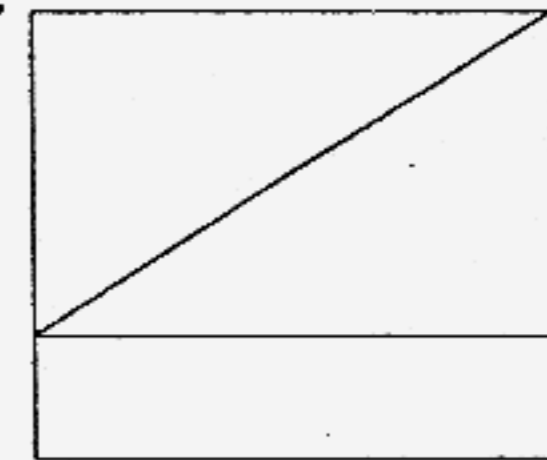# Anglo-Chinese School
(Barker Road)

END-OF-YEAR EXAMINATION 2006
SECONDARY 2 (EXPRESS)

MATHEMATICS
Part 1

DURATION : 1 HOUR

INDEX NO. :_____

CLASS : _____

INSTRUCTIONS TO CANDIDATES

Answer *all* questions.

Write in dark blue or black pen in the spaces provided on the Question Paper.

Omission of essential working will result in loss of marks.

The allocation of marks is shown in the brackets [ ] at the end of each question or part question. The total marks of this paper is 50.

You are expected to use an electronic calculator to evaluate explicit numerical expressions. You may use mathematical tables as well if necessary.

This question paper consists of **9** printed pages.

1. A sum of money is divided among John, Joshua and Raymond in the ratio 3 : 7 : 11. If Raymond has $168 more than John, find the sum of money.

Ans : _____ [1]

---

2. At 08 30, a beaker of boiling water at 100 ^{0}C was left to cool down. At 08 34, the temperature of the water was 84 ^{0}C.

a) Find the drop in temperature per minute.

b) Assuming that the temperature of the water continued to drop at the same rate for the next 5 minutes, find the temperature of the water at 08 39.

c) If the temperature dropped at a rate of 3 ^{0}C/min for the next 15 minutes, calculate the time when the temperature of the water was 40 ^{0}C.

Ans :   (a) _____ [1]

(b) _____ [1]

(c) _____ [2]

Mathematics Part 1

3a) Three bus services operate from the same interchange. The first service leaves at 27 minute intervals, the second at 18 minute intervals and the third at 21 minute intervals. All three services leave the together at 6.30 a.m. Find the time when the three services next leave the bus interchange together.

b) The length and width of a room are 650 cm and 550 cm respectively. If the room is to be covered with identical square tiles, find the side of the largest square tile that can be used to cover the floor without cutting any tile.

Ans : (a) _____ [2]

(b) _____ [1]

4. A model of an aircraft is made using a scle of 1 cm : 5 m.
   a) Express the scale if the form 1 : n.
   b) If the actual length of the aircraft is 24m, what is the length of the model?
   c) Given the the area of a window on the aircraft is $0.03m^2$, find the area of the window on the model.

Ans : a) _____ [1]

b) _____ [1

]

c) _____ [1

]

5. Factorise completely

a) $18ac - 3ad - 6bc + bd$

b) $5x^2 - 5$

c) $x^2 - 8x + 15$

Ans :   (a) _____ [2]

         (b) _____ [2]

         (c) _____ [2]

6. Solve the simultaneous equations

$$2y = 3x - 13$$
$$5x - 6y = 23$$

Ans : _____ [3]

7. P varies inversely as Q and that P = 1 when Q = 3.

    a) Express P in terms of Q,
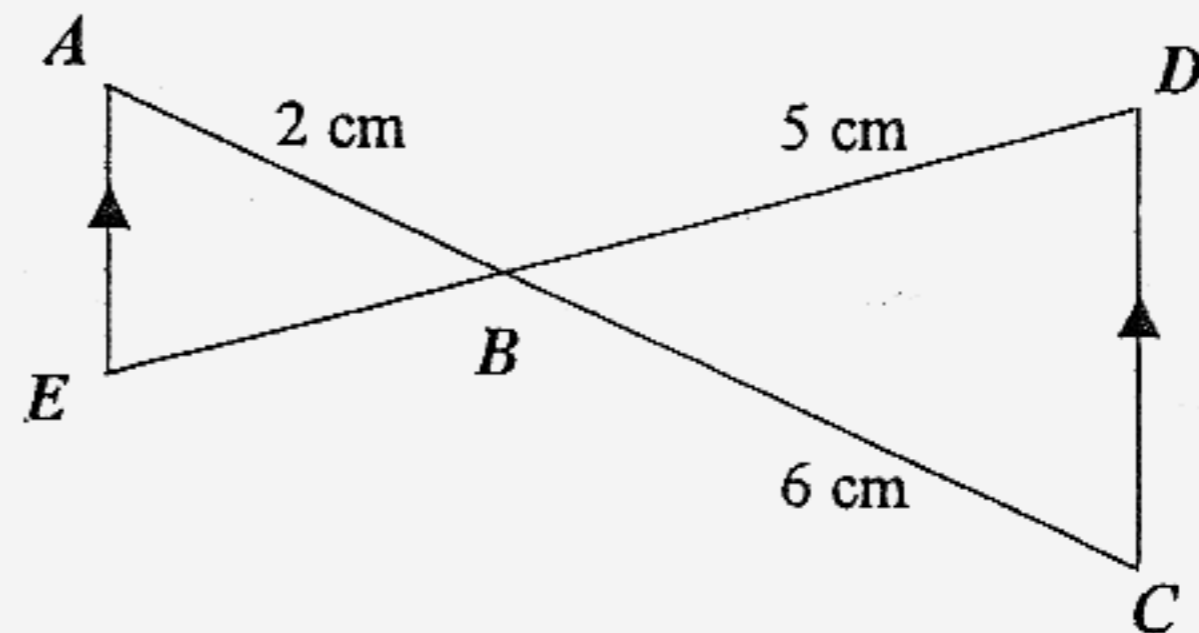
    b) Find the value of Q when P = -15.

