



Centre Number				Examination Number									

EXAMINATIONS COUNCIL OF ZAMBIA

Examination for School Certificate Ordinary Level



4024/1

Mathematics

Paper 1

Friday

12 NOVEMBER 2021

Candidates answer on the question paper

Additional materials:

Geometrical instruments

Time: 2 hours

Marks: 80

Instructions to Candidates

- 1 Write the **centre number** and your **examination number** on **every page** of this question paper.
- 2 There are **twenty-three** questions in this paper.
- 3 Answer **all the** questions.
- 4 Write your answers in the **spaces provided** on the question paper.
- 5 If working is needed for any question, it must be shown in the space below that question.
- 6 **Electronic calculators and mathematical tables should not be used in this paper.**

www.eczpastpapers.com

Information for Candidates

- 1 No paper for rough work is to be provided.
- 2 **Omission of essential working** will result in loss of marks.
- 3 The number of marks is given in brackets [] at the end of each question or part question.
- 4 Cell phones are **not allowed** in the examination room.

For Examiner's Use

Centre Number				Examination Number														

1 Simplify $2y - 3(x - 4) - y$.

Answer: [2]

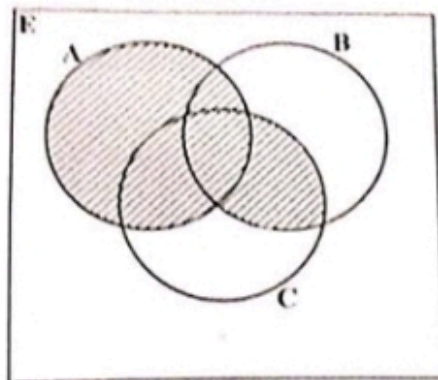
2 Evaluate $-3^2 + 3^2$.

Answer: [2]

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

Answer:

- 4 Use set notation to describe the shaded part in the Venn diagram below.



Answer: [2]

- 5 Find the equation of a straight line passing through the points (3, 4) and (7, 12).

www.eczpastpapers.com

Answer: [2]

- 6 Factorise completely $3x^3 - 12xy^2$.

Answer:

Centre Number				Examination Number											

For
Examiner's
use

7 (a) Matrix $M = \begin{pmatrix} -2 & 3 \\ 4 & -2 \end{pmatrix}$. Find the transpose of M .

(b) Matrix $P = \begin{pmatrix} 2 & -1 \\ 0 & 3 \end{pmatrix}$ and $Q = \begin{pmatrix} -1 \\ 3 \end{pmatrix}$. Find PQ .

Answer: (a) [1]

(b) [2]

8 (a) It is given that the universal set $E = \{\text{first 8 whole numbers}\}$ and $A = \{\text{even numbers}\}$.

List set A .

(b) A certain company sells shares at K1.30 per share. A businesswoman had K9.50 to buy shares. How many shares did she get?

Answer: (a) [1]

(b) [2]

Centre Number	Examination Number

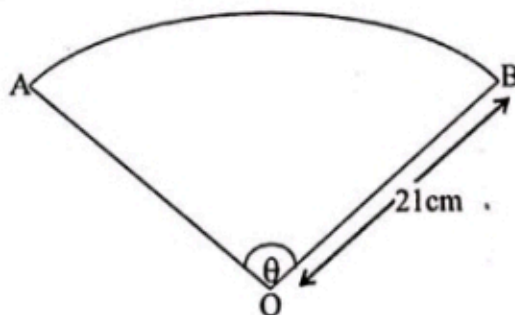
- 9 The third and fourth terms of an Arithmetic progression are 6 and 3 respectively. Find the
- first term,
 - formula for the n^{th} term.

For
Examiner
use

Answer: (a) [1]

(b) [2]

- 10 (a) The probability of getting a black button from a box is $\frac{2}{9}$. Find the probability of getting a button which is not black.
- (b) The diagram below shows a sector AOB with centre at O and radius 21cm. The angle subtended at the centre is θ and the area of the sector is 462cm^2 .



Calculate the value of θ . $[\pi = \frac{22}{7}]$

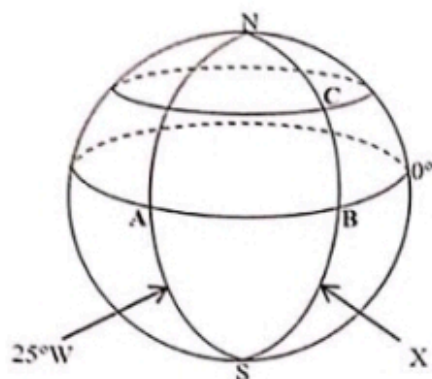
Answer: (a) [1]

(b) [2]

Centre Number	Examination Number									

- 11 The positions of three towns A, B and C on the earth's surface are shown in the diagram below.

