

Answer all the questions in the given space.

1. Express

(a) $12\frac{7}{8}\%$ as a fraction in its simplest form,

(b) 3.5 cm^2 in m^2 .

Answer (a) _____ [1]

(b) _____ m^2 [2]

2. It is given that y is directly proportional to the square root of x and $y = 2.4$ when $x = 36$.

(a) Write an equation connecting y and x .

(b) Find the value of x when $y = 15$.

⋮

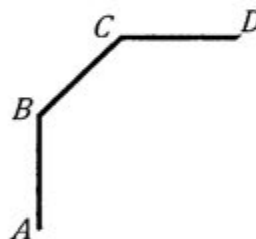
Answer (a) _____ [2]

(b) _____ [2]

3. Express $\frac{x+3}{2} - \frac{6x+3}{5} + \frac{5-2x}{4}$ as a single fraction in its simplest form.

Answer _____ [2]

4. In the diagram, $ABCD$ is part of a regular octagon.
- (a) Find $\angle ABC$.
- (b) Name a triangle that is congruent to $\triangle ABC$.



Answer (a) _____[°] [2]

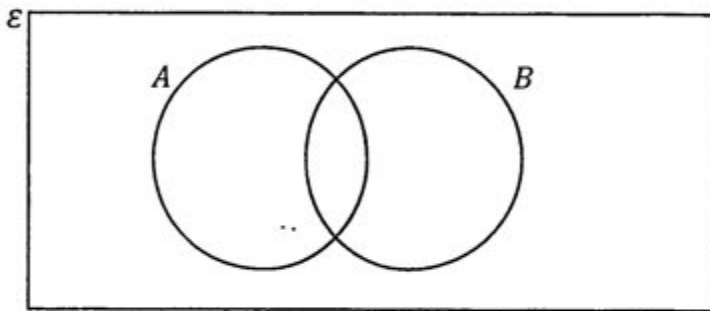
(b) _____ [1]

5. (a) Factorise $x^2 - 9$.
 (b) Hence, find two factors of 2491, other than 1 and 2491.

Answer (a) _____ [1]

(b) _____ [2]

6. (a) On the Venn diagram below, shade the set $A' \cap B$. [1]



- (b) Given that

$$E = \{x: x \text{ is an integer such that } 7 \leq x < 15\}$$

$$P = \{x: x \text{ is a multiple of 3}\}$$

$$Q = \{x: x \text{ is an odd number}\}$$

$$R = \{x: x \text{ is a number less than 6}\}$$

- (i) Find $n(P \cup Q)$.
 (ii) List the elements in R .
 (iii) Find the element x such that $x \in (P \cap Q')$.

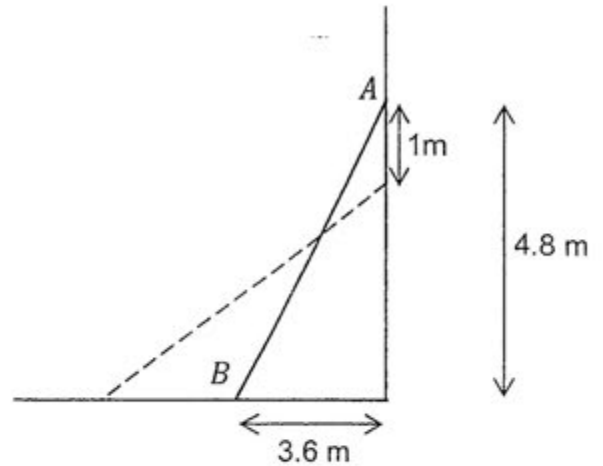
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Answer (bi) _____ [2]

(bii) _____ [1]

(biii) _____ [1]

7. In the diagram, a ladder AB , leans against a vertical wall. The foot of the ladder is initially 3.6 m from the the wall and the ladder reaches a height of 4.8 m. The ladder then slides 1 m down the wall. Find how far the foot of ladder has moved from its original position.



Answer _____ m [3]

8. A map is drawn to a scale of 1 : 50 000.
- (a) Find the actual distance, in km, of Town A and Town B which is 36.8 cm apart on the map.
- (b) A reservoir on this map is represented by 20 cm². Calculate the area, in cm², which represents the reservoir on a second map where the scale is 1 cm : 2 km.

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Answer (a) _____ km [2]

(b) _____ cm² [3]

9. The number 72, written as a product of its prime factors, is $2^3 \times 3^2$.
- (a) Write 540 as a product of prime factors.
- (b) Hence, or otherwise, find the smallest possible integer which is a multiple of 72 and 540.