Ans : (a) _____ [2]

        (b) _____ [1]

8. In the diagram, ABC and EBD are two straight lines. AE is parallel to DC.

    AB = 2 cm, BC = 6 cm and BD = 5 cm.

    a) Explain why triangle ABE is similar to triangle CBD.

    b) Find the length of BE.

Ans : (a) _____ [2]

(b) _____ [1]

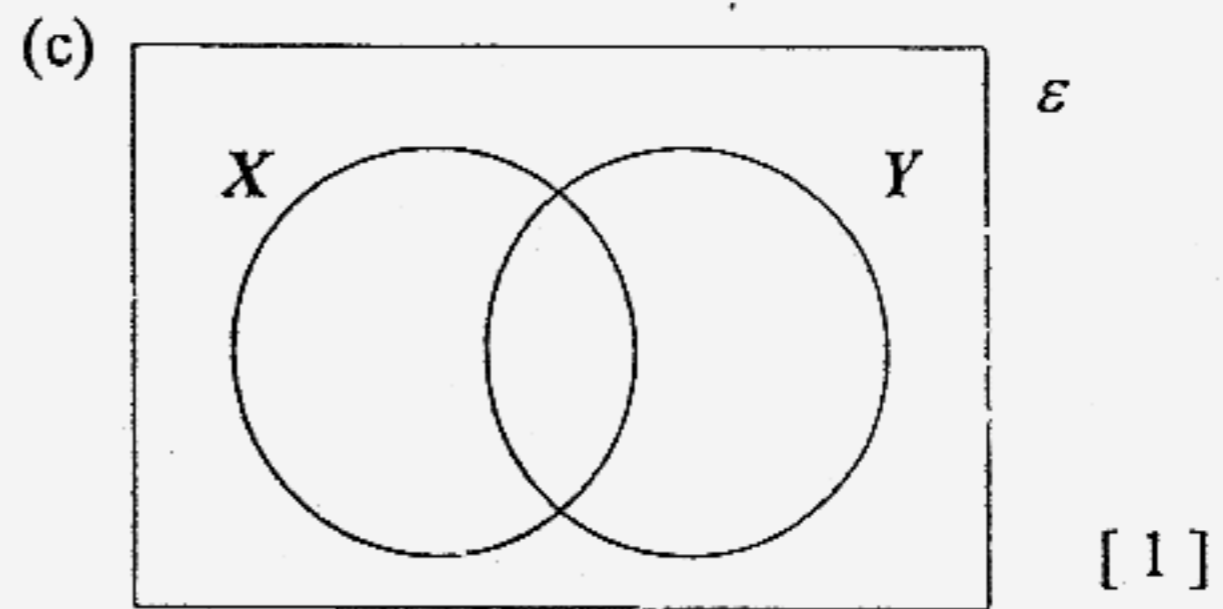9a) It is given that $\varepsilon = \{x : x$ is a whole number and $1 \leq x \leq 13\}$

$A = \{x : x$ is a prime number$\}$

$B = \{x : x$ is a factor of 30$\}$

i) List the elements of $A \cap B$ and $A \cup B$.

ii) Find $n(A')$.