For
Examiner's
use



- (a) A plane flying a distance of 4 500 nautical miles directly from town A to B takes 5 hours. Find the speed of the plane in knots.
- (b) If town C is 5 hours ahead of town A, find the longitude marked X.

www.eczpastpapers.com

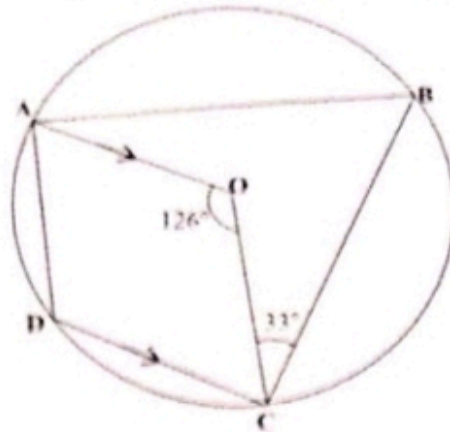
Answer: (a) [1]
(b) [2]

- 12 A learner measured the length of a line to be 2.2cm. If the actual length is 2cm, find the
- (a) absolute error,
- (b) percentage error.

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

Centre Number	Examination Number

- 13 The points A, B, C and D are on the circumference of a circle centre O, such that angle $AOC = 126^\circ$, AO is parallel to DC and angle $OCB = 33^\circ$.



Find

- (a) $\hat{ADC}$,
- (b) $\hat{OCD}$,
- (c) $\hat{BAO}$.

www.eczpastpapers.com

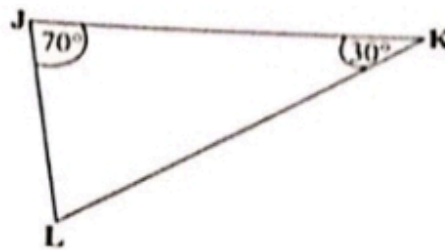
Answer: (a) [1]
 (b) [1]
 (c) [1]

2 0 2 1

[Turn over]

Centre Number					Examination Number									

- 14 The diagram below shows three points J, K and L on level ground. K is due east of J, angle LJK = 70° and angle JKL = 30° .



Calculate the bearing of

- (a) K from L,
- (b) J from L.

www.eczpastpapers.com

Answer: (a)

(b)

Centre Number	Examination Number									

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

Find

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

(b) $fg(x)$.

(c) $fg(-5)$.

www.eczpastpapers.com

Answer: (a) [1]

(b) [1]

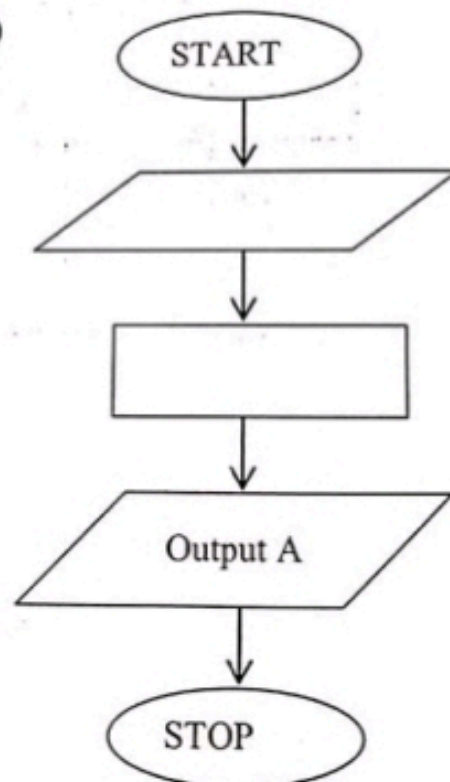
(c) [1]

- 16 (a) Find the equation of a straight line which is perpendicular to the line $2y - x = 3$ and passing through the point $(-4, 1)$.
- (b) In the answer space below is an incomplete flowchart for calculating the curved surface area (A) of a cylinder with radius (r) and height (h). Complete the flowchart.

www.eczpastpapers.com

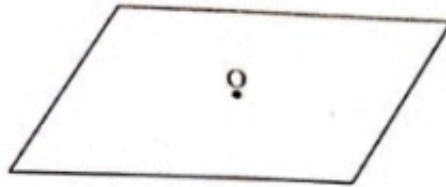
Answer: (a) [2]

(b)



