Centre Number	Candidate Number

Candidate Name________________________________

EXAMINATIONS COUNCIL OF ZAMBIA

Joint Examination for the School Certificate and General Certificate of Education Ordinary Level

MATHEMATICS (SYLLABUS D) 4024/1

PAPER 1

Monday **1 NOVEMBER 2010** **2 hours**

Candidates answer on the question paper.
Additional materials:
Geometrical instruments

TIME: 2 hours

INSTRUCTIONS TO CANDIDATES

Write your name, centre number and candidate number in the spaces provided at the top of this page.

There are **twenty-three** questions in this paper.

Answer **all** questions.

Write your answers in the spaces provided on the question paper.

If working is needed for any question, it must be shown in the space below that question.

No paper for rough work is to be provided.

Omission of essential working will result in loss of marks.

ELECTRONIC CALCULATORS AND MATHEMATICAL TABLES SHOULD NOT BE USED IN THIS PAPER.

CELL PHONES SHOULD NOT BE BROUGHT IN THE EXAMINATION ROOM.

INFORMATION FOR CANDIDATES

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

The total number of marks for this paper is 80.

FOR EXAMINER'S USE

1 Find the exact value of

(a) $1\frac{2}{3}-\frac{3}{4}$,

(b) $2.16 \div 0.03$.

Answer: **(a)** .... [1]

(b) .... [1]

2 **(a)** Express 0.52 as a fraction, giving your answer in its lowest terms.

(b) Express $\frac{21}{40}$ as a percentage.

Answer: **(a)** .... [1]

(b) .... [1]

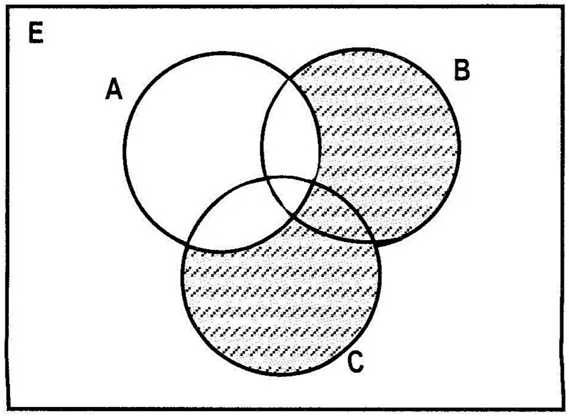
3 Express 4 995 257 in scientific notation correct to 3 significant figures.

Answer: .... [2]

For Examiner's Use

4 **(a)** Set A has 32 subsets. Find n(A).

(b) Use set notation to describe the shaded region in the Venn diagram below.



Answer: **(a)** ....[1]

(b) ....[1]

5 Given that $\begin{pmatrix} 2 & x \\ -4 & 1 \end{pmatrix}\begin{pmatrix} 3 \\ 4 \end{pmatrix} = \begin{pmatrix} 10 \\ -8 \end{pmatrix}$, find the value of x.

Answer: x = ...[2]

6 **(a)** How many lines of symmetry does a regular heptagon have?

(b) Convert 0.0075km^2 to m^2.

Answer: **(a)** ....[1]

(b) ....[2]

[Turn over

7 Solve the simultaneous equations

$2x + y = 4,$

$x - 2y = 2.$

Answer: x = ...

y = ...[3]

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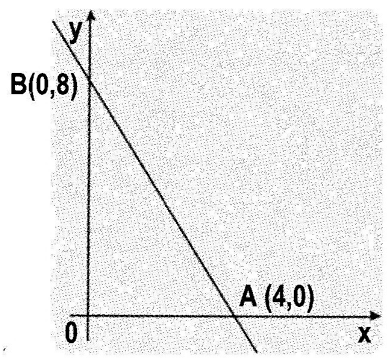
8 **(a)** Find the number of sides of a regular polygon whose exterior angle is 4°.

(b) In the diagram below, the points A and B are (4, 0) and (0, 8) respectively. Find the equation of AB.



