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0178/04

October/November 2022

2 hours 30 minutes

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.

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 130.

This document consists of 19 printed pages and 1 blank page.



Examinations Council of Lesotho

- 1 Tsela flew by plane from Lesotho to Nigeria.
The flight time was 6 hours 42 minutes.
The flight left Lesotho at 8.27 p.m. on Monday.

(a) On what day, and at which time does the plane arrive in Nigeria?

Day:.....Time:.....[2]

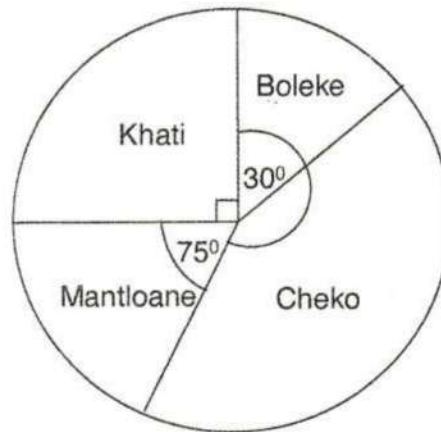
- (b) The average speed of the plane was 650 kilometres per hour.
Calculate the distance the plane flew.

.....km [3]

- (c) The return journey took 30 minutes less.
Find the average speed of the plane for the return journey.

.....km/h [3]

- 2 The diagram shows the results of a survey on the favourite games played by a group of students.



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- (a) Find the probability that a student chosen at random

(i) does not play Boleke,

..... [2]

(ii) plays Cheko.

..... [2]

- (b) A total of 10 students play Boleke.

(i) Find the number of students in the survey.

..... [2]

(ii) Two students are selected at random, one after the other.

Calculate the probability that the first student plays Khati and the second plays Mantloane.

..... [3]

3 (a) A sequence has $T_{10} = 40$, $T_{11} = 49.5$, $T_{12} = 60$, and $T_{13} = 71.5$.

(i) Find T_3 .

.....[2]

(ii) Write an expression for T_n , in terms of n .

.....[2]

(iii) Find n when $T_n = 312$.

.....[2]

(b) Natural numbers P , Q , and R , are such that:

- P is divisible by both 2 and 13,
- Q is divisible by 55,
- the smallest natural number that is divisible by both P and Q is 7150, and
- R is a prime number.

Find

(i) P and Q ,

$P = \dots\dots\dots$, $Q = \dots\dots\dots$ [2]

(ii) the smallest value of R for which $\sqrt{396R}$ is a **natural** number.

$R = \dots\dots\dots$ [1]

- 4 (a) (i) Simplify.

$$\frac{25x^2 - 49}{5x^2 - 12x + 7}$$

.....[4]

- (ii) Hence or otherwise express as a single fraction in its simplest form.

$$\frac{25x^2 - 49}{5x^2 - 12x + 7} \times \left(\frac{2}{x-3} - \frac{3}{5x+7} \right)$$

.....[3]

- (b) Find the value of x for which $\begin{pmatrix} 1 & 5 \\ 2 & x \end{pmatrix}$ has no inverse.

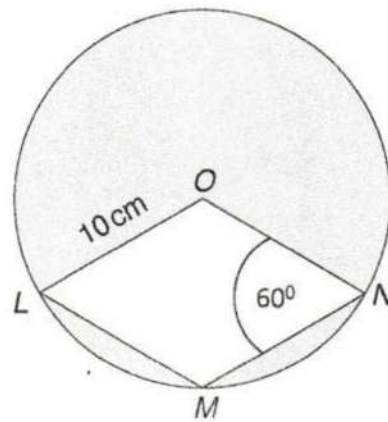
.....[1]

- (c) The two inequalities $2x + 3y \leq 4$ and $2x + 3y \leq 1$ are constraints to a linear program.

Which of the constraints is redundant? Explain your answer.

.....[2]

- 5 In the diagram, three vertices L , M , and N , of a rhombus lie on the circumference of a circle center O and radius 10 cm.
Angle $MNO = 60^\circ$.



