# EXAMINATIONS COUNCIL OF ZAMBIA

**Examination for General Certificate of Education Ordinary Level**

# Mathematics

Paper 1

4024/1

| Tuesday | 31 JULY 2018 |
| --- | --- |

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.

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**1**   Simplify $4(x + 2y) - (3x - 8y)$.

**Answer:** ................................................. [2]

**2**   Evaluate $27^{\frac{2}{3}}$.

**Answer:** ................................................. [2]

**3**   A straight line passing through A(3, 2) and B(5, $y$) has gradient $-2$.  Find the value of $y$.

**Answer:** ................................................. [2]

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

Answer: .................................................... [2]

5    Use set notation to describe the shaded region in the Venn diagram below.



Answer: .................................................... [2]

**[Turn over**
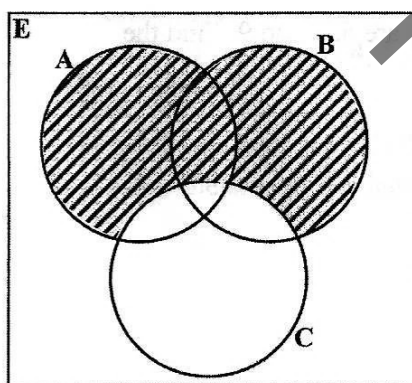
6    Given that $C = \begin{pmatrix} 5 & -1 \\ 2 & 1 \end{pmatrix}$ and $D = \begin{pmatrix} 1 \\ -2 \end{pmatrix}$, express CD as a single matrix.

Answer: ................................................ [2]

7    The first three terms in an arithmetic progression are 5, 7 and 9. Find the

(a)    common difference,

(b)    sum of the first 12 terms.

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

(b)    ..................................... [2]

**8**   **(a)**   In a game, the probability of a player losing is 0.3. What is the probability of a player winning the game?

   **(b)**   The coordinates of B and C are (2, 5) and (4, –3) respectively. If M is the mid-point of BC, what is the position vector of M?

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

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

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

   **(b)**   The scale of a map is 1 : 20 000. The actual area of residential plots is 60km$^2$. Calculate the area of residential plots on the map in **square centimetres**.

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

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

**[Turn over**

**10** **(a)** The difference in longitude between town A and town B is 105°. B is west of A. A family at A was watching a football match at 16 00 hours. At what time did a family at B watch the same match?

**(b)** The distance between P and Q is 3 600nm. If an aeroplane flies from P to Q at 600 knots, how long will it take?
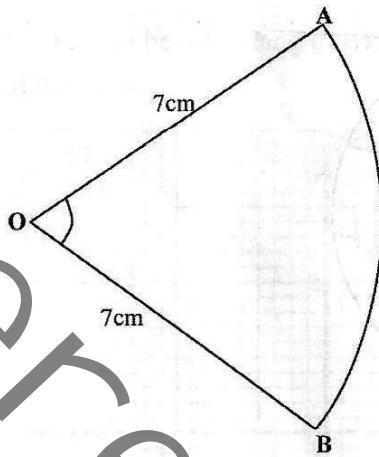
Answer: (a) ............................................. [1]

(b) ............................................. [2]

**11** **(a)** The transpose of a matrix P is $\begin{pmatrix} 1 & 3 & 4 \\ 2 & 5 & 1 \\ 3 & 0 & 1 \end{pmatrix}$. Write down the matrix P.

**(b)** Solve the equation $2^{2x-1} = 16^{-2x}$.

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

(b) ............................................. [2]

**12** **(a)** The diagram below shows a sector AOB of a circle with centre O and radius 7cm. The area of the sector is $25\frac{2}{3}$ cm$^2$. [$\pi = \frac{22}{7}$]
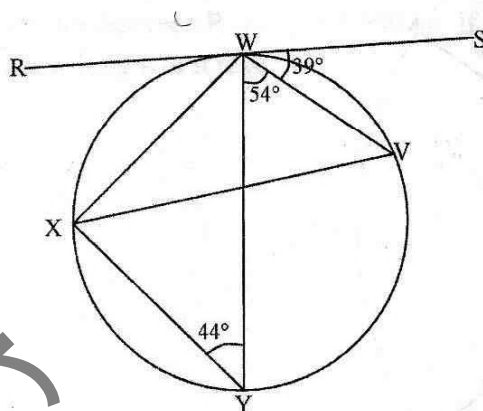


Calculate AÔB.

**(b)** Ngiwezi invested K14 500.00 in a business firm. The condition was that if she left her shares in the firm for 12 months, a profit of 5% would be added to her shares. How much will she get at the end of 12 months?

