Candidate Name _____

Centre Number	Candidate Number

EXAMINATIONS COUNCIL OF ZAMBIA

Examination for School Certificate Ordinary Level

Mathematics

4024/1

Paper 1

Wednesday **1 NOVEMBER 2017**

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 15 printed pages

For Examiner's use

1 Simplify $3x - (y - 2x) - 3y$.

Answer: ..... [2]

2 Evaluate $\left(\frac{81}{16}\right)^{-\frac{1}{4}} + \left(\frac{81}{16}\right)^{0}$.

Answer: ..... [2]

3 The gradient of the line joining the points $(-2, k)$ and $(k, -14)$ is 2. Calculate the value of k.

Answer: ..... [2]

4 Factorise completely $ax^2y - 4ay^3$.

Answer: ..... [2]

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5 The points P and Q have coordinates (2, 4) and (–3, 1) respectively.
Express $\overrightarrow{PQ}$ as a column vector.

Answer: $\overrightarrow{PQ}$ =..... [2]

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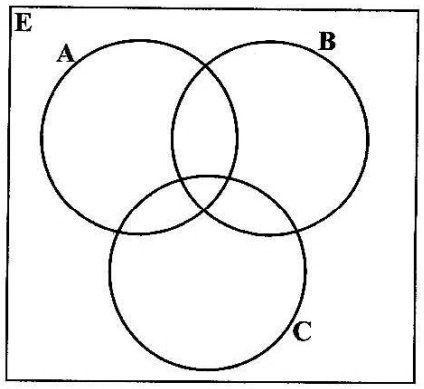
6 Shade $B' \cap (A \cap C)$ in the Venn diagram in the answer space.

Answer:



[2]

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7 Given that $A = \begin{pmatrix} 3 & 2 & 1 \\ 4 & 3 & 0 \end{pmatrix}$ and $B = \begin{pmatrix} 1 & 2 & 3 \\ 3 & 2 & 1 \\ 0 & 1 & 0 \end{pmatrix}$,

find

(a) A^T,

(b) AB as a single matrix.

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

(b) ..... [2]

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8 For the sequence 25, 22, 19, 16, …,
find the

(a) formula for the n^{th} term,

(b) sum of the first 20 terms.

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

(b) ..... [2]

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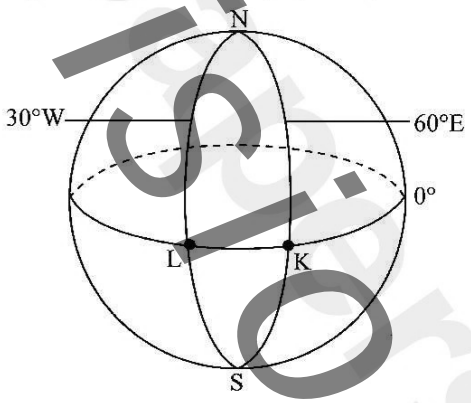
9 Town L is on (0°, 30°W) and town K is on (0°, 60°E) as shown in the diagram.



(a) If a radio quiz is scheduled to start at 12 00 hours at L, find the time at which the people at K will be listening to the quiz.

(b) What is the distance between L and K in kilometres? [R = 6370km, $\pi = \frac{22}{7}$]

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

(b) ..... [2]

For Examiner's use

10 **(a)** The probability that Chakupaleza will go for remedial lessons on a particular day is $\frac{7}{10}$. What is the probability that she will **not** go for her remedial lessons on that particular day?

(b) Solve the equation $10^x = 0.0001$.

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

(b) ..... [2]

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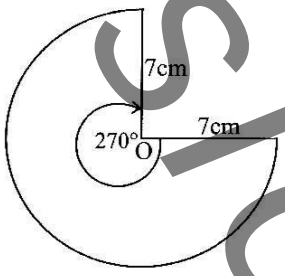
11 **(a)** Given that E = {2, 4, 6, 8, 10, 12}, A = {4, 8, 12} and B = {2, 10, 12}, list A′∩ B.

(b) The diagram below is a sector with centre O and radius 7cm. Angle at O is 270°.



