INDEX NO: _____

Anglo-Chinese School
(Independent)

PRELIMINARY EXAMINATION 2006
YEAR FOUR EXPRESS

MATHEMATICS
PAPER 1

4017/1

Wednesday **30 August 2006** **2 h**

INSTRUCTION TO STUDENTS

Write your index number in the space at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided below that question.

If working is needed for any question, show it in the space below that question.

Omission of working will result in loss of marks.

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

INFORMATION FOR STUDENTS

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

The total number of marks for this paper is 80.

This paper consists of 16 printed pages [including cover page].

Answer **ALL** the questions.

1. (a) Find, in its simplest form, the fraction which is exactly half-way between $\frac{3}{4}$ and $1\frac{1}{12}$.

(b) Express 14 ½ % as a decimal.

Answer: (a) ..... [2]
(b) ..... [2]

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2. (a) Express 0.068 square metres in square centimeters.

(b) Solve $2\times 3^{2x+3} = 6\times 9^{4x}$

Answer: (a) ..... [2]
(b) ..... [2]

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3. (a) (i) Express 2744 as the product of its prime factors.
(ii) Hence, evaluate $\sqrt[3]{2744}$

(b) List the following in descending order.
$\frac{1}{4}$, $1^{-\pi}$, 2%, $\sqrt{2}$

Answer: (a) (i) ..... [1]
(ii) ..... [1]
(b) ..... [1]

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4. If it takes 6 men 3 days to dig a well of 2 m deep,
(a) how deep can 12 men dig in 3 days?
(b) how many men does it take to dig 4 m deep in 2 days?

Answer: (a) ..... [2]
(b)..... [2]

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5. (a) The weekend rate of a room in a resort is 20% more than the normal weekday rate.

(i) Find the normal weekday rate of a room if one such room costs $270 a day on a weekend.

(ii) The holder of a privilege card is entitled to a 10% of discount of the weekend rate. How much will one such card holder pay for a room on a weekend?

(b) In a preliminary examination, a teacher distributes 70 pencils, 105 sheets of graph papers and 175 sheets of writing papers to a group of candidates. Given that each candidate receives an equal number of pencils, graph papers and writing papers, calculate the largest possible number of students in the group.

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

(ii) ..... [1]

(b) ..... [2]

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6. (a) Factorize completely $10 + x - 3x^2$

(b) Given that $2(p + q) = \frac{1}{2}(5p - 2q)$, find the value of $\frac{p}{q}$

Answer: (a) ..... [2]

(b) ..... [2]

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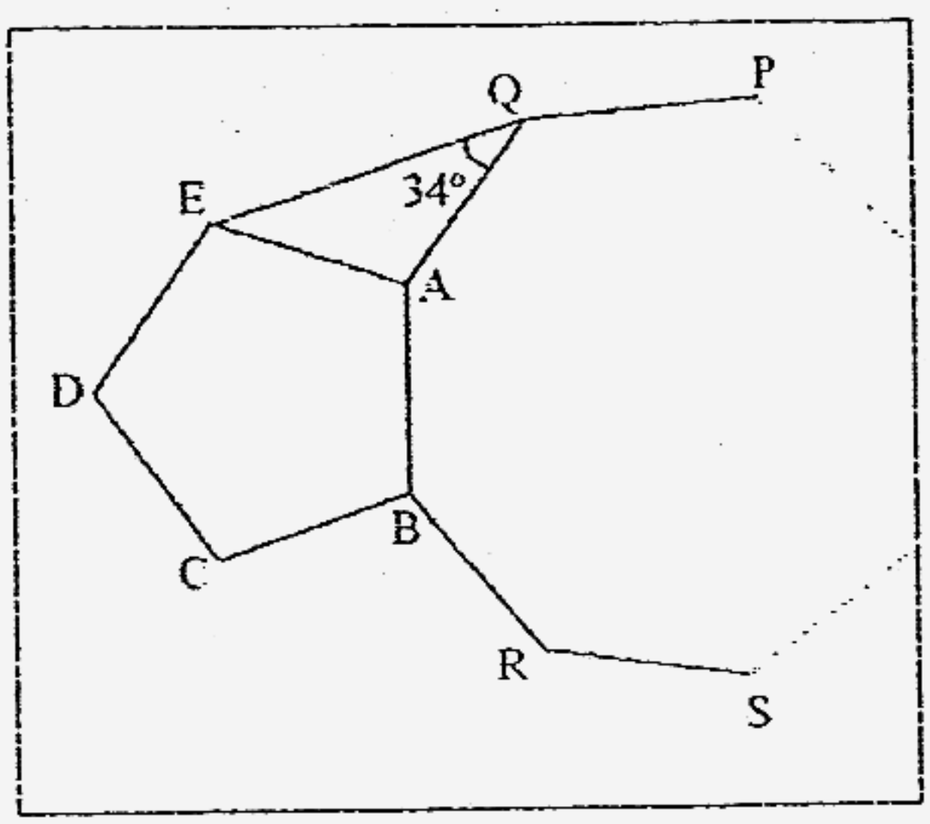
7. The diagram shows a regular pentagon *ABCDE* and part of a regular polygon *PQABRS* with *n* sides which are drawn on opposite sides of the common line AB.