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

(b) ........................................... [2]

**[Turn over**

13  The diagram below shows a circle with a tangent RWS. The points V, W, X and Y are on the circle such that $X\hat{Y}W = 44°$, $V\hat{W}Y = 54°$ and $S\hat{W}V = 39°$.



Calculate

(a)   $R\hat{W}X$,

(b)   $X\hat{V}W$,

(c)   $Y\hat{X}W$.

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

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

(c) ............................................. [2]
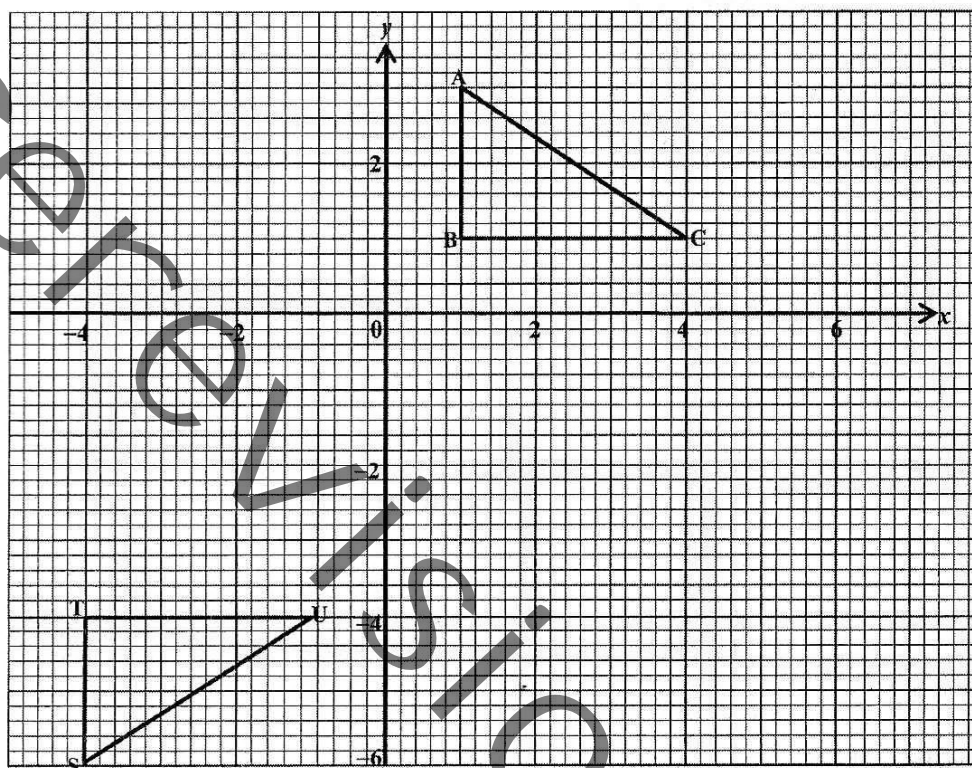
**14** **(a)** The ratio of the heights of two containers that are geometrically similar is 2:3. If the surface area of the smaller container is $80cm^2$, find the surface area of the larger container.

**(b)** In the diagram below, triangle ABC is mapped onto triangle STU by a combined transformation.



Name the two transformations that map triangle ABC onto triangle STU.

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

**(b)** ..........................................

.......................................... [2]

