Candidate Name:_____

Centre Number	Candidate Number

EXAMINATIONS COUNCIL OF ZAMBIA

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

MATHEMATICS (SYLLABUS D) 4024/1

PAPER 1

Wednesday 8 OCTOBER 2014

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 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 number of marks for this paper is 80.

FOR EXAMINER'S USE

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This question paper consists of 14 printed pages.

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1 Find the exact value of

(a) $2\frac{2}{3} - \frac{7}{12}$,

(b) 0.002×0.6.

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

(b) .....[1]

---

2 Simplify $7a + 2b - 4(3a - b)$.

Answer: .....[2]

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3 Asia has an area of 44 579 000 square kilometres. Write 44 579 000 in standard form correct to 2 significant figures.

Answer: .....[2]

For Examiner's Use

4 Given that P = $\begin{pmatrix} 3 & -1 \\ -2 & 0 \end{pmatrix}$ and Q = $\begin{pmatrix} 3 & 4 \\ -4 & x \end{pmatrix}$, find the value of x if P and Q have equal determinants.

Answer: .....[2]

---

5 Factorise completely $5x^2 - x - 4$.

Answer: .....[2]

---

6 When a car was sold at K12 000.00, a profit of 20% was made. What was the cost price?

Answer: .....[2]

For Examiner's Use

7 A sweet manufacturing company intends to start manufacturing lolly pops under the following brand names: IYALOWA, YONZUNA, YATOWALA, YEMUNATI, YATOBALA, ILWEELA and CHINAYEME.

(a) Complete the frequency table in the answer space which shows the occurrence of letters in these words.

(b) Find the mode.

(c) One letter is chosen at random from these words. Find the probability that it is either a T or a W.

Answer: (a)

Letter	A	B	C	E	H	I	L	M	N	O	T	U	W	Y	Z
Frequency	12	1	1	5	1	4	5		4	4		2	3		1

[1]

(b) ..... [1]

(c) ..... [1]

---

8 Solve the simultaneous equations

$3x = 4y + 1$,

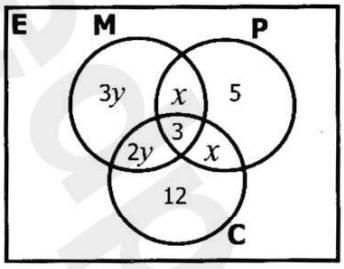
$7x + y = 23$.

Answer: x = ...

y = ... [3]

For Examiner's Use

9 The Venn diagram below illustrates the number of pupils who take Mathematics (M), Physics (P) and Chemistry (C) at Imishila Secondary School.



(a) Write an expression, in terms of x, for the total number of pupils who take Physics.

(b) Given that 22 pupils take Physics and 20 pupils take Mathematics, find x and y.

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

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

---

10 **(a)** Evaluate $14 + 3(7 - 2) - 2 \times 5$.

(b) Solve the equation $2(x - 2)^2 = 18$.

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

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

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11 The first three figures of a sequence are shown below. Figure 1 is a square of side 2cm, figure 2 contains 2 squares of side 2cm and figure 3 contains 3 squares of side 2cm.

Fig. 1

Fig. 2

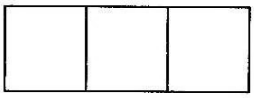


Fig. 3

The table below shows the number of the figure and its corresponding perimeter.

Figure	1	2	3	6
Perimeter	8	12	16	p

(a) Find the perimeter, p, of figure 6.

(b) Write an expression, in terms of n, for the perimeter of the nth figure.

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

(b) ..... [2]

---

12 **(a)** Find the largest integer, x, which satisfies the inequality $-5 < x + 3 \leq 1$.

(b) Given that $a = \dfrac{d-b}{cd-1}$, make d the subject of the formula.