Given $\angle AQE = 34°$, find

(a) $\angle EAQ$ [1]

(b) $\angle BAQ$ [1]

(c) the value of *n* [1]

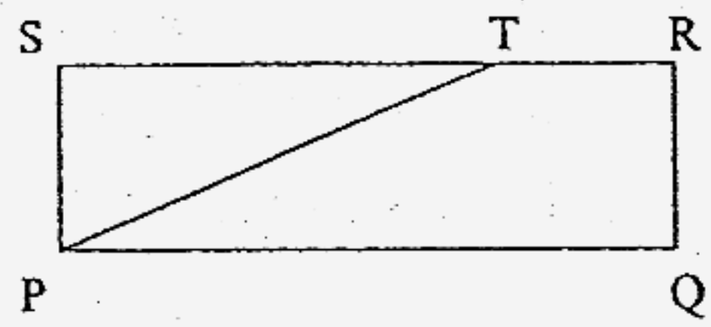
Answer: (a) ..... [1]
(b) ..... [1]
(c) ..... [1]

---

8. A small town Trid has an area of 200 cm^2 on a map. Its actual area is 8 km^2.
(a) If the map is drawn to a scale of 1: k, find the value of k.
(b) If the distance between its main post office and the only police station is 3 cm on the map, find the actual distance in km between them

Answer: (a) ..... [2]
(b) ..... [1]

9. PQRS is a rectangular plot of land in which PQ = 17 cm and RT = 5 cm.
T is a point on SR such that TR = RQ.
Find, as a fraction, the value of
(a) sin ∠TPQ
(b) cos ∠PTR



Answer: (a) ..... [2]
(b) ..... [1]