Calculate the area of the sector. [$\pi = \frac{22}{7}$]

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

(b) ..... [2]

12 The functions f and g are defined by $f(x) = 2x + 1$ and $g(x) = 5x - 1$.

Find

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

(b) $fg(x)$,

(c) $fg(-3)$.

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

(b) ..... [2]

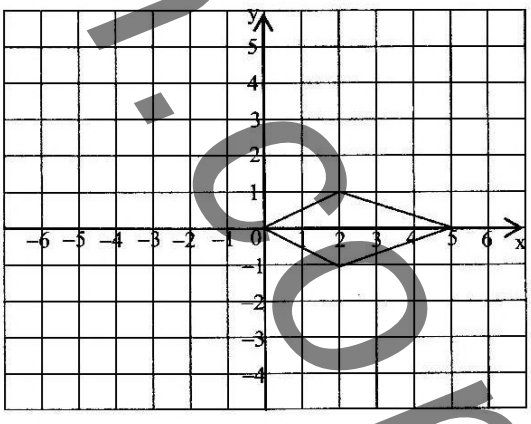
(c) ..... [1]

---

13 **(a)** The kite in the diagram in the answer space has coordinates (0, 0), (2, 1), (5, 0) and (2, −1). Draw the image of the kite after a reflection in the line $y = x$.

(b) Differentiate $y = \frac{1}{3}x^3 - 5x^2 - 2x$ with respect to x.

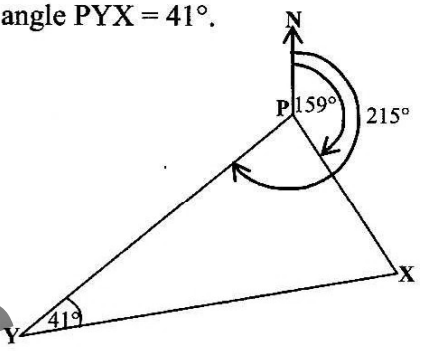
Answer: **(a)** [2]



(b)..... [2]

For Examiner's use

14 Two boats X and Y leave port P at the same time. X travels on a bearing of 159° and Y travels on a bearing of 215° as shown in the diagram below. After sometime, X and Y are at points such that angle PYX = 41°.



Find the

(a) bearing of X from Y,

(b) bearing of P from X.

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

(b) ..... [2]

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15 Misozi and Filamba estimated the length of a line to be 9cm and 10cm respectively. If the true length of the line was 9.6cm, find

(a) Misozi's absolute error,

(b) Filamba's percentage error.

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

(b) ..... [2]

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16 It is given that $t = kv^2$, where k is the constant of variation.

v	1	b	5
t	4	36	a

Use the information given in the table to find the

(a) value of k,

(b) value of a,

(c) values of b.

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

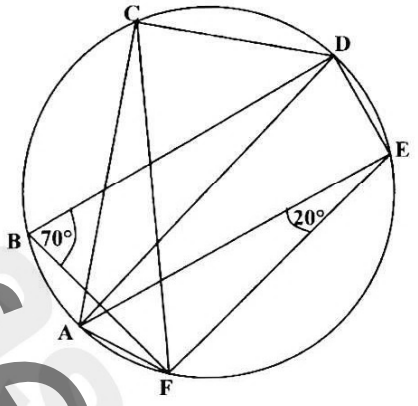
(b) $a =$ ..... [1]

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

For Examiner's use

17 In the diagram below, A, B, C, D, E and F are points on the circumference of a circle.

$\hat{FBD} = 70°$ and $\hat{AEF} = 20°$.



(a) Explain why AD is the diameter.

(b) Find

(i) $\hat{ACF}$,

(ii) $\hat{DEF}$.

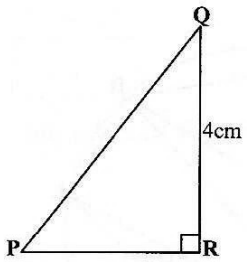
Answer: **(a)** .....

..... [1]

(b) **(i)** $\hat{ACF}$ = ... [1]

(ii) $\hat{DEF}$ = ... [2]

18 **(a)** It is given that ΔPQR below is right angled at R. QR = 4cm and $\tan \hat{QPR} = \frac{4}{3}$.



