



Candidate Name

Taanga Phiri

Centre
Number

Candidate
Number

EXAMINATIONS COUNCIL OF ZAMBIA

Examination for School Certificate Ordinary Level

Mathematics

Paper 1

4024/1

Thursday

14 NOVEMBER 2019

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 are not allowed 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.

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This question paper consists of 17 printed pages

- 1 Evaluate $(-1)^6 \times 2^3$.

Answer: [2]

- 2 Solve the equation $(x-1)(2x+5)=0$.

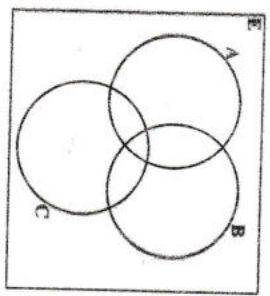
Answer: [2]

- 3 Simplify $4x^2 + 2y^2 - xy - 6x^2 + 2xy$.

Answer: [2]

- 4 Shade $(A \cup C) \cap B$ in the Venn diagram in the answer space.

Answer:



- 5 Factorise completely $4ab + 6ac - 6bd - 9cd$.

Answer: [2]

- 6 A company declared a dividend of K1.50 per share. Musalia has 600 shares in the company. How much will she get?

Answer: [2]

- 7 (a) Given that $17 + m + 27 + \dots$ are consecutive terms of an Arithmetic Progression, find the arithmetic mean, m .
- (b) For the sequence 11, 13, 15, ..., find the formula for the n^{th} term.

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Answer:

- (a) [1]
- (b) [2]

- 8 (a) The transpose of a matrix A is $\begin{pmatrix} -1 & 4 & 5 \end{pmatrix}$. Find the matrix A .

- (b) Given that $\begin{pmatrix} 1 & 2 & 3 \\ x & & 5 \end{pmatrix} = \begin{pmatrix} 24 \end{pmatrix}$, find the value of x .

Answer:

- (a) [1]
- (b) [2]

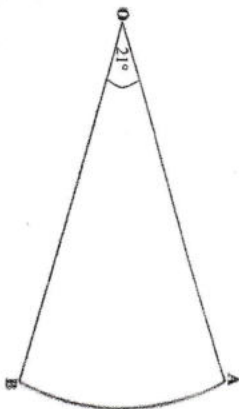
Mathematics/4024/1/2019

- 9 (a) A number is chosen at random from the set $\{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$. Find the probability that it is a perfect square.
- (b) Solve the equation $8^x = 128$.

Answer:

- (a) [1]
- (b) [2]

- 10 (a) Set $A = \{\text{Prime numbers less than } 12\}$. List set A .
- (b) The diagram below shows a sector AOB . Arc AB subtends an angle of 21° at the centre O .



Given that the area of the sector is 14.85 cm^2 , calculate the radius. [$\pi = \frac{22}{7}$]

Answer:

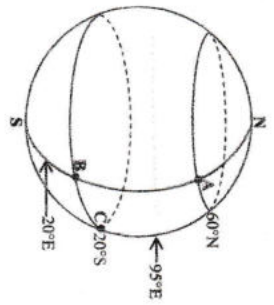
- (a) [1]
- (b) [2]

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Turn over

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11 The diagram below shows the positions of towns A, B and C on the earth's surface.



- (a) If it is 08 20 at A, what time is it at C?
 (b) A plane flies from A to B at a speed of 400 knots. How long does the journey take if $AB = 4\ 800\ \text{nm}$?

Answer: (a) [1]

(b) [2]

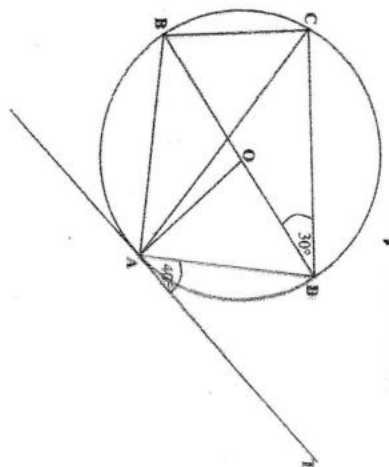
12 The length of a piece of wire is measured as 4.5 cm. Calculate

- (a) the tolerance,
 (b) the relative error.

Answer: (a) [2]

(b) [2]

13 In the diagram below, A, B, C and D are points on the circumference of a circle, centre O. $\widehat{DAT} = 40^\circ$, $\widehat{BDC} = 30^\circ$ and AT is a tangent to the circle at A.



Calculate

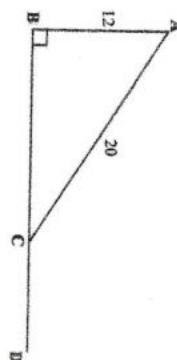
- (a) $\widehat{CBD}$,
 (b) $\widehat{BAC}$,
 (c) $\widehat{AOB}$.

Answer: (a) [1]

(b) [1]

(c) [2]

- 14 (a) In the diagram below, BCD is a straight line, $AB = 12\text{cm}$, $AC = 20\text{cm}$ and angle $ABC = 90^\circ$.



Find the value of $\cos \hat{ACD}$.

- (b) A and B are points with coordinates $(-3, 3)$ and $(5, 9)$ respectively. Find the length AB.

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

- 15 a varies directly as b and as the square of c and $a = 30$ when $b = 2, 5$ and $c = 2$.

