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IGCSE NOV
MATHEMATICS

6

PAPER 4

NOVEMBER 1988

2 h 30 min

Additional materials provided by the Syndicate:

1. 4 sheets of graph paper
2. Mathematical tables
3. Electronic calculator
4. Geometrical instruments

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INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

Instructions to candidates:

You should answer all the questions on the separate sheets of paper provided.

Show all your working on the same sheet as the rest of the answer. Marks will be given for working which shows that you know how to solve the problem even if you get the answer wrong.

Write your name and examination number on each separate piece of writing paper or graph paper you use. If you use more than one sheet of paper for your answers, all answer sheets should be placed in correct order and fastened together.

Electronic calculators should be used.

Three figure accuracy is required in your answers except where stated otherwise.

The total of the marks for this paper is 130.

The number of marks available is shown in brackets [] at the end of each question or part question.

This Question Paper consists of 7 printed pages and 1 blank page.

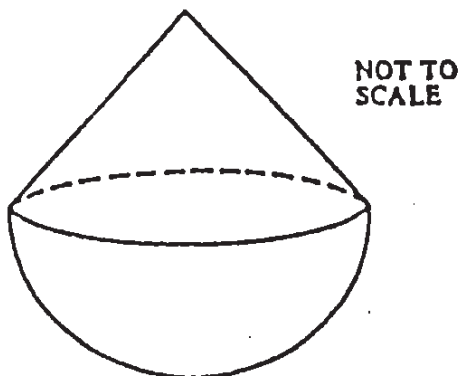


1 It is given that

$$y = \frac{3x^2}{4-z}$$

- (a) Find the value of y when $x = 3$ and $z = 2$. [2]
- (b) Find the value of z when $x = 2$ and $y = 3$. [2]
- (c) Find both possible values of x when $y = -8$ and $z = 10$. [2]
- (d) The value of x is doubled, and z remains unchanged.
What effect does this have upon the value of y ? [3]
- (e) Make z the subject of the formula $y = \frac{3x^2}{4-z}$. [3]

2



A glass paperweight consists of a cone mounted on a hemisphere. The common radius (r) is 4 centimetres; the height of the cone (h) is 5 centimetres. You are given that:

The volume of a cone is $\frac{1}{3}\pi r^2 h$;

The volume of a sphere is $\frac{4}{3}\pi r^3$;

The curved surface area of a cone is $\pi r l$ (slant height l);

The surface area of a sphere is $4\pi r^2$.

Take π to be 3.142.

- (a) Calculate
- (i) the volume of the paperweight, [4]
- (ii) the surface area of the paperweight. [5]
- (b) The mass of the paperweight is $\frac{1}{2}$ kg. Calculate the density of the glass, in grams per cubic centimetre. [3]

3 Answer the whole of this question on a sheet of graph paper.

Using a scale of 1 centimetre to represent 1 unit on each axis, draw a pair of axes for $0 \leq x \leq 16$ and $0 \leq y \leq 10$.

(a) On your axes:

(i) draw the line $y = x$; [1]

(ii) mark the two points $A(10, 0)$ and $B(14, 3)$; [1]

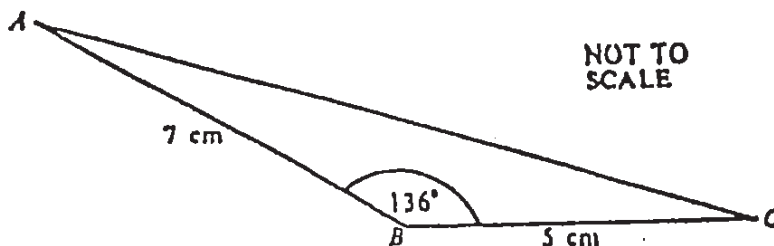
(iii) draw the locus of points which are equidistant from the points A and B ; [2]

(iv) draw the locus of points which are equidistant from the line $y = x$ and the x -axis; [2]

(v) draw the circle which touches the x -axis at A , and which passes through B . [3]

(h) Which other line, already drawn, does the circle touch? [1]

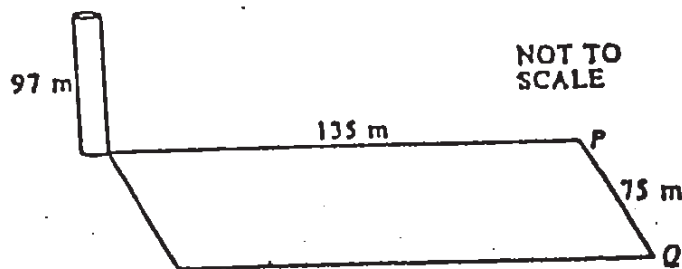
4 (a) In triangle ABC , $AB = 7$ cm, $BC = 5$ cm and $\angle ABC = 136^\circ$.