Find $\sin \hat{PQR}$.

(b) The ratio of the surface areas of two cubes is 16:25. What is the volume of the smaller cube, if the volume of the bigger cube is 500 cm^3?

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

(b) ..... [2]

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19 **(a)** A businessman bought 300 company shares at K60.00. The nominal price was K30.00. How much does he pay for the shares?

(b) The equation of a straight line L is given by $2y = 4x - 5$. Find the equation of the line passing through (–2, 3) and perpendicular to line L.

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

(b) ..... [2]

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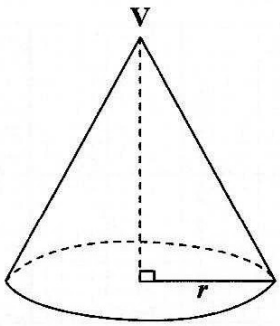
20 **(a)** The diagram below shows a cone with apex V and radius r.

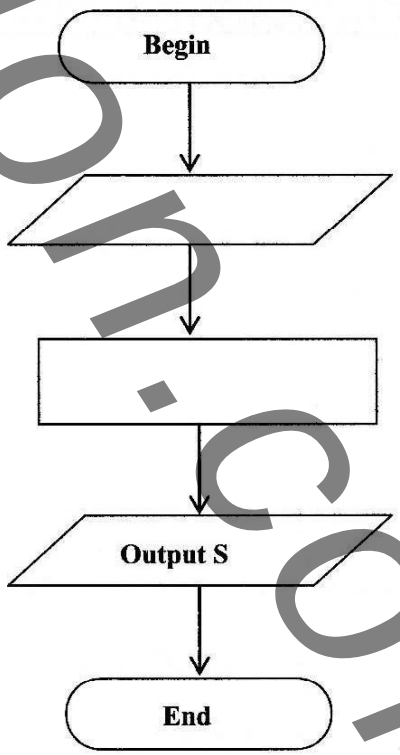


How many planes of symmetry has the cone?

(b) The diagram below is an incomplete program flow chart to calculate the curved surface area, S, of a cone with base radius r and slant height l. Complete the flow chart below by writing appropriate statements in the blank symbols.

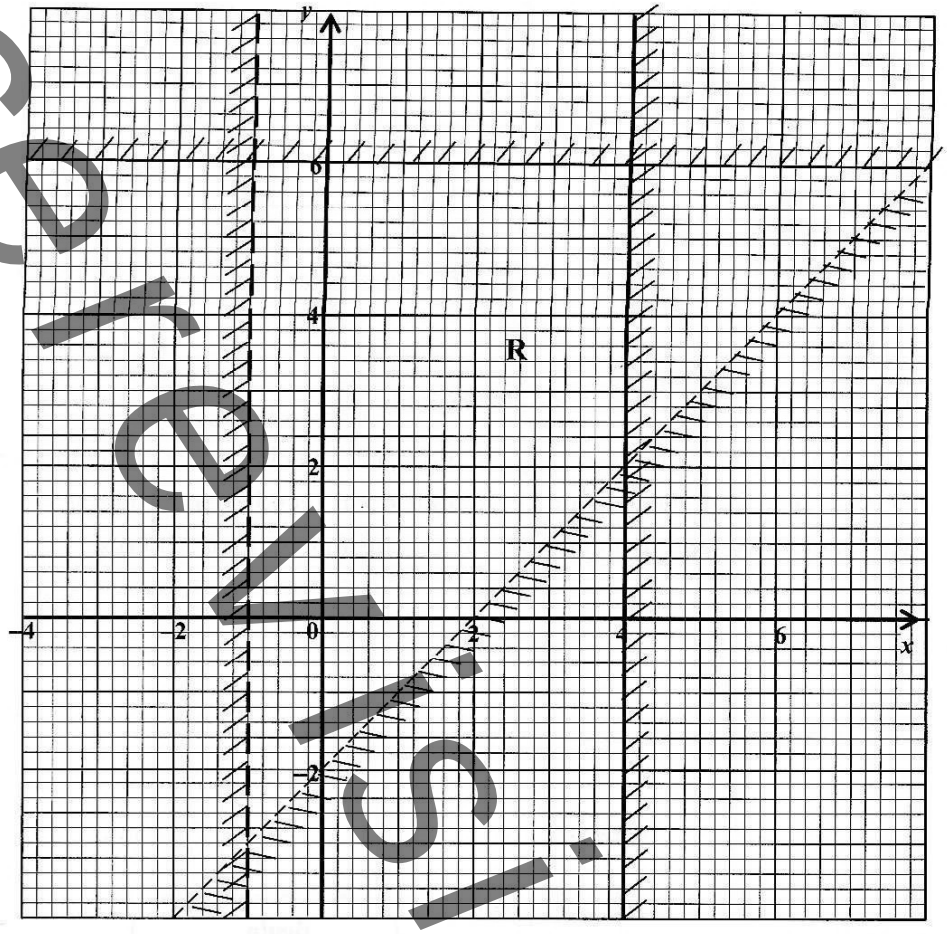
Answer: **(a)** ..... [2]

