Centre Number	Candidate Number

Candidate Name:_____

EXAMINATIONS COUNCIL OF ZAMBIA

Joint Examination for the School Certificate and General Certificate of Education Ordinary Level

MATHEMATICS (SYLLABUS D) 4024/1

PAPER 1

Monday **31 OCTOBER 2011** **2 hours**

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.

Working for any question should be shown in the space below that question.

Omission of essential working will result in loss of marks.

NEITHER ELECTRONIC CALCULATORS NOR MATHEMATICAL TABLES MAY 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 marks for this paper is 80.

FOR EXAMINER'S USE

This question paper consists of 14 printed pages.

1 Evaluate

(a) 7.007 x 0.7,

(b) $\frac{5}{6} - \frac{3}{10}$.

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

(b)..... [1]

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2 Find the fraction that is exactly halfway between $\frac{3}{4}$ and $\frac{7}{16}$.

Answer: ..... [2]

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3 The total number of pupils at Kalele, Mwela and Laleu Basic Schools in 2006 was 5 997. Express this number in standard form to the nearest hundred.

Answer: ..... [2]

For Examiner's Use

4 Evaluate

(a) $5 - 3 \times 2 \div 3$,

(b) $64^{\frac{2}{3}}$.

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

(b)..... [1]

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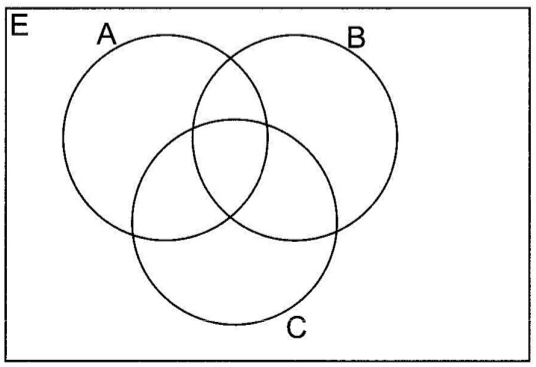
5 Shade $A' \cap (B \cup C)$ in the Venn diagram in the answer space.

Answer:



[2]

[Turn over

6 **(a)** Given that x = - 4 and $y = -\frac{1}{2}$, find the value of $xy - x^2$.

(b) The ratio of the surface areas of two similar bottles is 4:9. What is the ratio of their volumes?

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

(b)..... [2]

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7 **(a)** Write the next number in the sequence 2, -8, 32, -128, • • •

(b) Write the n^{th} term of the sequence 5, 7, 9, 11, • • •

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

(b)..... [2]

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8 Solve the simultaneous equations

$2x + y = 1$,

$3x - 2y = -9$.

Answer: x = ...

y = ... [3]

For Examiner's Use

9 A function f is defined as $f(x) = \frac{3}{5x+1}$, $x \neq -\frac{1}{5}$.

Find

(a) f(1),

(b) x, if f(x) = 6.

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

(b) x = ...[2]

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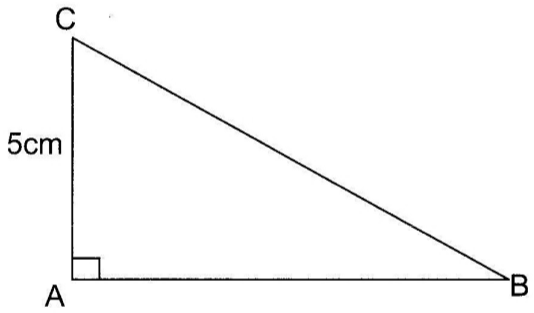
10 **(a)** The figure below shows ΔABC in which AC = 5cm. Given that Sin B = 0.5, cos B = 0.9 and tan B = 0.6, calculate the length of BC.



(b) Solve the equation $(y + 7)^2 = 9$.

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

(b) y =.....or.....[2]

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11 **(a)** The histogram in the answer space shows the distribution of the age groups A, B and C in a certain village. It is given that group A has 1 person.