Answers: (a) ....[1]

(b) ....[2]

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9 For the function $g(x) = \frac{4x-3}{2x-5}$,

(a) find g(–1),

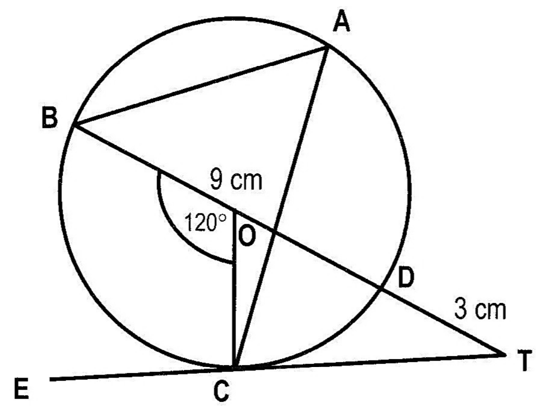
(b) find $g^{-1}(x)$.

Answer: (a) ....[1]

(b) ....[2]

For Examiner's Use

10 In the diagram below, O is the centre of the circle ABCD. BD = 9cm, DT = 3cm, $B\hat{O}C = 120^0$ and ECT is a tangent at C.



(a) Explain why $O\hat{C}T = 90^o$.

(b) Calculate the length of CT.

Answer: **(a)** ....[1]

(b) ....[2]

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11 For the sequence 7, 9, 11, 13, … write down,

(a) the eleventh term,

(b) the expression for the n^{th} term.

Answer: **(a)** ....[1]

(b) ....[2]

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12 **(a)** The bearing of a point B from A is 129°. What is the bearing of A from B?

(b) Describe fully the rotational symmetry of a 72-sided regular polygon with the centre K.

Answer: **(a)** ....[1]

(b) ....

.... [2]

13 Two towns, P and Q, lie on latitude 43° north. P is on longitude 23° west while Q is on longitude x° east.

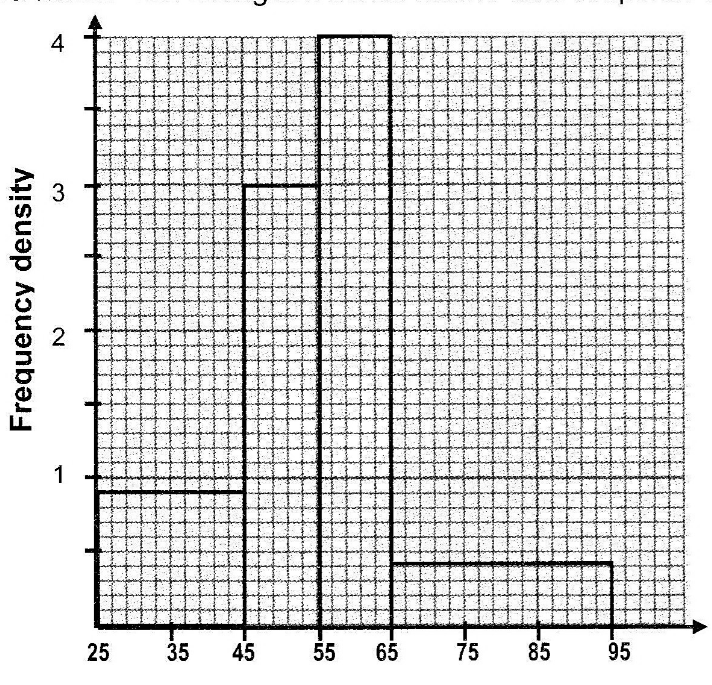
(a) If the difference in degrees between P and Q is 63°, state the value of x.

(b) A FIFA World Cup final match is scheduled to kick off at exactly 15 00 hours, local time, at Q. What will be the kick off time at P?

Answer: **(a)** .... [1]

(b) .... [2]

14 A number of drivers travelled between two towns, Kanjisunge and Kanjipikile, 80km apart. 100 drivers were asked how long it took them to cover the distance between the two towns. The histogram below shows their responses.



Time (minutes)

Complete the table in the answer space.

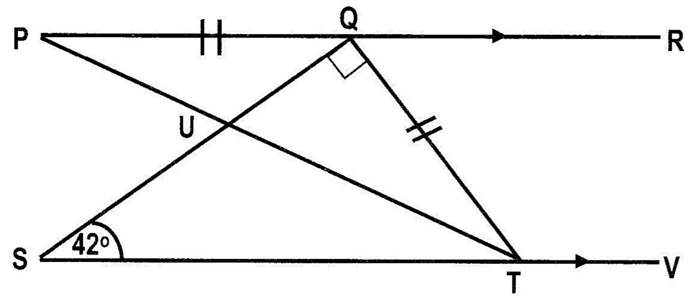
Answer:

Time (x minutes)	Frequency
$25 < x \leq 45$	
$45 < x \leq 55$	
$55 < x \leq 65$	40
$65 < x \leq 95$	