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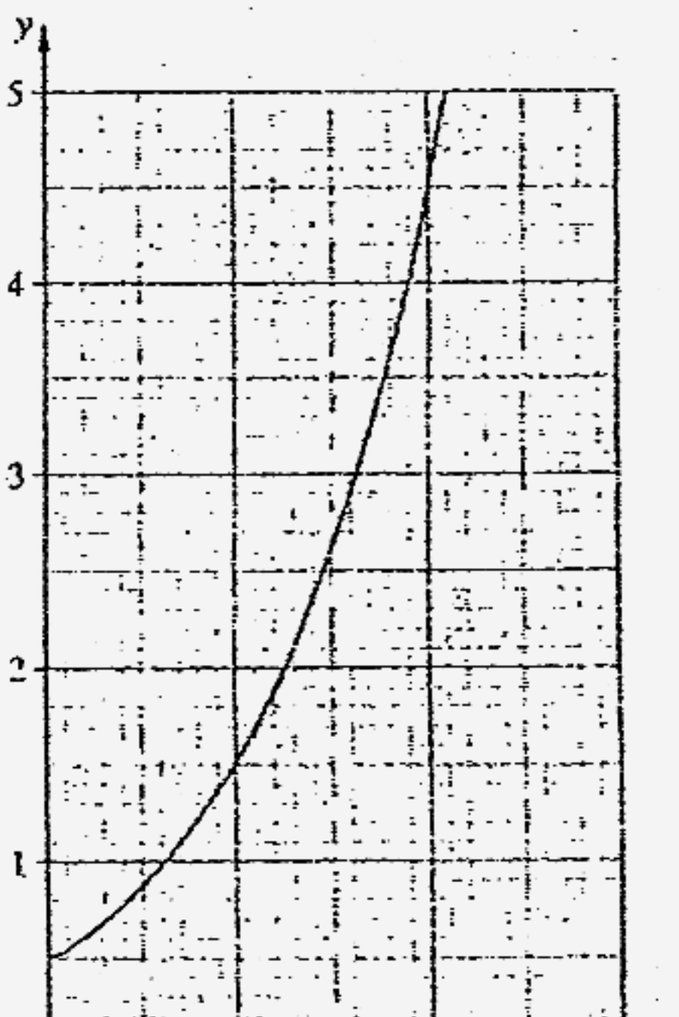
10. A student conducted an experiment to measure how the vertical distance (y) of a projectile fired from the edge of cliff varies with its horizontal distance (x).
The diagram shows the graph of $y = ka^x$.

(a) State the value of k,
(b) Find the value of a.



Answer: (a) ..... [1]
(b) ..... [2]

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11. Given that x is an integer such that $-4 < x \leq 10$ and y is an integer such that $11 \leq y \leq 20$.

Calculate the

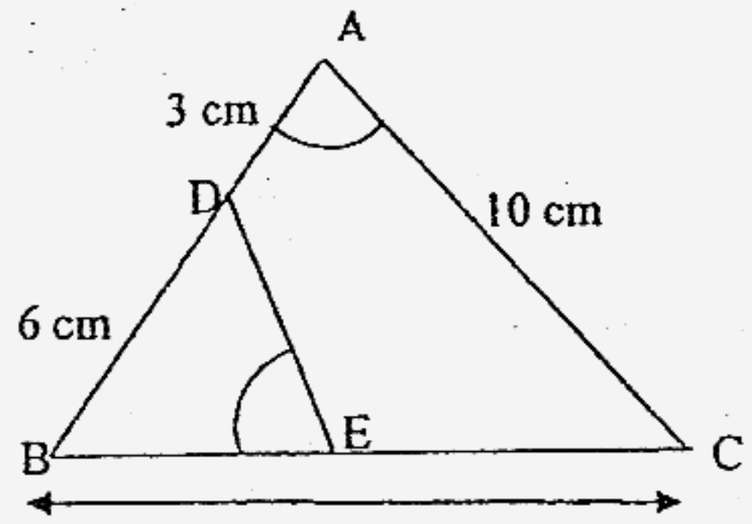
(a) greatest value of $y - x$

(b) least value of $x^2 + 2xy + y^2$

Answer: (a) ..... [1]

(b) ..... [2]

12. In the diagram, AC = 10 cm, BC = 12 cm, AD = 3 cm, DB = 6 cm and ∠BAC = ∠BED.



(a) Prove, stating your reason(s) clearly, that ΔABC is similar to ΔEBD

_____

_____ [1]

(b) Find the lengths of DE and EC.