**[Turn over**

**15** Two variables $x$ and $y$ have corresponding values as shown in the table below.

| $x$ | 2 | 3 | $a$ |
|-----|-----|-----|-----|
| $y$ | 20 | 40 | 104 |

Given that $y$ varies directly as $(x^2 + 1)$, find the

**(a)** constant of variation, $k$,

**(b)** equation connecting $y$ and $x$,

**(c)** values of $a$.

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

**(b)** ............................................. [1]

**(c)** ............................................. [2]

**16** Given that $f(x) = 8x$ and $g(x) = \dfrac{3x - 2}{4}$ , find

**(a)** $f^{-1}(x)$,

**(b)** an expression for $fg(x)$,

**(c)** the value of $x$ for which $fg(x) = 20$.

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

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

**(c)** $x =$ ............................................. [1]

**17**    In the diagram below, a cyclist starts from town W and cycles on a bearing of 216° to town P. She then leaves town P and cycles on a bearing of 296° to Z. Z is west of W.
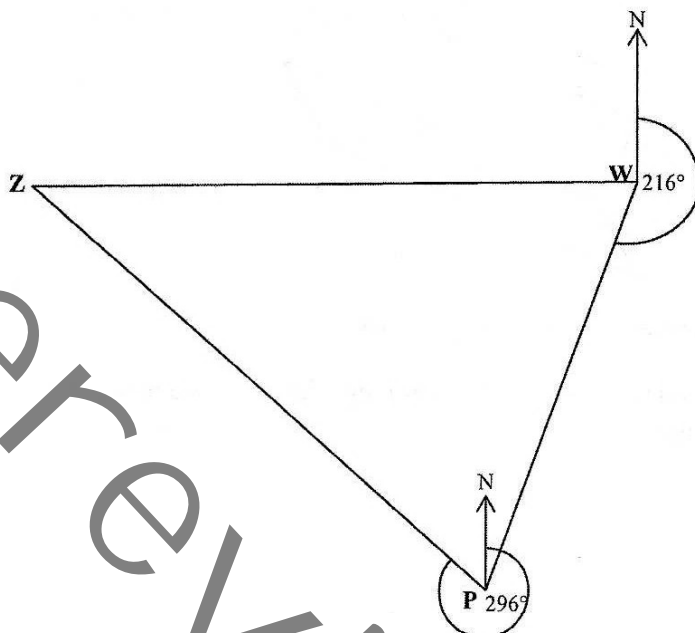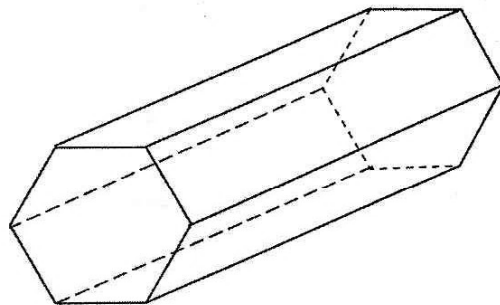


Calculate

   **(a)**    $P\hat{W}Z$,

   **(b)**    $W\hat{P}Z$.

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

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

**[Turn over**

**18**　　**(a)**　　The diagram below shows a regular hexagonal prism.



State the number of planes of symmetry.

　　**(b)**　　A piece of timber measures 5.25cm long. Calculate the relative error of the measurement.

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

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

**19**　　**(a)**　　Integrate $3x^4 - 4x^{-3}$ with respect to $x$.

　　**(b)**　　Solve the equation $(2x - 1)^2 = 25$.

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

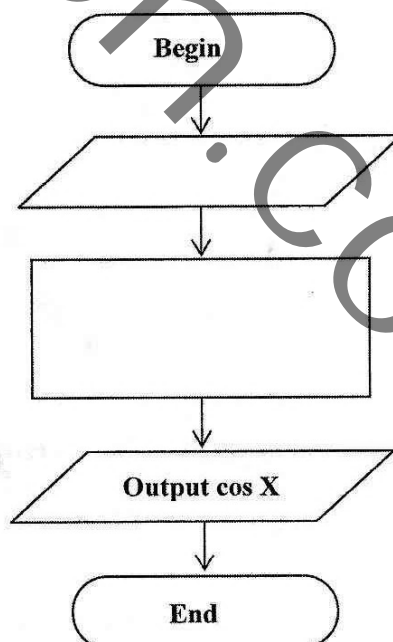　　　　　　　**(b)**　.........................................　[2]

**20**  **(a)**  Find the equation of a line which is parallel to $2x + y = 3$ passing through $(-2, 3)$.

**(b)**  The diagram in the answer space below is an incomplete flow chart to calculate cos X for the triangle shown below.
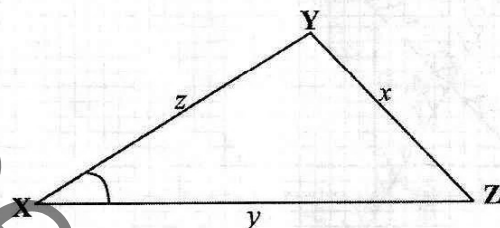


