



Index no.	
Total	50

Anglo-Chinese School (Barker Road)

END-OF-YEAR EXAMINATION 2008

SECONDARY TWO
EXPRESS

MATHEMATICS
PART I

TIME: 1 Hour 30 minutes

INSTRUCTIONS TO CANDIDATES

Write index number in the box above.

Answer **all** the questions in the space provided on the question paper.

You are reminded of the need for clear presentation in your answers.

The use of calculators is allowed.

The intended marks for each question or part of questions are given in brackets [] at the end of the question

Omission of essential steps will result in loss of marks.

Give non-exact numerical answers correct to 3 significant figures or 1 decimal place in the case of angles in degrees, unless a different level of accuracy is specified in the question.

Part 1 (50 marks)

Answer **all** the questions in the space provided.

1. A plan is drawn to a scale of 1 : 200.
- (a) Calculate the length of the line on the plan which represents a straight road 14 m long in centimeters.
 - (b) The area of a pond is represented by 12cm^2 on the plan. Calculate the actual area of the pond, giving your answer in square metres.

Ans: (a) _____ cm [1]

(b) _____ m^2 [2]

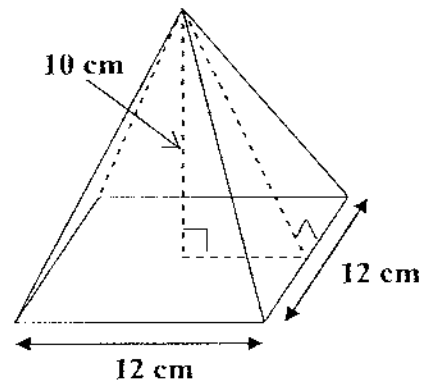
-
2. Given that y varies inversely with x^2 and that $y = 3$ when $x = 5$, find the value of y when $x = 2$.

Ans: _____ [2]

3. In a factory, 10 workers can produce a certain number of furniture in 14 days. How many workers are required if the same number of furniture are to be produced in 5 days' time? Assume that all workers work at the same rate.

Ans: _____ workers [2]

4. (a) Find the volume of the following square pyramid whose height is 10 cm and square base with sides 12 cm.
 (b) Find the surface area of the square pyramid.



Ans: (a) _____ cm^3 [2]

(b) _____ cm^2 [2]

5. Factorise completely

(a) $12ab - 3ad - 8bc + 2cd$

(b) $18x^2 - 98y^2$

(c) $4y^2 - 34y + 42$

Ans: (a) _____ [2]

(b) _____ [2]

(c) _____ [2]

6. Solve the simultaneous equations

$$5y = 2x - 6$$

$$3x - 8y = 20$$

Ans: $x =$ _____ [1]

$y =$ _____ [1]

7. There are 5 blue balls, 8 red balls and 7 yellow balls in a box. A ball is selected from the box randomly.
- Find the probability of picking a blue ball.
 - Find the probability of picking a blue ball or a red ball.
 - Find the probability of not picking a red ball.
 - x number of red balls are removed from the box. If the probability of picking a red ball from the box after x number of the red balls are removed is $\frac{1}{3}$, find x .

Ans: (a) _____ [1]
 (b) _____ [1]
 (c) _____ [1]
 (d) _____ [2]

8. (a) A regular polygon has n sides. Find the number of sides, n , if each interior angle is 162°
 (b) A polygon has n sides. Two of its exterior angles are 40° and one is 55° . All the other $(n-2)$ exterior angles are 35° each. Find the value of n .

Ans: (a) _____ [2]
 (b) _____ [2]

9. Express, as a single fraction, in its simplest form:

$$\frac{5}{2x-5} + \frac{3}{15-6x}$$

Ans: _____ [2]

10. (a) Solve the following equation.

$$\frac{1}{4}(2x+5) = \frac{1}{3}x + \frac{1}{2}$$

- (b) Given that $2y = \frac{3x+2}{x-1}$, make x the subject.