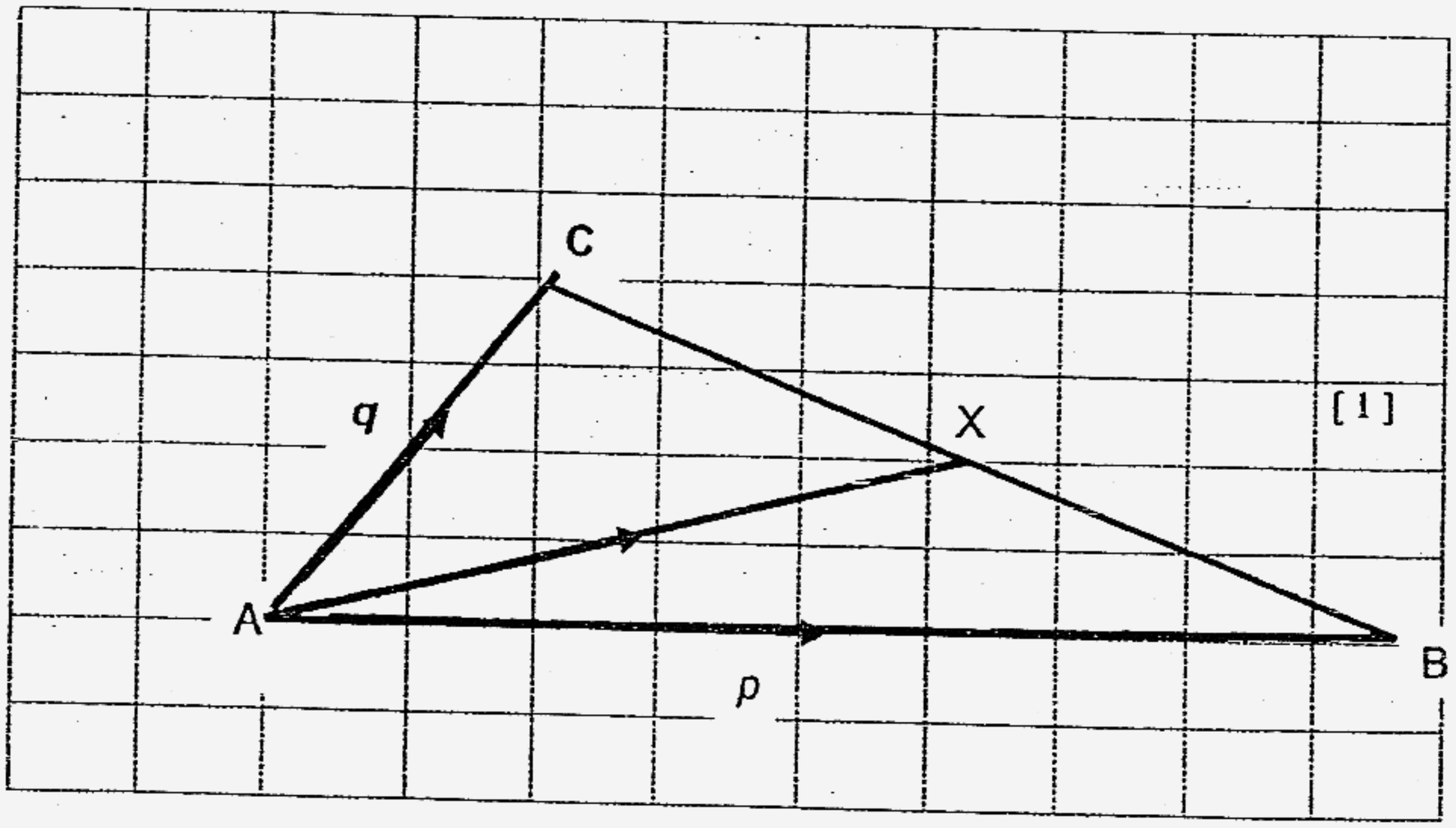
Answer : (b) DE = ...[1]
EC = ...[1]

13. Given that y is inversely proportional to the square root of x.
(a) If y is doubled, x becomes n times its original value. Find the value of n.
(b) If the difference in the values of y when x = 9 and when x = 16 is 5, express y in terms of x.

