Candidate Name _____

Centre Number	Candidate Number

4024-1-27487

EXAMINATIONS COUNCIL OF ZAMBIA

Examination for General Certificate of Education Ordinary Level

Mathematics

4024/1

Paper 1

Wednesday 31 July 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.

For Examiner's Use

This question paper consists of 16 printed pages

For Examiner's use

1 Simplify $4 - 2(b - a) - 1$.

Answer: ..... [2]

2 Evaluate $\left(\sqrt[4]{81}\right)^3$.

Answer: ..... [2]

3 Factorise completely $32x^2 - 50$.

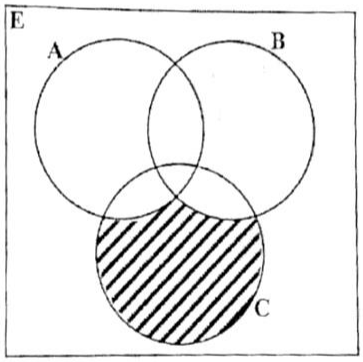
Answer: ..... [2]

For Examiner's use

4 Find the gradient of a line which passes through $(-5, 3)$ and $(-4, 1)$.

Answer: ..... [2]

5 The Venn diagram below shows three sets A, B and C.



Use set notation to describe the shaded region.

Answer: ..... [2]

6 The vector $PQ = \begin{pmatrix} -3 \\ 2 \end{pmatrix}$. Given that the point P is (1, 4), find the coordinates of the point Q.

Answer: ..... [2]

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7 Given that $R = \begin{pmatrix} 2 & -1 \\ 1 & 3 \end{pmatrix}$ and $S = \begin{pmatrix} 1 & 0 & -4 \\ -2 & 1 & 1 \end{pmatrix}$,

find

(a) S^T,

(b) RS.

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

(b) ..... [2]

For Examiner's use

8 For the sequence $-10, -7, -4, -1, \ldots$, find the

(a) 17^{th} term,

(b) sum of the first 20 terms.

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

(b) ..... [2]

9 (a) There are 4 blue and 5 white marbles in a bag. What is the probability of randomly picking a white marble?

(b) Solve the equation $2x^2 + 5x - 3 = 0$.

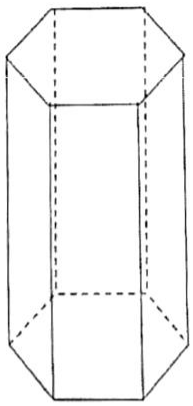
Answer: (a) ..... [1]

(b) $x =$ .....or..... [2]

For Examiner's use

10 **(a)** Given that E = {0, 1, 2, 3, 4, 5, 6, 7, 8, 9}, A = {2, 3, 6, 8} and B = {3, 6, 7, 9}, list $(A \cap B)'$.

(b) The diagram below shows a prism, with a base that is a regular hexagon.



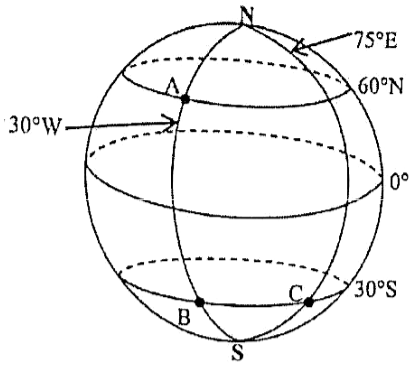
How many planes of symmetry does it have?

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

(b) ..... [2]

For Examiner's use

11 The diagram below shows point A(60°N, 30°W), B(30°S, 30°W) and C(30°S, 75°E).



(a) If the local time at B is 15 00, what is the local time at C?

(b) It takes a plane 6 hours to fly from A to B. What is its speed in knots?

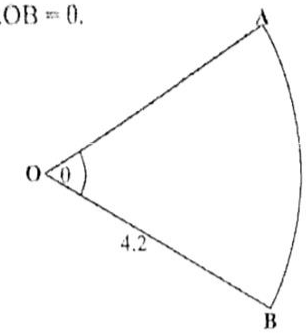
Answer: (a) ..... [1]

(b) ..... [2]

For Examiner's use

12 (a) Evaluate $3^0 \times 3^3 + 3^1$.

(b) The diagram below shows a sector of a circle with centre O and radius 4.2 cm. Angle AOB = θ.



Given that the area of the sector AOB is 9.24 cm^2, find the value of θ. $[\pi = \frac{22}{7}]$

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

(b) ..... [2]

13 (a) The mass, m, of a block of wood is 876.4 g, correct to 1 decimal place. Complete the statement in the answer space below.