[3]

For Examiner's Use

15 In the diagram below, PQR is parallel to STV, $S\hat{Q}T = 90^\circ$, $Q\hat{S}T = 42^\circ$ and PQ = QT.



Calculate

(a) $T\hat{Q}R$,

(b) $P\hat{T}S$,

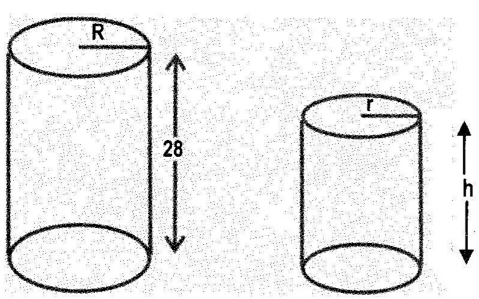
(c) $P\hat{U}S$.

Answer: **(a)** $T\hat{Q}R$ = ... [1]

(b) $P\hat{T}S$ = ... [1]

(c) $P\hat{U}S$ = ... [1]

16 The two tins below are geometrically similar. The ratio of their volumes is 64:27.



(a) Calculate the ratio of their curved surface areas.

(b) Given that the height of the larger tin is 28cm, calculate the height of the smaller tin.

Answer:(a) .... [2]

(b) h =............................ [2]

17 It is given that x varies inversely as the square of y and directly as z, and $x = 2$ when $y = 3$ and $z = 4$.

(a) Find k (the constant of variation).

(b) Find y when $x = 3$ and $z = 24$.

Answer: **(a)** $k =$ .... [1]

(b) $y =$ .... [3]

18 A Grade One pupil has a certain number of Fanta, Cocacola and Sprite bottle tops in her bag. She takes one bottle top at random from the bag and the probability that it is a Fanta bottle top is 0.25 and the probability that it is a Sprite bottle top is 0.4.

(a) Find the probability that it is

(i) a Cocacola bottle top,

(ii) not a Sprite bottle top.

(b) Originally there were 16 Sprite bottle tops in her bag. Find the total number of bottle tops that she had.

Answer: **(a)** **(i)**.................................... [1]

(ii).................................... [1]

(b).................................... [2]

For Examiner's Use

19 **(a)** The Highest Common Factor of 24, x and 72 is 6. Find the greatest possible value of x such that x < 60.

(b) Using as much of the information given below as is necessary, find the value of $\sqrt{415}$.

$$\left(\sqrt{4.15} = 2.037, \quad \sqrt{41.5} = 6.442\right)$$

(c) A father left a sum of money to be shared between his two children, Kabaso and Lushomo, in the ratio 2:3 respectively. What was the total amount left by the father, if Lushomo's share was K2 565 000.

Answer: **(a)** .... [1]

(b) .... [2]

(c) .... [2]

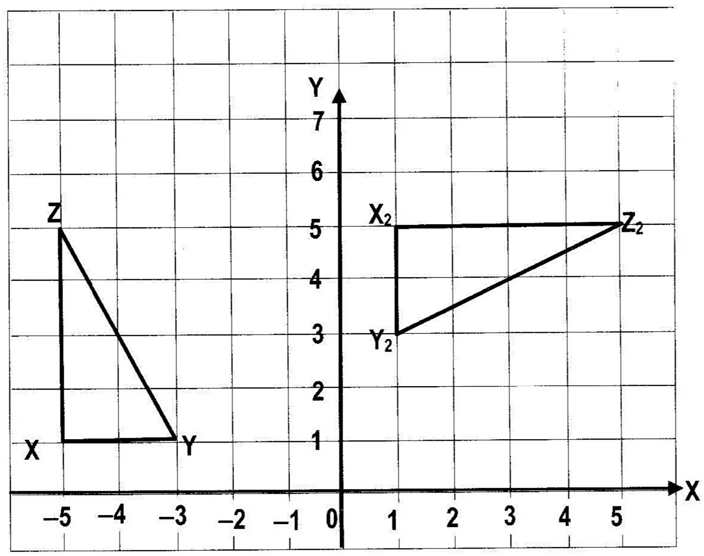
20 Study the diagram in the answer space and answer the questions below.

(a) On the diagram draw $\Delta X_1Y_1Z_1$, the image of ΔXYZ under a reflection in the line x = 0.

(b) $\Delta X_1 Y_1Z_1$ can be mapped onto $\Delta X_2Y_2Z_2$ by a single transformation P. Name the transformation P.

