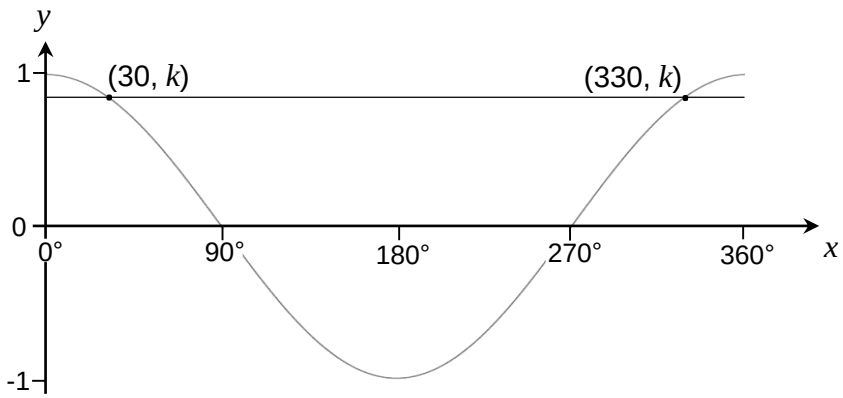
[4 marks]

Answer _____

13

Do not write outside the box

10 Here is a sketch of $y = \cos x$ for $0° \leqslant x \leqslant 360°$ and the line $y = k$



The line $y = k$ intersects the graph of $y = \cos x$ at points (30, k) and (330, k)

