Candidate Name | Centre Number | Candidate Number

ZIMBABWE SCHOOL EXAMINATIONS COUNCIL

General Certificate of Education Ordinary Level

MATHEMATICS

PAPER 1

4008/1, 4028/1

NOVEMBER 2011 SESSION

2 hours 30 minutes

Candidates answer on the question paper.
Additional materials:
Geometrical instruments

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.

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.
Omission of essential working will result in loss of marks.
Decimal answers which are not exact should be given correct 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.

FOR EXAMINER'S USE

This question paper consists of 21 printed pages and 3 blank pages.

[Turn over

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

For Examiner's Use

1 Giving your answer as a common fraction in its lowest terms, find the value of

(a) $\frac{3}{5} - \frac{5}{9}$,

(b) $\frac{2}{3\frac{2}{5}}$.

Answer: *(a)* _____ [1]

(b) _____ [2]

For Examiner's Use

2 Given $P = \dfrac{0.00274 \times 3460}{(9.88 + 23.8)^2}$

(a) Rewrite this expression with each number correct to one significant figure.

(b) Estimate the value of P correct to one significant figure.

Answer: (a) $\dfrac{\times}{(\quad + \quad)^2}$ [2]

(b) _____ [1]

3 **(a)** Simplify $\left(27x^6\right)^{\frac{1}{3}}$.

(b) If $32^{-\frac{2}{5}} = 2^p$, find p.

Answer: *(a)* _____ [1]

(b) $p =$ _____ [2]

For Examiner's Use

4 Evaluate $3{,}25 \times 10^4 \times 10^{-6}$ giving the answer

(a) in standard form,

(b) as a decimal fraction,

(c) as a common fraction in its lowest terms.

Answer: *(a)* _____ [1]

(b) _____ [1]

(c) _____ [1]

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5 **(a)** State the number of lines of symmetry of an equilateral triangle.

(b) Factorise completely $3x^3 - 12x$.

Answer: *(a)* _____ [1]

(b) _____ [2]

---

6 Solve the simultaneous equations

$$x - 6y = -4,$$
$$9x + 3y = -17.$$

For Examiner's Use

Answer: $x =$ _____

$y =$ _____ [3]

---

7 A and B are sets. Write the following sets in their simplest form.

(a) $A \cap A'$

(b) $A \cup A'$

(c) $(A \cap B) \cup (A \cap B')$

Answer: *(a)* _____ [1]

(b) _____ [1]

(c) _____ [1]

For Examiner's Use

8 It is given that y varies inversely as the square of $(x-1)$. When $y = 2$, $x = 2$.

Find the value of y when $x = 4$.

Answer: $y =$ _____ [3]

---

9 **(a)** If A is a non-singular matrix, simplify $\mathbf{AA}^{-1}$

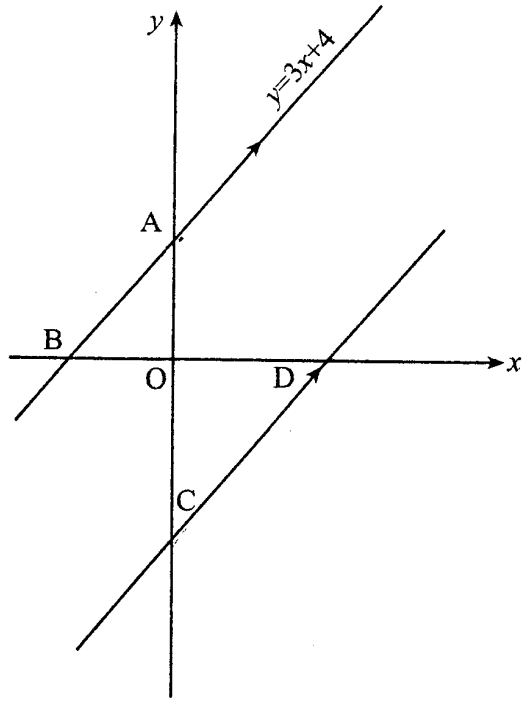
(b) If $\mathbf{B} = \begin{pmatrix} 1 & 3 \\ 5 & 2 \end{pmatrix}\begin{pmatrix} 2 \\ 6 \end{pmatrix}$, write down the order of matrix **B**.

Answer: *(a)* _____ [1]

(b) _____ [2]

10

For Examiner's Use



In the diagram AC is 10 units and BA is parallel to CD. BA is the line $y = 3x + 4$.

(a) Write down

(i) the value of y at C,

(ii) the equation of the line CD which is parallel to $y = 3x + 4$.

