

8845 Candidate Name Centre Number Candidate Number

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ZIMBABWE SCHOOL EXAMINATIONS COUNCIL
General Certificate of Education Ordinary Level

MATHEMATICS
PAPER 1

4008/1, 4028/1

Wednesday 9 JUNE 2004

Morning

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.

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 30 printed pages and 2 blank pages.

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

For
Examiner's
Use

- 1 (a) Write down 0,004188
- (i) correct to 3 decimal places,
- (ii) correct to 2 significant figures.
- (b) Write $3,57 \times 10^{-3}$ in ordinary form.

Answer (a) (i) _____ [1]

(ii) _____ [1]

(b) _____ [1]

- 2 (a) Simplify $\frac{2xy^2 \times 7x^2yt}{7yt^2 \times 4xy^3}$.
- (b) Given that $v = u + at$, calculate
- (i) v when $u = 0$, $a = 3.5$ and $t = 4$,
- (ii) t when $v = -7$, $u = 8$ and $a = -3$.

Answer (a) _____ [1]

(b) (i) $v =$ _____ [1]

(ii) $t =$ _____ [1]

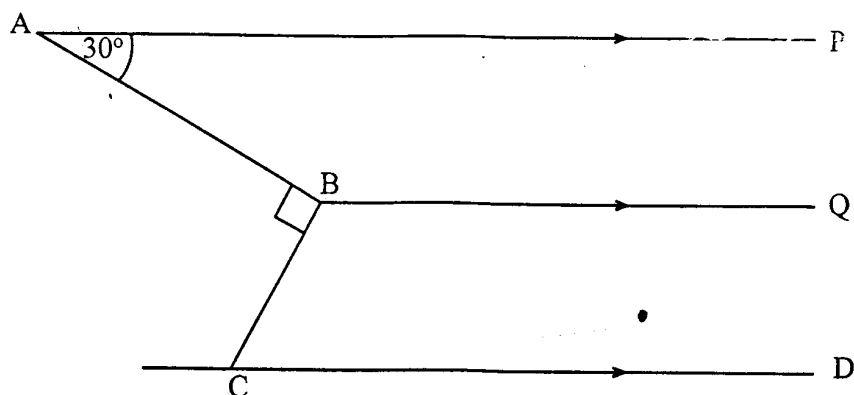
- 3 (a) Calculate the exact value of $0,072 \times 0,4$.
- (b) Simplify $\frac{2}{7} + \frac{2}{3} - \frac{5}{42}$ giving the answer as a fraction in its lowest terms.
- (c) Express 0,341 as a percentage.

Answer (a) _____ [1]

(b) _____ [1]

(c) _____ [1]

4



In the diagram, the straight lines AP, BQ and CD are parallel.

$\hat{PAB} = 30^\circ$ and $\hat{ABC} = 90^\circ$.

Find (a) \hat{BCD} ,

(b) \hat{CBQ} .

Answer (a) $\hat{BCD} =$ _____ [2]

(b) $\hat{CBQ} =$ _____ [1]

5 Given that $-1 \leq x \leq 4$ and $-9 \leq y \leq -6$, calculate

(a) the greatest value of $y - x$,

(b) the least possible value of $x^2 - y^2$.

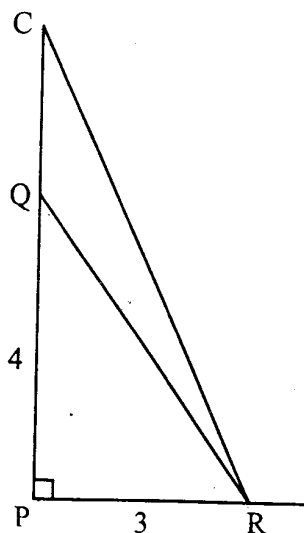
Answer (a) _____ [1]
(b) _____ [2]

6 (a) Find the value of $\left(\frac{1}{2}\right)^0 + 2^4$.

(b) Solve the equation $x^{\frac{3}{2}} = 27$.

Answer (a) _____ .[1]

(b) $x =$ _____ [2]



In the diagram $\hat{CPR} = 90^\circ$, $PR = 3\text{cm}$ and Q is the point on PC such that $PQ = 4\text{cm}$.

- (a) Calculate QR .
- (b) Write down the value of $\cos \hat{CQR}$.
- (c) Given also that $QC = \frac{1}{2}PQ$, calculate the area of $\triangle CQR$.

