EXAMINATIONS COUNCIL OF ZAMBIA

Examination for General Certificate of Education Ordinary Level

Mathematics

4024/1

Paper 1

Wednesday   26 JULY 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 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

1   Simplify $2a - 7b - 2(a - 3b)$.

Answer: .... [2]

2   Factorise completely $\dfrac{x^2}{4y^2} - \dfrac{1}{9}$.

Answer: .... [2]

3   Given that $\begin{pmatrix} 2 & x \\ -5 & 1 \end{pmatrix} \begin{pmatrix} 4 \\ 3 \end{pmatrix} = \begin{pmatrix} 14 \\ -17 \end{pmatrix}$, find the value of x.

Answer: .... [2]

4   Two tins are geometrically similar. If the ratio of their volumes is 27:64, find the ratio of their curved surface areas.

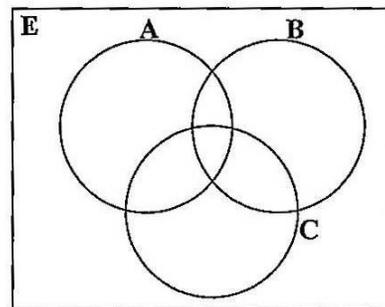Answer: .... [2]

5   Given that $\underline{a} = \begin{pmatrix} 3 \\ -4 \end{pmatrix}$, find $|\underline{a}|$.

Answer: .... [2]

6   On the Venn diagram in the answer space below, shade the region defined by $A' \cap (B \cup C)$.

Answer:

[2]

7 **(a)** For the sequence 11, 13, 15, 17, ..., find the 13th term.

(b) If the arithmetic mean of 5 and c is 11, what is the value of c?

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

(b) .... [2]

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8 **(a)** If A^T = (1 −2 3 −4 5), write the matrix A.

(b) Find the derivative of $y = 2x^3 - 2x^2 - 3x + 1$, with respect to x.

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

(b) .... [2]

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9 **(a)** Given that E = {1, 2, 3, 4, 5, 6, 7, 8}, A = {1, 8} and B = {2, 3, 4, 5, 6, 7}, list (A∪B)′.

(b) Solve the equation $25^x = 5$.

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

(b) .... [2]

10 (a) A soccer match kicked off at 14 00 hours at A(20°N, 30°E). What would be the kick off time of the soccer match at B(20°N, 15°W)?

(b) Two towns P and Q are on the same longitude. Given that P is (40°N, 15°W) and PQ is 7 200nm, find the position of Q.

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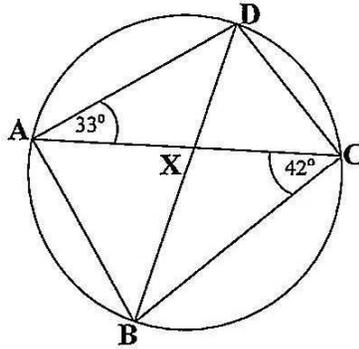
(b) .... [2]

11 (a) A die and a coin are rolled and tossed, respectively. What is the probability of getting a five and a tail?

(b) Given that $x = 3.2 \times 3^4$ and $y = 4 \times 3^2$, evaluate $\dfrac{x}{y}$.

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

(b) .... [2]

[Turn over

12   In the diagram below, points **A**, **B**, **C** and **D** are on a circle. **BD** is the diameter of the circle. $A\hat{C}B = 42°$, $C\hat{A}D = 33°$ and the lines **AC** and **BD** intersect at **X**.

Find

(a) $C\hat{B}D$,

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

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

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

(b)   ....   [1]

(c)   ....   [2]

13 The functions g and f are defined as $g : x \longrightarrow \dfrac{x-1}{2}$ and $f : x \longrightarrow 3x - 5$. Find

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

   (b) x, if $f(x) = g(x)$,

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

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

            (b) .... [1]

            (c) .... [2]

14   The table below shows the relationship between two variables x and y. It is given that y varies inversely as the square root of x, where x is positive.

y	2	8	$\dfrac{8}{9}$
x	16	1	a

(a)   Write an expression for y in terms of x and the constant of variation k.
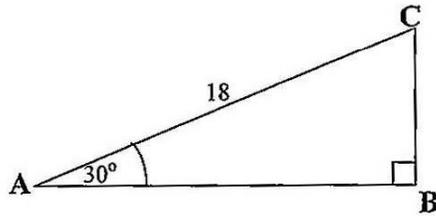
(b)   Find the value of

(i) k,

(ii) a.

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

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

(ii)................................ [2]

15   **(a)**   Maphone Manufacturing Company paid a total dividend of K12 600.00 at the end of 2015 on 6 000 shares. If Magula owned 200 shares in the company, how much was paid out in dividends to her?