(b) Find the coordinates of the point D where the line in part **(a)(ii)** crosses the x-axis.

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

(ii) _____ [1]

(b) (____;____) [1]

For Examiner's Use

11 **(a)** Evaluate $765_8 - 567_8$, giving your answer in base eight.

(b) Express $5^3 + 4$ as a number in base five.

(c) Convert 13_{10} to a number in base two.

Answer: *(a)* _____ [1]

(b) _____ [1]

(c) _____ [1]

---

12 A rectangle is 9,1 cm long and 5,7 cm wide correct to one decimal place.

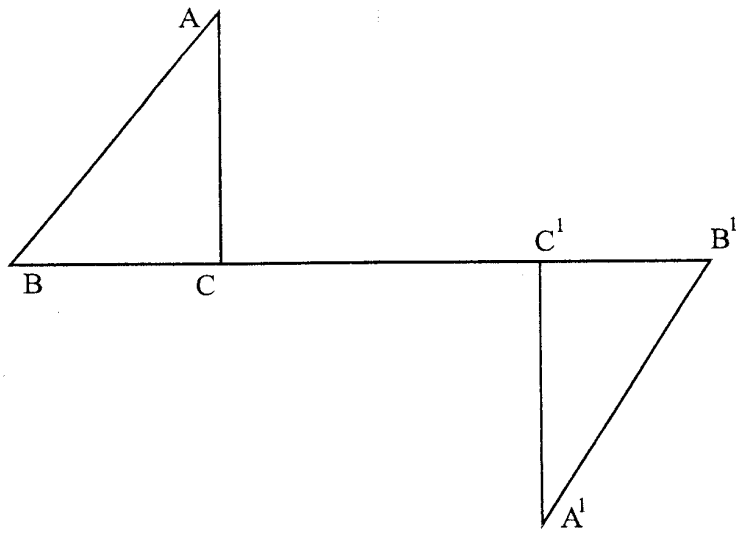
(a) State the least possible width of the rectangle.

(b) Find the limits within which the perimeter of the rectangle lies.

Answer: *(a)* _____ [1]

(b) _____ cm ≤ perimeter < _____ cm [2]

13



In the diagram ABC and $A^1B^1C^1$ are congruent triangles and BCC^1B^1 is a straight line.

Describe fully a single transformation that maps triangle ABC onto triangle $A^1B^1C^1$.

Answer: _____

_____ [3]

_____

For Examiner's Use

14 Solve the equations

(a) $\frac{2y}{3} - 9 = 0,$

(b) $x^2 - 5x - 6 = 0.$

Answer: *(a)* $y =$ _____ [2]

(b) $x =$ _____ or _____ [2]

---

15 A car manufacturer makes a scale model of one of his real cars.

(a) The capacity of the fuel tank of the real car is 64 litres and that of the model car is 0.512 litres.

Find the ratio of the length of the real car: the length of model car.

(b) The area of the front window of the model is 0.0484 m^2. Find the area of the front window of the real car.

Answer: *(a)* _____ [2]

(b) _____ m^2 [2]

For Examiner's Use

16 **(a)** Given that $y = m^2 - 4n^2$, find the value of y when $m = 4$ and $n = 2$.

(b) If $\frac{x}{a} + \frac{y}{b} = 1$, make x the subject.

Answer: *(a)* _____ [1]

(b) $x =$ _____ [3]

---

17 Evaluate

(a) $\log_3 9$,

(b) $\log_5\left(\frac{1}{25}\right)$,

(c) $\log_{29} 1$.

Answer: *(a)* _____ [1]

(b) _____ [2]

(c) _____ [1]

For Examiner's Use

18 On a map, a distance of 20 km is represented by a length of 40 cm. The scale of the map is 1: n.

(a) Calculate the value of n.

(b) The distance between two towns on the map is 70 cm. Calculate the actual distance in kilometres between the towns.

Answer: *(a)* $n =$ _____ [2]

(b) _____ km [2]

19 Study the pattern below.

For Examiner's Use

$3^2 - 1^2 = 8 = 4 \times 2$
$4^2 - 2^2 = 12 = 4 \times 3$
$5^2 - 3^2 = 16 = 4 \times 4$
$6^2 - p^2 = q = 4 \times 5$

(a) Write down the value of

(i) p,

(ii) q.

(b) Write down the 10^{th} line of this pattern.