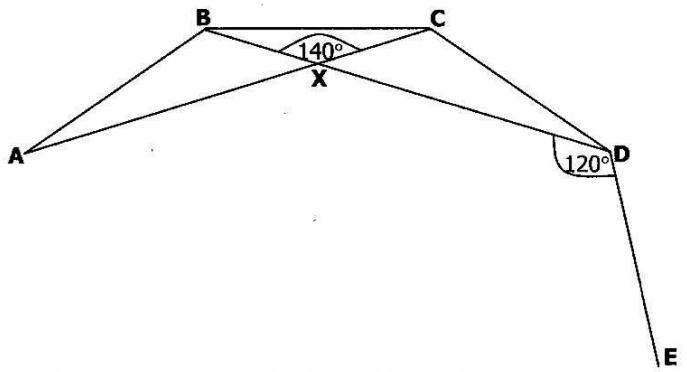
Answer: (a) ..... [1]

(b) ..... [2]

For Examiner's Use

13 (a) Evaluate $-4^2 + 4^3$.

(b) In the figure below, ABCDE is part of a regular polygon. AC and BD meet at X, $B\hat{X}C = 140°$ and $B\hat{D}E = 120°$.



Find the number of sides of this polygon.

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

(b) ..... [2]

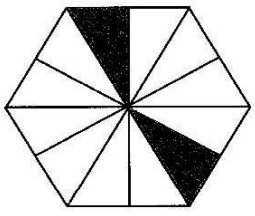
---

14 (a) Convert a speed of 144km/h to m/s.

(b) The diagram in the answer space is a regular hexagon. It is divided into congruent triangles, two of which have been shaded. Shade two more triangles so that the figure has exactly two lines of symmetry.

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

(b)



[2]

For Examiner's Use

15 Two places A and B lie on the equator and are 2 820 nautical miles apart. A is on longitude 17°W and B is east of A. Find the longitude of B.

Answer: ..... [3]

---

16 A function is defined by f(x) = $10x + 9$. Find

(a) f(–2),

(b) k, if f(k) = k,

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

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

(b) ..... [1]

(c) ..... [2]

For Examiner Use

17 A square park has its map drawn to a scale of $1 : n$. Four beacons P, Q, R and S are placed on the four corners of the park. Beacons P and Q, which are 240m apart on the ground, are 12cm apart on the map. Find

(a) the value of n,

(b) the actual area of the park in **square kilometres**.

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

(b) ..... [2]

---

18 Given that $y = kx^2 - 1$, where k is a constant and that $y = 17$ when $x = 3$, find

(a) the value of k,

(b) the value of y when $x = -5$,

(c) the values of x when $y = 7$.

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

(b) ..... [1]

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

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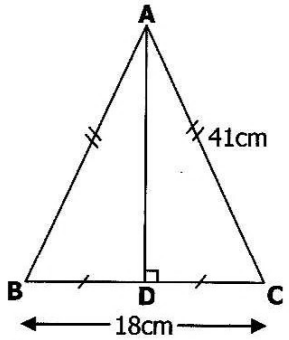
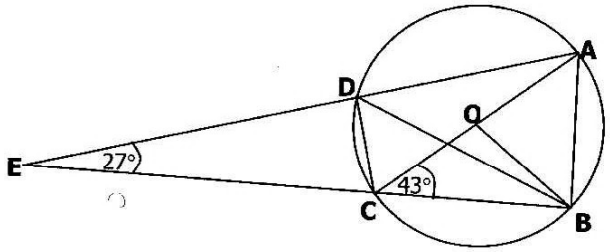
19 (a) The diagram below is an isosceles triangle ABC in which AB = AC = 41cm, BC = 18cm and D is the midpoint of BC.



Calculate the length of AD.

(b) In the diagram below, O is the centre of the circle ABCD. AC is the diameter, AD and BC are produced to meet at E, $C\hat{E}D = 27°$ and $A\hat{C}B = 43°$.



Find

(i) $A\hat{D}B$,

(ii) $C\hat{A}D$,

(iii) $D\hat{C}E$.

