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 **2 NOVEMBER 2009** **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.

No paper for rough work is to be provided.

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

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

This question paper consists of 14 printed pages.

[Turn over

For Examiner's Use

1 Evaluate

(a) $2\frac{1}{4}+1\frac{4}{5}$,

(b) $\frac{5}{8}-\frac{3}{8}\div\frac{3}{4}$.

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

(b)..... [1]

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2 **(a)** Express 65% as a fraction in its lowest terms.

(b) The operation * is defined over R by $x*y = (x-y)^2$. Find 2*3.

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

(b)..... [1]

---

3 Express 0.0245 in scientific notation correct to 2 significant figures.

Answer: ..... [2]

For Examiner's Use

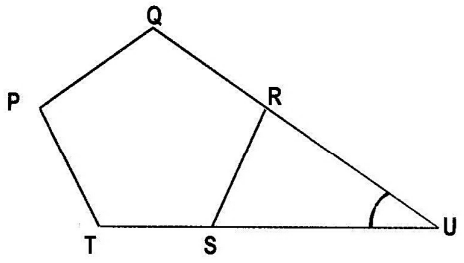
4 **(a)** Find the exact value of $16 - (3 + 7) \div 2 + 6 \times 3$.

(b) Express 0.06 as a common fraction in its lowest terms.

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

(b)..... [1]

5 PQRST is a regular pentagon. QR and TS are produced to meet at U. Calculate ∠RUS.



Answer: ∠RUS=..... [2]

6 Given that $p = -2$, $q = 8$ and $r = 12$, evaluate

(a) $r - q$,

(b) $q^2 - pr$,

(c) $\sqrt[3]{q}$.

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

(b) ..... [1]

(c) ..... [1]

For Examiner's Use

7 It is given that V varies inversely as the square of t. Some corresponding values of V and t are given in the table below.

t	2	5	b
V	25	a	¼

Find the values of k (the constant of variation), a and b.

Answer: k= ..... [1]

a= ..... [1]

b= ..... [1]

---

8 Solve the simultaneous equations

$2x = 5y,$

$x - 2y = 3.$

Answer: x= .....

y= ..... [3]

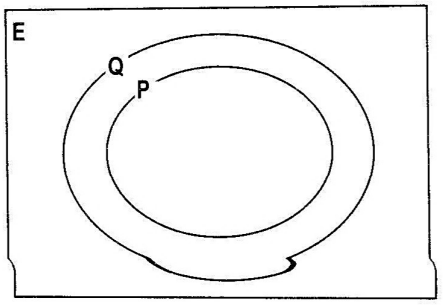
For Examiner's Use

9 **(a)** A set P has 16 subsets. Find n(P).

(b) On the Venn diagram in the answer space, shade the region represented by $P' \cap Q$.

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

(b)



[2]

10 Given that f(x) =12 – 3x, find

(a) f(–3),

(b) $f^{-1}(-3)$.

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

(b) .....[2]

11 A box contains blue, green, black and red marbles. Given that P(green)$=\frac{2}{5}$, P(red)$=\frac{1}{4}$ and P(black)$=\frac{1}{5}$.

(a) Find P(blue).

(b) Find the least number of marbles that must be in the box to suit these probabilities.

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

(b) ..... [1]

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12 **(a)** Factorise completely $3h^4-12h$.

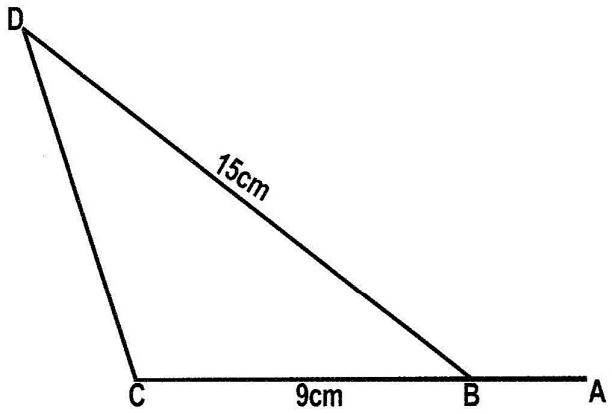
(b) If two men can dig a well in 3 days, how many more men are needed if the work is to be completed in 2 days and working at the same rate?