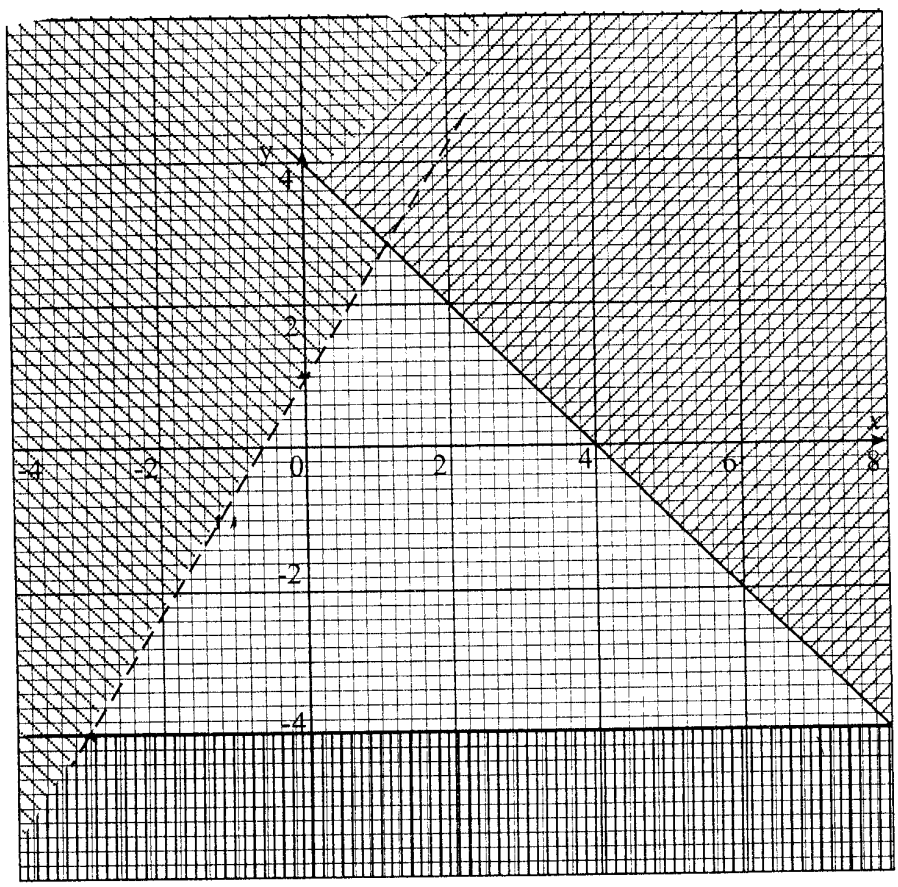
Answer: *(a)* *(i)* $p =$ _____ [1]

(ii) $q =$ _____ [1]

(b) _____ = _____ = _____ [3]

For Examiner's Use

20



Find the three inequalities that define the unshaded region in the diagram above.