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

(b) (i) ..... [1]

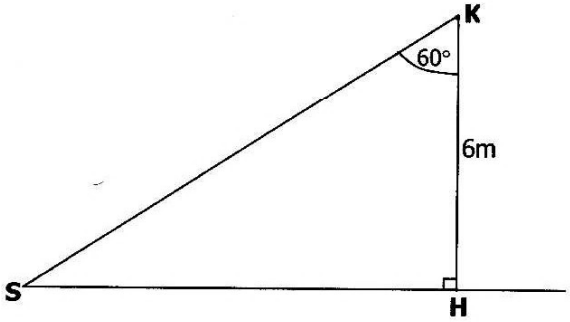
(ii) ..... [1]

(iii) ..... [2]

For Examiner's Use

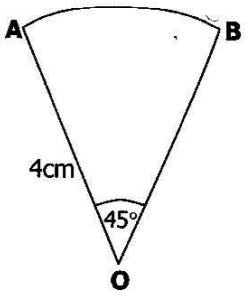
20 **(a)** Given that $3x = 2y$, find the ratio $x : y$.

(b) A kite (K) being flown is such that its vertical height HK is 6m and the angle formed between the vertical height and the string SK it is attached to is 60° as shown in the diagram below.



If sin 60° = 0.866, cos 60° = 0.5 and tan 60° = 1.73, calculate the length of the string SK.

(c) The diagram below shows a sector AOB in which OA = 4cm and $A\hat{O}B = 45°$.



Find the area of the sector. [Take π to be 3.14].

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

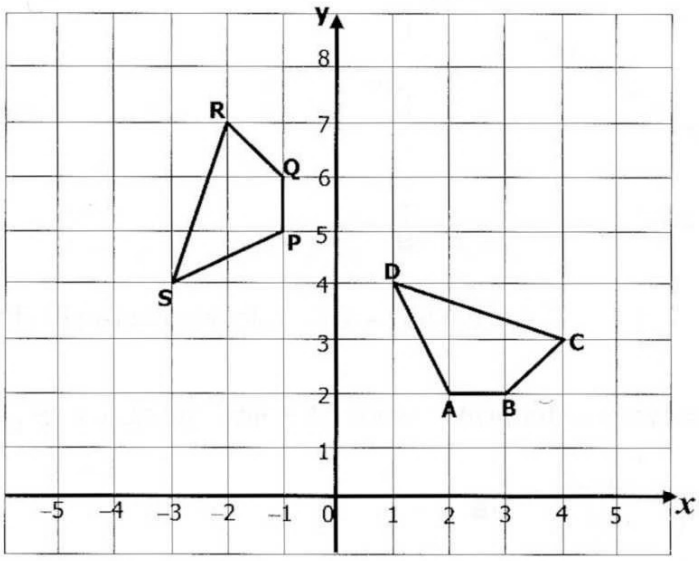
(b) ..... [2]

(c) ..... [2]

21 **(a)** Part of the graph of $y = x^3$ is sketched in the answer space. Complete the graph.

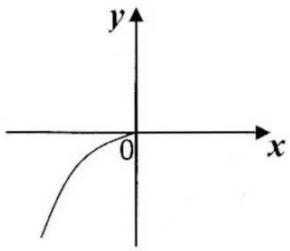
(b) The ratio of the surface areas of two similar solids is 1 : 64. Calculate the ratio of their volumes.

(c) The diagram below shows two shapes ABCD and PQRS on an XOY plane.



Describe fully the single transformation which maps ABCD onto PQRS.

Answer: (a)



[1]

(b) ..... [2]

(c) .....

.....

.....

..... [2]

For Examiner's Use

22 (a) An outing expedition centre charges as follows:

K300.00 per person for a full day,

K200.00 per person for half a day and

K500.00 fixed charge per group for admission to the centre.

Find the total amount that a group of 12 would pay if it intended to stay in the centre from Monday to Friday.