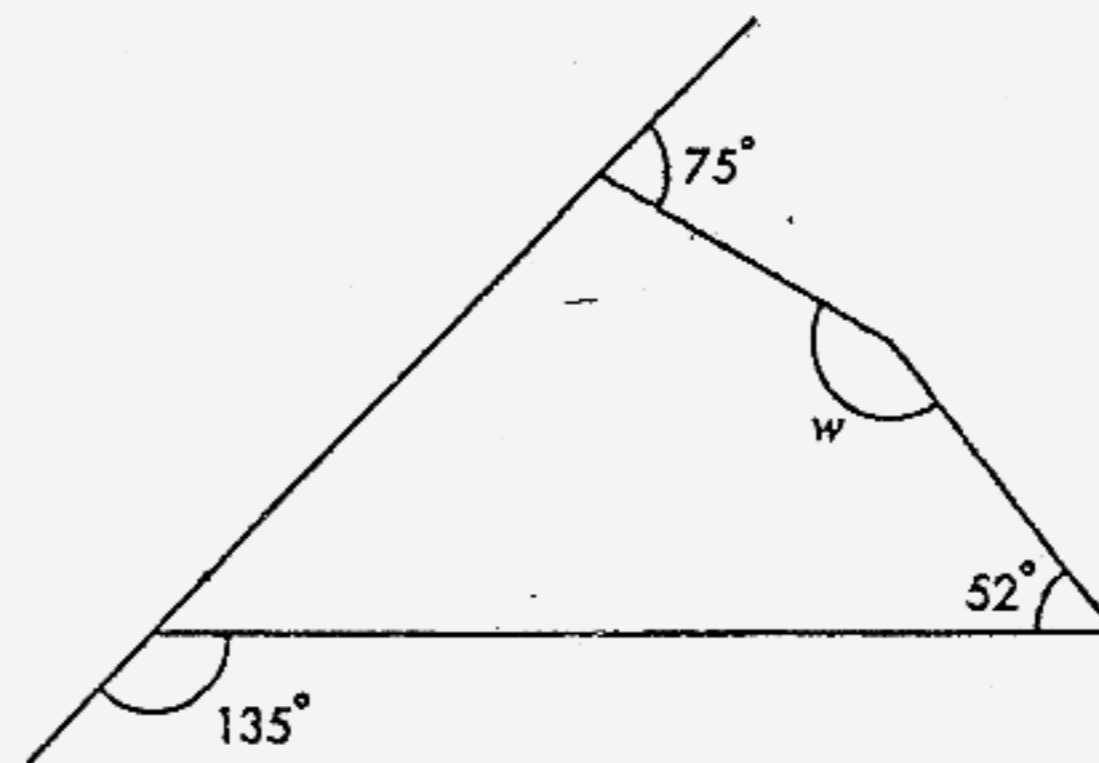b) Shade the regions in the Venn Diagram that represents $(X \cup Y)'$.

(c)

ε

[1]

Ans : (ai) _____

_____ [2]

(aii) _____ [1]

10a) Find the value of w.

Ans : (a) _____ [3]

b) A polygon has n sides. Two of its exterior angles are 50^0 each and one is 85^0.

All the other exterior angles are 25^0. Find the value of n.

Mathematics Part 1

Ans : (b) _____ [2]

11. The diagram shows the first three of a sequence of squares formed by using toothpicks.

a) Write down the number of toothpicks required for 6 squares.

b) Write down a formula to find the total number of toothpicks t, when there are n number of squares formed.

c) Find the number of toothpicks required to form 22 such squares?

Ans : (a) _____ [1]

(b) _____ [1]

(c) _____ [1]

12a) In a Mathematics test, the scores of the students are recorded as shown.

| 25 | 37 | 14 | 47 | 11 | 27 | 40 | 23 | 9 | 29 |
| 30 | 14 | 27 | 29 | 32 | 38 | 45 | 21 | 34 | 28 |

Construct a stem-and-leaf diagram to represent the scores of the students.

[2]

b) Some students were asked how many hours they spend using the computer after school. The results are as shown.

No. of hours	0	1	2	3	4	5
No. of students	6	10	3	4	3	x

i)   Write down the largest possible value of x given that the mode is 1.

ii) Find the value of x given that the median is 2.5.

iii) Calculate the value of x given that the mean is 2.

Ans : (i) _____ [1]

(ii) _____ [2]

(iii) _____ [2]

13. Draw a line PQ 8 cm long.

Construct the perpendicular bisector of PQ, passing through PQ at R.   [1]

Mark the point S on the perpendicular such that angle RPS = 40^0.   [1]

Construct the angle bisector of angle PSR.   [1]

Measure the length of PS.

Ans :   PS = _____ [1]

THE END

Anglo-Chinese School
(Barker Road)

END-OF-YEAR EXAMINATION 2006
SECONDARY 2 (EXPRESS)

MATHEMATICS
Part 2

DURATION: 1hour 30 minutes

INSTRUCTIONS TO CANDIDATES

Answer *all* questions.

Leave *three* lines between each question.

Show your answers and working on the writing papers provided.

Omission of essential working will result in loss of marks.

INFORMATION FOR CANDIDATES

The allocation of marks is shown in the brackets [ ] at the end of each question or part question.
The total marks of this paper is 50.

You are expected to use an electronic calculator to evaluate explicit numerical expressions. You may use mathematical tables as well if necessary.

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.

1. Amrit went on a holiday to Italy. Before he left, he exchanged S$2300 into Euro dollars. During the trip, he spent a total of 800 Euro dollars. When he returned, he converted the remaining amount back to Singapore dollars. The chart below shows the rate of conversion at the money changer.