Ans: (a) _____ [2]

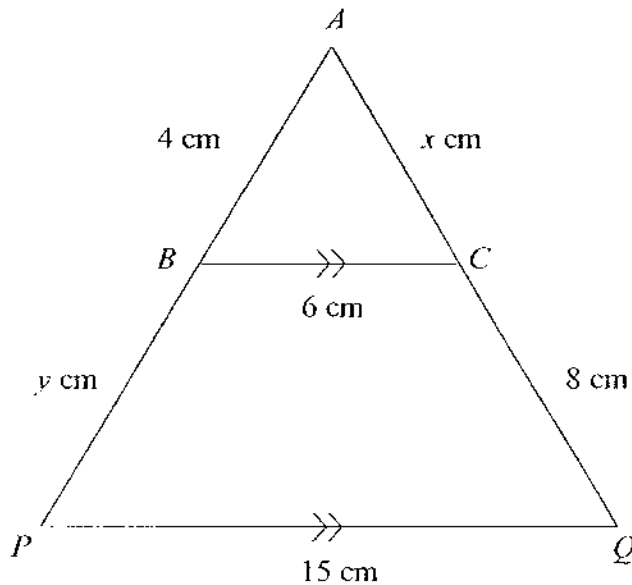
(b) _____ [2]

11. (a) Lydia borrowed \$200,000 from the bank with compound interest of 3 % per annum to finance his house. How much interest did John owe the bank at the end of 2 years?
- (b) Patrick bought a flat directly from HDB. After 5 years, he made a profit of 45% when he sold the flat to Nigel. After 5 more years, Nigel incurred a loss of 20% when he sold the flat for \$450,000. What was the original price of the flat when Patrick bought directly from HDB?

Ans: (a) \$ _____ [2]

(b) \$ _____ [2]

12.



In the diagram above, triangle ABC is enlarged to triangle APQ . $AC = x$ cm, $AB = 4$ cm, $BP = y$ cm, $CQ = 8$ cm, $BC = 6$ cm and $PQ = 15$ cm. Line BC is parallel to line PQ .

- Find the value of x .
- Find the value of y .
- Find the scale of enlargement, k , from triangle ABC to triangle APQ .

Ans: (a) _____ cm [2]
 (b) _____ cm [2]
 (c) _____ [1]

13. In a History test, the scores of the students are recorded as shown.

54	22	33	35
35	43	41	53
22	38	46	23

- (a) Construct a stem-and-leaf diagram to represent the scores of the students. [2]
 (b) Write down the median score.

Ans: (b) _____ [1]

14. A group of 40 people were asked the number of hours they spend watching the television per day. The results are shown below:

No. of Hours	0	1	2	3	4	5
No. of Students	3	7	10	14	5	1

- (a) Find the modal number of hours.
 (b) Find the median number of hours.
 (c) Write down the total number of hours spent by all the students.
 (d) Find the mean number of hours spent by each student.

Ans: (a) _____ hours [1]

(b) _____ hours [1]

(c) _____ hours [1]

(d) _____ hours [1]

END OF PAPER

ANS

Part 1 (50 marks)

Answer all the questions in the space provided.

1. A plan is drawn to a scale of 1 : 200.

- (a) Calculate the length of the line on the plan which represents a straight road 14 m long in centimeters.
- (b) The area of a pond is represented by 12cm^2 on the plan. Calculate the actual area of the pond, giving your answer in square metres.

(a)

$$1\text{ cm} = 200\text{ cm}$$

$$1\text{ cm} = 2\text{ m}$$

$$12\text{ m} = \frac{12}{2} \times 1 = 6\text{ cm}$$

(b)

$$1\text{ cm}^2 = 4\text{ m}^2$$

$$12\text{ cm}^2 = 12 \times 4 = 48\text{ m}^2$$

Ans: (a) 6 cm [1]

(b) 48 m^2 [2]

2. Given that y varies inversely with x^2 and that $y = 3$ when $x = 5$, find the value of y when $x = 2$.

$$y = \frac{k}{x^2}$$

$$3 = \frac{k}{5^2}$$

$$k = 18$$

$$y = \frac{18}{x^2}$$

$$y = \frac{18}{2^2} = 6$$

Ans: 6 [2]

3. In a factory, 10 workers can produce a certain number of furniture in 14 days. How many workers are required if the same number of furniture are to be produced in 5 days' time? Assume that all workers work at the same rate.