10 (a) Write down the exact value of k. **[1 mark]**

$k =$ _____

10 (b) Solve $\cos x = -k$ for $0° \leqslant x \leqslant 360°$ **[2 marks]**

_____

_____

_____

_____

Answer _____

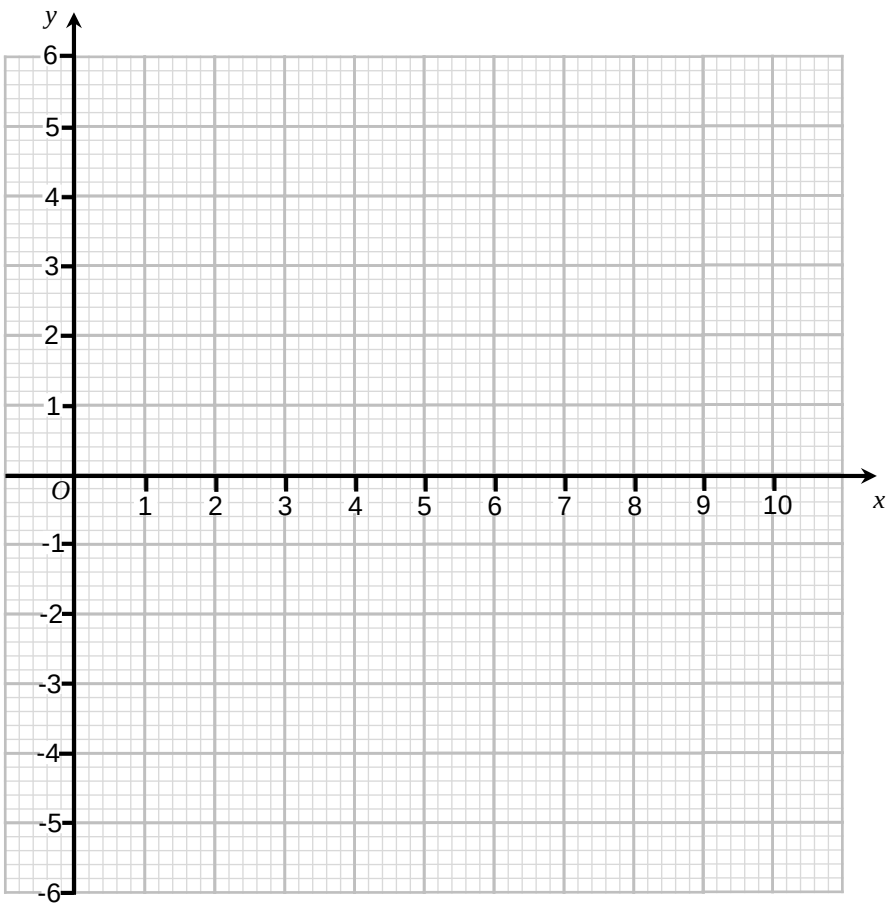
Do not write outside the box

11 A function f is given by

$$f(x) = x(x - 4) \qquad 0 \leq x < 5$$
$$= 10 - x \qquad 5 \leq x < 8$$
$$= 2 \qquad 8 \leq x \leq 10$$

Draw a sketch of $y = f(x)$ for values of x from 0 to 10.

[4 marks]



7

Do not write outside the box

12 The first four terms of a quadratic sequence are

0 p 16 33

12 (a) Work out the value of p **[3 marks]**

$p =$ _____

12 (b) Work out an expression for the nth term. **[3 marks]**

Answer _____

Do not write outside the box

13 (a) $\mathbf{M} = \begin{pmatrix} 3 & 0 \\ 0 & 3 \end{pmatrix}$

Describe geometrically the single transformation represented by **M**. **[2 marks]**

Answer _____

13 (b) Here are three transformations in the $x - y$ plane.

A: Rotation through 90° clockwise about the origin.
B: Reflection in the line $y = x$
C: Transformation A followed by transformation B.

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

[4 marks]

12

Do not write outside the box

14 $y = 8ax^3 + \frac{6}{x}$

y has a minimum value when $x = 0.5$

Work out the value of a.

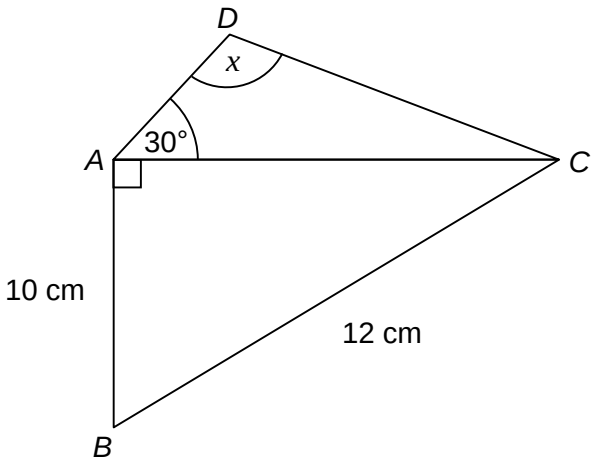
[4 marks]

$a =$ _____

Do not write outside the box

15 Quadrilateral *ABCD* is made from two triangles.

$AB = 10$ cm $BC = 12$ cm $\sin x = \frac{2}{3}$



Not drawn accurately

Work out the length of *DC*.

[4 marks]