   (a) Calculate the amount of Euro dollars he took on holiday.   [1]

   (b) How much in Singapore dollar does he have at the end?   [2]

   > You can buy and sell foreign currency here.
   >
   > **We buy Euros : S$1 = Eu 0.51**
   >
   > **We sell Euros : S$1 = Eu 0.48**

2. Mr. Lim borrowed $16000 at 7.5% per annum simple interest for 2 years.

   (a) How much will he have to repay at the end of 2 years?   [1]

   (b) As soon as he received the $16000 loan, he immediately lent it to his friend. Given that he charged his friend 7.5% compound interest over 2 years, how much profit or loss does Mr. Lim make overall?   [3]

3(a) Solve the inequality $7 - 6x < -5$,

   representing your answer on a number line.   [2]

   (b) Solve the inequality $1 - \frac{1}{3}x \geq 5 \geq 2 - \frac{3}{5}x$.   [3]

   (c) Alicia and Susan planned for a party and they decided not to spend more than $150. Alicia spent $25 more that one-fourth of what Susan spent.

   i) Let the amount that Susan spent be $x, form an inequality.   [2]

   ii) Solve the inequality to find the maximum amount that Susan spent.   [2]

Mathematics Part 2

4. The formula $C = pn + q$ is used to calculate the cost of electricity, where n is the number of units of electricity. A family has to pay \$75 if it consumes 15 units and \$90 if it consumes 20 units.
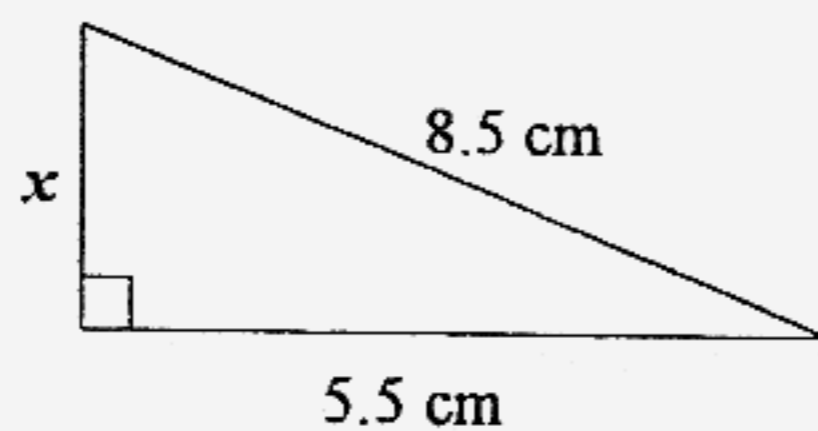
(a) Find the values of p and q. [3]

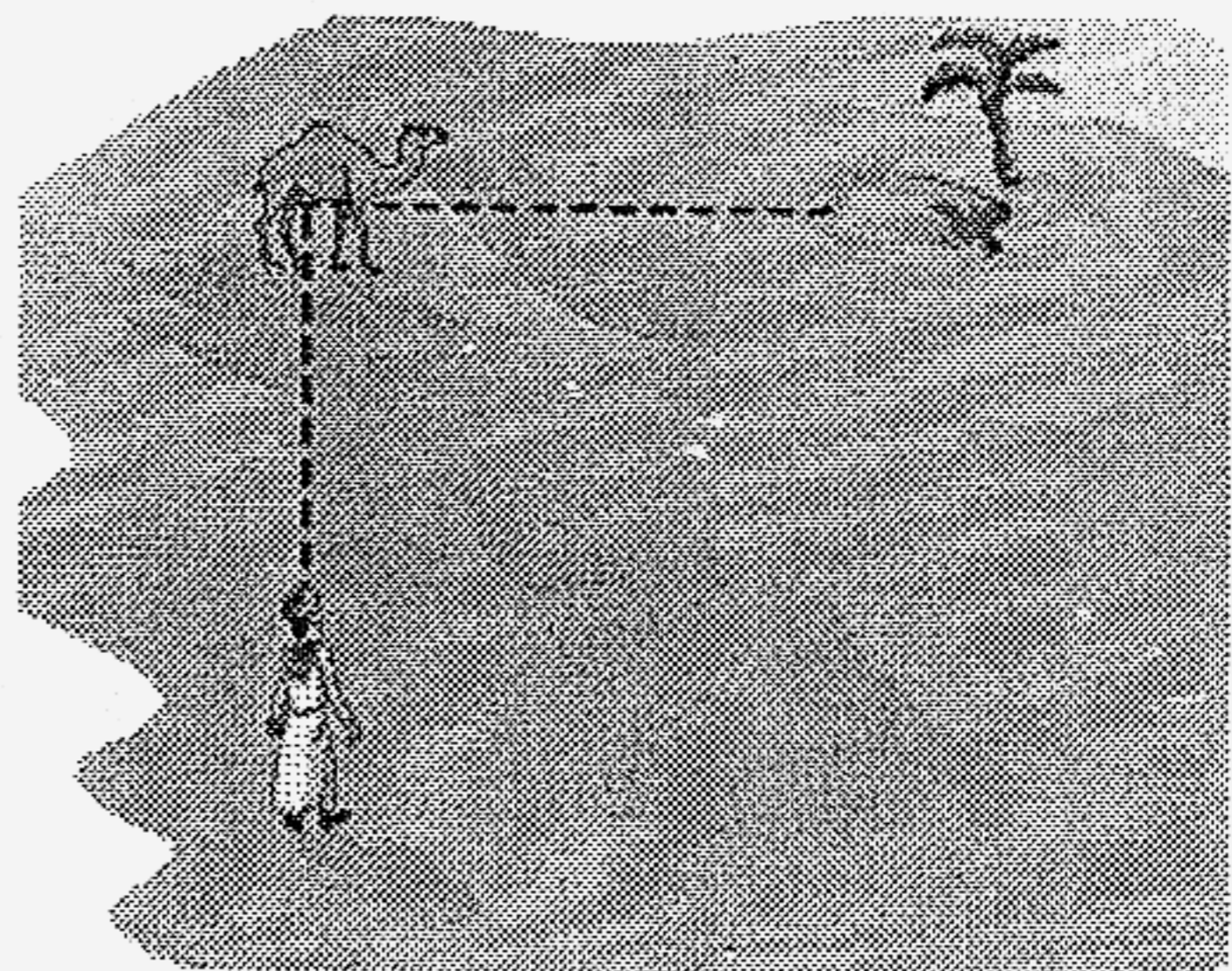(b) Find the no. of units of electricity consumed by the family if the total bill was \$135. [1]