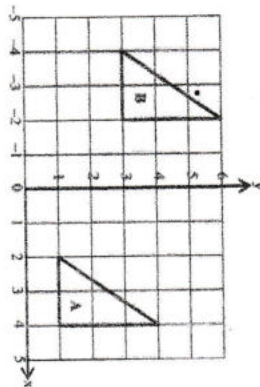
Find the

- (a) value of k , the constant of variation,
(b) value of a when $b = 2$ and $c = 3$,
(c) values of c when $a = 300$ and $b = 4$.

Answer: (a) $k =$ [1]
(b) $a =$ [1]
(c) $c =$ or [2]

16 (a) Find $\int (3x^2 + 8x - 5) dx$.

(b) The diagram below shows two triangles A and B.

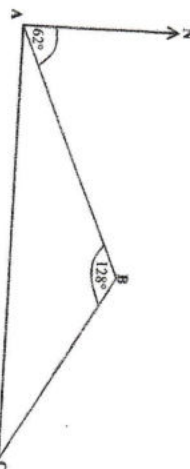


Describe fully the single transformation which maps triangle A onto triangle B.

Answer: (a) [2]

(b) [2]

17 In the diagram below, A, B and C are three points on level ground. The bearing of B from A is 062° and angle $ABC = 128^\circ$. C is due east of A.



Find the bearing of

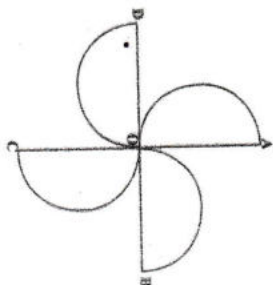
(a) C from B,

(b) A from C.

Answer: (a) [2]

(b) [2]

- 18 (a) The diagram below shows a plane figure made up of congruent semi circles. Angle AOB = 90° .



Describe fully the symmetry of the figure.

- (b) In the answer space below is an incomplete program written in pseudocode for calculating the volume V of a cuboid, given the length, l , base, b , and the height, h . Complete the program by filling in the blank spaces with appropriate statements.

Answer: (a)

..... [2]

(b) Begin

Enter

$V =$

Output V

End

[2]

- 19 The functions f and g are defined by $f(x) = 2x - 3$ and $g(x) = 3x$. Find

- (a) $f^{-1}(x)$,
(b) $gf(x)$,
(c) $gf(2)$.

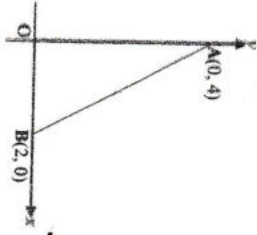
Answer: (a)

..... [1]

(b) [2]

(c) [1]

- 20 (a) In the diagram below, A is the point $(0, 4)$ and B is the point $(2, 0)$ and O is the origin.



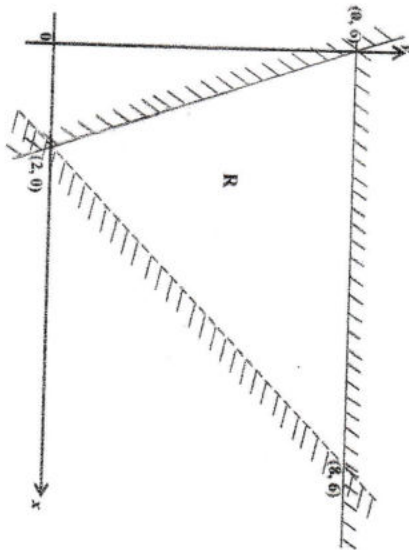
Find the equation of a straight line through O which is parallel to the line AB.

- (b) The heights of two similar cylinders are 4 cm and 6 cm. If the volume of the smaller cylinder is 48 cm^3 , find the volume of the larger cylinder.

ANSWER: (a) [2]
(b) [2]

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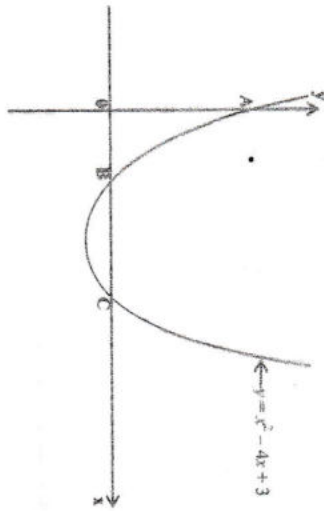
- 21 Write down the three inequalities that define the unshaded region R, on the diagram below.



ANSWER:
.....
..... [5]

- 22 (a) M is the point (0, 5) and $\vec{MN} = \begin{pmatrix} -3 \\ 4 \end{pmatrix}$. Find $\vec{ON}$.

- (b) The sketch shown below represents the graph of the curve $y = x^2 - 4x + 3$, passing through the points A, B and C.



- Find the
- (i) coordinates of the points B and C,
 - (ii) minimum value of y .

Answer: (a) [2]

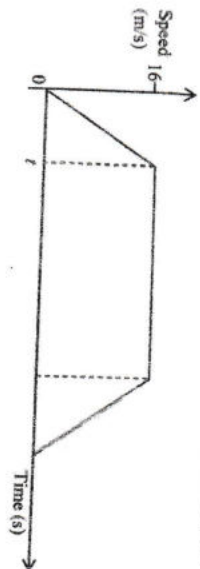
(b) (i) [2]

(ii) [2]

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The diagram below is the speed time graph of a car. The car starts from rest and uniformly at 2 m/s^2 for t seconds until it reaches a speed of 16 m/s . It then travels for 40 seconds, after which it comes to rest in a further 10 seconds.



- Find the
- (a) value of t ,
 - (b) distance travelled in the last 50 seconds,
 - (c) speed of the car when $t = 53$ seconds.

Answer: (a)

(b)

(c)

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