Answer: (a) ..... [2]
(b) ..... [1]

---

14. In the figure below, $\overrightarrow{AB} = \boldsymbol{p}$ and $\overrightarrow{AC} = \boldsymbol{q}$.
(a) Given that $\overrightarrow{AX} = h\,\boldsymbol{p} + k\,\boldsymbol{q}$, find the values of h and k.
(b) Given further that $\overrightarrow{AT} = \frac{1}{2}\,\boldsymbol{p} + \frac{3}{4}\,\boldsymbol{q}$, label the point T in the figure.



[1]

Answer: (a) h = ...; k = ... [2]

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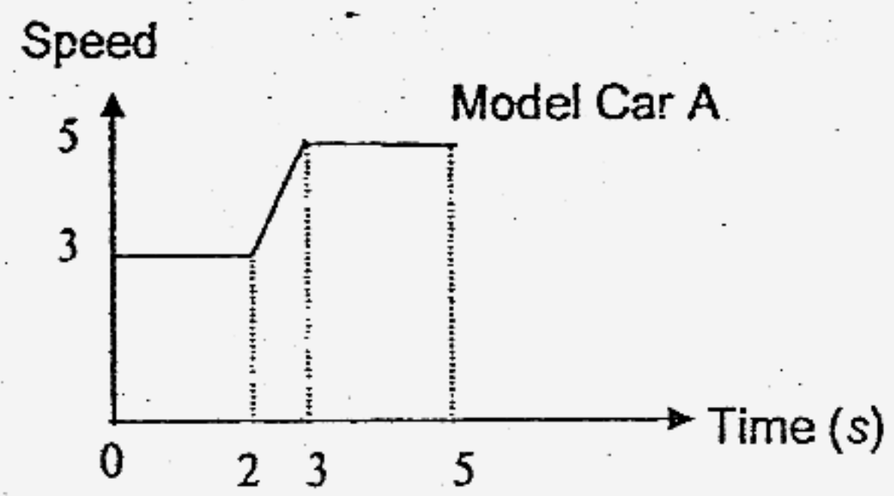
15. In a simulated experiment to test car performance, two model cars A and B were travelling on a straight runway. The model car A travels at a constant speed of 3 m/s for 2 seconds and then accelerates uniformly for 1 second before travelling at a constant speed of 5 m/s for a further 2 seconds.