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- (a) Show that angle $LON = 120^\circ$.

[2]

- (b) Calculate

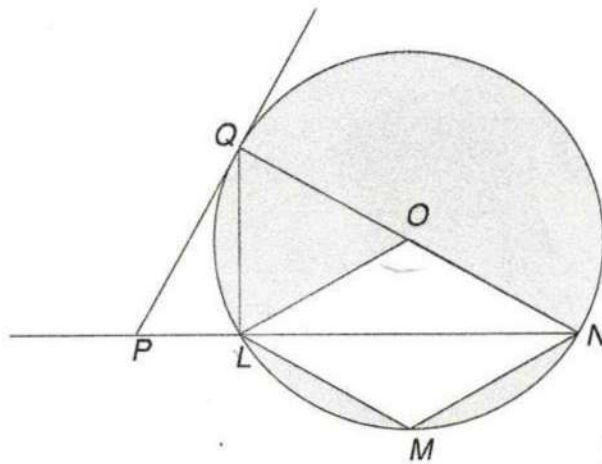
- (i) the area of the rhombus,

.....cm² [3]

- (ii) the area of the shaded part.

.....cm² [3]

- (c) PQ is a tangent to the circle at Q .
 PLN and NOQ are straight lines.



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- (i) Find

(a) angle LPQ ,

.....[2]

(b) angle OLP ,

.....[1]

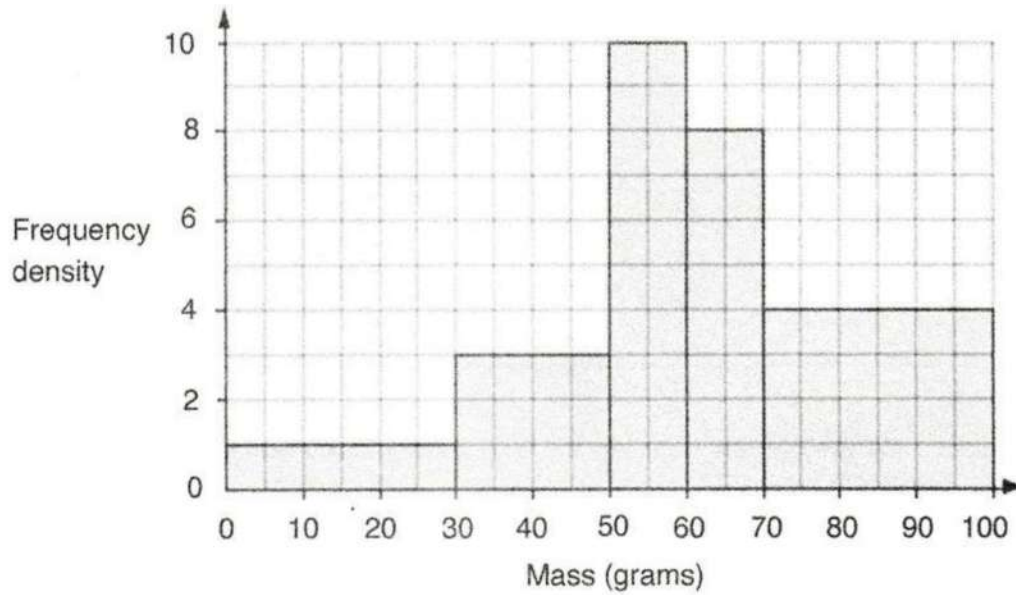
(c) angle LQP .

.....[1]

- (ii) Show that $\triangle LPQ$, $\triangle NPQ$ and $\triangle LNQ$ are similar.

[3]

- 6 The histogram shows the distribution of masses (m grams) of packets of sweets in a box.



- (a) There are 100 packets in the mass group $50 < m \leq 60$.

Calculate the total number of packets of sweets in the box.

.....[3]

- (b) Show that approximately 15.4% of the packets are in the mass group $30 < m \leq 50$.

[2]

- (c) Calculate an estimate of the mean mass of all the packets.

.....[4]

- (d) Estimate the number of packets with a mass of $78 < m \leq 100$.

