

EXAMINATIONS COUNCIL OF ZAMBIA

Examination for School Certificate Ordinary Level

Mathematics

4024/1

PAPER 1

Wednesday

7 OCTOBER 2015

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 (a) Find the value of $3\frac{1}{3} - \frac{1}{5}$.

(b) Convert 0.375 to a common fraction in its lowest terms.

Answer: (a) [1]

(b) [1]

2 A road construction company needed a sum of 0.04455 billion kwacha (1 billion = 1 000 000 000) to rehabilitate bridges on a road. Write 0.04455 billion in standard form correct to 2 significant figures.

Answer: [2]

3 (a) Evaluate $12 + 3 \times 6 - 36$.

(b) Find the value of n , if $4^n = 2^2 \times 4^2$.

Answer: (a) [1]

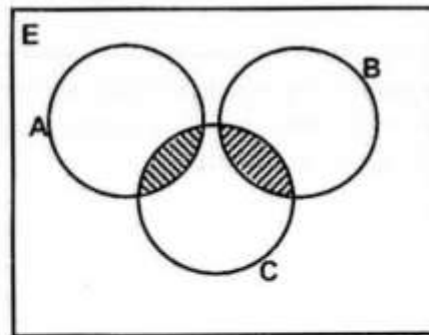
(b) [1]

- 4 A furniture shop conducted a sale. In this sale, prices were reduced by 15%. Find the price before reduction of a table that was reduced by K120.00.

Ex

Answer: [2]

- 5 Describe the region shaded using set notation.



Answer: [2]

- 6 Chanda changed \$620 into Zambian Kwacha at an exchange rate of \$1 = K6.25. He later changed all the Zambian Kwacha back into American Dollars (\$) at an exchange rate of \$1 = K6.20. Calculate the profit made.

Answer: [2]

- 7 (a) The position vectors of the points X and Y are $\begin{pmatrix} 3 \\ -4 \end{pmatrix}$ and $\begin{pmatrix} -8 \\ -1 \end{pmatrix}$ respectively.
Express \overrightarrow{XY} as a column vector.
- (b) A fair six sided die numbered 1, 2, 3, 4, 5 and 6 is rolled. Find the probability of obtaining a prime number.

Answer: (a) [1]

(b) [1]

- 8 Solve the simultaneous equations

$$5 - 8y = 4,$$

$$4x - 5y = 6.$$

Answer: $x =$

$y =$ [3]

- 9 (a) If $E = \{\text{first eight natural numbers}\}$ and $A = \{1, 4, 7\}$, find the set A' .
 (b) Factorise $2x^2 - x - 15$.

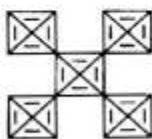
Answer: (a)..... [1]

(b)..... [2]

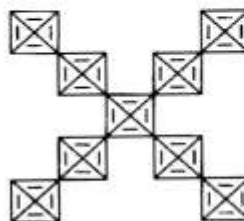
- 10 The patterns below were made using floor tiles.



Pattern No.1



Pattern No. 2



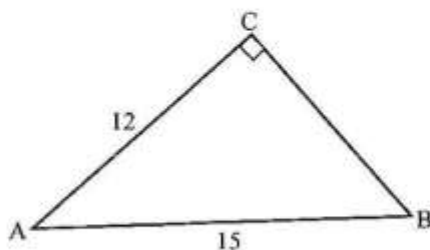
Pattern No. 3

- (a) Find the number of floor tiles in pattern number 10.
 (b) Given that m is the number of tiles in pattern number n , find a formula for m in terms of n .

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

(b)..... [2]

- 11 (a) The diagram below is a right angled triangle in which $\hat{ACB} = 90^\circ$, $AB = 15\text{cm}$ and $AC = 12\text{cm}$.



Find the length of BC.

- (b) Given that $t = \sqrt{\frac{n+3}{n}}$, express n in terms of t .

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

(b)..... [2]

- 12 (a) Simplify $7m - 2(3n - m) - 9n$.
- (b) The table below shows information about the number of leave days taken by the employees at Katobamabwe Quarry Company in the year 2013.

Number of leave days taken	0	1	2	3	4	5
Frequency	2	1	4	2	2	1

Find

- (i) the mode,
- (ii) the median.

Answer: (a) [2]

(b) (i) [1]

(ii) [1]

13 Given that $f(x) = \frac{2x+7}{8}$ and $g(x) = \frac{3x-6}{6}$, find

- (a) $g(6)$,
- (b) $f^{-1}(x)$,
- (c) the value of x if $f(x) = g(x)$.