(c) Describe fully a single transformation which maps ΔXYZ onto $\Delta X_2Y_2Z_2$.

(a)



[1]

(b) .... [1]

(c) .... [3]

For Examiner's Use

21 **(a)** Find the integer n such that $n + 3 < 11 < n + 5$.

(b) Factorize completely $\frac{4u^2}{a^2} - \frac{1}{9}$.

(c) Given that $x * y = \frac{x}{y} + \frac{1}{2}$, find the value of $\frac{3}{4} * 2$.

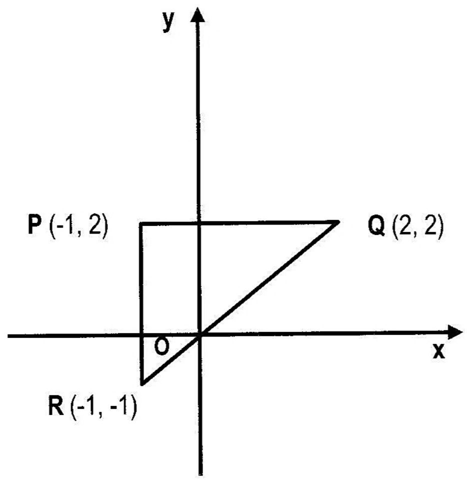
Answer: **(a)** ....[1]

(b) .... [2]

(c) .... [2]

22 **(a)** Mr Saukani takes three hours to drive from town A to town B at a speed of 80km/h. How long would it take him to drive from town A to town B if he increased his speed to 96km/h?

(b) The diagram below shows triangle PQR with vertices P(–1, 2), Q(2, 2) and R(–1, –1).



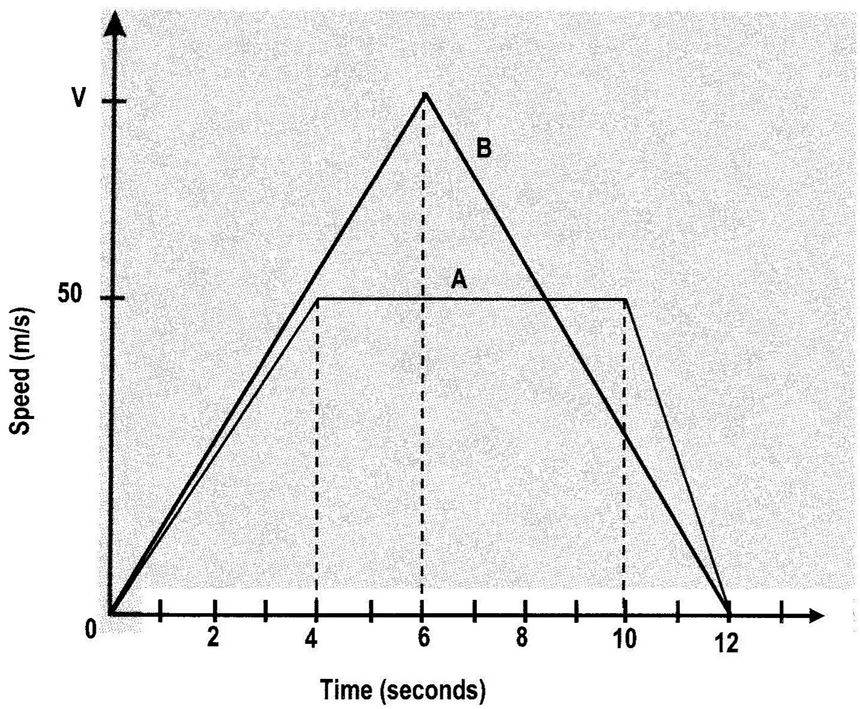
Write down the three inequalities which define the region inside the triangle PQR.

Answer:(a) ....[2]

(b) ....

....[4]

23 The diagram below shows the speed-time graphs of two trains leaving a station at the same time. Train A accelerates uniformly from rest to a speed of 50m/s in 4 seconds. It moves at this speed for 6 seconds before coming to rest in a further 2 seconds. Train B accelerates uniformly from rest to a speed of v m/s in 6 seconds then comes to rest in a further 6 seconds.



(a) Given that the trains moved the same distance, calculate the maximum speed, v, of train B.

(b) Find the distance between the trains during the first 6 seconds.

Answer (a) .... [4]

(b).. [3]