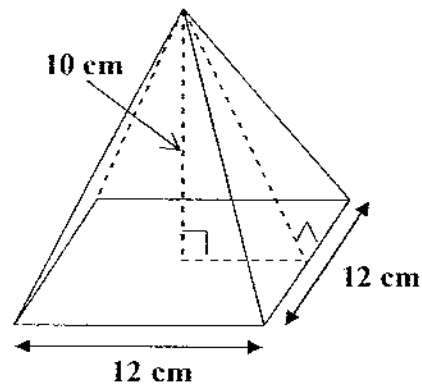
10 workers – 14 days

$$5 \text{ days} - \frac{14}{5} \times 10 = 28 \text{ workers}$$

Ans: 28 workers [2]

4. (a) Find the volume of the following square pyramid whose height is 10 cm and square base with sides 12 cm.
 (b) Find the surface area of the square pyramid.

$$\text{volume} = \frac{1}{3} \times 12 \times 12 \times 10 = 480$$



(b)

$$\text{Slanted Length} = \sqrt{10^2 + 6^2} = 11.7 \text{ cm}$$

$$\text{Surface Area} = 4 \times 0.5 \times 11.7 \times 12 + 12 \times 12 = 424.8 \text{ cm}^2$$

Ans: (a) 480 cm³ [2]

(b) 424.8 cm² [2]

5. Factorise completely

(a) $12ab - 3ad - 8bc + 2cd$

(b) $18x^2 - 98y^2$

(c) $4y^2 - 34y + 42$

(a) $3a(4b - d) - 2c(4b - d) = (4b - d)(3a - 2c)$

(b) $18x^2 - 98y^2 = 2(9x^2 - 49y^2) = 2(3x - 7y)(3x + 7y)$

(c) $4y^2 - 34y + 42 = 2(2y^2 - 17y + 21) = 2(2y - 3)(y - 7)$

Ans: (a) $\underline{(4b-d)(3a-2c)}$ [2]

(b) $\underline{2(3x-7y)(3x+7y)}$ [2]

(c) $\underline{2(2y-3)(y-7)}$ [2]

6. Solve the simultaneous equations

$$\begin{aligned} 5y - 2x &= -6 \\ 3x - 8y &= 20 \end{aligned}$$

$$5y - 2x = -6$$

$$3x - 8y = 20$$

$$-6x + 15y = -18$$

$$6x - 16y = 40$$

$$y = -22$$

$$5(-22) - 2x = -6$$

$$-110 - 2x = -6$$

$$-2x = -6 + 110$$

$$-2x = 104$$

$$x = -52$$

Ans: $\underline{x = -52}$ [1]

$\underline{y = -22}$ [1]

7. There are 5 blue balls, 8 red balls and 7 yellow balls in a box. A ball is selected from the box randomly.

(a) Find the probability of picking a blue ball.

(b) Find the probability of picking a blue ball or a red ball.

(c) Find the probability of not picking a red ball.

(d) x number of red balls are removed from the box. If the probability of picking a red ball from the box after x number of the red balls are removed is $\frac{1}{3}$, find x .

(a) $probability = \frac{5}{5+8+7} = \frac{1}{4}$

(b) $probability = \frac{5+8}{5+8+7} = \frac{13}{20}$

(c)

$$\text{probability} = \frac{5+7}{5+8+7} = \frac{12}{20} = \frac{3}{5}$$

or

$$1 - \frac{8}{5+8+7} = \frac{12}{20} = \frac{3}{5}$$

(d)

$$\text{probability} = \frac{8-x}{20-x} = \frac{1}{3}$$

$$3(8-x) = 20-x$$

$$24-3x = 20-x$$

$$4 = 2x$$

$$x = 2$$

Ans: (a) $\frac{1}{4}$ [1]

(b) $\frac{13}{20}$ [1]

(c) $\frac{x}{5}$ [1]

(d) 2 [2]

8. (a) A regular polygon has n sides. Find the number of sides, n , if each interior angle is 162° .
 (b) A polygon has n sides. Three of its exterior angles are 45° , 50° and 55° . All the other $(n-3)$ exterior angles are 21° each. Find the value of n .