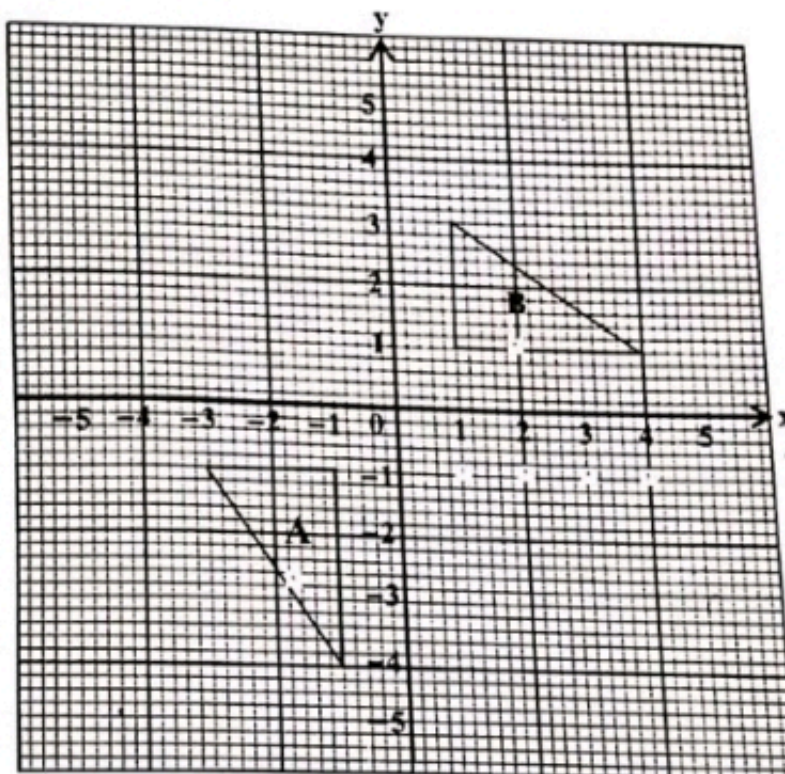
[2]

- 17 (a) The figure below shows a parallelogram with centre O.



Describe fully the symmetry of the parallelogram about the centre O.

- (b) The diagram below shows triangle A which is mapped onto triangle B by a single transformation P.



Describe fully the transformation P.

Answer: (a)

[2]

(b)

[2]

Centre Number				Examination Number													

- 18 It is given that y varies directly as $2x$ and inversely as z^2 and $y = 4$ when $x = 8$ and $z = 2$.
Find the

- (a) value of k , the constant of variation,
- (b) value of y when $x = 27$ and $z = 3$,
- (c) values of z when $x = 24$ and $y = 3$.

For
Examiner's
use

www.eczpastpapers.com

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

Centre Number				Examination Number															

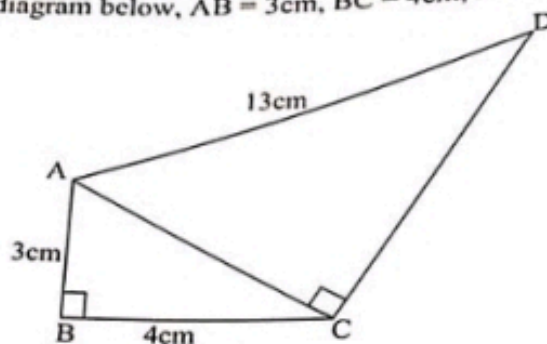
For
Examiner's
use

- 19 (a) Find $\int (6x^2 - 2x + 7) dx$.
- (b) The areas of two similar cylinders are 64cm^2 and 36cm^2 respectively. If the height of the larger cylinder is 30cm, find the height of the smaller cylinder.

www.eczpastpapers.com

Answer: (a)

- 20 (a) In the diagram below, $AB = 3\text{cm}$, $BC = 4\text{cm}$, $AD = 13\text{cm}$ and $\hat{ABC} = \hat{ACD} = 90^\circ$.



Calculate the value of $\tan \hat{DAC}$.