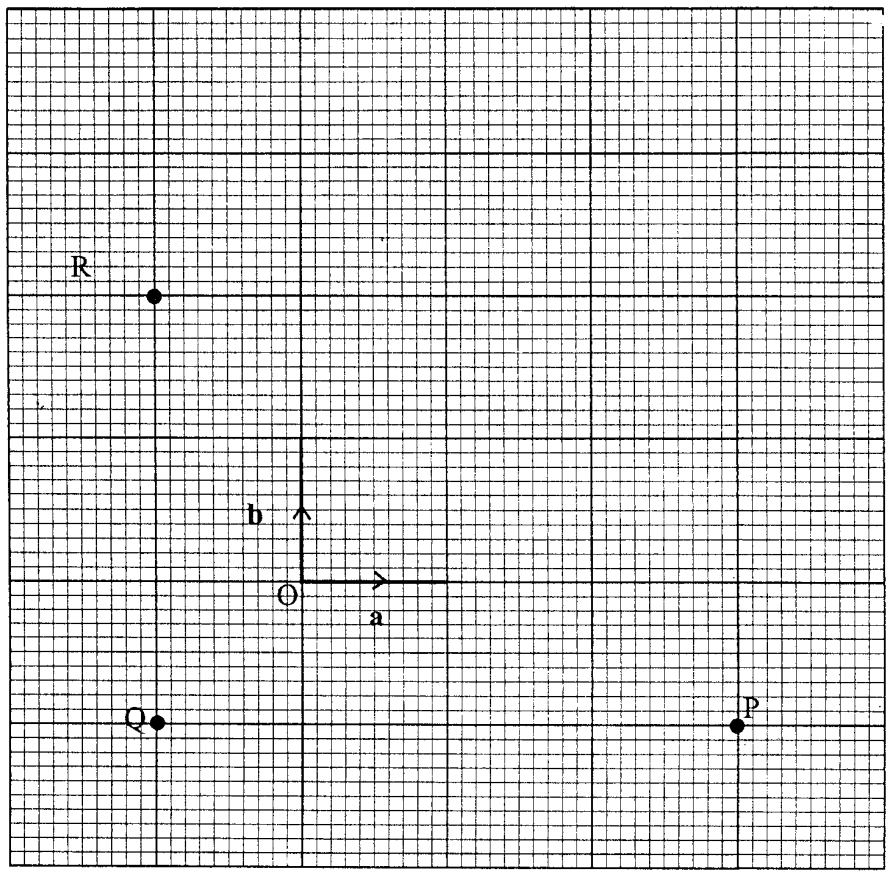
Answer: _____

_____

_____ [5]

21

For Examiner's Use



In the diagram, O is the origin.

Vectors **a** and **b** are shown in the diagram.

(a) Write down, in terms of **a** and/or **b**.

(i) the position vector of the point P,

(ii) $\overrightarrow{PR}$,

(iii) $\overrightarrow{PR} - \overrightarrow{QR}$.

(b) If $|\mathbf{b}| = 4$, write down the value of $|\overrightarrow{QR}|$.

For Examiner's Use

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

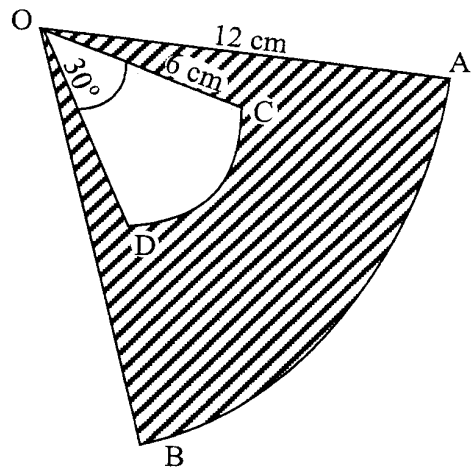
(ii) $\overrightarrow{PR}$ = _____ [1]

(iii) $\overrightarrow{PR} - \overrightarrow{QR}$ = _____ [2]

(b) $|\overrightarrow{QR}|$ = _____ [1]

22

For Examiner's Use



In the diagram, OAB is a sector of a circle centre O and radius 12 cm and angle AOB = 50°
OCD is a sector of a circle centre O and radius 6 cm and angle COD = 30°.

Calculate, in terms of π,

(a) the area of the shaded part,

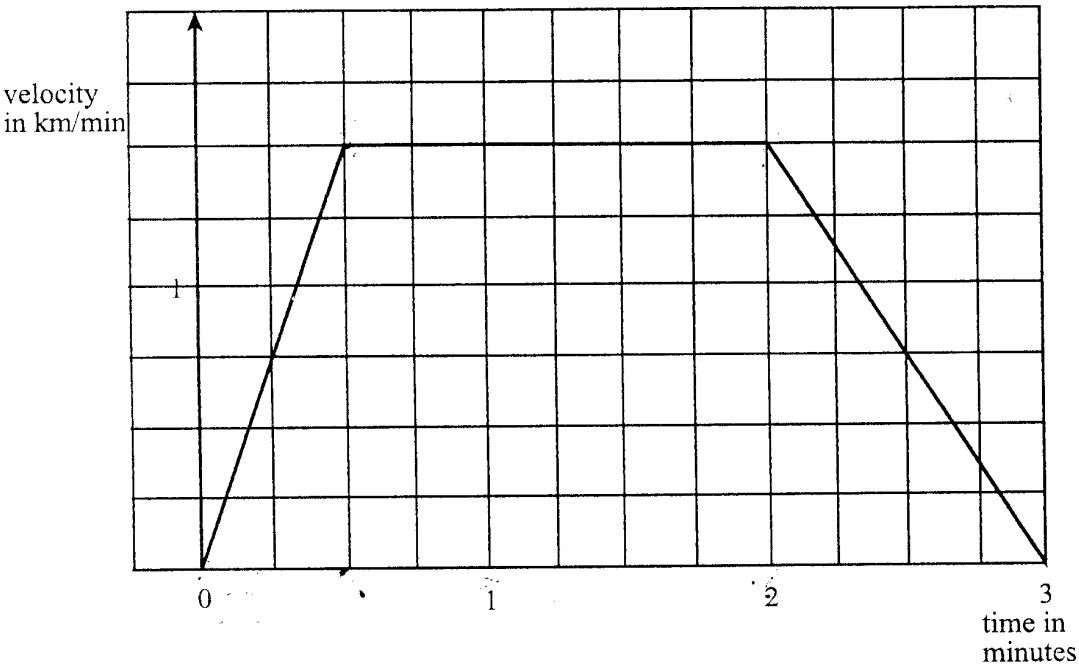
(b) the perimeter of the shaded area AOCDOBA.