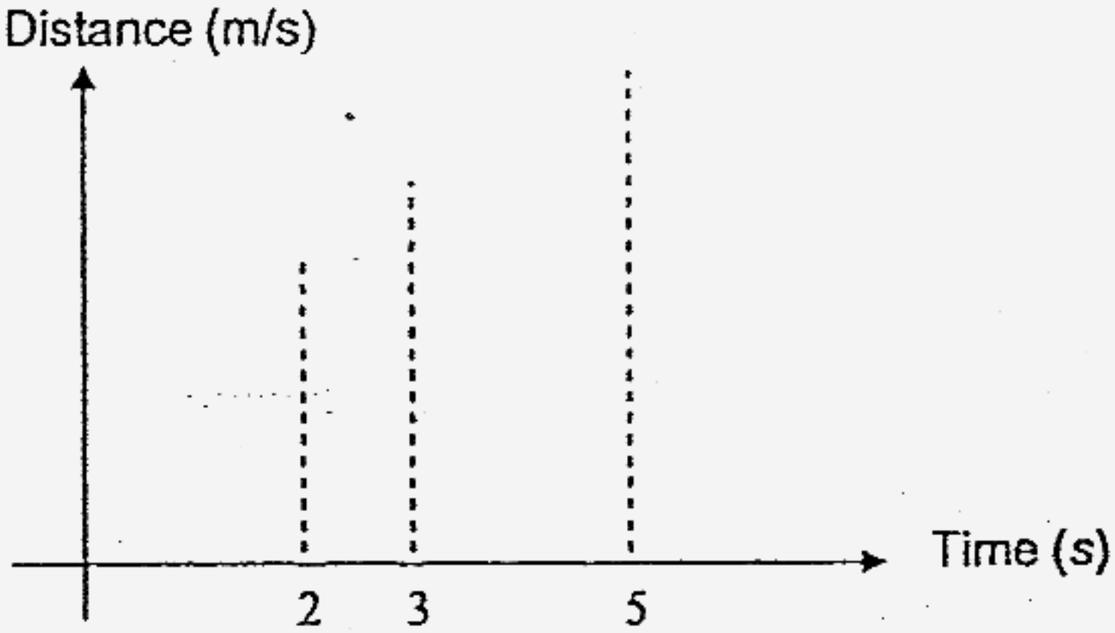


Another model car B accelerates uniformly for 2 seconds and then travels at a constant speed of 5 m/s for the next 3 seconds.

(a) Calculate the total distance traveled by model car A in 5 seconds.

(b) Hence, otherwise, find the acceleration of model car B so that it will overtake model car A in 5 seconds.

(c) On the axes below, sketch the distance-time graph of model car B for the first 5 seconds



[2]

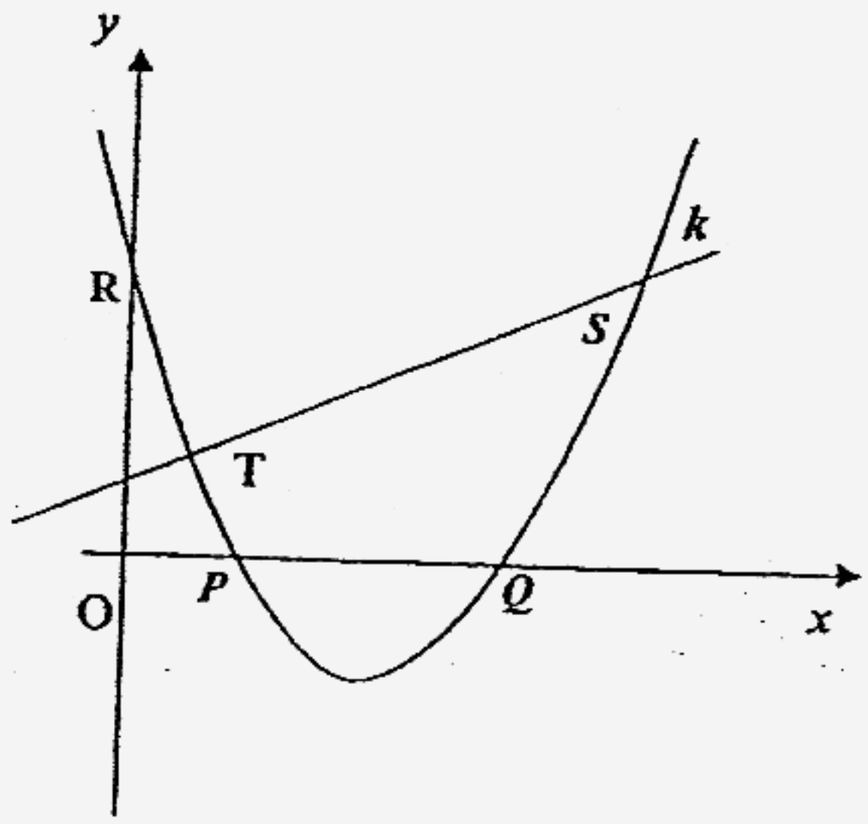
Answer: (a) ..... [2]
(b) ..... [1]

16 The curve $y = x^2 + bx + c$ cuts the x-axis at points P(2, 0) and Q(6, 0) and the y-axis at R.

(a) Find the value of b and the value of c.

(b) Find the coordinates of point R.

(c) A line k of equation $y = x + 4$ passes through the curve at points S and T. Find the coordinates of S.

