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0178/03

October/November 2021

2 hours

Candidates answer on the Question Paper.

Additional Materials: Electronic Calculator
Geometrical Instruments
Tracing paper (optional)

READ THESE INSTRUCTIONS FIRST

Write your name, Centre number and candidate number on all the work you hand in.

Write in dark blue or black pen.

You may use an HB pencil for any diagrams or graphs.

Do not use staples, paper clips, glue or correction fluid.

DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.

If working is needed for any question it must be shown below that question.

Electronic calculators should be used.

If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.

For π use either your calculator value or 3.142.

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

The total of the marks for this paper is 100.

This document consists of **14** printed pages and **2** blank pages.



- 1 (a) Make p subject of the formula.

$$2p + q = kp + 4$$

..... [2]

- (b) Express as a single fraction in its simplest form.

$$\frac{2x+3}{6} - \frac{5x-3}{7}$$

..... [3]

- (c) Solve.

$$x + 1.5 = 2.5y$$

$$2y - x = 0$$

$x =$

$y =$ [3]

(d) $f(x) = \frac{3x+2}{2}$

Find

(i) $\frac{1}{2}f(x)$,

..... [1]

(ii) $f(2)$.

..... [1]



- 2 (a) Write 126 as a product of its prime factors.

..... [1]

- (b) Find the difference between the fifth prime number and the fourth composite number.

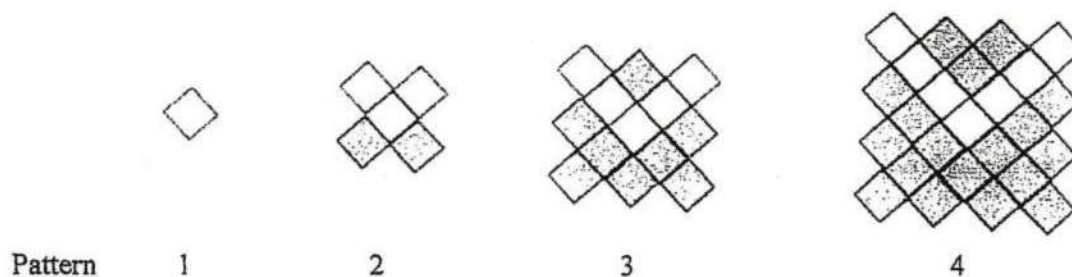
..... [2]

- (c) Show that $2.\overline{12}$ is rational.

[3]



- 3 The diagram shows a sequence of patterns made from shaded and unshaded squares.



- (a) Complete the table.

Pattern number	1	2	3	4
Number of unshaded squares	1	3		
Number of shaded squares	0	2	8	
Total number of squares	1	5	13	

[3]

- (b) Write an expression in terms of n for the number of unshaded squares in pattern n .

..... [2]

- (c) In another sequence the n th term is given by $n^2 - n + 30$.

- (i) Write the second term of the sequence.

..... [1]

- (ii) What term number is 102?

..... [4]



- 4 (a) Tau buys a car at M32 500 and sells it making a loss of 20%.

Calculate his selling price.

M [2]

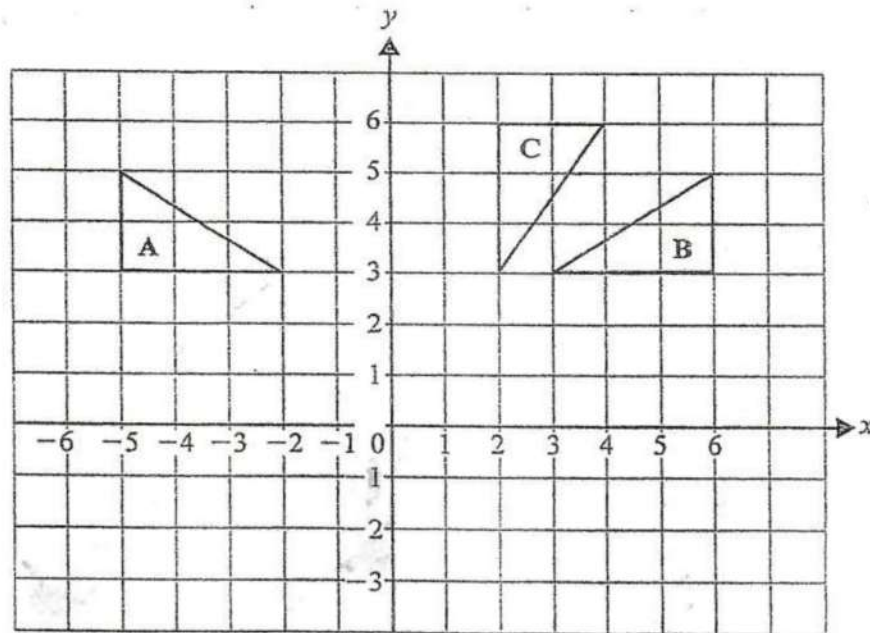
- (b) Mule invests M41 600 in a bank that offers;

- compound interest for the first 2 years at 3% per annum, then
- simple interest for the next 8 years at 5% per annum.