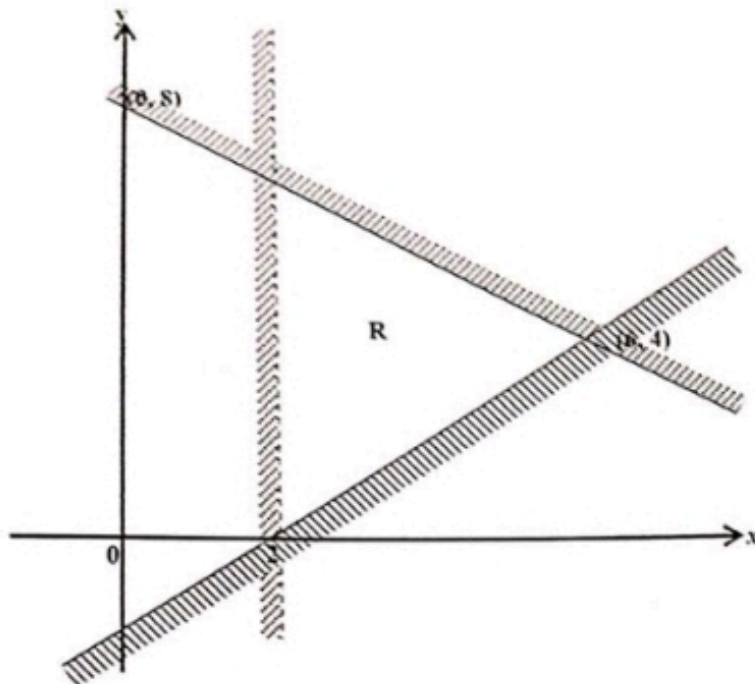
- (b) A is the point $(1, 2)$ and B is the point $(-2, 5)$. Find $\vec{AB}$ as a column vector.

www.eczpastpapers.com

Answer: (a) [2]

(b) [2]

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



www.eczpastpapers.com

Answer:

.....

.....

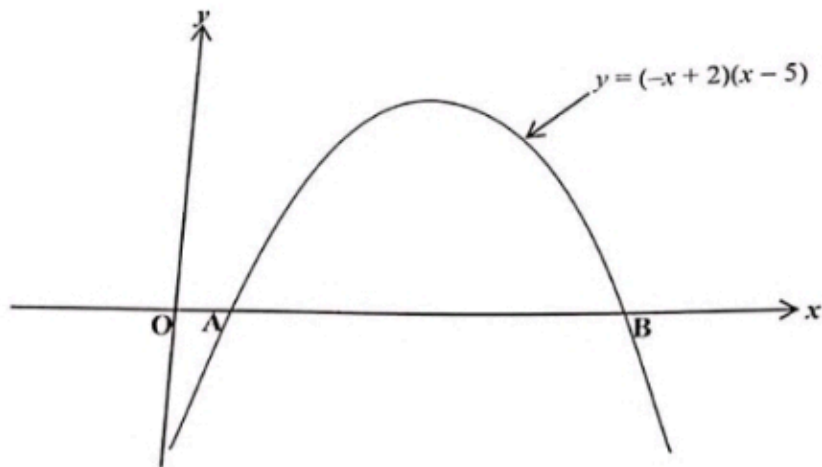
.....

[5]

Centre Number					Examination Number														

For
Examiner's
use

- 22 (a) Given that $\sqrt{2} = 2^x$, find the value of x .
- (b) The diagram below shows the graph of $y = (-x + 2)(x - 5)$. The graph cuts the x -axis at A and B.



Find the

- (i) coordinates of the points A and B,
- (ii) maximum value of y .

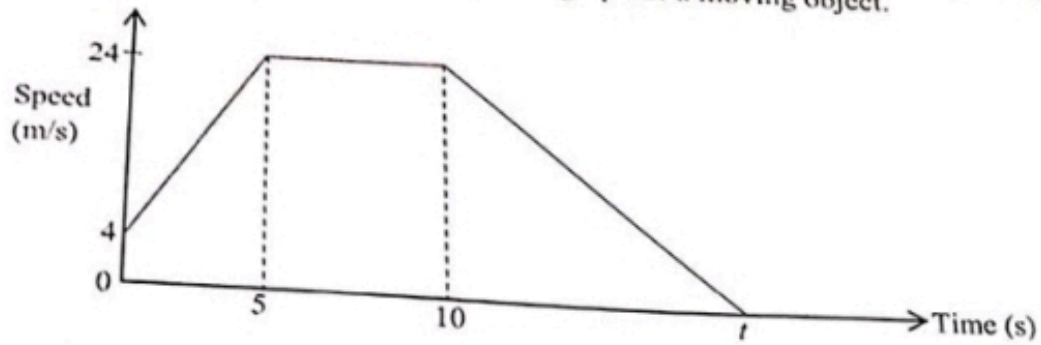
www.eczpastpapers.com

Answer: (a) [2]

(b) (i) [2]

(ii) [2]

23 The diagram below shows the speed-time graph of a moving object.



- Find the acceleration of the object when $t = 3$,
- Given that the object decelerates at 2m/s^2 , find the value of t ,
- Calculate the average speed of the object in the first 10 seconds of the journey.

www.eczpastpapers.com

Answer: (a)

(b)

(c)