Answer

- (a) $QR = \underline{\hspace{2cm}} \text{cm}$ [1]
- (b) $\cos \hat{CQR} = \underline{\hspace{2cm}}$ [1]
- (c) Area of $\triangle CQR = \underline{\hspace{2cm}} \text{cm}^2$ [1]

8 (a) Given that $f(x) = 3x + 2$, find $f(-2)$.

(b) Solve the equation $\frac{m}{2} + 5 = \frac{2m}{3}$.

Answer (a) _____ [1]

(b) $m =$ _____ [2]

9 Solve the simultaneous equations

$$\begin{aligned}m + 2n &= 13, \\ 2m - 3n &= 5.\end{aligned}$$

Answer $m =$ _____

$n =$ _____ [3]

- 10 (a) Factorise completely

$$6h^2 - 4hp + 2hq.$$

- (b) Evaluate $\begin{pmatrix} 2 \\ 3 \end{pmatrix} \begin{pmatrix} 4 & -7 \end{pmatrix}$.

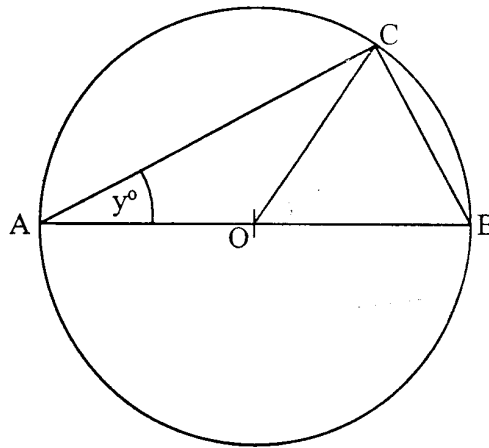
Answer (a) _____ [1]

(b) _____ [2]

- 11 Find the smallest whole number by which 756 must be multiplied so that the product is a perfect square.

Answer _____ [3]

12



In the diagram, A, B and C are points on a circle centre O. AB is a diameter and $\hat{BAC} = y^\circ$.

Find, in its simplest form, an expression in terms of y , for

- (a) \hat{BOC} ,
 (b) \hat{OBC} .

Answer (a) $\hat{BOC} = \underline{\hspace{2cm}}$ [1]
 (b) $\hat{OBC} = \underline{\hspace{2cm}}$ [2]

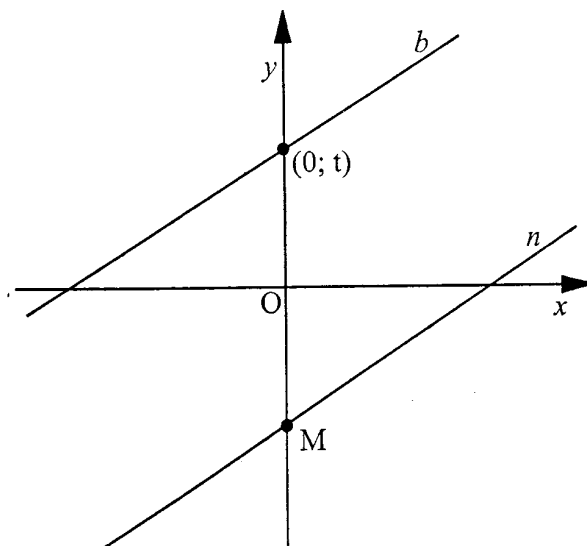
13 Given that $\log_{10} 5 = 0,699$, evaluate

(a) $\log_{10} 125$,

(b) $\log_{10} 50$,

(c) $\log_{10} \frac{1}{2}$.

<i>Answer</i>	(a)	_____	[1]
	(b)	_____	[1]
	(c)	_____	[1]



In the diagram, the equation of line b is $y = \frac{1}{2}x + 3$. OM is 5 units.

- (i) Given that line b passes through $(0; t)$, find the value of t .
 - (ii) Write down the coordinates of M .
 - (iii) If line n is parallel to line b , write down the equation of the line n .
- (b) In the expression $5x + 7$ write down the special name given to 5 with respect to x .