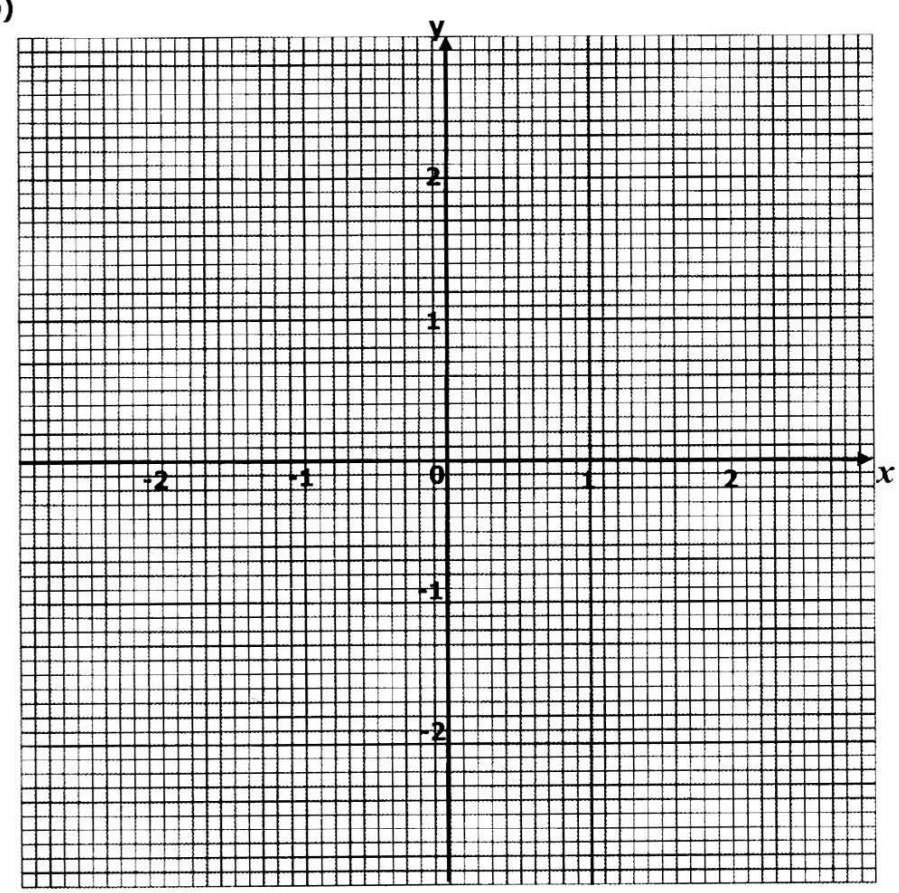
(b) A region R is defined by the following inequalities:

$x > 1$, $x \leq 2$, $y \leq 1$ and $y > x - 2$.

Show region R by shading the unwanted area on the diagram in the answer space.

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

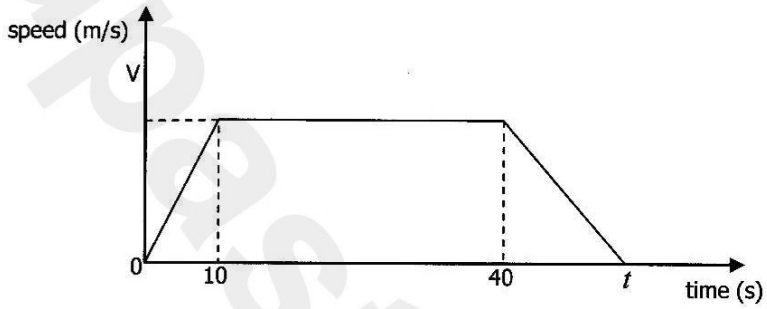
(b)



[5]

23 **(a)** Given that A is a point (3, 2) and B is a point (–1, 5), find $\overrightarrow{AB}$.

(b) The diagram below is the speed-time graph of a bus which leaves a bus stop and accelerates uniformly for 10 seconds over a distance of 100m. It then maintains the speed it has attained for 30 seconds and finally retards uniformly to rest at the next bus stop. The whole journey takes t seconds.



If the two bus stops are 1 kilometre apart, find

(i) the value of V,

(ii) the acceleration in the first 10 seconds,

(iii) the total time *(t)* taken for the whole journey.

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

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

(ii) ..... [1]

(iii) ..... [3]

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