(i) Calculate the length of AC . [3]

(ii) Calculate the area of the triangle ABC . [3]

(b) The Piazza San Marco in Venice is a rectangle 135 metres long and 75 metres wide. The Campanile tower stands in one corner, and it is 97 metres high.

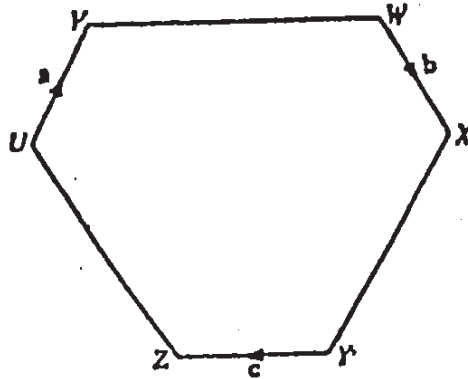


Calculate the angle of elevation of the top of the tower

(i) from P , [2]

(ii) from Q . [4]

5

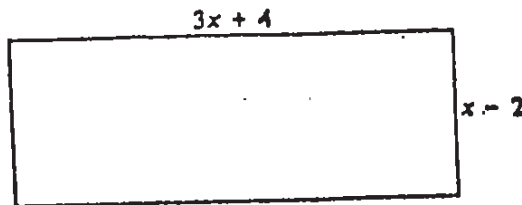


In the diagram, opposite sides of the hexagon are parallel and are in the ratio 1 : 2.
Given that $\vec{UY} = a$, $\vec{W'X} = b$ and $\vec{ZY} = c$,

- (a) (i) write down the vector representing \vec{YX} ; [1]
 (ii) hence show that $\vec{Y'W} = 2a - b$; [2]
 (iii) use similar methods to write down $\vec{U'Y}$ and $\vec{W'U}$. [2]
- (b) Write down, in terms of a , b and c ,

$$\vec{Y'W} + \vec{W'U} + \vec{U'Y}$$
 expressing your answer in its simplest form. [2]
- (c) Write down a vector equation which follows from the result of part (b). [2]

6



The rectangle has length $(3x + 4)$ cm and width $(x - 2)$ cm.

- (a) Write down and simplify an expression for the perimeter of the rectangle. [2]
 (b) Write down an expression for the area of the rectangle. [1]
 (c) If the area of the rectangle is 57 cm^2 , show that

$$3x^2 - 2x - 65 = 0.$$
 [3]
 (d) Solve the quadratic equation $3x^2 - 2x - 65 = 0$. [3]
 (e) Write down the length and width of the rectangle when its area is 57 cm^2 . [2]

- 7 (a) On each of two short holes on his golf course, Mr. A. Rabbit can take 3, 4, 5, 6, 7 or 8 strokes. All outcomes are equally likely.

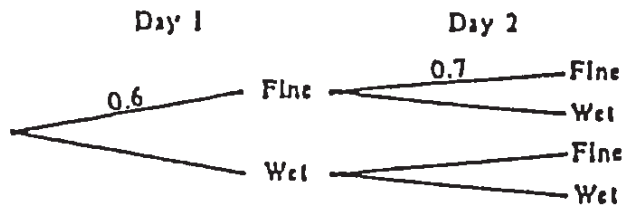
Consider these two holes only.

- (i) What is the probability that he takes a total of 6 strokes? [1]
- (ii) What is the probability that he takes a total of 13 strokes? [2]
- (iii) What is his most likely total? [1]

- (b) If the weather is fine today, the probability that it will be fine tomorrow is 0.7. This and the other probabilities are shown in the following matrix.

		TOMORROW	
		Fine	Wet
TODAY	Fine	0.7	0.3
	Wet	0.4	0.6

Given also that the probability of the weather being fine on any one day is 0.6, copy and complete the tree diagram below, to represent all this information.



[2]

Calculate the probability of

- (i) two fine days, [1]
- (ii) a wet day followed by a fine day, [1]
- (iii) one fine day and one wet day, in either order. [2]