Answer (a) (i) $t =$ _____ [1]

(ii) (;) [1]

(iii) _____ [1]

(b) _____ [1]

- 15 (a) Giving the answer in base 3, evaluate $1001_3 - 122_3$.
- (b) A family borrowed \$12 000 from a lending institution. The amount was paid back with interest in 9 months. If the amount paid back was \$12 360, calculate
- (i) the interest charged,
- (ii) the interest rate per annum as a percentage.

Answer (a) _____ [1]

(b) (i) \$ _____ [1]

(ii) _____ % [2]

- 16 It is given that $\xi = \{4; 6; 8; 9; 10; 12; 13; 15; 25; 36\}$ and that P, Q and R are subsets of ξ such that

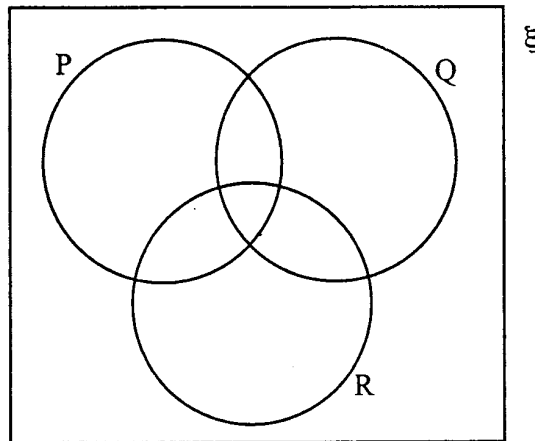
$$P = \{4; 6; 8; 10; 12; 36\},$$

$$Q = \{6; 9; 12; 15; 36\},$$

$$R = \{4; 9; 25; 36\}.$$

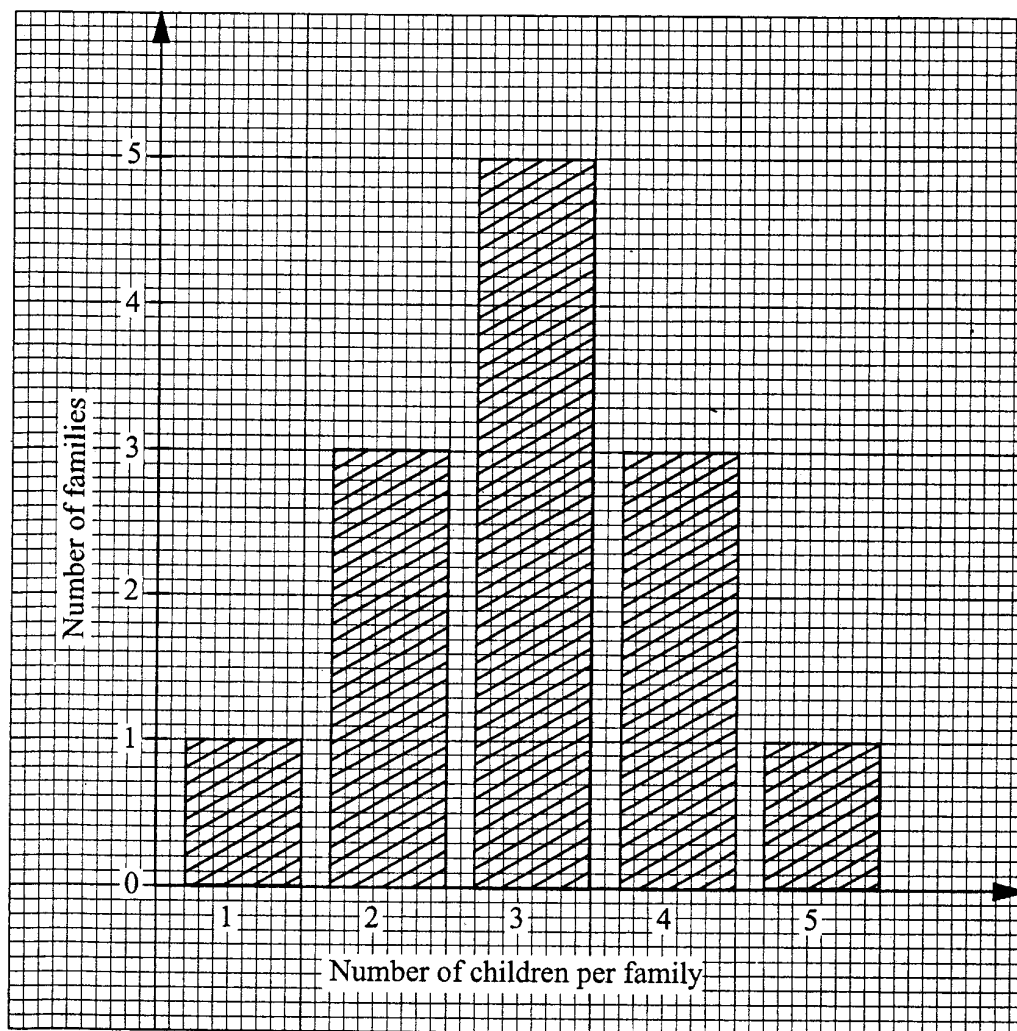
- (a) Insert the elements of each subset in the Venn diagram below.
- (b) List the elements of $P \cap (Q \cup R)'$.

