OXFORD INTERNATIONAL COLLEGE

ADDITIONAL MATHEMATICS

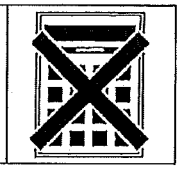
1 hour 30 minutes

Surname
Other Names

Non-Calculator

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.
- Answer **all** questions.
- You must answer the questions in the spaces provided.
- 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.

I declare that the above named student was fully supervised during the test. The assessment was completed under strict exam conditions and in the time allowed, in accordance with the instructions on the test paper.

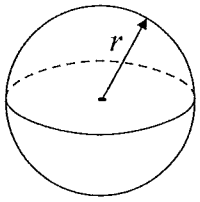
INVIGILATOR NAME

SIGNATURE:_____DATE:_____

Formulae Sheet

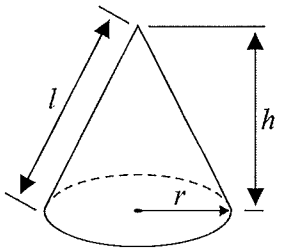
Volume of sphere $= \frac{4}{3}\pi r^3$

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



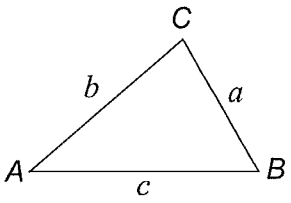
Volume of cone $= \frac{1}{3}\pi r^2 h$

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



In any triangle ABC

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



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

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

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

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

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

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

1 $f(x) = 2x^2 + 7$ for all values of x.

What is the range of $f(x)$?

Answer..... *(1 mark)*

2a Factorise fully $2x^2 - 2x - 40$

.....

.....

.....

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

2b Factorise fully $(x+y)^2 + (x+y)(2x+5y)$

.....

.....

.....

.....

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

3 Solve the simultaneous equations

$$2y = 3x + 4$$

$$2x = -3y - 7$$

Do **not** use trial and improvement.

.....

.....

.....

.....

.....

.....

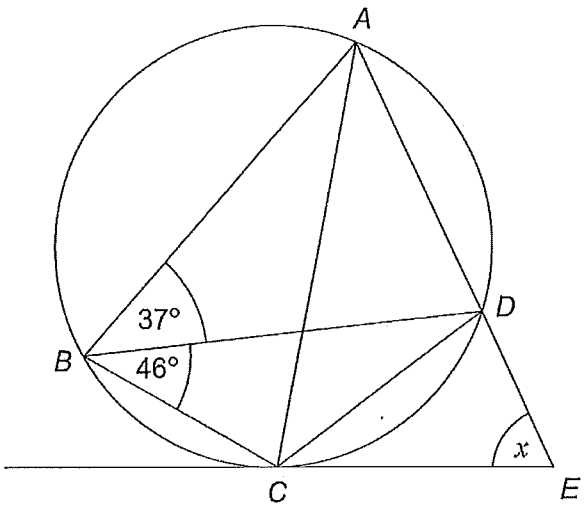
.....

.....

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

4 The diagram shows a cyclic quadrilateral *ABCD*.

ADE is a straight line.
CE is a tangent to the circle.



Not drawn accurately

Work out the size of angle x.

.....

.....

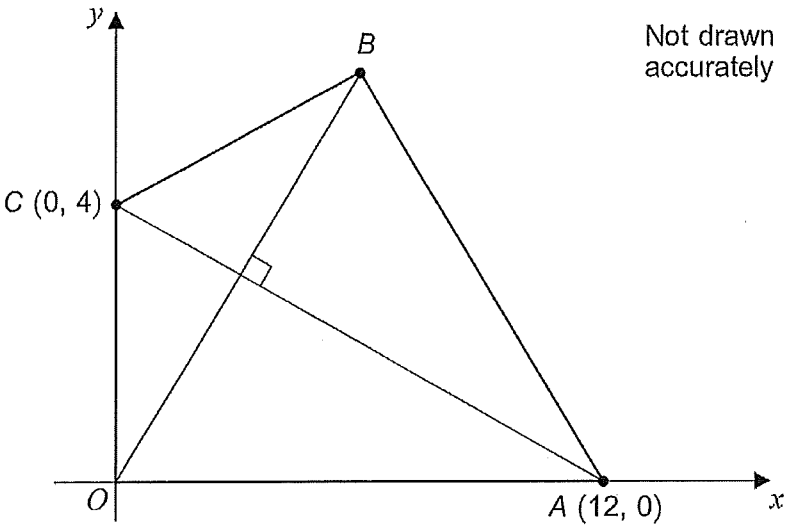
.....

.....

.....

$x =$ ..... degrees *(3 marks)*

5a *OABC* is a kite.



5b Work out the equation of *AC*.

.....

.....

.....

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

5c Work out the coordinates of *B*.

.....

.....

.....

.....

.....

.....

.....

.....