       (b)   The diagram below shows triangle **ABC** in which **AC** = 18cm, **CÂB** = 30° and **AB̂C** = 90°.

Calculate the length of **BC**.

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

                  (b)   ....   [2]

16 (a) The curved surface area of a cone is 88cm². Given that the base radius is 4cm, calculate the slant height of the cone. $[\pi = \frac{22}{7}, A = \pi r l]$

(b) The diagram below shows a flow chart for a program to calculate tax on an income.
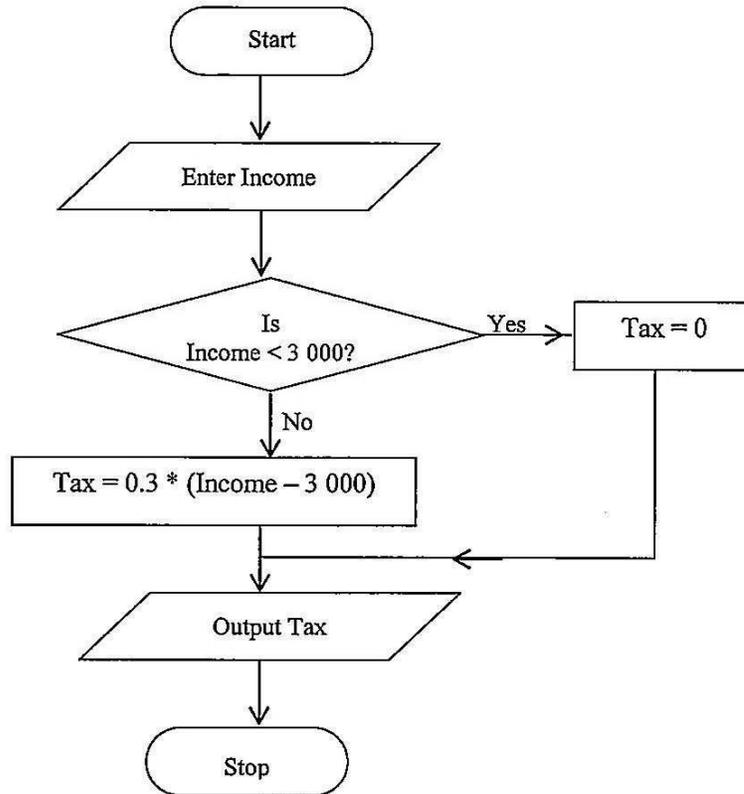
Complete the table in the answer space below.

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

(b)

Income	Tax
K2 900.00	
K5 000.00	

[2]

17   A bag of potatoes has mass (15.4 ± 0.05)kg.

(a)   Find the tolerance of this mass.

(b)   Write down the relative error of the mass, as a fraction, in its simplest form.

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

(b)   ....   [2]

18   A, B and C are three points on level ground. B is on a bearing of 070° from A and C is on a bearing of 130° from B.
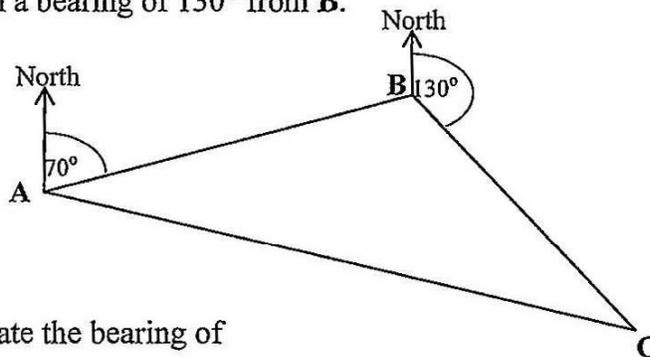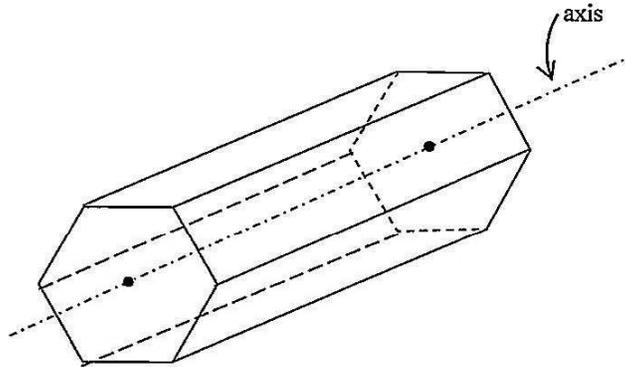

Calculate the bearing of

(a)   A from B,

(b)   B from C.