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

(b) ..... [2]

For Examiner's Use

13 **(a)** In the diagram below, AC is a straight line, BC=9cm, BD=15cm and Sin $\hat{ABD}$=0.6. Calculate the area of triangle BCD.



(b) For the sequence 1, 4, 7, …., find the 20^{th} term.

Answer: **(a)** ..... [3]

(b) ..... [1]

14 **(a)** Find the value of $\sqrt[3]{-8}$.

(b) On a certain day, the exchange rate was US$1 to K3 750 and British £1 to K5 250. Based on these rates, what would be the cost, in **dollars**, of a car costing £900?

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

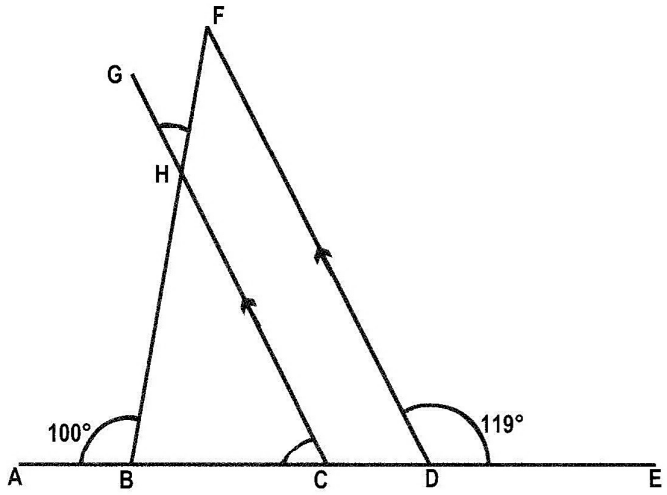
(b) ..... [3]

For Examiner's Use

15 **(a)** Solve the equation

$$6x - 1 = \frac{2}{x}.$$

(b) In the diagram below, AE, BF and CG are straight lines. CG is parallel to DF, $\angle EDF = 119°$ and $\angle ABF = 100°$.



Calculate

(i) $\angle ACG$,

(ii) $\angle GHF$.

Answer: **(a)** x=.....or.....[2]

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

(ii).....[1]

16 (a) (i) Find column vector $\underline{m}$ such that

$$\begin{pmatrix} -5 \\ 2 \end{pmatrix} - \underline{m} = \begin{pmatrix} -8 \\ 6 \end{pmatrix}.$$

(ii) Hence find $|\underline{m}|$.

(b) Given that $\overrightarrow{AB} = \begin{pmatrix} -1 \\ 9 \end{pmatrix}$, find $\overrightarrow{BA}$ in component form.

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

(ii) ..... [1]

(b) ..... [1]

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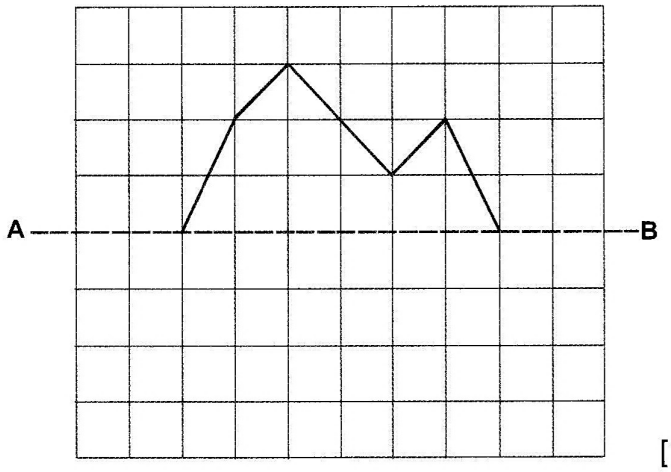
17 (a) Given that $\begin{pmatrix} 2 & 0 & 3 \\ 0 & 3 & n \end{pmatrix} \begin{pmatrix} m \\ -4 \\ 1 \end{pmatrix} = \begin{pmatrix} 15 \\ 2 \end{pmatrix}$, find the value of m and n.