(a)

$$162 = \frac{(n-2) \times 180}{n}$$

$$162n = 180n - 360$$

$$18n = 360$$

$$n = 20$$

(b)

$$45 + 50 + 55 + (n-3) \times 21 = 360$$

$$(n-2) \times 10$$

$$n = 12$$

Ans: (a) 20 [2]

(b) 12 [2]

9. Express, as a single fraction, in its simplest form:

$$\begin{aligned} & \frac{5}{2x-5} + \frac{3}{15-6x} \\ & \frac{5}{2x-5} + \frac{3}{15-6x} = \frac{5}{2x-5} + \frac{3}{3(5-2x)} \\ & = \frac{5}{2x-5} - \frac{3}{3(2x-5)} \\ & = \frac{15-3}{3(2x-5)} \\ & = \frac{12}{3(2x-5)} \\ & = \frac{4}{2x-5} \end{aligned}$$

Ans: $\frac{4}{2x-5}$ [2]

10. (a) Solve the following equation.

$$\frac{1}{4}(2x+5) = \frac{1}{3}x + \frac{1}{2}$$

- (b) Given that $2y = \frac{3x+2}{x-1}$, make x the subject.

(a)

$$\frac{1}{4}(2x+5) = \frac{1}{3}x + \frac{1}{2}$$

$$\frac{1}{2}x + \frac{5}{4} = \frac{1}{3}x + \frac{1}{2}$$

$$\frac{1}{2}x - \frac{1}{3}x = \frac{1}{2} - \frac{5}{4}$$

$$\frac{1}{6}x = -\frac{3}{4}$$

$$x = -4.5$$

(b)

$$2xy - 2y = 3x + 2$$

$$2xy - 3x = 2y + 2$$

$$x = \frac{2y+2}{2y-3}$$

Ans: (a) -4.5 [2]

(b) $x = \frac{2y+2}{2y-3}$ [2]

11. (a) Lydia borrowed \$200,000 from the bank with compound interest of 3 % per annum to finance his house. How much interest did John owe the bank at the end of 2 years?
- (b) Patrick bought a flat directly from HDB. After 5 years, he made a profit of 45% when he sold the flat to Nigel. After 5 more years, Nigel incurred a loss of 20% when he sold the flat for \$450,000. What was the original price of the flat when Patrick bought directly from HDB?

a)

First year:

$$\frac{3}{100} \times 200000 = 6000$$

Second Year:

$$\frac{3}{100} \times 206000 = 6180$$

$$\text{Total Interest} = 6000 + 6180 = \$12180$$

b)

Let the original price be x

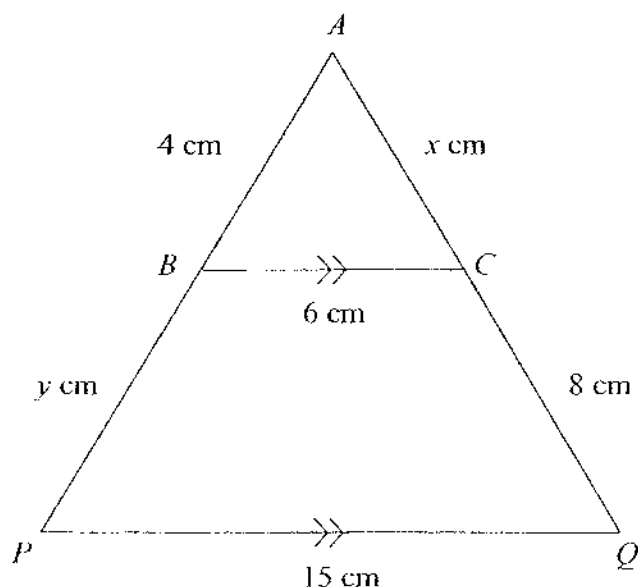
$$\frac{80}{100} \times \frac{145}{100} \times x = 450000$$

$$x = 387931$$

Ans: (a) _____ \$12180 _____ [2]

(b) _____ \$387931 _____ [2]

12.