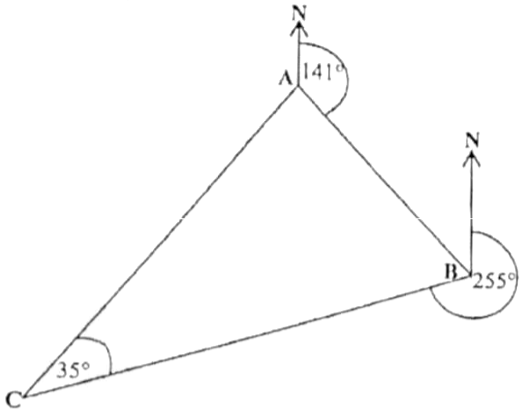
(b) The length of a piece of wire is 15.2 cm, correct to 1 decimal place. What is the relative error of the length of the piece of wire?

Answer: (a) .....$\leq m \leq$ ..... [2]

(b) ..... [2]

For Examiner's use

14 The diagram below shows Mr Moenda's trip. He travels on a bearing of 141° from A to B. He then decides to continue with his trip from B on a bearing of 255° to C. The angle BCA = 35°.



Find the bearing of

(a) A from B,

(b) A from C.

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

(b) ..... [2]

15 The functions f and g are defined as $f(x) = 2x + 1$ and $g(x) = \frac{3x-5}{2}$. Find

(a) $f^{-1}(x)$,

(b) $fg(x)$,

(c) $fg(4)$.

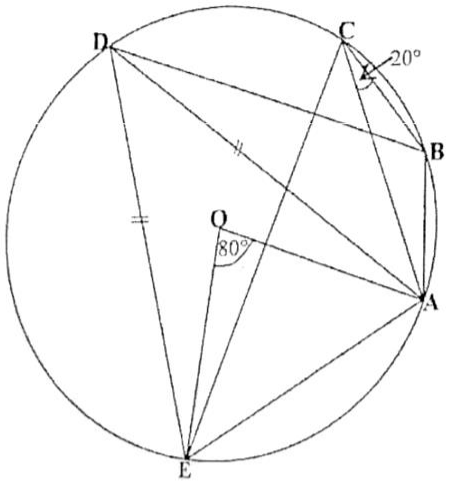
Answer: (a) ..... [1]

(b) ..... [2]

(c) ..... [1]

[Turn over

16 In the diagram below, A, B, C, D and E are points on the circumference of the circle with centre O. DE = AD, $A\hat{C}B = 20°$ and $A\hat{O}E = 80°$.



Find

(a) $A\hat{D}E$,

(b) $D\hat{A}E$,

(c) $B\hat{A}D$.

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

(b) ..... [1]

(c) ..... [2]

For Examiner's use

17 (a) A point R(−3, 1) is mapped onto a point S(2, −1) by a translation T. Express T as a column vector.

(b) In the answer space below is an incomplete program written in pseudocode, for calculating the mean (m) of 10 numbers whose sum is S. Complete the program by filling in the blank spaces with appropriate statements.

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

(b) Start

Enter.....

m = ...

Output m

Stop [2]

For Examiner's use

18 Given that y varies directly as x and inversely as the square of z, and that $y = 10$ when $x = 32$ and $z = 4$,

find

(a) the value of k, the constant of variation,

(b) y when $x = 20$ and $z = 5$,

(c) z when $x = 9$ and $y = 5$.

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

(b) $y =$ ..... [1]

(c) $z =$ ..... or..... [2]

19 (a) A company's working capital consists of 450 10% preference shares of K50.00 each and 700 ordinary shares of K10.00 each. After 6 months, the company declared a dividend of K5 750.00. How much dividend will be paid to each ordinary shareholder?

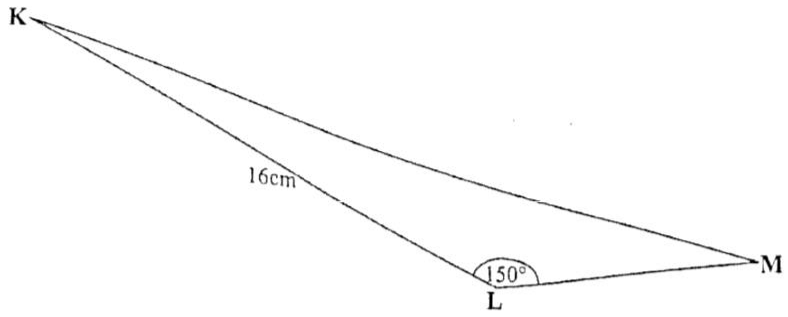
(b) The ratio of the volumes of two similar solids is 64:27. The surface area of the smaller solid is 180 cm^2. What is the surface area of the bigger solid?

