Candidate Name	Centre Number	Candidate Number

ZIMBABWE SCHOOL EXAMINATIONS COUNCIL

General Certificate of Education Ordinary Level

MATHEMATICS 4004/1

PAPER 1

NOVEMBER 2021 SESSION 2 hours 30 minutes

Candidates answer on the question paper

Additional materials:
Mathematical Instruments

Allow candidates 5 minutes to count pages before the examination.

This booklet should not be punched or stapled and pages should not be removed.

Time 2 hours 30 minutes

INSTRUCTIONS TO CANDIDATES

Write your Name, Centre number and Candidate number in the spaces at the top of this page.
Write your centre and candidate number in the box on the top right corner of every page of this paper.
Check that all the pages are in the booklet and ask the invigilator for a replacement if there are duplicate or missing pages.
Answer **all** questions.
Write your answers in the spaces provided on the question paper using **black** or **blue** pens.
If working is needed for any question, it must be shown in the space below that question.
Omission of essential working will result in loss of marks.
Decimal answers which are not exact should be given to three significant figures unless stated otherwise.
Mathematical tables, slide rules and calculators should **not** be brought into the examination room.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets [ ] at the end of each question or part question.

This question paper consists of 25 printed pages and 3 blank page.

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Answer all questions

NEITHER MATHEMATICAL TABLES NOR SLIDE RULE NOR CALCULATORS MAY BE USED IN THIS PAPER

1 Express 30.098

(a) correct to the nearest tenth.

Answer (a)

[1]

(b) correct to **four** significant figures.

Answer (b)

[1]

(c) in standard form.

Answer (c)

[1]

2 **(a)** Express $4\frac{2}{3}$ as a recurring decimal.

Answer (a)

[1]

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(b) Find the value of $10 - 10 \div 2 + 2 \times 2$.

Answer (b)

[2]

3 **(a)** Write down the next term in the sequence 2; 3; 5; 8; 12; ....

Answer (a)

[1]

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(b) Simplify $\frac{20 - 8}{20 + 8}$, giving your answer as a common fraction in its simplest form.

Answer (b)

[2]

4 **(a)** **(i)** List the prime numbers between 14 and 20,

Answer (a)(i)

[1]

(ii) Write the number 801 008 in words.

Answer (a)(ii) in answer space

[1]

(b) Express 6,65 hours in hours and minutes.

Answer (b)

[1]

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5 **(a)** List the first three values of x such that $1 \leq x \leq 4$ where x is a **natural** number.

Answer (a)

[2]

(b) Express 270 as a product of its prime factors in index form.

Answer (b)

[2]

6 **(a)** If the bearing of P from Q is 054 °, find the bearing of Q from P.

Answer (a)

[1]

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(b) Calculate the number of sides of a regular polygon with interior angles of 162° each.

Answer (b)

[2]

7 Express $\dfrac{1}{x^2-1} - \dfrac{1}{1+x}$ as a single fraction in its simplest form.

Answer

[3]

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8 (a) Write down the largest four-digit number in base 5.

Answer (a)

[1]

(b) Convert 111_8 to a number in base 7.

Answer (b)

[2]

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9 Factorise completely $x^2(y+1) - y - 1$.

Answer

10 Evaluate [3]

(a) $\log_4 64$,

Answer (a)

[1]

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(b) $\dfrac{\log\ 8}{\log\ 16}$.

Answer (b)

[2]

11 Solve the simultaneous equations:

$$2x + y = 4$$
$$5y - 4x = 13$$

Answer

[3]

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12 For the expressions $10(x + 1)$ and $8(x + 1)^2$, find the

(a) H.C.F.

Answer(a)

[1]

(b) L.C.M.

Answer (b)

[2]

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13 A triangle has sides of lengths 5 cm, 8 cm and 12 cm.
Find the cosine of the smallest angle as a common fraction in its simplest form.

Answer

[3]

14 (a) Solve the equation $5^x = 125$.

Answer (a)

[2]

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(b) Simplify $\left(\frac{98}{32}\right)^{-\frac{1}{2}}$.

Answer (b)

[2]

15 Given that $-2 \leq x \leq 5$ and $3 \leq y \leq 10$, calculate the

(a) greatest possible value of $y^2 - x^2$.

Answer (a)

[2]

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(b) least possible value of xy.

Answer (b)

[2]

16 **(a)** Solve the simultaneous inequalities $2x - 6 \leq 4x < 10 - x$.
Leave the answer in the form $a \leq x < b$, where a and b are integers.