Answer (a) _____ [2]

(b) _____ [2]

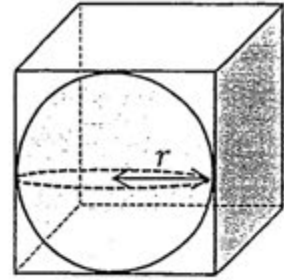
10. An integer is chosen at random from 10 to 99 inclusive. Find the probability of choosing an integer having 2 different digits such that the difference between the digits is 3.

Answer _____ [2]

11. A solid sphere is placed into a cubical box. It fits exactly inside the box. Find

- (a) the radius of the sphere if its volume is 263 cm^3 .
 (b) hence, the exterior surface area of the cubical box.

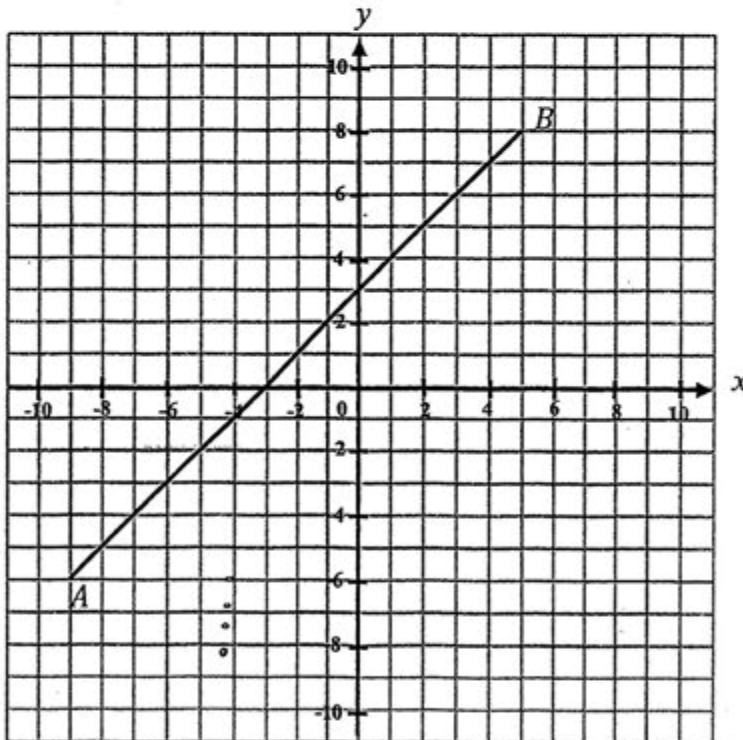
[Volume of a sphere = $\frac{4}{3}\pi r^3$, surface area of a sphere = $4\pi r^2$]



Answer (a) _____ cm [2]

(b) _____ cm^2 [2]

12. (a) Write down the coordinate of A .
 (b) Find the equation of the line AB .
 (c) On the grid provided below, draw and label the line $x = -4$. [1]