..... [3]

- 7 (a) A whole number formed by using the digit h in the hundreds place and the digit t in the tens place

is $100h + 10t$.

- (i) Reversing the digits gives a new number that is 540 less in size.

Show that $h - t = 6$.

[3]

- (ii) The two numbers in the digits h and t have a sum of 440.

Show that $h + t = 4$.

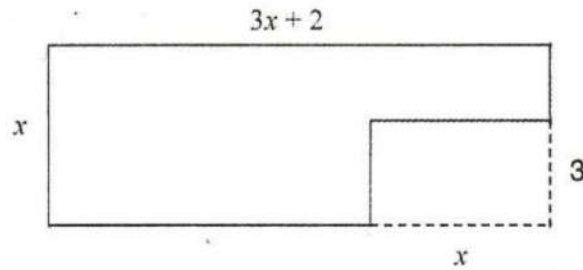
[2]

- (iii) Hence, or otherwise, find the value of h and the value of t .

$h =$

$t =$ [3]

- (b) The diagram shows a shape of area 70 cm^2 formed by cutting off a rectangle of length x cm and width 3 cm from a bigger rectangle of length $(3x + 2)$ cm and width x cm.



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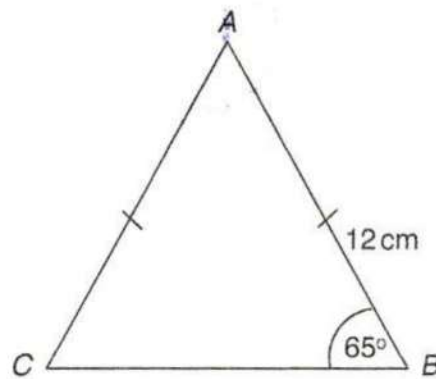
- (i) Show that $3x^2 - x - 70 = 0$.

[2]

- (ii) Find the length of the rectangle.

.....[4]

- 8 A , B and C is an isosceles triangle with $AB = 12$ cm and angle $ABC = 65^\circ$.



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- (a) Find the length BC .

- (b) Calculate the area of the triangle.

.....cm [3]

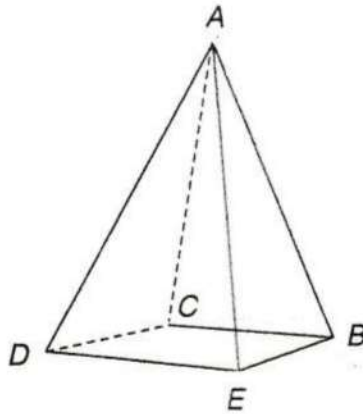
- (c) C is due West of B .

Find the bearing of C from A .

.....cm² [2]

..... [2]

- (d) Triangle ABC is a face of a **square-based** pyramid $ABCDE$.



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- (i) Find the height of the pyramid correct to 2 decimal places.

.....cm [4]

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

..... cm² [3]

- 9 (a) Maema earns M4500 of which he spends 20% on food.

(i) Calculate the amount of money spent on food.

M.....[1]

(ii) Leru spends 18% of his salary on food.

This amount is 36% more than the amount Maema spends on food.

Calculate Leru's salary.

M..... [3]

(iii) Express as a ratio, **in its simplest form**, the amount Leru spends on food to the amount Maema spends on food.

.....[2]

(b) Pule buys enough potatoes and cabbage for 35 needy people.

(i) On average 10 potatoes weigh 2.4 kg.

Each needy person is to get 7 potatoes.

Calculate the total mass of potatoes that Pule buys.

.....kg [2]

(ii) Pule buys 110 kg lot of cabbage but losses $y\%$ due to transportation on the lot.

Write an expression, in terms of y , for the mass of cabbage each person gets.

.....kg [3]

(c) White bank offers a 5.5% simple interest per year.

Yellow bank offers $r\%$ compound interest per year.

Find r if the two banks yield equal interest in 3 years.