Calculate the **total interest** obtained.

M [5]

- 5 The diagram shows triangles A, B and C.



- (a) Describe fully a single transformation which maps,

(i) A onto B

..... [2]

(ii) A onto C

.....

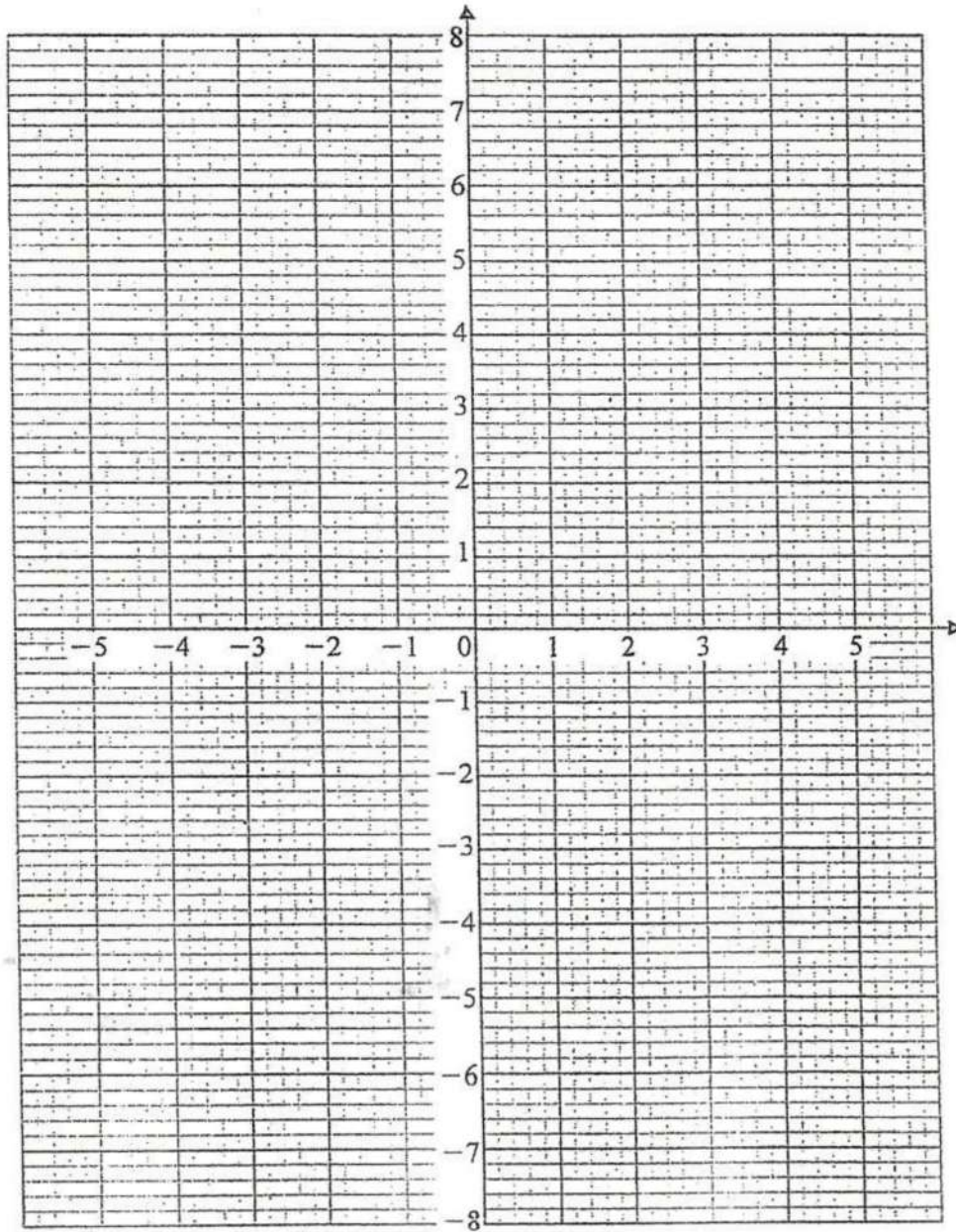
- (b) Draw the image of A as an enlargement, scale factor $-\frac{1}{2}$, and centre

- 6 (a) Complete the table of values for $y = x^2 + x - 6$.

x	-4	-3	-2	-1	0	1	2	3
y	6	0	-4		-6	-4		6

[2]

- (b) On the grid, draw the graph of $y = x^2 + x - 6$ for $-4 \leq x \leq 3$.