Answer (a)



[3]

(b) _____ [1]



The bar graph above shows the results of a survey carried out to find the number of children per family.

(a) Write down

- (i) the number of families that had 5 children,
- (ii) the modal number of children per family,
- (iii) the total number of children who were in the survey.

- (b) Find the average number of children per family.

Answer

(a) (i) _____ [1]

(ii) _____ [1]

(iii) _____ [1]

(b) _____ [1]

- 18 (a) Write down the next two terms in the sequence 12; 8; 4; 0; ...
- (b) Study the pattern below and answer the questions that follow:

Position of term	1	2	3	4	5	6	...	y	...	n
Term	2	8	18	32	50	x	...	200	...	z

- (i) Write down the value of x .
- (ii) Write down the value of y .
- (iii) Express z in terms of n .

Answer (a) _____ [1]

(b) (i) $x =$ _____ [1]

(ii) $y =$ _____ [1]

(iii) $z =$ _____ [1]

19 It is given that $\overrightarrow{PQ} = \begin{pmatrix} 8 \\ -6 \end{pmatrix}$ and $\overrightarrow{RS} = \frac{3}{2}\overrightarrow{PQ}$.

- (a) State any other relationship between PQ and RS.
- (b) Calculate $|\overrightarrow{PQ}|$.
- (c) Express \overrightarrow{RS} as a column vector.
- (d) Given that P is the point (6; 9), find the co-ordinates of the point Q.

Answer

(a) _____ [1]

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

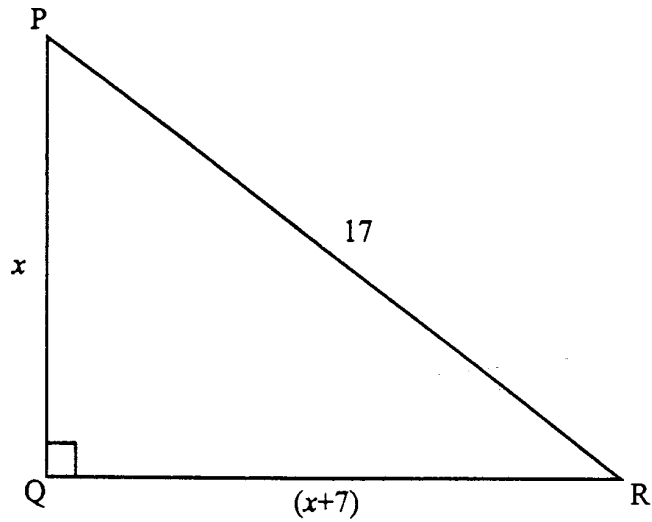
(c) $\overrightarrow{RS} = \begin{pmatrix} \\ \end{pmatrix}$ [1]

(d) Q (;) [1]

- 20 (a) A water tap can fill a drum in 10 minutes. Write down the fraction of the drum that can be filled in one minute.
- (b) Another tap can fill the same drum in 5 minutes. Calculate, in its lowest terms, the fraction of the drum that can be filled in one minute when both taps are running simultaneously.
- (c) Calculate the time both taps can take to fill the drum when they are running simultaneously.

Answer (a) _____ [1]
(b) _____ [2]
(c) _____ minutes [2]

21



The triangle PQR above is right-angled at Q. $PQ = x\text{cm}$, $QR = (x + 7)\text{cm}$ and $PR = 17\text{cm}$.

- (a) Form an equation in x and show that it reduces to $x^2 + 7x - 120 = 0$.
- (b) Solve the equation $x^2 + 7x - 120 = 0$.
- (c) Write down the length of QR.