Answer: *(a)* _____ cm^2 [3]

(b) _____ cm [3]

23

For Examiner's Use



The diagram is a velocity-time graph of a train journey between two stations.

Find

(a) the maximum speed of the train in km/h,

(b) the train's acceleration in the first half minute,

(c) the distance the train travels at maximum speed,

(d) the distance between the stations.

Answer: *(a)* _____ km/h [2]

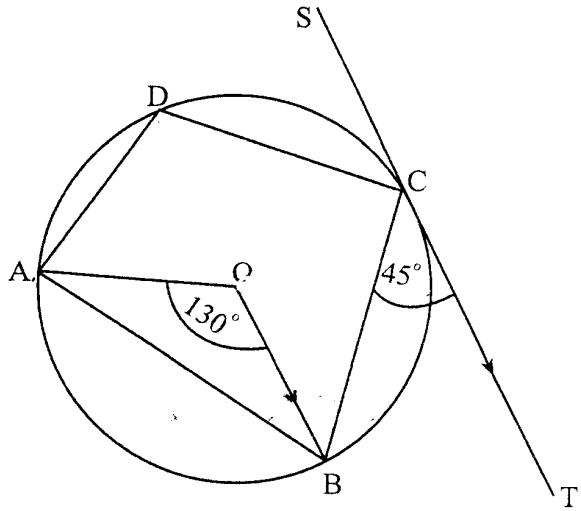
(b) _____ km/minute^2 [2]

(c) _____ km [1]

(d) _____ km [1]

24

For Examiner's Use



A, B, C and D lie on the circumference of a circle centre O.

SCT is a tangent to the circle at C and is parallel to OB.

$A\hat{O}B = 130°$ and $B\hat{C}T = 45°$

(a) Write down the geometrical word which completes the following statement "ABCD is a..... quadrilateral".

(b) Find the values of

(i) $O\hat{B}C$,

(ii) $O\hat{B}A$,

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

(iv) $O\hat{C}T$,

(v) reflex angle AOC.

For Examiner's Use

Answer: *(a)* _____ [1]

(b) *(i)* $O\hat{B}C$ =_____ [1]

(ii) $O\hat{B}A$ = _____ [1]

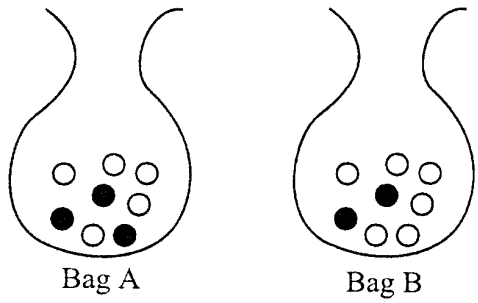
(iii) $A\hat{D}C$,= _____ [1]

(iv) $O\hat{C}T$, = _____ [1]

(v) reflex angle AOC= _____ [2]

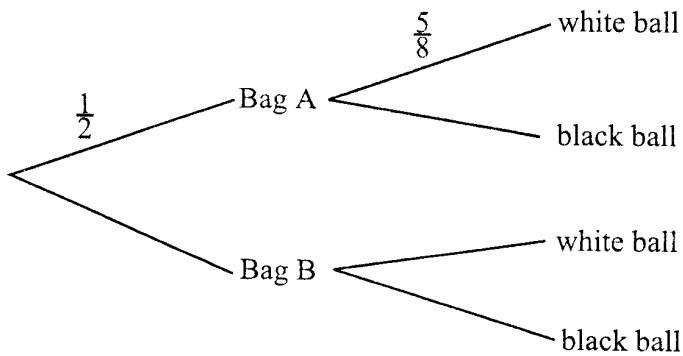
25

For Examiner's Use



Denis must choose a bag from which he should pick a ball. The probability that he chooses Bag A is $\frac{1}{2}$.

Bag A contains 5 white and 3 black balls. Bag B contains 6 white and 2 black balls. The tree diagram below shows some of this information.



(a) Complete the probability tree diagram shown above.

(b) Find the probability that Denis chooses Bag A and then a white ball.

(c) Find the probability that Denis picks a white ball.

Answer: *(a)* on diagram [2]

(b) _____ [2]

(c) _____ [3]