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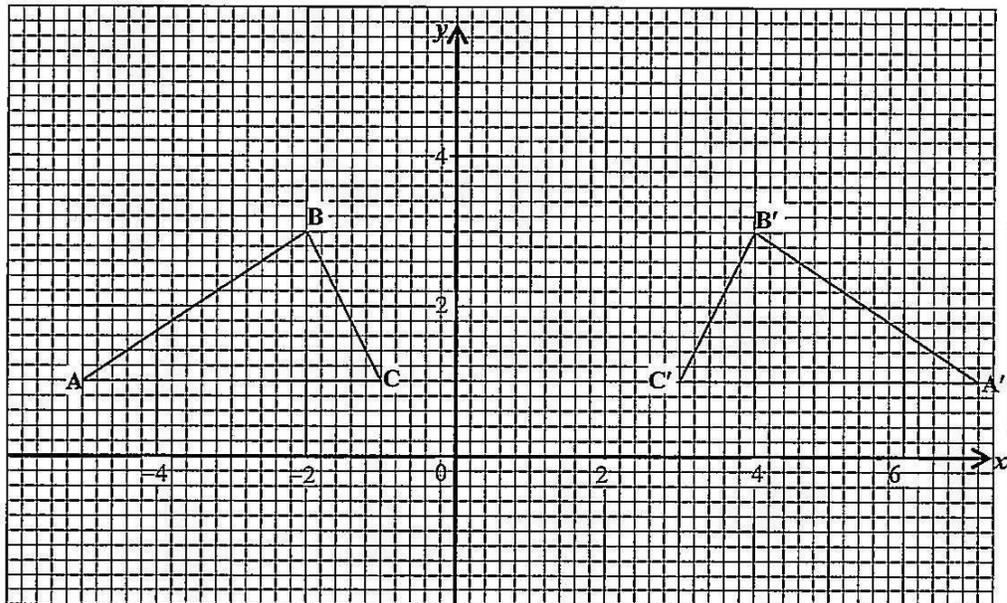
(b)   ....   [2]

19   (a)   The diagram shows a regular hexagonal prism.

What is the order of rotational symmetry about the indicated axis?

(b)   The diagram below shows two triangles **ABC** and **A′B′C′** on the **XOY** plane.

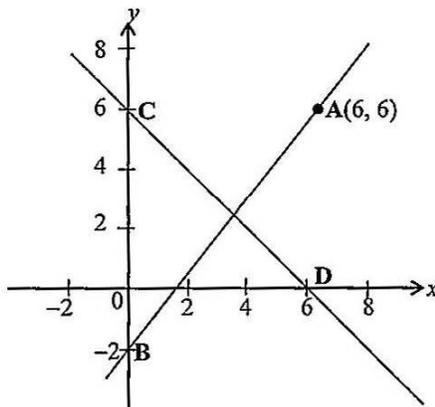Describe fully the single transformation that maps triangle **ABC** onto triangle **A′B′C′**.

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

(b)   ....

....

....   [2]

20 The diagram below shows a Cartesian plane with points **A**(6, 6), **B**(0, –2), **C**(0, 6) and **D**(6, 0).

Find the

(a) equation of the line **CD**,

(b) distance **AB**.

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

(b) .... [2]