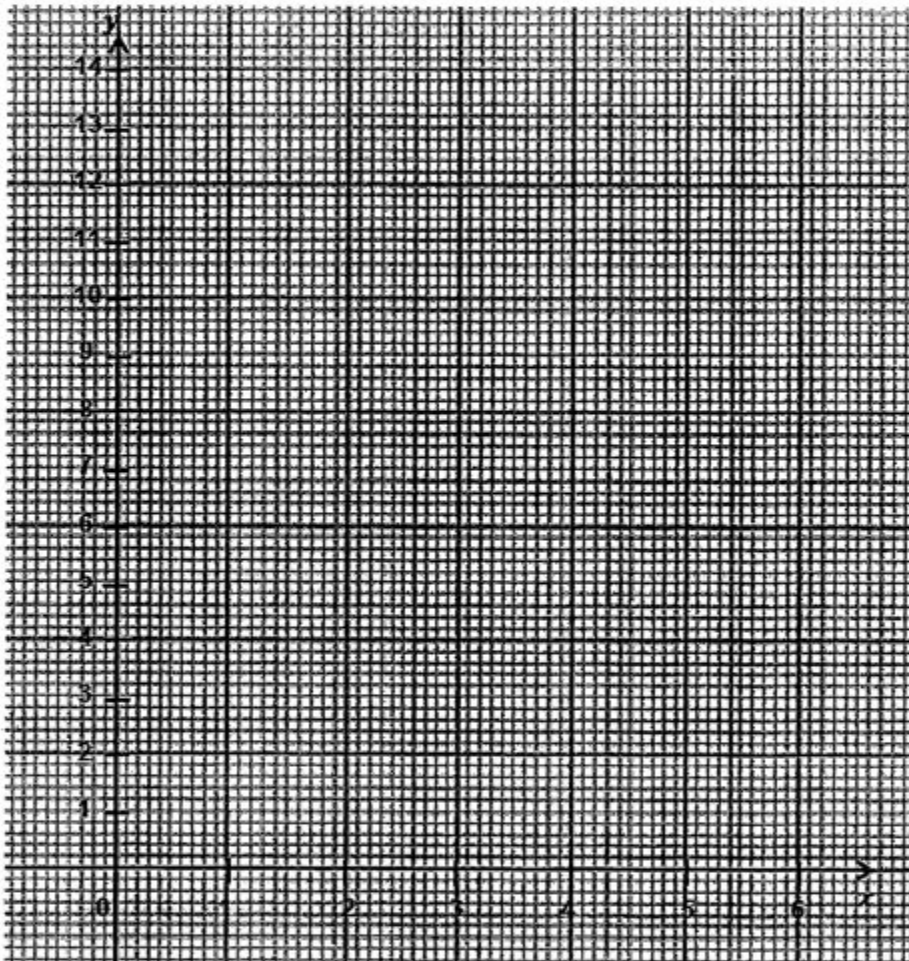


Answer (a) A (____, ____) [1]

(b) _____ [2]

13. Mr and Mrs Lim brought along their three children to watch the movie "Frozen Age 4". They paid a total of \$22.
- (a) Using y to represent the cost for an adult ticket and x the cost of a child ticket, show that $y = -1.5x + 11$.
- (b) Mr Khoo brought along two children to watch the same movie and paid a total of \$12.50. Write down another equation involving y and x .
- (c) Hence, using the grid below, solve the two simultaneous equations obtained in (a) and (b) graphically to find the cost of an adult ticket and the cost of a child ticket. [4]

Answer(c)



- Answer (a) As shown on space provided [1]
- (b) _____ [1]
- (c) Cost of an adult ticket
= \$ _____ [1]
- Cost of a child ticket
= \$ _____ [1]

END OF PAPER 1

END-OF-YEAR EXAMINATION 2012

Secondary 2 Express

MATHEMATICS

4016/02

Paper 2

5 October 2012

TIME: 9.15 a.m. – 10.30 a.m.

Duration: 1 h 15 min

INSTRUCTIONS TO STUDENTS:

Write your name, index number and class on the question paper.

Write in dark blue or black pen.

You may use a pencil for any diagrams or graphs.

Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer **all** questions in the spaces provided in the question paper.

If working is needed for any question it must be shown in the space below the question.

Omission of essential working will result in loss of marks.

You are expected to use a scientific calculator to evaluate explicit numerical expressions.

If the degree of accuracy is not specified in the question and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.

For π , use 3.142 unless otherwise stated in the question.

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

The total number of the marks for this paper is 50.

Name of Student : _____ ()

Class/ Band : _____ / _____

Parent's Signature : _____

For Examiner's Use	
Total	50

Setter : Mrs Lee-Kwek Yu Zhen

This paper consists of 8 printed pages, including this cover page.

[Turn over]

Section A (22 marks)
Answer all the questions.

1. (a) Factorise $3px + 4py - 12qy - 9qx$ completely. [2]

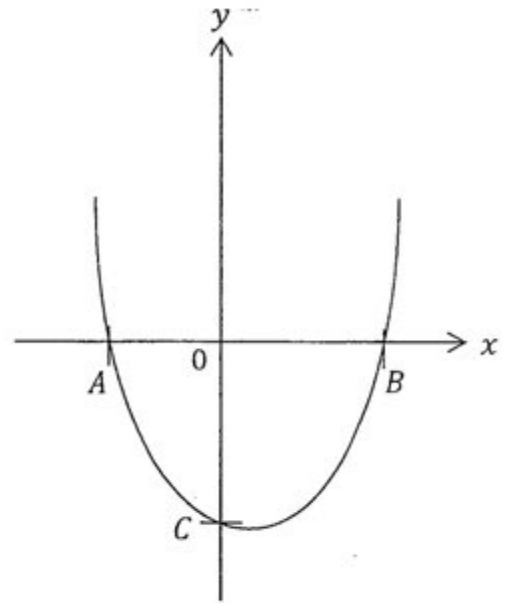
(b) Express $\frac{6b^2-5b}{b^2-3b+2} - \frac{b}{1-b}$ as a single fraction in its simplest form. [3]

(c) Given that $m^2 + n^2 = 53$ and $n = -14$, find the possible values of $(m + n)$. [3]

⋮

2. The curve $y = x^2 - x - 12$ cuts the x -axis at A and B , and the y -axis at C .

- (a) Write down the coordinates of A , B and C . [3]
(b) Find the equation of the line of symmetry. [1]
(c) Write down the coordinates of the minimum point. [1]



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3. Given that $P = s + \frac{qr^3}{3}$,
(a) express r in terms of P , s and q , [2]
(b) find the value of s when $P = 10$, $q = \frac{3}{4}$, and $r = 2$. [2]