(b) (i) Complete the figure below so that it is symmetrical about AB.



[1]

(ii) State the order of rotational symmetry of a regular hexagon.

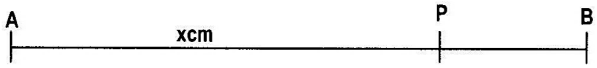
Answer:(a) m=.....[1]

n=.....[1]

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

For Examiner's Use

18 **(a)** In the diagram below, AB = 7cm and AP = xcm.



Find x, if AP = 3PB.

(b) The translation vector $\begin{pmatrix} 8 \\ 12 \end{pmatrix}$ maps the point (n+3, 2) onto (2n–4, 14). Find the value of n.

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

(b) n = ... [2]

---

19 For the inequality $\frac{4}{x} < \frac{x}{4}$, find

(a) the least positive integer x,

(b) the greatest negative integer x satisfying this inequality.

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

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

---

20 **(a)** Given that $x - y = 7$ and that $x^2 - y^2 = 21$, find the value of x and the value of y.

(b) A die is rolled ten times giving the following scores
2, 5, 3, 1, 4, 6, 2, 1, 2, 2.

Find

(i) the median score,

(ii) the mean score.

Answer: **(a)** x=.....y=.....[3]

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

(ii)..... [1]

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21 **(a)** **(i)** A cyclist arrived at town K from town L after a journey lasting 1 ½ hours. What time did he start off from L if he arrived at 10 10 hours?

(ii) If the cyclist's average speed was 6km/h, what is the distance between K and L?

(b) Two towns lie on the same meridian. Find the difference in latitudes between these two towns if they are 200 nautical miles apart.

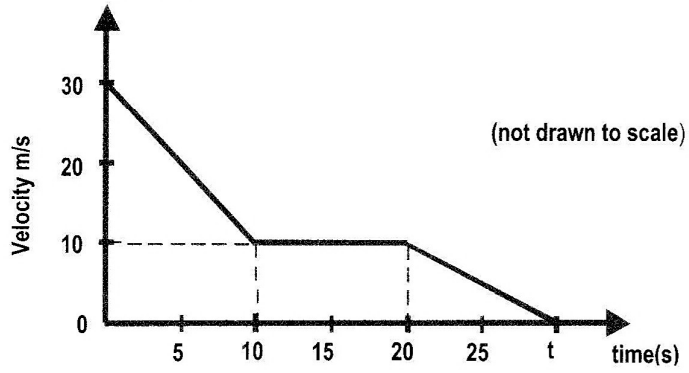
Answer:(a) **(i)** .....[1]

(ii).....[2]

(b) .....[2]

For Examiner's Use

22 The diagram shows the velocity-time graph of a particle during a period of t seconds.



Calculate

(a) the acceleration of the particle in the first 10 seconds,

(b) the value of t, if it travelled 50m from the 20^{th} second,

(c) the average speed of the particle for the whole journey.

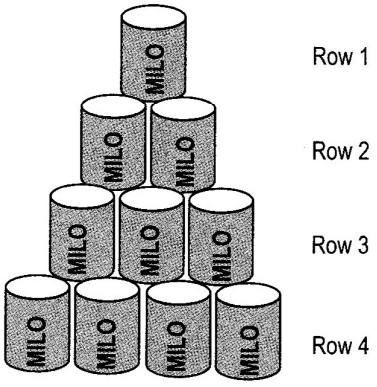
Answer:(a) .....[1]

(b) .....[2]

(c) .....[2]

For Examiner's Use

23 Cans are often arranged as shown below, in some shops.



(a) Complete the table in the answer space.

(b) Write down a formula for the number of cans, C, in terms of n.

(c) If there are 10 rows, how many cans are there altogether?

(d) How many rows would be needed to display 78 cans?

Answer:(a)

No. of rows (n)	1	2	3	4
No. of Cans (C)	1	3	6	

[1]

(b) .....[2]

(c) .....[1]

(d) .....[2]