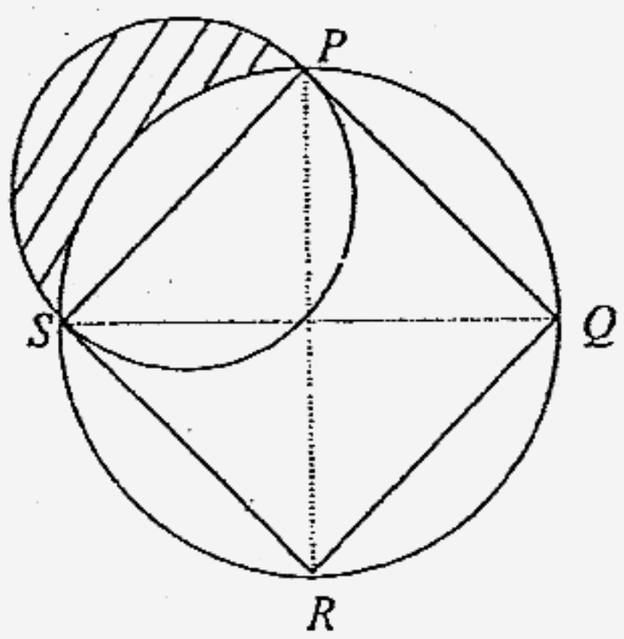


Answer: (a) ..... [2]

(b) ..... [1]

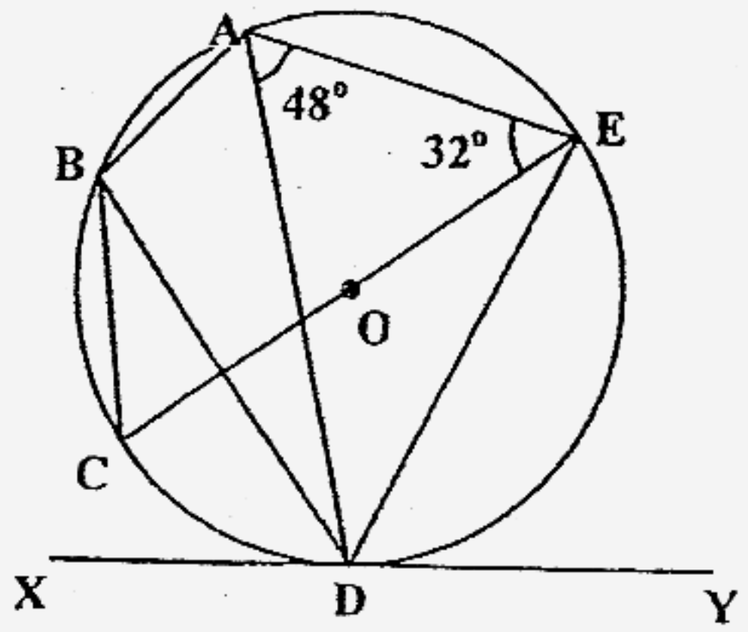
(c) ..... [2]

17. In the diagram, PQRS is a square whose diagonals are each 2 cm long. *QS* and PS are the diameters of the bigger and smaller circles respectively. Find the perimeter of the shaded region without simplifying your answer.



Answer: _____ [3]

18. In the diagram, O is the centre of a circle with CE as the diameter, ∠DAE = 48° and ∠AEC = 32°. XDY is a tangent to the circle touching the circle at D.
Calculate, stating your reasons clearly,
(a) ∠EDY,
(b) ∠ABC,
(c) ∠DEC.



Answer: (a) ..... [1]
(b) ..... [1]
(c) .....[1]

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19. A translation T maps the point (9,1) onto the point (2,-3). Find the image of the point Q(2,3) under the transformation T^2.

Answer: ..... [2]