5(a) Solve $\dfrac{2x-5}{3} - \dfrac{x-6}{5} = 1$. [3]

(b) Make x the subject of the formula : $4y = \dfrac{3x^2 + 1}{2}$. [3]

6(a) Find the unknown value x. [1]

(b) Ali Baba is 210 m due south of a camel which is walking east towards an oasis. If the camel is currently 200 m from the waterhole, what is the shortest distance of Ali Baba from the oasis? [1]
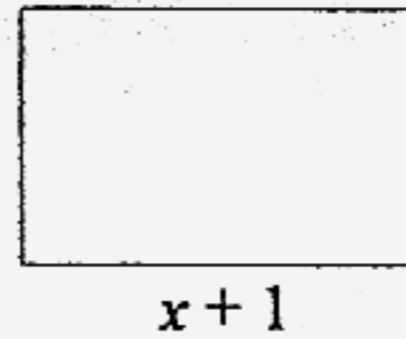
7.

Rectangle A   Rectangle B

x $x + 1$

Two rectangles, A and B, each have an area of 18 cm^2.

The length of rectangle A is x cm. The length of rectangle B is ($x + 1$) cm.

(a) Find, in terms of x, an expression for the width of

       (i) rectangle A,   [1]

       (ii) rectangle B.   [1]

(b) Given that the width of rectangle A is 3 cm greater than the width of rectangle B,

    form an equation in x and show that it simplifies to

$$x^2 + x - 6 = 0$$ [3]

(c) Solve the equation $x^2 + x - 6 = 0$, to find the value of x.   [2]

(d) Hence find the width of rectangle B.   [1]

8. The container below is in the form of a cone surmounted on a hemisphere.

   The container has a height of x cm. The hemisphere has a radius of 7 cm.

   (Take $\pi = 3.142$).

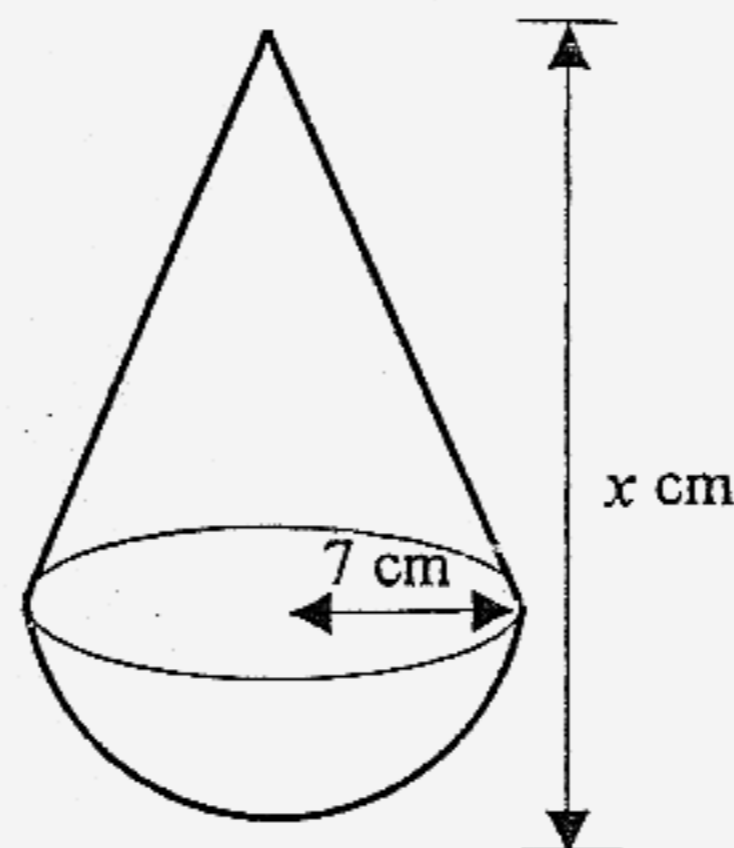   (a) Find the volume of the hemisphere.   [2]