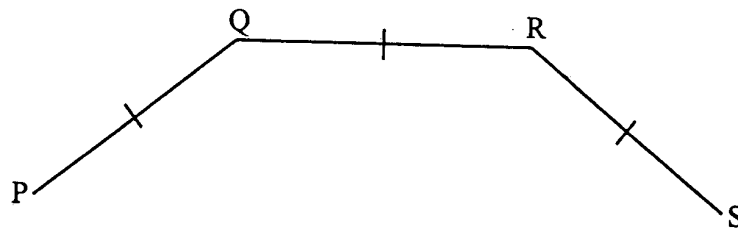
Answer

(a)

_____ [2]

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

(c) $QR =$ _____ cm [1]



In the diagram PQ, QR and RS are adjacent sides of a regular polygon with 10 sides.

- (a) Write down the geometrical name of this polygon.
- (b) Calculate
- (i) \hat{PQR} ,
- (ii) \hat{PRS} .

Answer

(a) _____ [1]

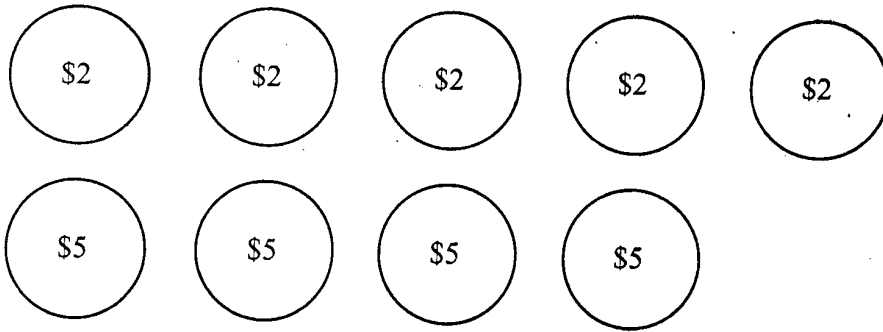
(b) (i) $\hat{PQR} =$ _____ [2]

(ii) $\hat{PRS} =$ _____ [2]

- 23 (a) Express $\frac{a}{a+1} - \frac{3}{a+2}$ as a single fraction in its simplest form
- (b) Solve the equation $(t+5)^2 = 6\frac{1}{4}$.

Answer (a) _____ [2]

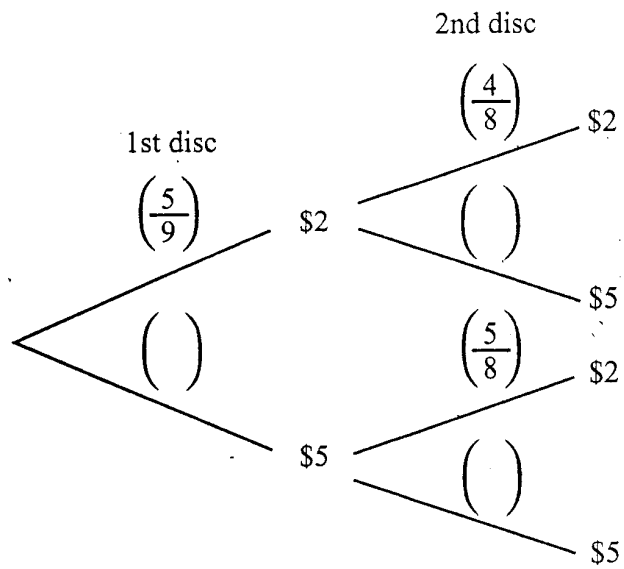
(b) $t =$ _____ or _____ [3]



Nine (9) identical discs are marked \$5 or \$2 as shown in the diagram above. The 9 discs are put in a bag and two are picked one after the other.

- (a) Complete the probability tree diagram shown in the answer space.
- (b) Find the probability that the total value on the two discs is
 - (i) \$4,
 - (ii) \$10,
 - (iii) at least \$7.