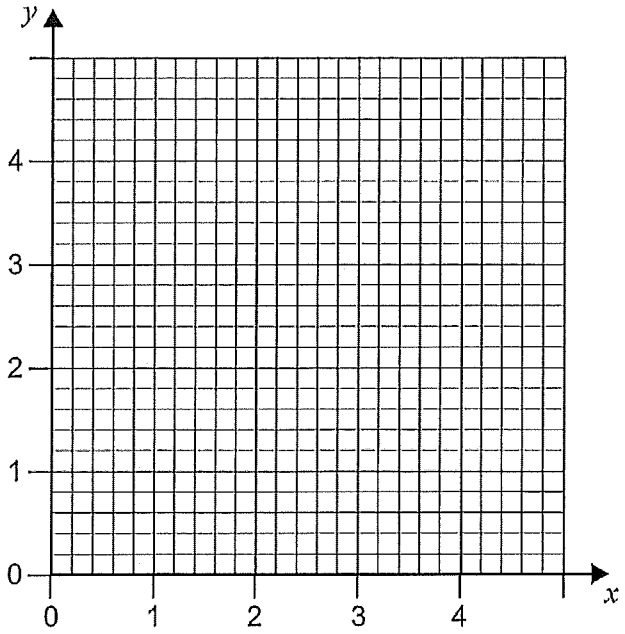
.....

Answer (..... , ...) *(6 marks)*

6a A graph passes through (0, 0).

The rate of change of y with respect to x is always $\frac{1}{2}$.

Draw the graph of y for values of x from 0 to 4.

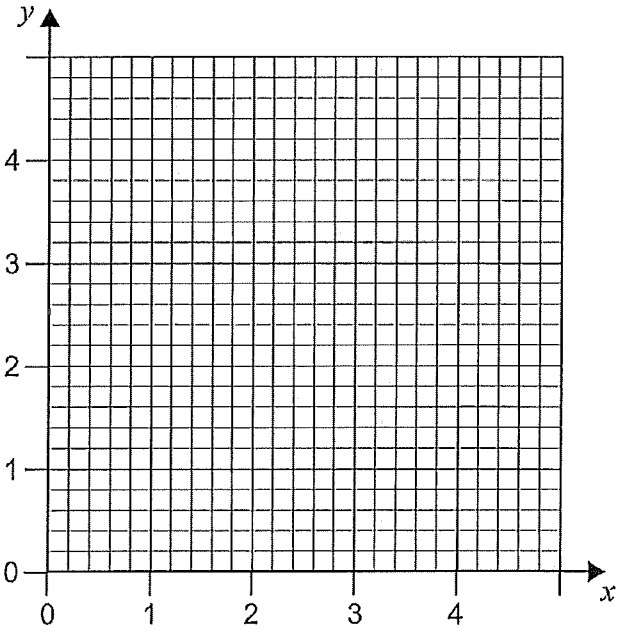


(1 mark)

6b A graph passes through (1, 2).

The rate of change of y with respect to x is always 0.

Draw the graph of y for values of x from 0 to 4.



(1 mark)

6c $y = 2x^3 + ax$, where a is a constant.

The value of $\frac{dy}{dx}$ when $x = 2$ is twice the value of $\frac{dy}{dx}$ when $x = -1$

Work out the value of a.

.....

.....

.....

.....

.....

.....

$a =$ ..... *(5 marks)*

Turn over for the next question

7 Simplify $\dfrac{x^2+4x-12}{x^2-25} \div \dfrac{x+6}{x^2-5x}$

.....

.....

.....

.....

.....

.....

.....

.....

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

8 $x^{\frac{3}{2}} = 8$ where $x > 0$ and $y^{-2} = \dfrac{25}{4}$ where $y > 0$

Work out the value of $\dfrac{x}{y}$.

.....

.....

.....

.....

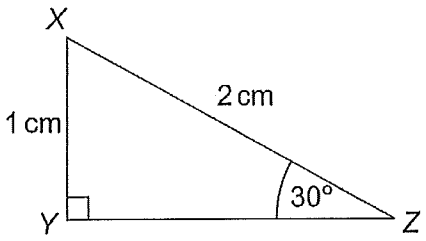
.....

.....

.....

$\dfrac{x}{y} =$ ..... *(5 marks)*

9a *XYZ* is a right-angled triangle.



Not drawn accurately

Use triangle *XYZ* to show that $\sin 60° = \frac{\sqrt{3}}{2}$

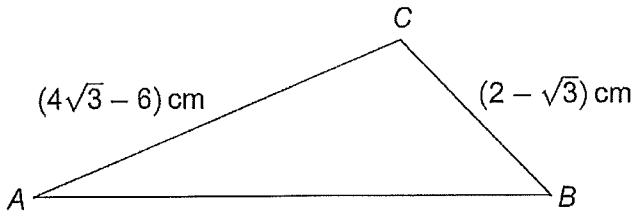
.....

.....

.....

(2 marks)

9b Triangle *ABC* has an obtuse angle at *C*.



Not drawn accurately

Given that $\sin A = \frac{1}{4}$, use triangle *ABC* to show that angle $B = 60°$

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(6 marks)

10 Prove that $\tan\theta + \frac{1}{\tan\theta} \equiv \frac{1}{\sin\theta\cos\theta}$

.....

.....

.....

.....

.....

.....

.....

.....

(3 marks)

END OF QUESTIONS