    (b) Express the volume of the cone in terms of x.   [2]

    (c) Given that the volume of the container is 1624cm^3, show that the

       value of x is 24.6 cm to 3 significant figures.   [2]

x cm

7 cm

Mathematics Part 2

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

The given table is for $y = -\frac{1}{2}x^2 + x + \frac{3}{2}$

x	-2	-1	0	1	2	3	4	5
y	-2.5	0	1.5	2	1.5	0	-2.5	p

(a) Calculate the value of p.   [1]

(b) Using a scale of 2 cm to 1 unit on the x and y-axes, draw the graph of

$y = -\frac{1}{2}x^2 + x + \frac{3}{2}$ for the values of x from $-2 \le x \le 5$.   [4]

(c) Use your graph to find the values of x when $y = -1$.   [2]

(d) Use your graph to find the value of y when $x = 0.5$.   [1]

THE END

Answers

1) $441

2a) $4\,^0C$ 2b) $64\,^0C$ c) 08 47

3a) 12.48p.m.   3b) 50 cm

4a) 1 : 500   4b) 4.8 cm   c) $0.0124m^2$

5a) *(6c − d) (3a − b)*   5b) *5 (x + 1)(x − 1)*   c) *(y − 3)(y − 5)*

6)   *x = 4, y = − 0.5*

7a) P = 3/Q   7b) Q = -1/5

8a) *Angle EAB = Angle DCB (Alt. angles)*

     Angle AEB = Angle CDB (Alt. angles)

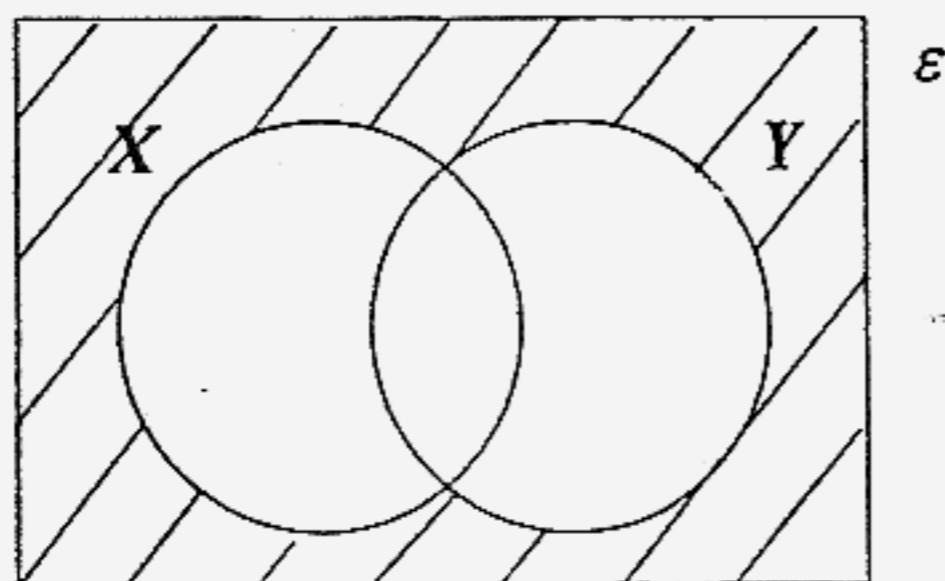   *Angle ABE = Angle CBD (Vert. opp. angles)*

     AAA property.

8b) $BE = 1\dfrac{2}{3}\,cm$

9ai) *A∩B = 1, 2, 3, 5*   *A∪B = 1, 2, 3, 5, 6, 7, 10, 11*

9aii) *n (A') = 6*

9b)