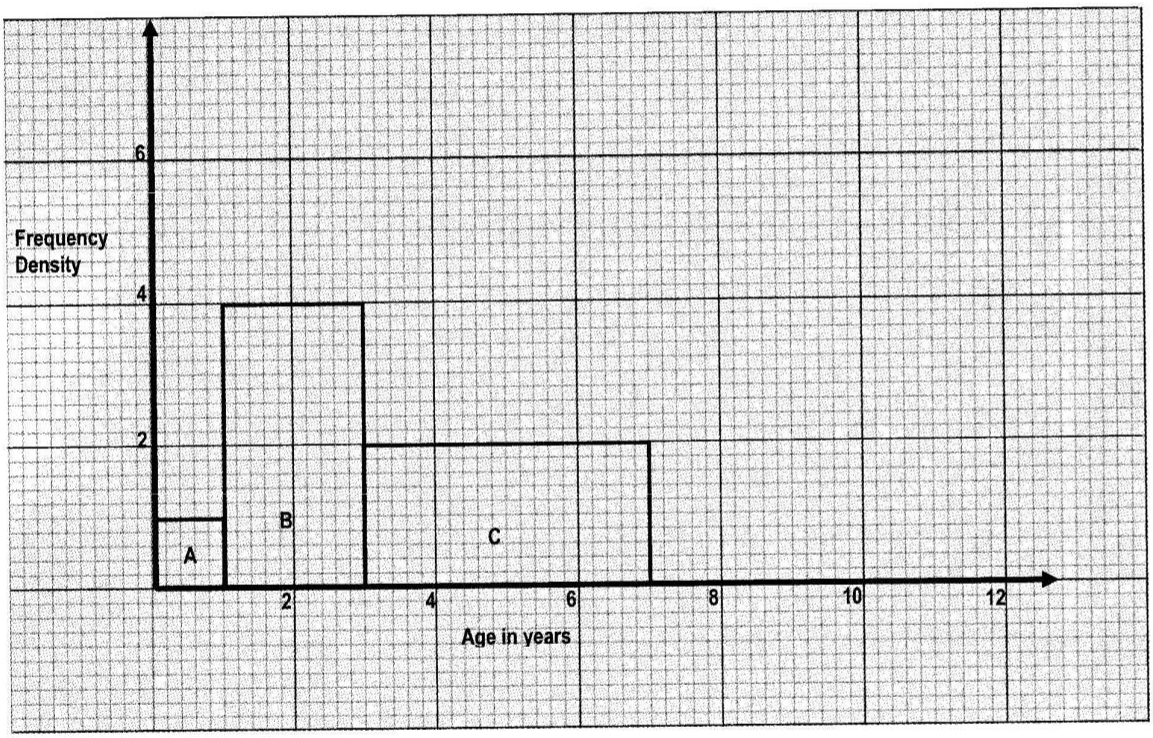
(i) How many people are in group B?

(ii) If group D has 25 people and the height of its bar is 5, complete the diagram by including group D.

(b) The position vectors of A and B are $\begin{pmatrix} 0 \\ 1 \end{pmatrix}$ and $\begin{pmatrix} 3 \\ 5 \end{pmatrix}$ respectively. Find $\overrightarrow{AB}$.

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

(ii)



[1]

(b) $\overrightarrow{AB}$ = ...[1]

For Examiner's Use

12 **(a)** Find the gradient of the line $x + 2y = 4$.

(b) Convert 40m/s to km/h.

(c) Mr Sengeleti gets a monthly salary of K4 500 000. Calculate his annual salary.

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

(b)..... [1]

(c)..... [1]

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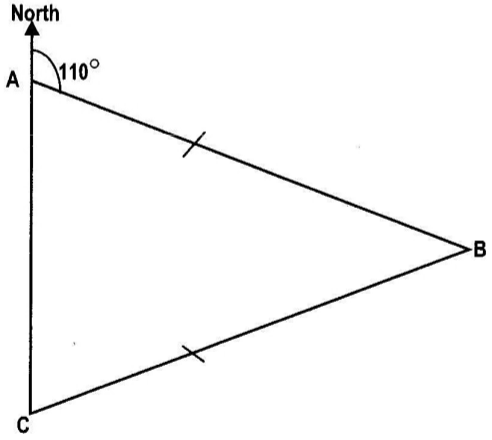
13. **(a)** A set has 6 proper subsets. How many elements does it have?

(b) In the diagram below, C is due south of A, AB = BC and the bearing of B from A is 110°.



Find the bearing of C from B.

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

(b)..... [2]

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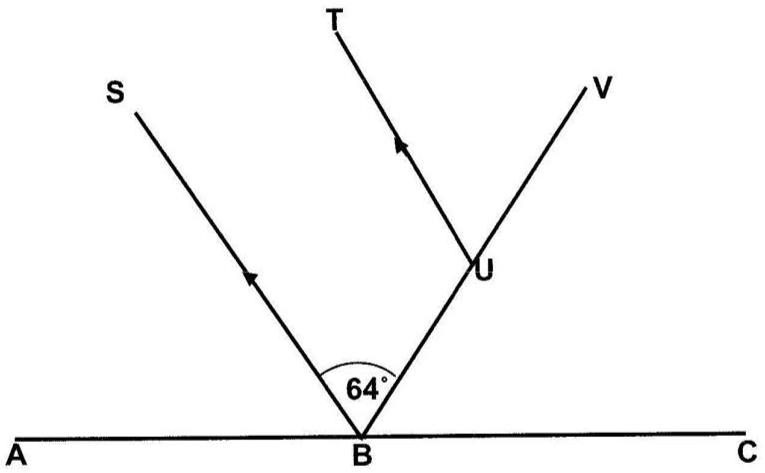
14 An aeroplane flew from point A(60°S, 30°W) to point B (60°S, 60°E).