In the diagram above, triangle ABC is enlarged to triangle APQ . $AC = x$ cm, $AB = 4$ cm, $BP = y$ cm, $CQ = 8$ cm, $BC = 6$ cm and $PQ = 15$ cm. Line BC is parallel to line PQ .

- (a) Find the value of x .
 (b) Find the value of y .
 (c) Find the scale of enlargement, k , from triangle ABC to triangle APQ .

$$(a) \quad \frac{15}{6} = \frac{x+8}{x} = \frac{y+4}{4}$$

$$15x = 6x + 48$$

$$9x = 48$$

$$x = 5\frac{1}{3}$$

$$(b) \quad 60 = 6y + 24$$

$$6y = 36$$

$$y = 6$$

$$(c) \quad \text{scale of enlargement} = \frac{15}{6} = 2.5$$

Ans: (a) $5\frac{1}{3}$ [2]

(b) 6 [2]

(c) 2.5 [1]

13. In a History test, the scores of the students are recorded as shown.

54	22	33	35
35	43	41	53

17

22 38 46 23

- (a) Construct a stem-and-leaf diagram to represent the scores of the students. [2]
 (b) Write down the median score.

(a)

2	2	2	3		
3	3	5	5	8	
4	1	3	6		
5	3	4			

(b)

$$\text{median} = \frac{35 + 38}{2} = 36.5.$$

Ans: (b) 36.5 [1]

- 14 A group of 40 people were asked the number of hours they spend watching the television per day. The results are shown below:

No. of Hours	0	1	2	3	4	5
No. of Students	3	7	10	14	5	1

- (a) Find the modal number of hours.
 (b) Find the median number of hours.
 (c) Write down the total number of hours spent by all the students.
 (d) Find the mean number of hours spent by each student.

(a) 3 hrs

(b) $\frac{2+3}{2} = 2.5.$

(c) Total hours = $7 + 20 + 42 + 20 + 5 = 94$ hrs

(d) Mean = $\frac{94}{40} = 2.35$

- Ans: (a) 3 hours [1]
(b) 2.5 hours [1]
(c) 94 hours [1]
(d) 2.34 hours [1]

END OF PAPER



Anglo-Chinese School (Barker Road)

END-OF-YEAR EXAMINATION 2008

**SECONDARY TWO
EXPRESS**

**MATHEMATICS
PART 2**

TIME: 1 Hour 30 minutes

INSTRUCTIONS TO CANDIDATES

Arrange your answers in numerical order. Attach the cover page on top of your answer script.
You are reminded of the need for clear presentation in your answers.
Omission of essential steps will result in loss of marks.

INFORMATION FOR CANDIDATES

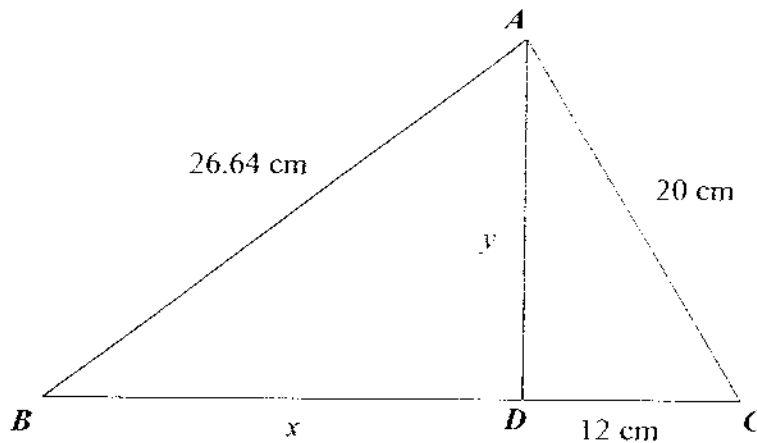
The number of marks is given in [] at the end of each question or part question.
The total of the marks for this paper is 50.
The use of an electronic calculator is expected, where appropriate.
Give non-exact numerical answers correct to 3 significant figures or 1 decimal place in the case of angles in degrees, unless a different level of accuracy is specified in the question.