.....[3]

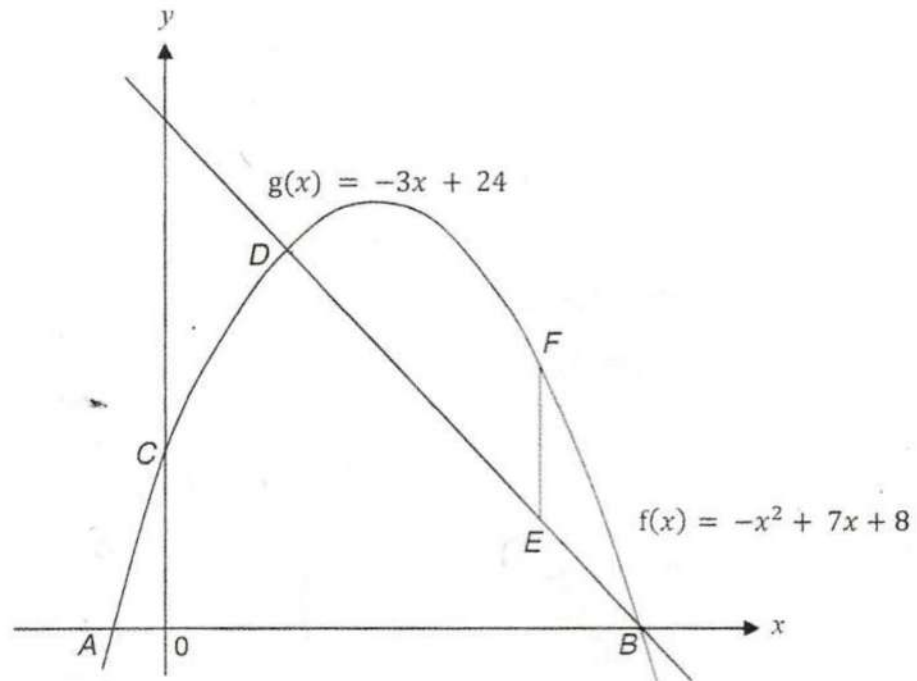
- 10 The diagram shows the graphs of $f(x) = -x^2 + 7x + 8$ and $g(x) = -3x + 24$.

$f(x)$ cuts the x -axis at A and B .

$f(x)$ and $g(x)$ intersect at B and D .

F is a point on $f(x)$ and E is a point on $g(x)$.

EF is parallel to the y -axis.



- (a) Write the coordinates of point C .

(.....,) [1]

- (b) Determine the coordinates of A and B .

$A = (\dots\dots\dots, \dots\dots\dots)$

$B = (\dots\dots\dots, \dots\dots\dots)$ [4]

(c) Find the x coordinate of point D .

..... [3]

(d) Determine EF in terms of x .

..... [2]

11 (a) P is the point $(3, 5)$.

(i) Write the coordinates of the image of P under a translation through $\begin{pmatrix} 6 \\ -4 \end{pmatrix}$.

(.....) [2]

(ii) G and M are transformations represented by $\begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}$ and $\begin{pmatrix} 1 & 0 \\ 0 & -2 \end{pmatrix}$, respectively.

Q is the image of P under M , and R is the image of Q under G .

Write down the coordinates of R .

(.....) [4]

(b) Describe fully a single transformation that is represented by the matrix $\begin{pmatrix} 1 & -2 \\ 0 & 1 \end{pmatrix}$.

.....

..... [3]

(c) State the necessary condition for the existence of a transformation matrix.

..... [1]

(d) $\overrightarrow{AM} = \begin{pmatrix} 1 \\ -6 \end{pmatrix}$, $\overrightarrow{RN} = \begin{pmatrix} -3 \\ 4 \end{pmatrix}$ and $\overrightarrow{NM} = \begin{pmatrix} 7 \\ 9 \end{pmatrix}$.

(i) Work out $\overrightarrow{AR}$.

.....[2
]

(ii) M is the point $(1,0)$ and $|\overrightarrow{MQ}| = |\overrightarrow{RN}|$.

Find **two possible** coordinates of Q that are positive integers.

.....[3]