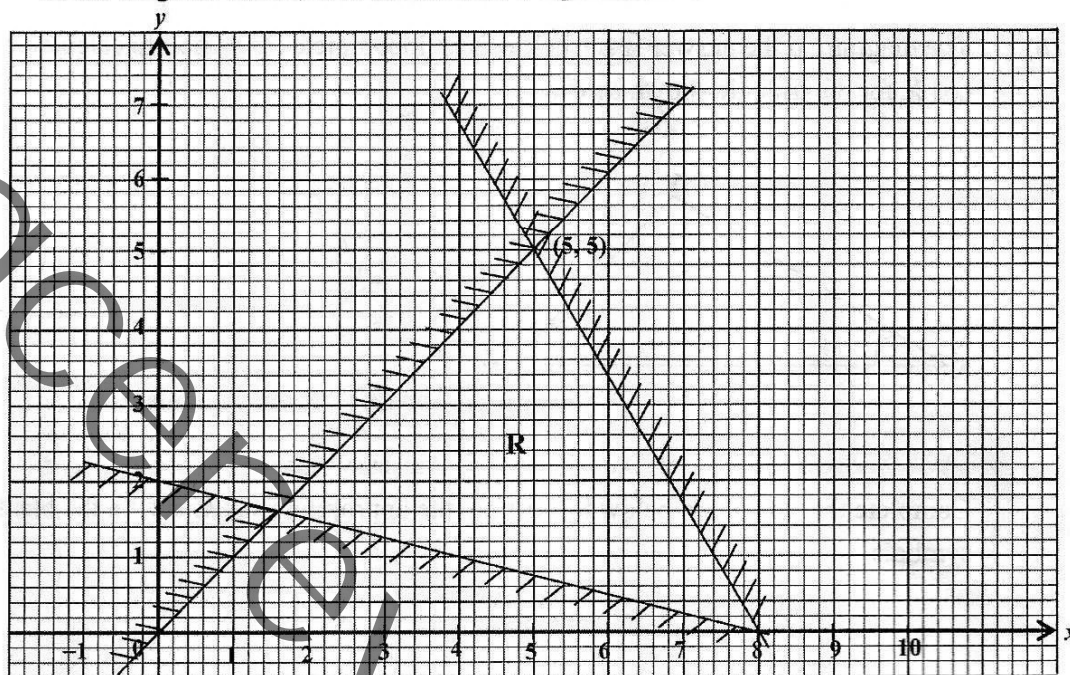Complete the flow chart below by writing the appropriate statements in the blank symbols.

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

**(b)**



[2]

**[Turn over**

**21** In the diagram below, **R** is the unshaded region.



Write three inequalities which describe the region **R**.

**Answer:** ........................................

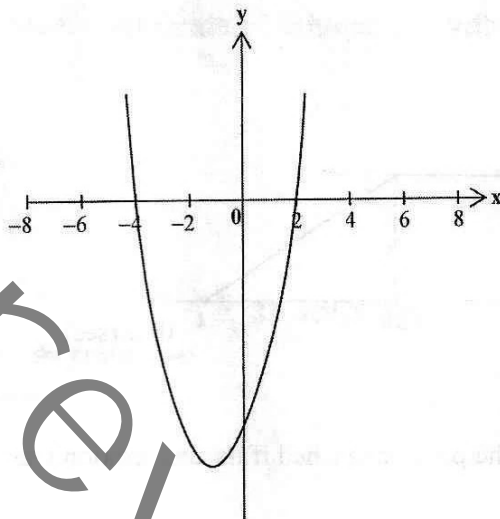........................................

........................................ [5]

22 (a) Given a right angled triangle XYZ where $\angle Z$ is 90° and $\sin X = \dfrac{4}{5}$ , find the value

of cos X.

(b) The diagram below shows a sketch of a graph which meets the x-axis at –4 and 2.



Find the

(i) equation of the graph,

(ii) coordinates of the turning point.

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

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

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

**[Turn over**

**23** The diagram below shows the speed-time graph of a particle. The particle started off from rest and accelerated uniformly for 10 seconds. It then travelled at a constant speed for 20 seconds and then decelerated to rest.
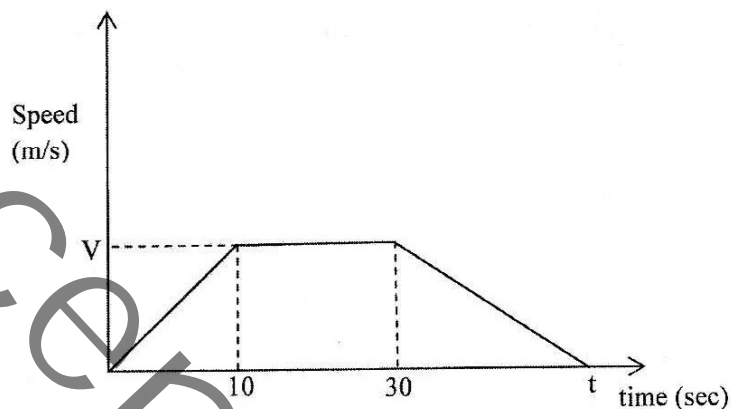


**(a)** Find the speed V the particle reached if its acceleration was $2m/s^2$ in the first 10 seconds.

**(b)** Given that the total distance covered was 750m, find the value of $t$ in the diagram.

**(c)** What was the speed at 40 seconds?

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

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

**(c)** ................................... [2]