[4]

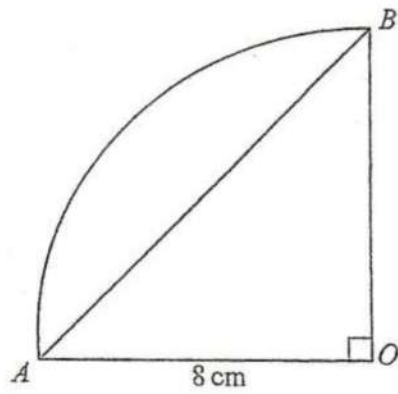
- (c) Write down the equation of the line of symmetry of the graph.

..... [2]



- 7 (a) The diagram shows a sector of radius 8 cm.

Angle AOB is 90° .



NOT TO
SCALE

Calculate

- (i) the perimeter of the sector,

..... cm [3]

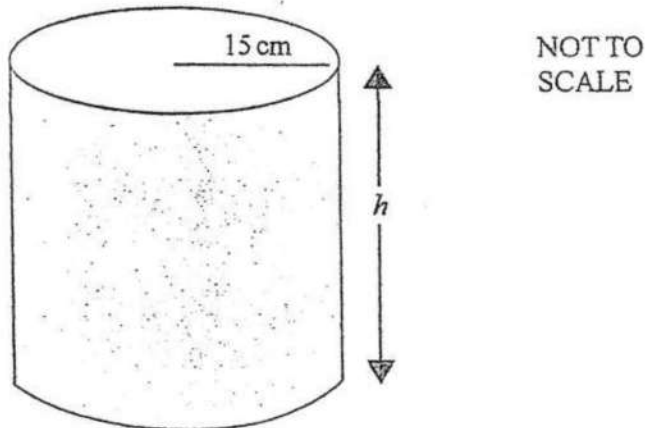
- (ii) the shaded area.

..... cm^2 [4]



- (b) The diagram shows an open cylindrical container of radius 15 cm.

The container is filled with $30\,500\text{ cm}^3$ of a liquid.



- (i) Show that the height, h , of the container is 43.1 cm, correct to one decimal place.

..... [2]

- (ii) Calculate the total surface area of the container.

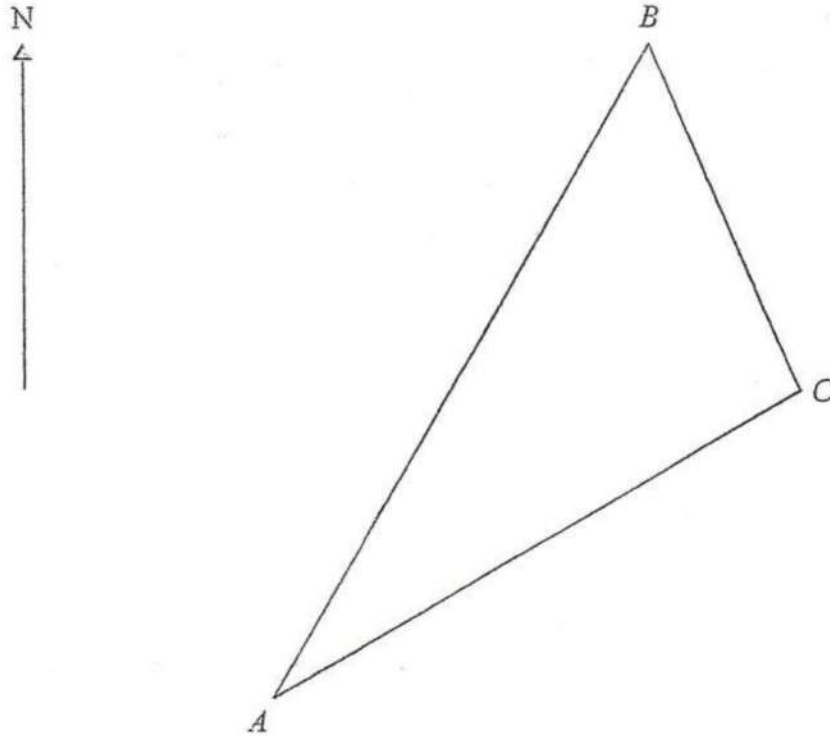
..... cm^2 [3]

- (iii) One cm^3 of the liquid has a mass of 0.80g.

Find the mass of the liquid, in kilograms.

..... kg [3]

- 8 The diagram shows a triangle ABC .