Answer (a)

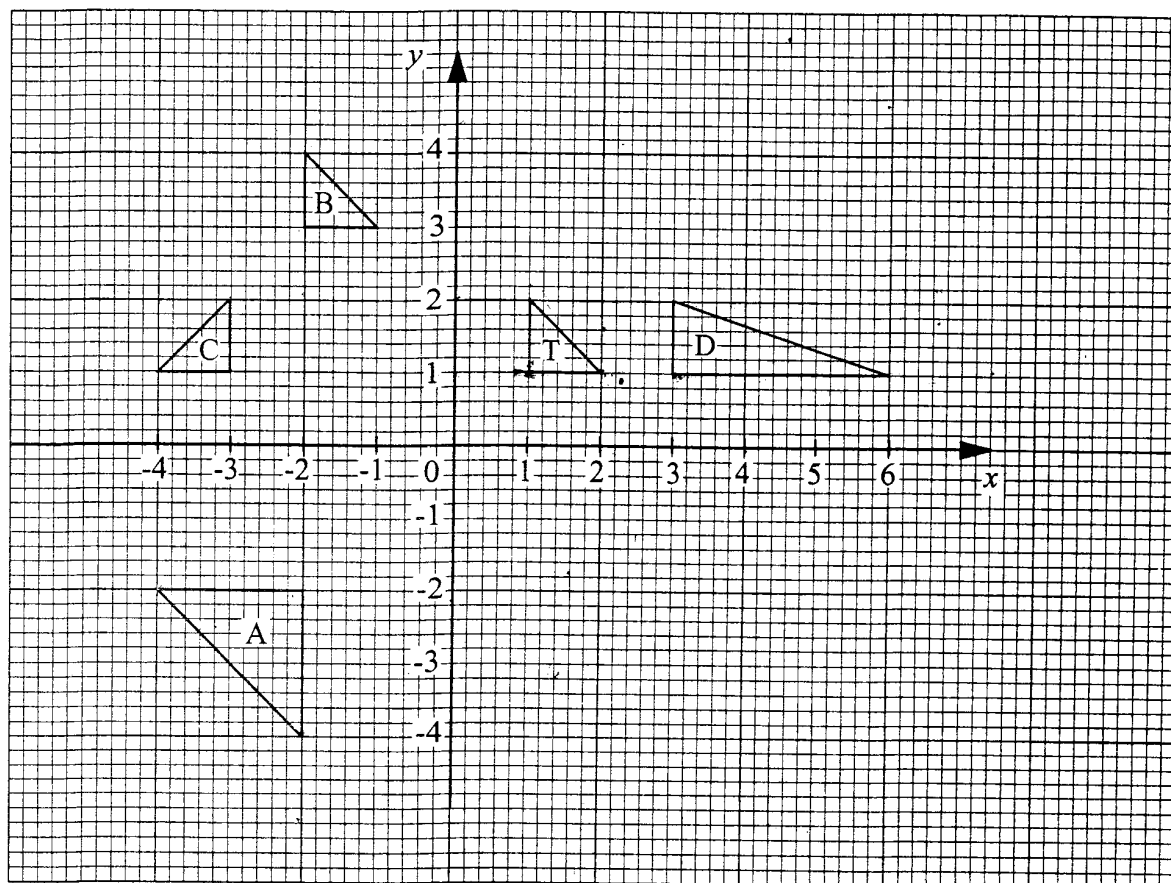


[2]

(b) (i) _____ [1]

(ii) _____ [1]

(iii) _____ [1]



Triangles A, B, C, D and T are drawn on a Cartesian plane as shown above.

- (a) An enlargement maps triangle T onto triangle A. Write down the matrix which represents this enlargement.
- (b) A translation maps triangle T onto triangle B. Find the column vector of this translation.
- (c) Triangle T is reflected onto triangle C. Write down the equation of the line of this reflection.

- (d) Describe fully the **single** transformation which maps triangle T onto triangle D.

<i>Answer</i>	(a)	_____	[1]
	(b)	_____	[1]
	(c)	_____	[1]
	(d)	_____	

		_____	[3]

26 A model of a house with a water tank outside is made to a scale of 1:500.

- (a) Find the length of the house, in metres, represented by a length of 3cm on the model.
- (b) If the height of the house is 7m calculate the height of the model in cm.
- (c) The dining room floor has an area of $300\,000\text{cm}^2$. Find the area of the dining room floor on the model, giving the answer in cm^2 .
- (d) Calculate the ratio of the capacity of the tank on the model to the capacity of the actual tank.

Answer

- (a) _____ m [1]
- (b) _____ cm [1]
- (c) _____ cm^2 [2]
- (d) _____ [2]