10a) *w = 158⁰*   10b) n = 11

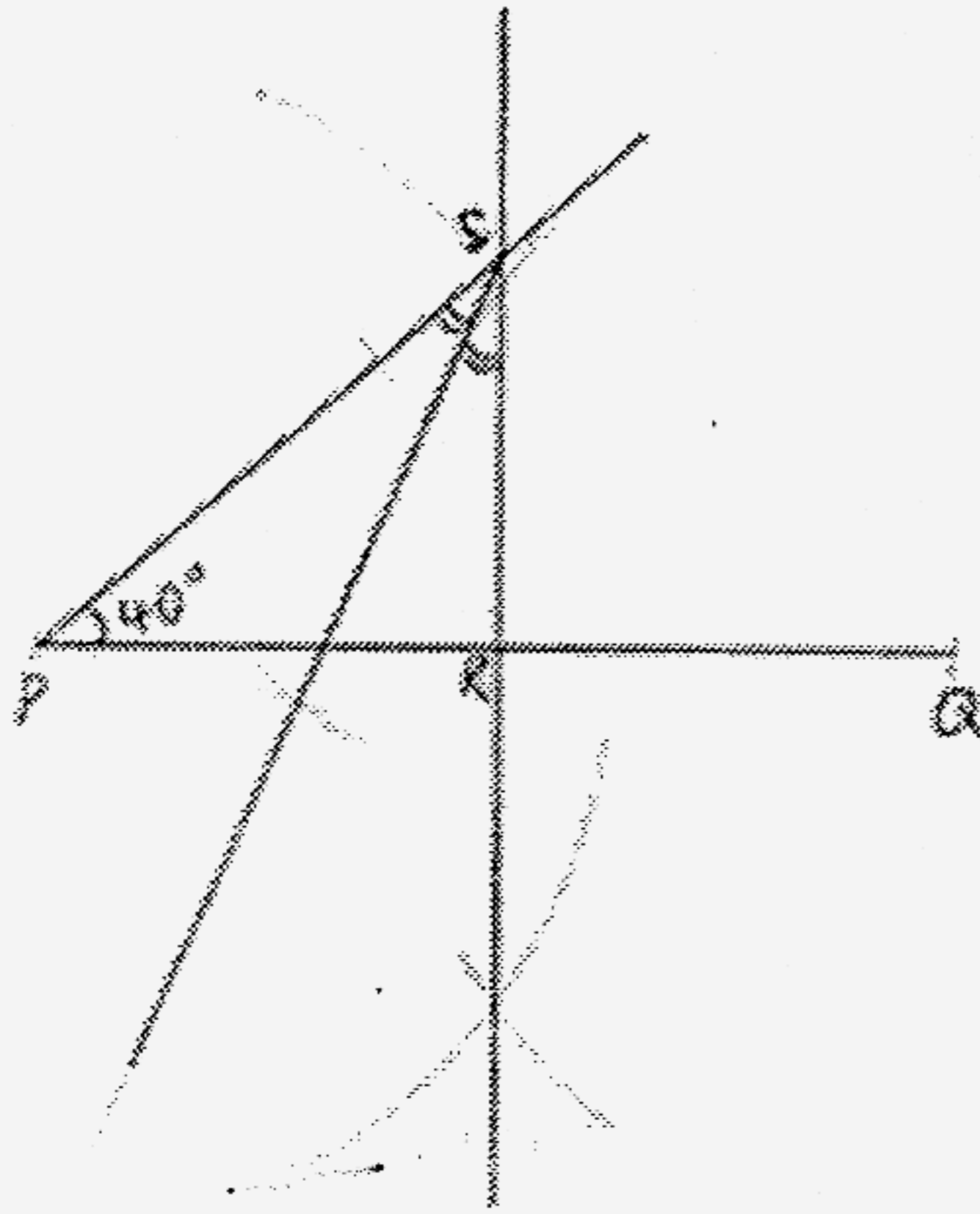11a) 19 toothpicks   11b) *t = 3n + 1*   11c) 67 toothpicks

12a)

S	L	e	a	f			
0	9						
1	1	4	4				
2	1	3	5	7	7	8	9	9
3	0	2	4	7	8		
4	0	5	7				

12bi)   *x = 9*   12bii)   *x = 12*   12biii)   *x = 4*

13)

PS = 5.2 cm

Answers

1a) Eu 1104   1b) S$596.08
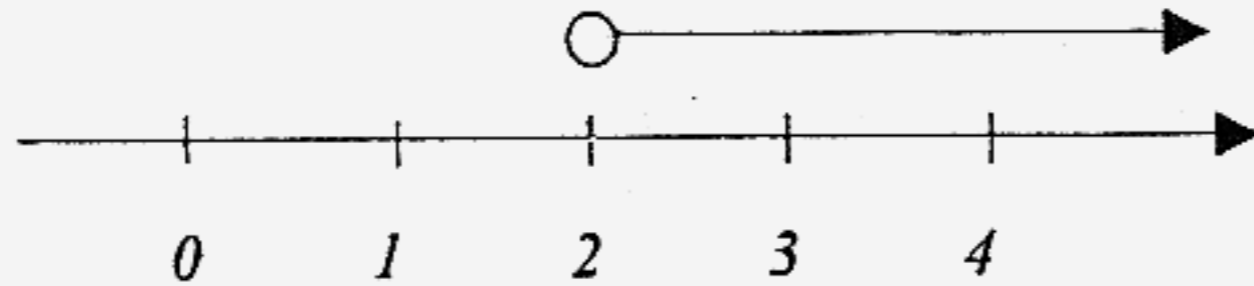
2a) $18 400   2b) $90