(b)



[2]

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



Answer: .....

.....

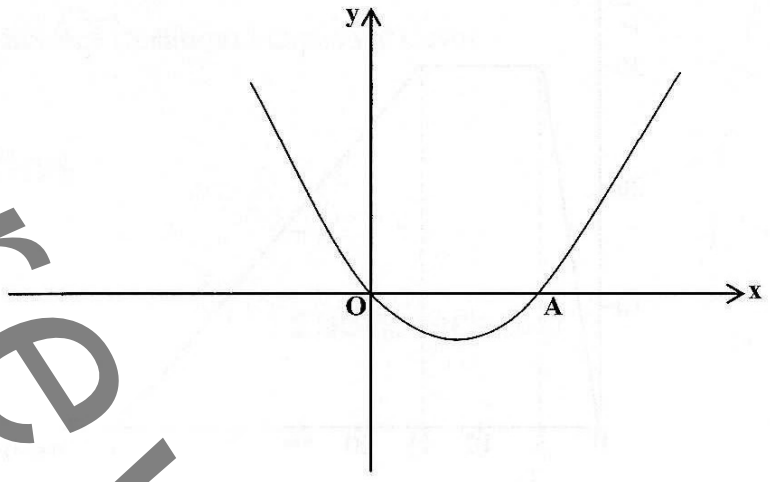
.....

..... [5]

For Examiner's use

22 **(a)** If $y = (1 - 2x)(1 + x) - 2$, find the values of x for which $y = -2$.

(b) The sketch shown below represents a section of the curve $y = x(x - 2)$.



(i) Find the coordinates of the points where the curve cuts the x-axis.

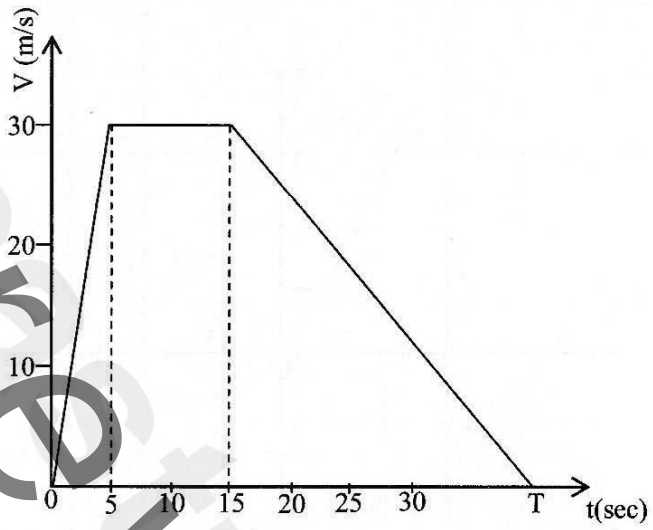
(ii) What is the minimum value of the function?

Answer: **(a)** $x =$ ..... or..... [2]

(b) **(i)** ..... [2]

(ii) ..... [2]

23 The diagram below shows a speed-time graph of a car journey.



(a) Find the acceleration during the first 5 seconds.

(b) If the total distance travelled was 825m, find the value of T.

(c) Find the average speed for the whole journey.

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

(b) ..... [3]

(c) ..... [2]