21   Write the four inequalities that define the unshaded region **R** on the **XOY** plane below.
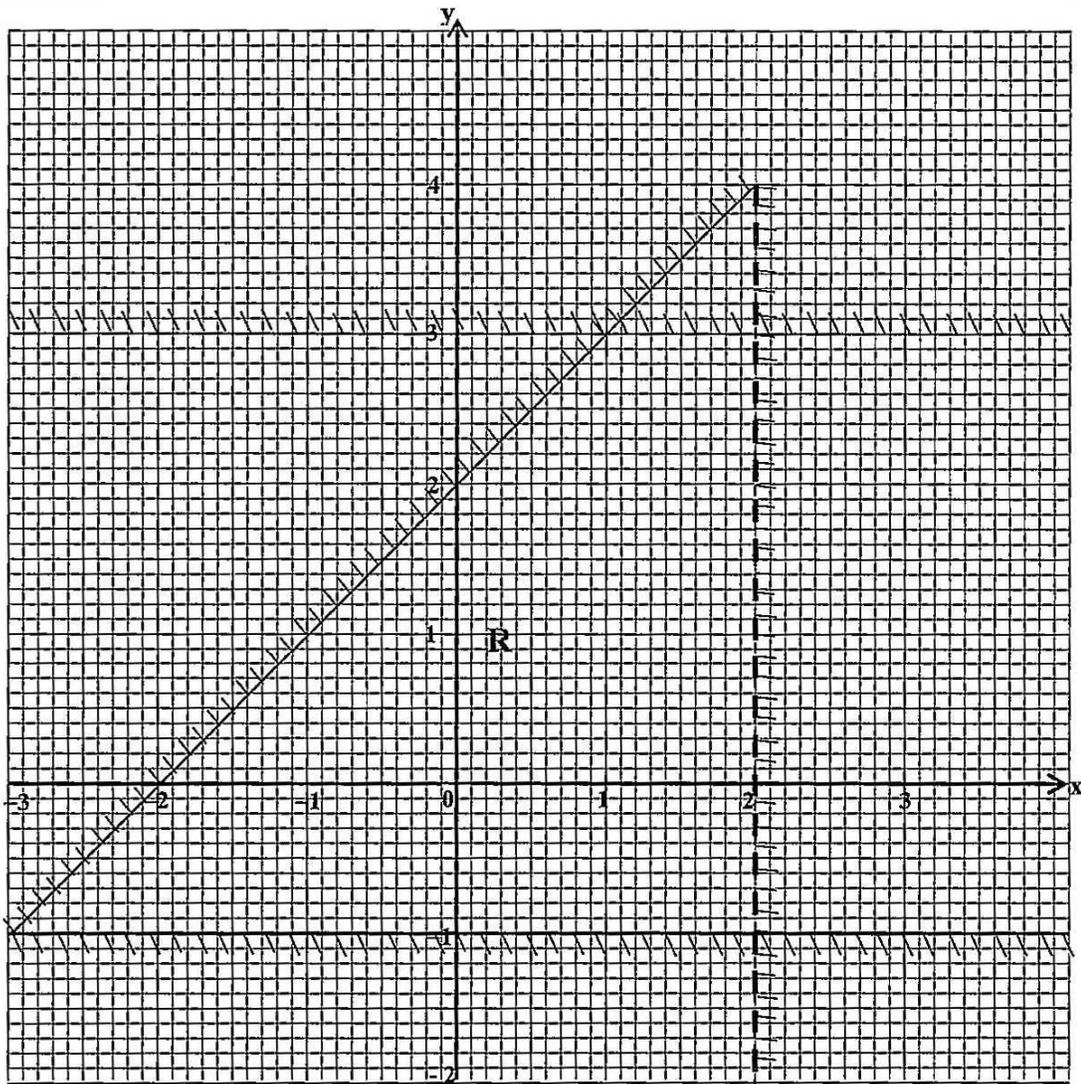
Answer: ....

....

....

....   [5]
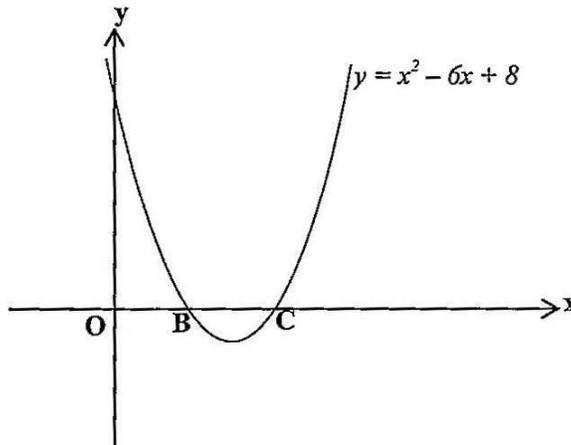
22   The diagram below shows a sketch of the graph of $y = x^2 - 6x + 8$, cutting the x-axis
   at **B** and **C**.

(a)   Find the coordinates of **B** and **C**.

(b)   Find the coordinates of the turning point of the graph.

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

C(.................. ,..............)   [2]

(b)   ....   [2]

[Turn over

23   The diagram below shows the speed-time graph of a 100m sprinter who accelerates uniformly for 3 seconds until he reaches a speed of 12m/s. He maintains the speed for 7 seconds and then uniformly retards for a further 4 seconds and comes to a stop.
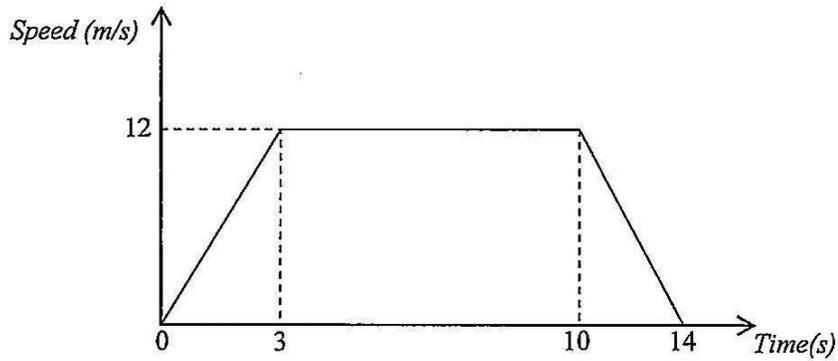
Calculate the

(a)   acceleration during the first 3 seconds,

(b)   retardation at the end of his race,

(c)   distance he covered in the first 10 seconds.

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

(b)   .... [2]

(c)   .... [2]

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