Using as much of the information given below as is necessary, find the distance covered by the aeroplane in kilometres.

[$\pi = \frac{22}{7}$, R = 6370km, sin 60° = 0.87, cos 60° = 0.50, tan 60° = 1.73].

Answer: ..... [3]

15 In the diagram below, ABC is a straight line and BS is parallel to UT.
Angle SBV = 64° and BS bisects angle ABV.



Find

(a) $A\hat{B}S$,

(b) $B\hat{U}T$,

(c) $S\hat{B}C$.

Answer: **(a)** $A\hat{B}S$ =..... [1]

(b) $B\hat{U}T$ = ... [1]

(c) $S\hat{B}C$ = ... [2]

For Examiner's Use

18 **(a)** A transformation is represented by a matrix $\begin{pmatrix} 2 & 0 \\ -3 & 1 \end{pmatrix}$. A point J is mapped onto the point Y(6, 16) by this matrix. Find the coordinates of J.

(b) Solve the inequation $2(x - 3) \leq 5x + 9$.

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

(b) .....[2]

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17 **(a)** Express n in terms of a for $\sqrt[3]{n} = a$.

(b) Factorise completely $x^2y + 2x^2 - 9y - 18$.

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

(b) .....[3]

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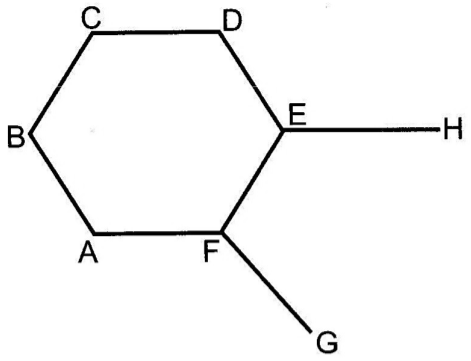
18 **(a)** In the diagram below, ABCDEF is a regular hexagon and HEFG is part of a regular pentagon.



Calculate $\hat{DEH}$.

(b) Express as a single matrix $\begin{pmatrix} 4 \\ -3 \end{pmatrix}(2 \quad -1)$.

Answer: (a) $\hat{DEH}$ = ... [2]

(b) ..... [2]

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19 Given that x varies as y and inversely as z^2 and that x = 12 when y = 3 and z = 2, find

(a) the equation connecting x, y and z,

(b) the value of x when y = 3 and z = 4,

(c) the values of z when x = 4 and y = 25.

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

(b) x = ... [1]

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

For Examiner's Use

20 **(a)** Six pupils obtained the following marks in a Mathematics Contest:

23, 24, 39, 40, 26, 37. Find the probability that a pupil selected at random obtained more than 27 marks.

(b) What is the angle of rotational symmetry of a regular pentagon?

(c) The diagram below shows a simple electricity bill for Mrs Bena Kantwa.

Name: Mrs Kantwa B.		Billing date: 10/06/2010	
Previous reading	Present Reading	Rate/Unit	Charge
71879	74279		K184,800

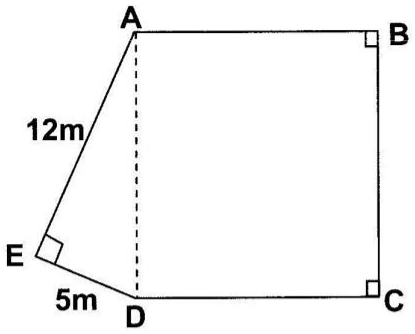
Find the cost per unit of electricity.

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

(b) ..... [2]

(c) ..... [2]

21 **(a)** A vegetable garden is in the form of an irregular pentagon ABCDE shown below. AB = BC = CD = AD, AE = 12m, DE = 5m and $A\hat{B}C = B\hat{C}D = D\hat{E}A = 90°$.



(i) Find AD.

(ii) Calculate the perimeter of the garden.

(b) A map is drawn to a scale of 1:200 000. The actual area of a town is 60 km^2. Calculate, in **cm^2**, the area of the town on the map.