This question paper consists of 3 printed pages.

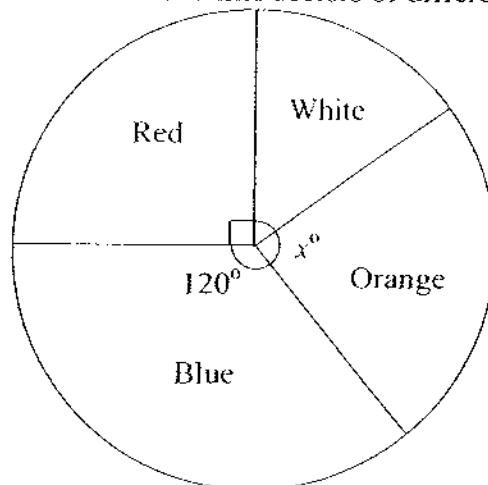
Paper 2 (50 marks)

Answer all the questions in this section on the writing papers provided except question 5.

- The formula $C = pn + q$ is used to calculate the cost of electricity, where n is the number of units of electricity and C is the cost of electricity. A family has to pay \$80 if it consumes 20 units and \$120 if it consumes 35 units.
 - Find the value of p and q . [3]
 - Find the number of units of electricity consumed by the family if the total bill was \$225. [1]
- Triangles ABC , ACD and ABD are right-angle triangles. Using Pythagoras Theorem, find the value of x and y . [4]



- The diagram shows a circle divided into sectors of different colours.



A point is selected randomly in the circle.

- Calculate the probability that the point lies in the Blue sector. [1]
- Calculate the probability that the point lies in the Blue sector or Red sector. [1]
- Calculate the probability that the point does not lie in the Red sector. [1]
- Given the probability that the point lies in the Orange sector is $\frac{2}{9}$, find the angle at the centre of the Orange sector. [1]
- Hence, calculate the probability that the point lies in the White sector. [1]

4. The height, h , of a group of 30 boys were measured to the nearest centimeter.

(a) Copy the table below on your answer sheet and complete the table. [3]

Height (h cm)	Mid-value (x)	Frequency (f)	fx
$110 < h \leq 115$	112.5	2	
$115 < h \leq 120$		4	
$120 < h \leq 125$		10	
$125 < h \leq 130$		8	
$130 < h \leq 135$		6	
		$\Sigma f =$	$\Sigma fx =$

(b) Use your table to estimate the mean height of the 30 boys. [1]

(c) Estimate the percentage of boys whose heights are above 125 cm. [1]

5. Answer the whole of this question on a sheet of white paper.

Construct a triangle ABC where $AB = 4$ cm, $AC = 10$ cm and $\angle ABC = 120^\circ$. [2]

(a) From your construction, measure and write down the value of $\angle ACB$. [1]

(b) On the same construction, draw trapezium $ABCD$ where $\angle ADB$ and $\angle ADC$ are right angles and AB is parallel to DC . [1]

(c) From your construction, measure and write down the length of DC . [1]

(d) Hence, find the area of trapezium $ABCD$. [1]

6. If $\varepsilon = \{x : x \text{ is an integer and } 1 \leq x \leq 12\}$, $A = \{x : x \text{ is a prime number}\}$ and $B = \{x : x \text{ is an odd number}\}$, illustrate the relationship of A and B in a Venn diagram and mark the numbers in each region. [3]

(a) Find $n(A \cap B)$. [1]