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

(b)..... [1]

(c)..... [2]

- 14 (a) Solve the equation $2y^2 = 13y$.
- (b) A lawn in front of Bomuluti Secondary School administration block is circular in shape and has a radius of 14 metres. Mr Kakwempa is contracted to cut the grass using his lawnmower. He charges K1.50 per every square metre of lawn cut. Find the total amount he was paid for cutting the whole lawn.
- (Take π to be $\frac{22}{7}$)

Answer: (a) $y = \dots\dots\dots$ or $\dots\dots\dots$ [2]

(b) $\dots\dots\dots$ [2]

- 15 (a) Solve the inequation $14x - 8 \geq 20$.
- (b) An aeroplane leaves a town P(33°N , 32°E) and flies due south to a town Q(12°S , 32°E). Given that it flew for 4 hours to cover the distance PQ, find the average speed of the aeroplane in km/h. (Take π to be $\frac{22}{7}$ and $R = 6370\text{km}$)

Answer: (a) $\dots\dots\dots$ [1]

(b) $\dots\dots\dots$ [3]

- 16 A map of a settlement area is drawn to a scale of 1: 40 000.
- (a) If the distance between two shopping malls is 8cm on the map, calculate the actual distance between the two shopping malls in kilometres.
- (b) If the actual area of the settlement is 200 square kilometres, calculate the area of the settlement on the map in **square centimetres**.

Answer: (a)[2]

(b) [2]

- 17 (a) The figure in the answer space below is a regular hexagon inscribed in a circle with centre O, as shown. Shade any three segments so that the resulting shape has rotational symmetry of order 3.

- (b) Given that $P = \begin{pmatrix} 3 & -4 \\ 1 & 2 \end{pmatrix}$, express P^2 as a single matrix.

Answer: (a)  [2]

(b).....[2]

18 Given that y is proportional to x^3 and that $y = 250$ when $x = 10$, find

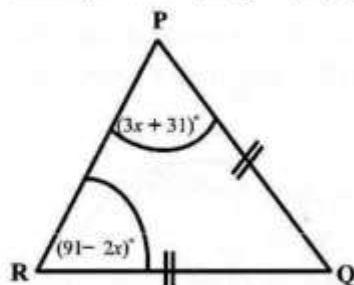
- (a) the value of the constant k ,
- (b) y when $x = 4$,
- (c) x when $y = 54$.

Answer: (a)[1]

(b)[1]

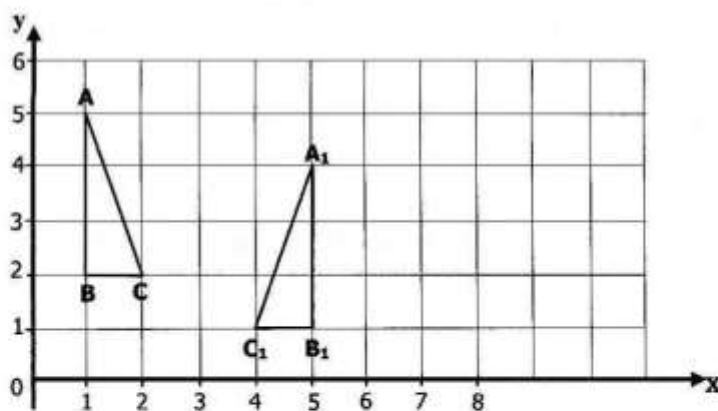
(c)[2]

- 19 (a) In the triangle below, $PQ = QR$, $\angle P = (3x + 31)^\circ$ and $\angle R = (91 - 2x)^\circ$.



Find the size of $\angle Q$.

- (b) In the diagram below, triangle ABC is mapped onto triangle $A_1B_1C_1$ by transformation X followed by transformation Y.



Describe fully the transformations X and Y.

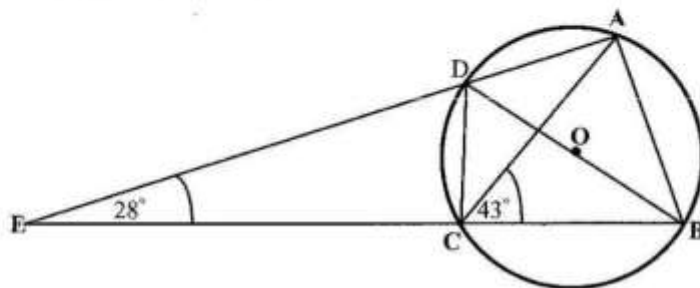
Answer: (a) [2]

(b)

.....

..... [2]

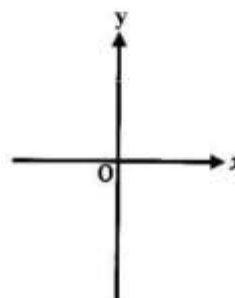
- 20 (a) Sketch the graph of $y + x^2 = 0$ in the answer space.
- (b) In the diagram below, A, B, C and D are points on the circumference of a circle with centre O. ADE and BCE are straight lines. Angle $CED = 28^\circ$ and angle $BCA = 43^\circ$.



Find

- (i) $\angle CDE$,
 (ii) $\angle CDB$,
 (iii) $\angle DAC$.