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4. The first four terms of a sequence T are T_1 , T_2 , T_3 and T_4 .

$$T_1 = 1+3 = 4 = 2^2$$

$$T_2 = 1+3+5 = 9 = 3^2$$

$$T_3 = 1+3+5+7 = 16 = 4^2$$

$$T_4 = 1+3+5+7+9 = 25 = 5^2$$

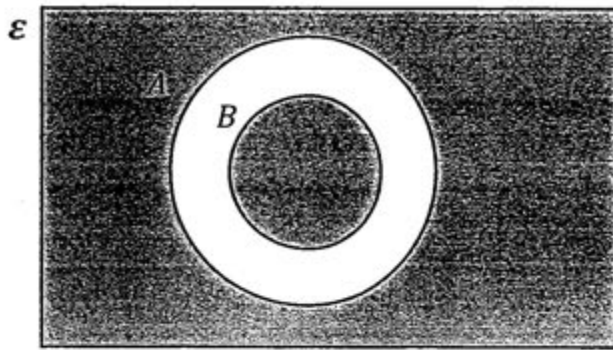
- (a) Write down an expression for T_5 , in a similar form as shown above. [1]
- (b) How many odd numbers are there from 1 to 25? [1]
- (c) Find the sum of $1 + 3 + 5 + \dots + 25$. [1]
- (d) Express T_n in terms of n . [1]
- (e) If $T_n = 676$, find the value of n . [1]

Section B (28 marks)

Answer all the questions.

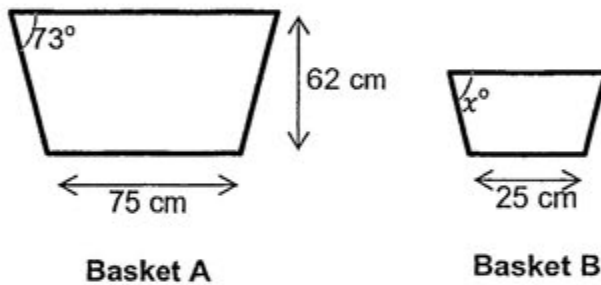
5. (a) Describe the shaded region in set notation.

[1]



- (b) The diagram shows the side view of two similar baskets, A and B. The dimensions of the baskets are in centimetres.

- (i) Calculate the height of basket B if the height of basket A is 62 cm. [2]
 (ii) Find the value of x . [1]



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6. (a) The cost for a student to go on a Science trip is inversely proportional to the number of the students in the group. Each student in a group of 80 students needs to pay \$3. Find the additional amount each student has to pay if 5 fewer students go on the same trip. [2]
- (b) After the Science trip, 33 students took a quiz. The results are displayed in the stem and leaf diagram below.

Boys				Stem	Girls					
Leaf					Leaf					
	2	2	1	5	0					
7	3	3	3	6	2	2	2	3		
9	8	5	5	7	0	1	3	4	4	
	9	8	2	8	6	6	8	9	9	
	4	2	0	9	5					

- (i) Find the modal score of the boys. [1]
- (ii) Find the median score of the boys and the median score of the girls. [2]
- (iii) Hence, which group performs better in the quiz? Give a reason for your answer. [2]

7. A solid rectangular metal pyramid of base measuring 27 cm by 16 cm and height 33 cm is melted and recast into a solid cone of height 14 cm. Find

(a) the base radius, _____ [3]

(b) the total surface area of the cone formed. [3]

(Take π to be $\frac{22}{7}$)

[Volume of a cone = $\frac{1}{3}\pi r^2 h$, Curve surface area of a cone = $\pi r l$]

8. The masses, in kg, of 24 students are given in the table below.

Mass, x (kg)	$40 \leq x < 45$	$45 \leq x < 50$	$50 \leq x < 55$	$55 \leq x < 60$
Number of students	2	6	7	9

- (a) Find the estimated mean mass of the students. [2]
- (b) Explain why the calculated mean is an estimate. [1]
- (c) Find the probability of choosing a student whose mass is 50 kg and above. [1]

Answer the whole of this question on a sheet of graph paper.

9. During a festival, fireworks were launched vertically upwards. The height, y metres, of the fireworks above the ground after x seconds is given by the formula $y = 30x - 5x^2$.

- (a) Find the value of a and b . [2]

x	0	1	2	3	4	5	6
$y = 30x - 5x^2$	0	25	a	45	40	b	0

- (b) Draw the graph of $y = 30x - 5x^2$ for $0 \leq x \leq 6$, using a scale of 2 cm to represent 1 unit on the x -axis and 2 cm to represent 5 units on the y -axis. [3]
- (c) Use your graph to find
- (i) the time taken for the fireworks to first reach a height of 20 m, [1]
- (ii) maximum height reached by the fireworks above the ground. [1]

End of Paper 2