3a) $x > 2$ [A1]

$$[A1]$$

3b) $-5 \le x \le 18$

3ci) $\dfrac{1}{4}x + 25 + x \le 150$ 3cii) $100

4a) $p = 3$, $q = 30$ 4b) $n = 35$

5a) $x = 3\dfrac{1}{7}$ 5b) $x = \sqrt{\dfrac{8y-1}{3}}$

6a) $x = 6.48\,\text{cm}$ 6b) $x = 290\,\text{m}$

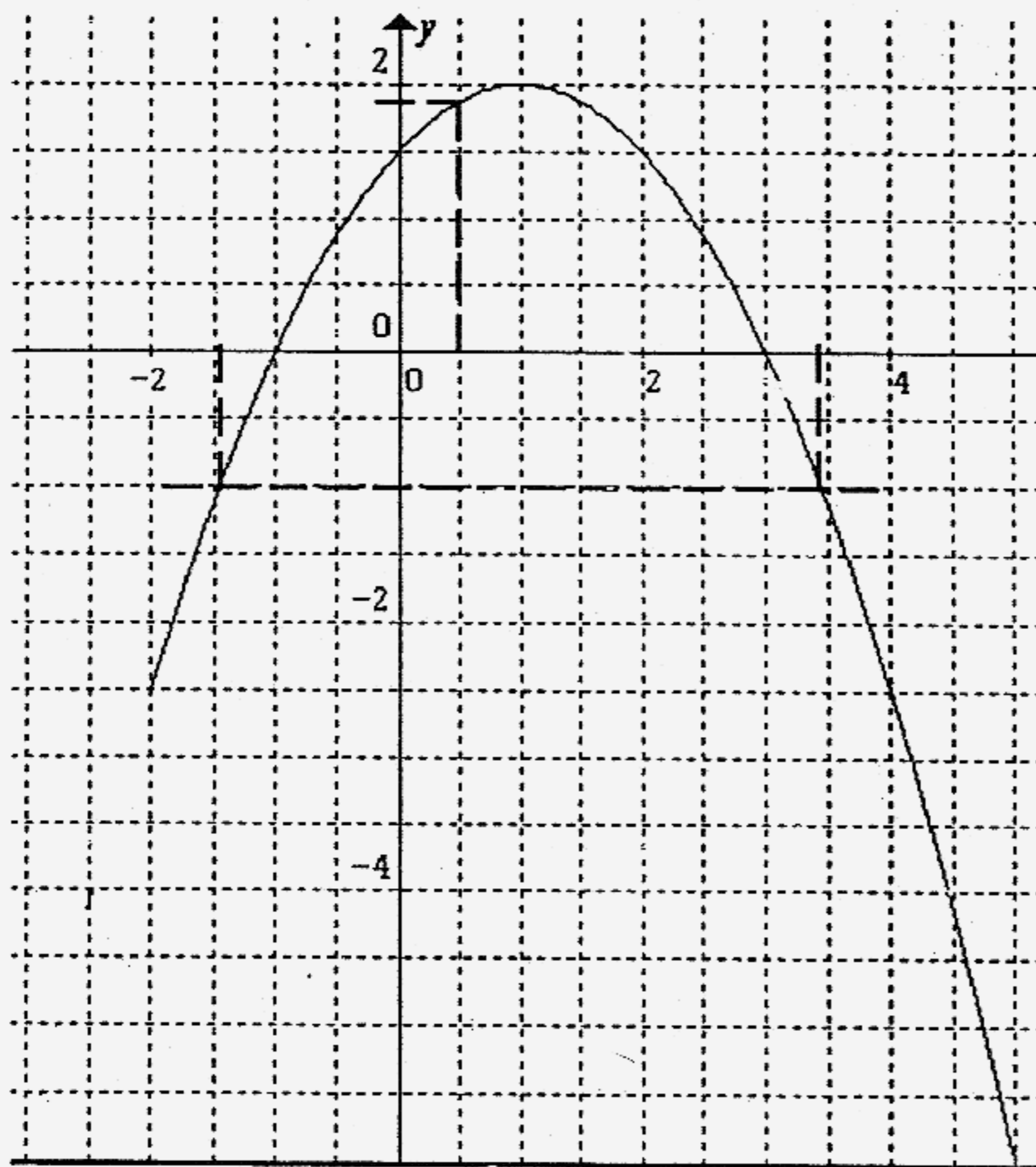7ai) $\dfrac{18}{x}$ 7aii) $\dfrac{18}{x+1}$ 7c) $x = 2$, -3 (n.a.)   7d) 6 cm

8a) $718\ cm^3$ 8b) $\dfrac{1}{3} \times 3.142 \times 7^2 \times (x-7)$

9a) $p = -6$

9b)

9c) *When y = -1, x = - 1.4 $\pm$ 0.2 and 3.4 $\pm$ 0.2*

9d) *When x = 0.5, y = 1.8 $\pm$ 0.2*