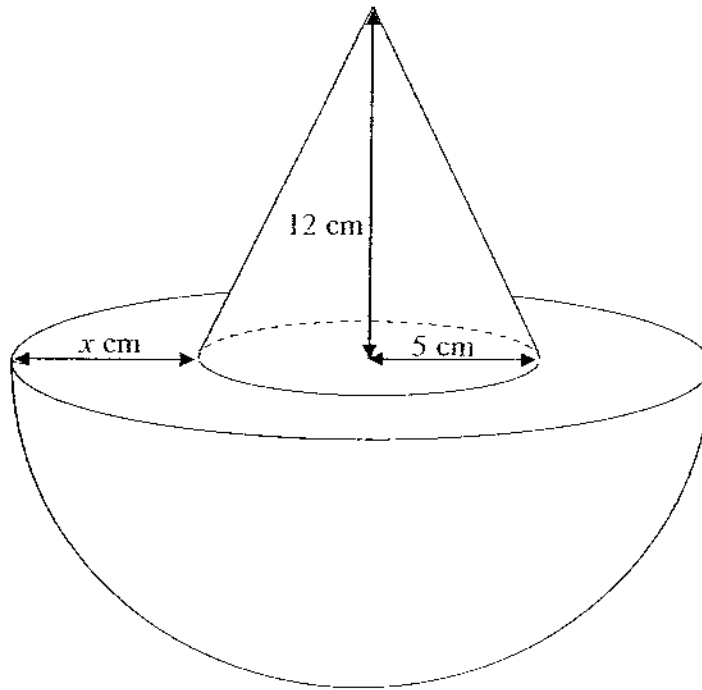
(b) List the elements in $A \cup B$. [1]

(c) Find $n(A \cap B')$. [1]

(d) If $C = \{x : x \text{ is a factor of } 3\}$, draw on the same Venn diagram set C . Mark the numbers in Set C clearly. [1]

(e) Write down in a single expression the relationship between set B and set C . [1]

7. The solid is formed by a cone centrally on top of a hemisphere. The cone has a height of 12 cm and radius of 5 cm. The radius of the hemisphere is x cm more than the radius of the cone. Take π from your calculator.



- (a) Find the volume of the cone. [2]
 (b) Find the curved surface area of the cone. [2]
 (c) Given that the volume of the hemisphere is 1527 cm^3 , find the value of x . [2]
 (d) Find the total surface area of the solid. [3]
8. Answer the whole of this question on a sheet of graph paper.
 The given table is for $y = 2 + 2x + x^2$
- | | | | | | | | |
|-----|----|-----|----|----|---|---|-----|
| x | -4 | -3 | -2 | -1 | 0 | 1 | 2 |
| y | 10 | p | 2 | 1 | 2 | 5 | q |
- (a) Calculate the value of p and q . [1]
 (b) Using 2 cm to represent 1 unit on the x -axis and 1 cm to represent 1 unit on the y -axis, plot the graph of $y = 2 + 2x + x^2$ for $-3 \leq x \leq 2$. [3]
 (c) Write down the coordinates of the minimum point on your graph. [1]
 (d) Use your graph to find the value of y when $y = 4$. [1]
 (e) On the same graph, draw the line $y = x + 8$. [2]
 (f) Hence, from your graph, solve the equation $x^2 + x - 6 = 0$. [1]

END OF PAPER

Sec 2 Express EOY 2008 Maths paper 2 Answers

1a. $p = 2\frac{2}{3}$ $q = 26\frac{2}{3}$

b. $n = 74.375$

2. $x = 21.3$

3a. $\frac{1}{3}$

b. $\frac{7}{12}$

c. $\frac{3}{4}$

d. 80

e. $\frac{7}{36}$

4a. $fx = 3735$

b. 124.5

c. 46.67%

5. $\angle ACB = 17^\circ$, $DC = 8.9\text{cm}$, $\text{Area} = 56.76\text{cm}^2$

6a. 7

b. 3, 5, 7, 11

c. 10

d. 1, 3

7a. 314.159cm^3

b. 204.2cm^2

c. $x = 4$

d. 889cm^2

8.

8) $y = 2 + 2x + x^2$

x	-4	-3	-2	-1	0	1	2
y	10	5	2	1	2	5	10