Answer: (a)



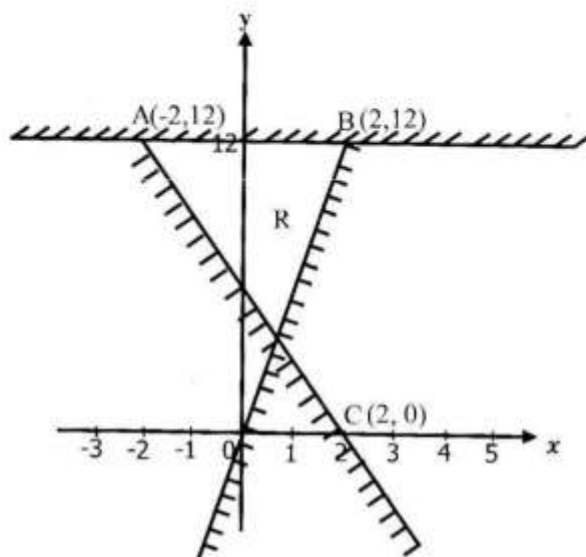
[1]

(b) (i) $\angle CDE = \dots\dots\dots$ [1]

(ii) $\angle CDB = \dots\dots\dots$ [1]

(iii) $\angle DAC = \dots\dots\dots$ [2]

- 21 In the XOY plane below, the unshaded region R is bounded by straight lines AB, AC and OB.



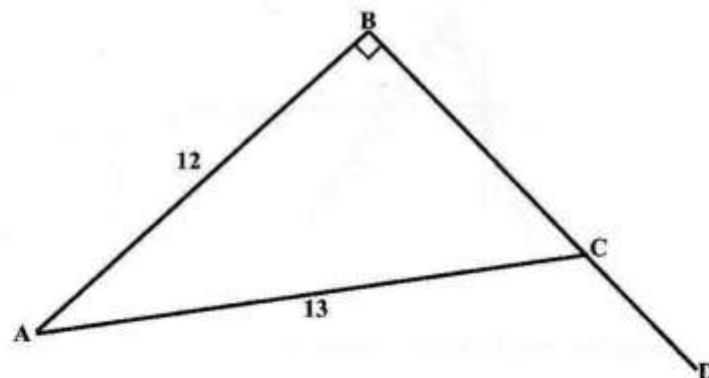
Write three inequalities that define the region R.

Answer:

.....

..... [5]

- 22 (a) A sum of money is shared among Satala, Sichale and Sichambo in the ratio 7:5:4 respectively. If Satala got K140 000.00, how much
- was the total sum of money,
 - did Sichambo get?
- (b) Two cylindrical mugs are geometrically similar. The smaller mug has diameter 8cm and holds 125cm^3 of a liquid. If the larger mug holds 1000cm^3 of a liquid, find its diameter.
- (c) In the diagram below, BCD is a straight line. It is given that $AB = 12\text{cm}$, $AC = 13\text{cm}$ and $\angle ABC = 90^\circ$.



Find, as a fraction, $\cos \angle ACD$.

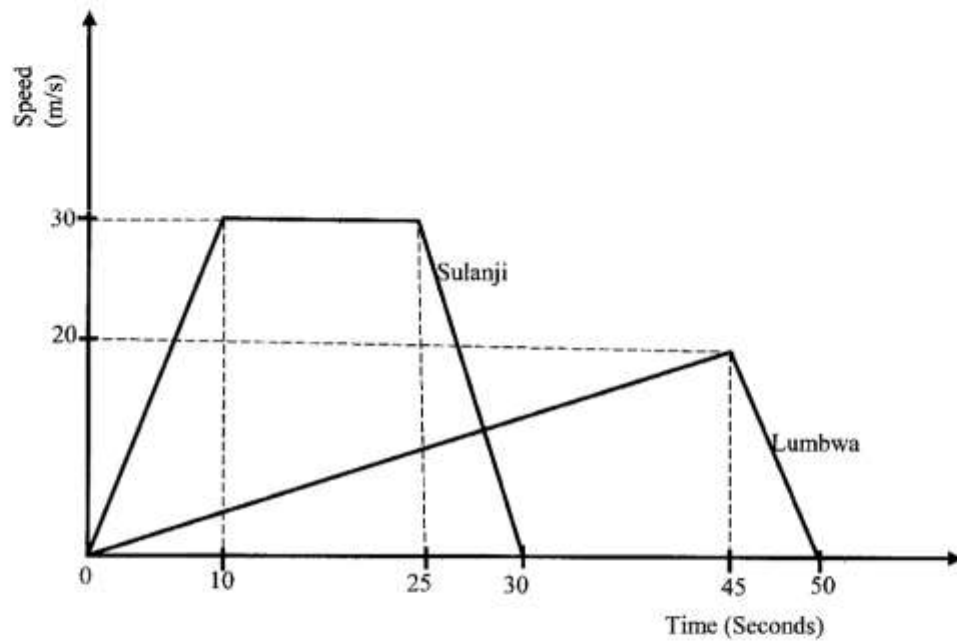
Answer: (a) (i) [1]

(ii) [1]

(b) [2]

(c) [2]

- 23 The figure below shows speed – time graphs of cars driven by Sulanji and Lumbwa.



- Find the acceleration of Sulanji's car during the first 10 seconds.
- Calculate how far Lumbwa's car travelled before coming to rest.
- What is Sulanji's acceleration between the 25th and 30th seconds?

Answer: (a) [2]

(c) [2]

(c) [2]