Answer (a)

[3]

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(b) Represent the solution to part (a) on a number line.

Answer (b)

[1]

17 **(a)** Given that $v^2 = u^2 + 2as$,

make a the subject of the formula.

Answer (a)

[2]

(b) Find a when $s = 5, u = 2$ and $v = 2$.

Answer (b)

[2]

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18 D varies jointly as S and T.

(a) Find an equation connecting D, S, T and a constant k.

Answer (a)

[1]

(b) Find the value of k given that $D = 24$ when $S = 4$ and $T = 2$.

Answer (b)

[1]

(c) Find the value of T given that $D = 50$ and $S = 10$ using the value of k in (b) above.

Answer (c)

[2]

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19 The universal set ξ has subsets A and B such that
$n(\xi) = 45,\ n(A) = 25,\ n(A' \cap B) = 9$ *and* $n(A \cap B) = n(A \cup B)'$.

(a) Show this information on a Venn diagram.

Answer (a) on the diagram

[3]

(b) Find $n(B)$.

Answer (b)

[1]

20 Given that $f(x) = \dfrac{3}{x+2},\ x \neq -2,$

find

(a) $f(-1)$.

Answer (a)

[1]

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(b) the value of x for which $f(x) = -\frac{3}{4}$

Answer (b)

[3]

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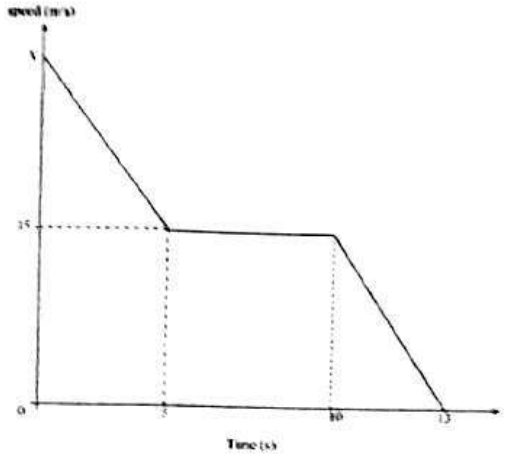
21



The diagram above shows a speed - time graph of a moving object.
The objects decelerates uniformly at 3 m/s^2 from a speed of V m/s to a speed of 15 m/s in 5 seconds.
It maintains the speed of 15 m/s for a further 5 seconds.
It then decelerates uniformly until it comes to rest after 3 seconds.
Calculate

(a) V,

Answer (a)

[2]

(b) the deceleration in the last 3 seconds.

Answer (b)

[1]

(c) the distance travelled in the last 8 seconds.

Answer (c)

[2]

22 (a) By selling an article for S20, 00 a dealer made a profit of 25%.
Calculate the cost price of the article.

Answer (a)

[2]

(b) Given that $\frac{7t - s}{2} = \frac{s - 5t}{3}$,

find the ratio $t : s$

Answer (b)

[3]

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23 A straight line, l passes through the origin and the point (1;2).
Find the

(a) gradient of line l.

Answer (a)

[1]

(b) equation of the line l.

Answer (b)

[2]

(c) equation of the straight line through point (0; −1) which is parallel to line l.

Answer (c)

[2]

24 (a) On a map the distance between point A and point B is 10 cm.
The actual distance is $2\frac{1}{2}$ km.

Find the scale on the map, giving the answer in the form 1:n.

Answer (a)

[2]

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(b) Calculate the actual

(i) distance, **in metres**, between 2 places which are 3 cm apart on the map.

Answer (b)(i)

[1]

(ii) area in km^2, represented by an area of 8 cm^2 on the map.

Answer (b)(ii)

[2]

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25 Given that $\vec{OA} = \begin{pmatrix} -2 \\ 1 \end{pmatrix}$ and $\vec{OB} = \begin{pmatrix} 1 \\ -2 \end{pmatrix}$, where O is the origin, find

(a) $\vec{AB}$.

Answer (a)

[2]

(b) $\left|\vec{AB}\right|$, leaving the answer in surd form.

Answer (b)

[2]

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(c) $\overrightarrow{OM}$, where M is the midpoint of AB.

Answer (c)

[2]

26 Given that matrix $A = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$ and matrix $C = \begin{pmatrix} 1 & -4 \\ -2 & 3 \end{pmatrix}$,

find

(a) the determinant of matrix C,

Answer (a)

[2]

(b) $A - 3C$,

Answer (b)

[2]

(c) matrix B if B = $A\begin{pmatrix}5\\6\end{pmatrix}$.

Answer (c)

[2]

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