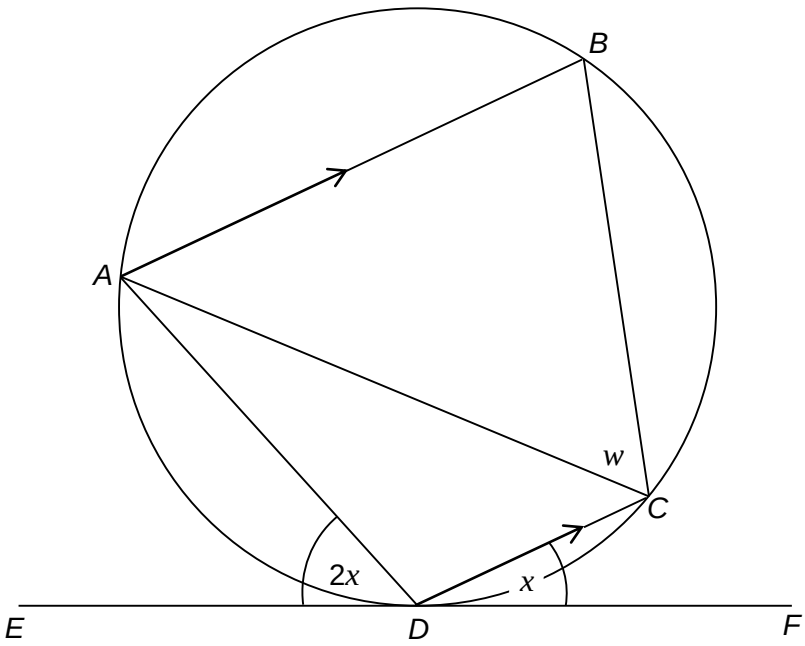
Answer _____

8

Do not write outside the box

16 *A*, *B*, *C* and *D* are points on a circle.
Line *EDF* is tangent to the circle.
AB and *DC* are parallel.

Angle *CDF* = *x* Angle *ADE* = 2*x* Angle *ACB* = *w*



Prove that $w = 180° - 5x$

[5 marks]

Do not write outside the box

17 Show that $\sqrt{3^9 + 3^6}$ can be written in the form $a\sqrt{7}$ where a is an integer.

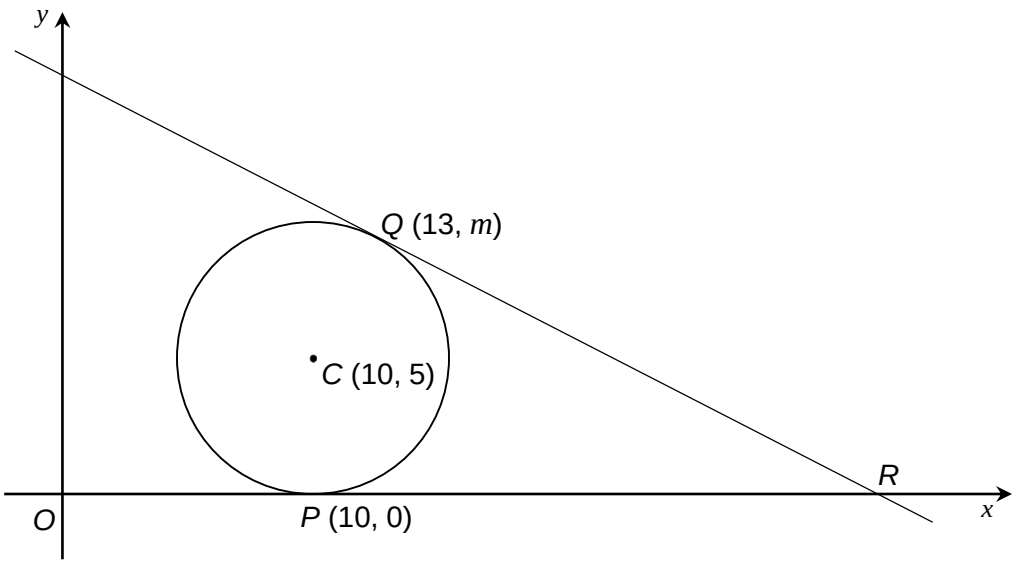
[4 marks]

9

Do not write outside the box

18 A circle, centre C (10, 5) touches the x-axis at the point P (10, 0).

The tangent to the circle at point Q (13, m) intersects the x-axis at point R.



$OP : PR = 2 : k$

Find the value of k. **[5 marks]**

$k =$ _____

Do not write outside the box

19 Show that $8 - 3\sin x \cos x \tan x$ can be written in the form

$a\cos^2 x + b$ where a and b are integers.

[4 marks]

9

Do not write outside the box

20 Solve the simultaneous equations

$$3y^2 - xy - 4x^2 - 13 = 0$$
$$y = 2x + 1$$

Do **not** use trial and improvement.

You **must** show your working.

[5 marks]

Answer _____

END OF QUESTIONS

5