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

(b) ..... [2]

For Examiner's use

20 (a) The diagram below shows triangle KLM in which KL = 16 cm, angle KLM = 150° and its area is 32 cm^2.



Calculate the length of LM.

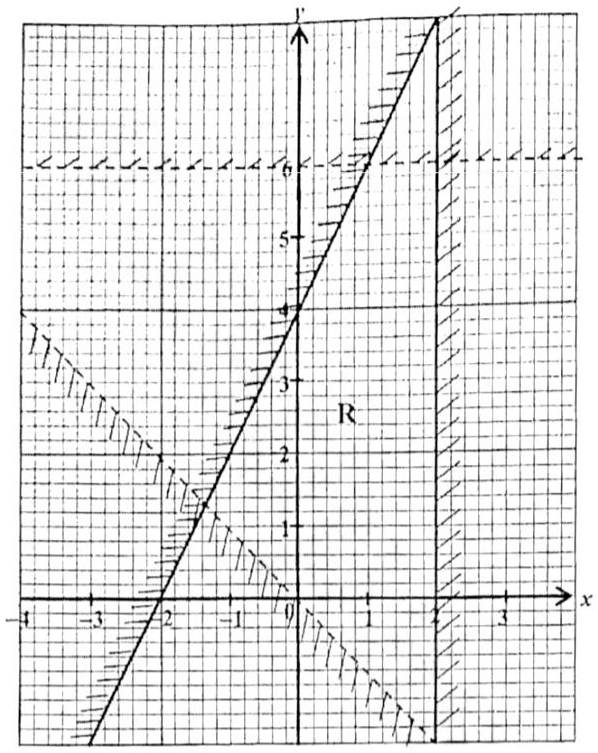
(b) The equation of line A is $3x + 2y = 10$. Line B is parallel to line A and passes through the point (4, 6). Find the equation of the line B.

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

(b) ..... [2]

For Examiner's use

21 Write four inequalities that define the unshaded region R, on the diagram below.



Answer: .....

.....

.....

..... [5]

For Examiner's use

22 (a) Find the integral of $\frac{3x^3}{2} - 5x + \frac{1}{x^2}$ with respect to x.

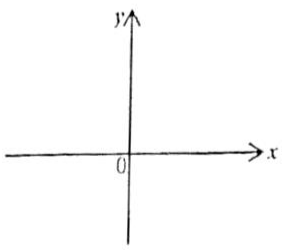
(b) A function $y = (1 + x)(x - 2)$.

(i) Sketch the graph of the function in the answer space below.

(ii) Find the minimum value of y.

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

(b) (i)

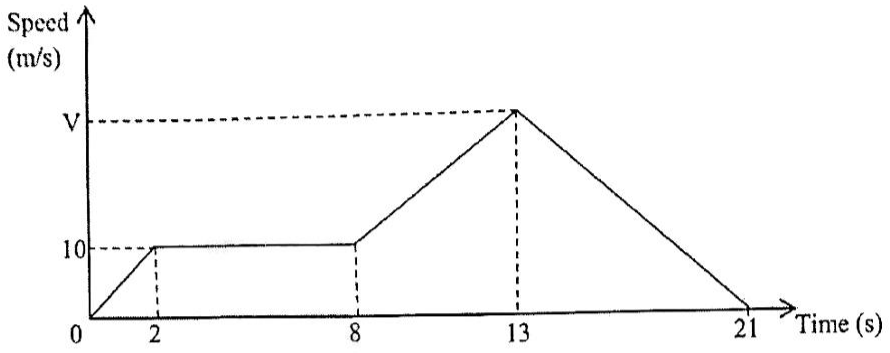


[2]

(ii) ..... [2]

For Examiner's use

23 The diagram below shows a speed time graph of an object. It starts from rest and accelerates uniformly for 2 seconds until it reaches a speed of 10m/s. It moves at this constant speed for 6 seconds then accelerates until it reaches a speed of V m/s after 5 seconds. Finally it retards for the next 8 seconds until it comes to a halt.



Calculate the

(a) acceleration during the first 2 seconds,

(b) value of V if the retardation in the last 8 seconds is 3 m/s^2,

(c) average speed for the whole journey.

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

(b) ..... [2]

(c) ..... [3]