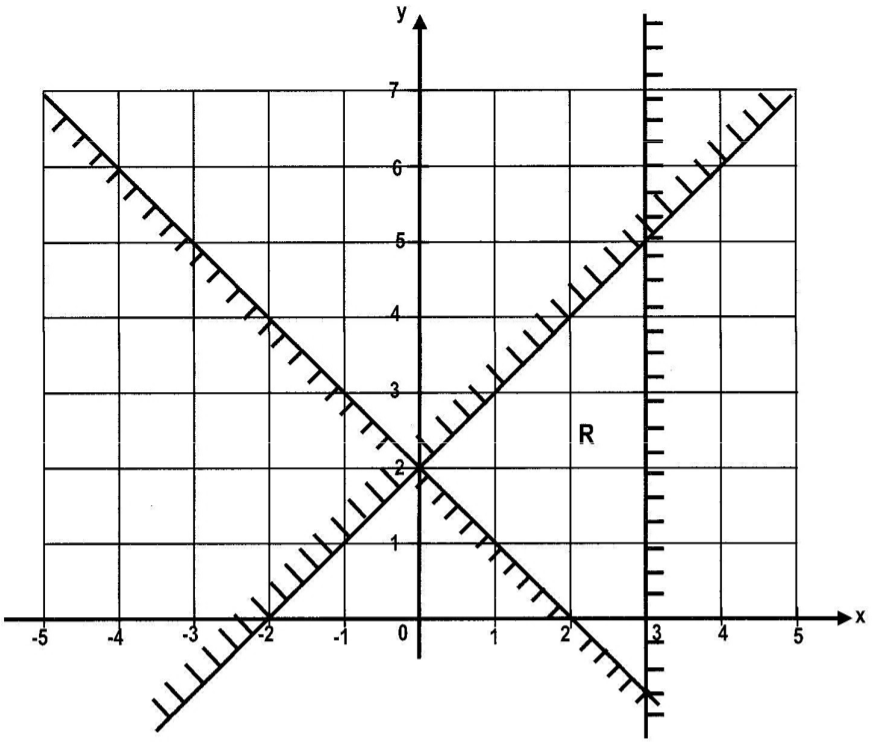
(a) (i) AD =..... [1]

(ii)..... [1]

(b).....cm^2 [3]

For Examiner's Use

22 In the diagram below, R is the unshaded region.



(a) Write three inequalities which describe the region R.

(b) Find the maximum value of $2x + y$, within the region R.

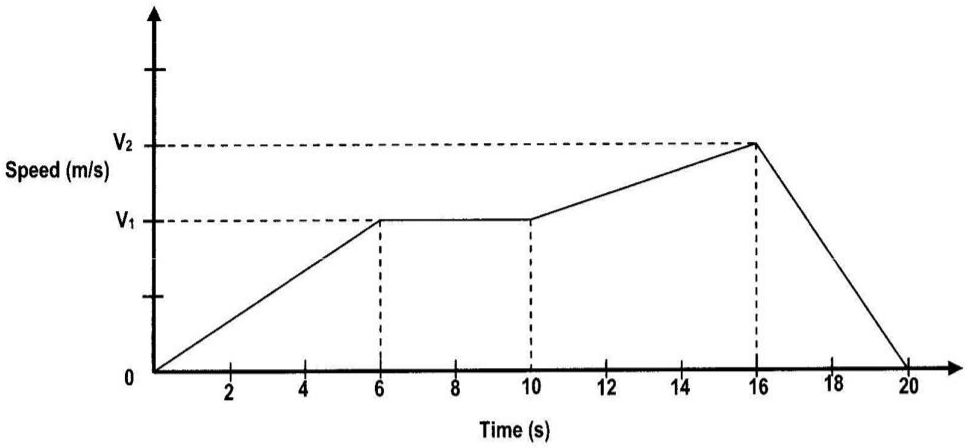
Answer: **(a)** .....

.....

..... [5]

(b) ..... [1]

23 The diagram below shows the speed-time graph of a lorry which starts off from rest and increases its speed at a constant rate for 6 seconds. Then it travels at a constant speed of V_1m/s for 4 seconds. It again increases its speed constantly for 6 seconds reaching a maximum speed of V_2m/s before it eventually comes to rest a further 4 seconds.



(a) If the lorry travelled 120m in the first 6 seconds, calculate the value of V_1.

(b) Given that the acceleration of the lorry between 10 and 16 seconds is $2m/s^2$, find the value of V_2.

(c) Calculate the total distance covered by the lorry.

Answer: **(a)** V_1 = ... [2]

(b) V_2 = ... [2]

(c) ..... [2]