- (a) Measure and write

- (i) the length of BC ,

..... cm [1]

- (ii) the bearing of A from B .

..... [2]

- (b) (i) By construction show all the points inside triangle ABC , that are

- (a) 1.5 cm from AC ,

[2]

- (b) equidistant from C and A .

[2]

- (ii) Shade the region, inside triangle ABC , of points that are

- more than 1.5 cm from AC

and

- nearer to C than to A .

[4]

- 9 The table shows arrival time, lunch time, and departure time for three employees Chale, Mpata and Nko.

EMPLOYEE	ARRIVAL TIME	LUNCH TIME	DEPARTURE TIME
Chale	08 00 hrs	12 30 hrs – 13 30 hrs	16 45 hrs
Mpata	10 05 hrs	13 15 hrs – 14 00 hrs	17 05 hrs
Nko	07 30 hrs	12 05 hrs – 13 05 hrs	17 20 hrs

- (a) Write Nko's departure time in 12 hour clock.

..... [1]

- (b) Another employee, Thipa, takes 3 hours 5 minutes at work before lunch.

Between Thipa and Mpata, who spends the longest time at work before lunch?

Support your answer.

..... [2]

- (c) One day Mpata took his lunch outside the workplace.

Calculate the time, in **hours** and **minutes**, that Mpata spent at work on this day.

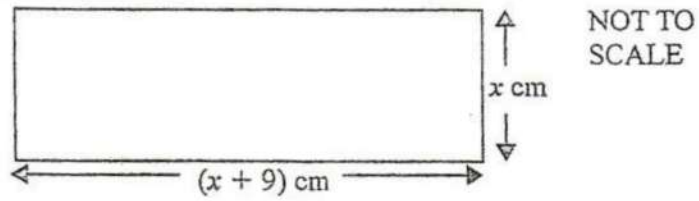
..... h min [3]

- (d) The distance, d , between Chale's home and work is 120 km, correct to the nearest 10 km.

Complete the statement for d .

..... $\leq d <$ [2]

- 10 (a) The diagram shows a rectangle of length $(x + 9)$ cm and width x cm.



- (i) Write an expression in terms of x for the perimeter of the rectangle.

Give your answer in its simplest form.

..... cm [2]

- (ii) The length and the width of the rectangle are in the ratio 3 : 1.

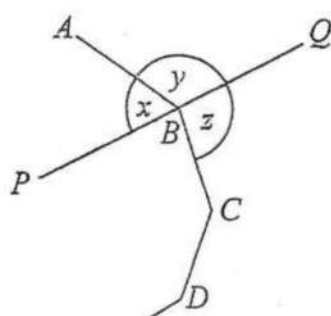
Calculate the width of the rectangle.

..... cm [2]

- (b) A , B , C and D are some of the vertices of a regular polygon and PBQ is a straight line.

$$y + z = 210^\circ$$

$$x + y + z = 270^\circ$$



NOT TO
SCALE

Calculate

- (i) the size of each exterior angle of the polygon.

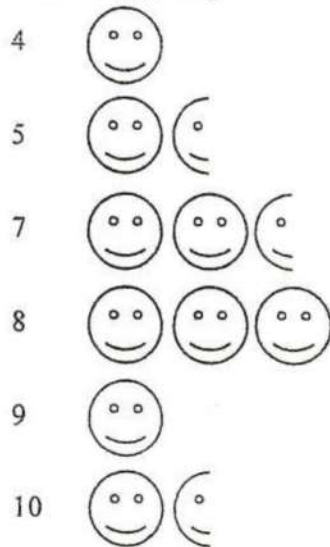
..... [3]

- (ii) the number of sides of the polygon.

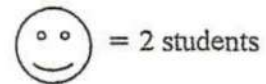
..... [1]

- 11 (a) The diagram shows the frequency distribution of marks obtained by students in a test.

Mark Frequency



KEY



- (i) What is the name given to this kind of diagram?

..... [1]

- (ii) Find the total number of students who wrote the test.

..... [1]

- (iii) Calculate the mean mark.

..... [2]



- (b) The table shows the distribution of ages of guardians of 40 students in a class.

Age of guardian	43	45	49	54	56	60	67	77
Number of students	1	4	8	11	10	3	1	2

- (i) (a) Find the range of the distribution.

..... [1]

- (b) Write the mode of the distribution.

..... [1]

- (ii) A student is chosen at random from the class.

Find the probability that the student has a guardian aged between 44 and 61 years.

..... [2]

- (iii) 20 percent of the class have a guardian aged 'm' years.

Find the value of m.

..... [2]

- (iv) Tanki draws a pie chart to represent the information in the table.

Calculate the sector angle representing the number of students whose guardians are aged 54.

..... [2]