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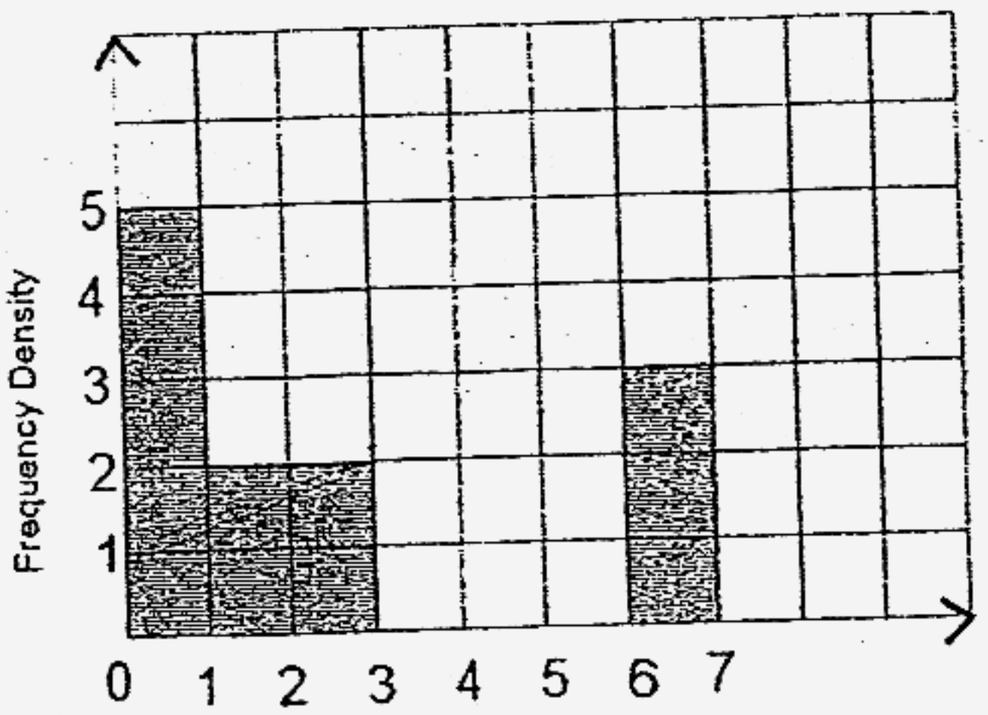
20. A budding scientist wanted to know the population profile of the earthworms in a garden. He set out to measure the lengths of some worms in a garden. A histogram is then partially drawn.

Length(l/mm)	Frequency
$0 < l \leq 1$	5
$1 < l \leq 3$	4
$3 < l \leq 6$	3
$6 < l \leq 7$	3



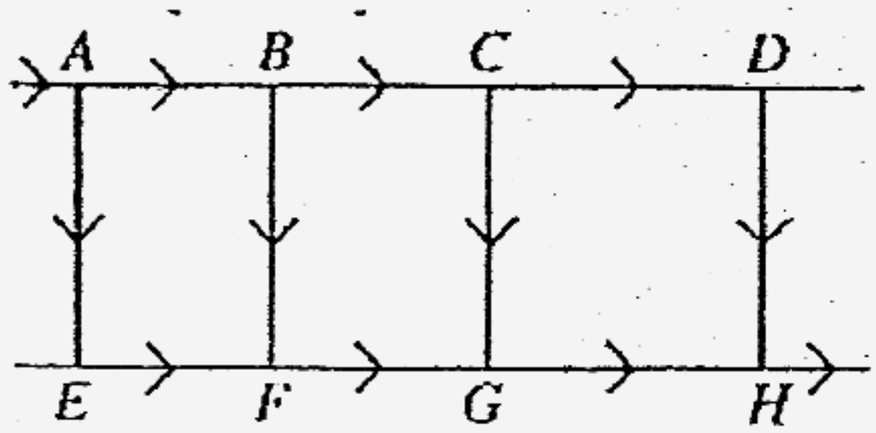
[2]

(a) Complete the histogram.

(b) A pie chart is drawn to represent the above data. Calculate the angle of the sector that represents the length $1 < l \leq 3$.

Answer (b) .....[1]

21 The diagram shows a rectangular system of roads, the direction A to D being east and A to E south. A man walks from A to H always going either east or south.



At any junction where he has a choice of two roads – he will either go straight ahead or make a 90° turn. Assume that the probability that he will go straight ahead is $\frac{2}{3}$.

Express, as a fraction, the probability that he will walk along/pass

(a) FG,

(b) GH,

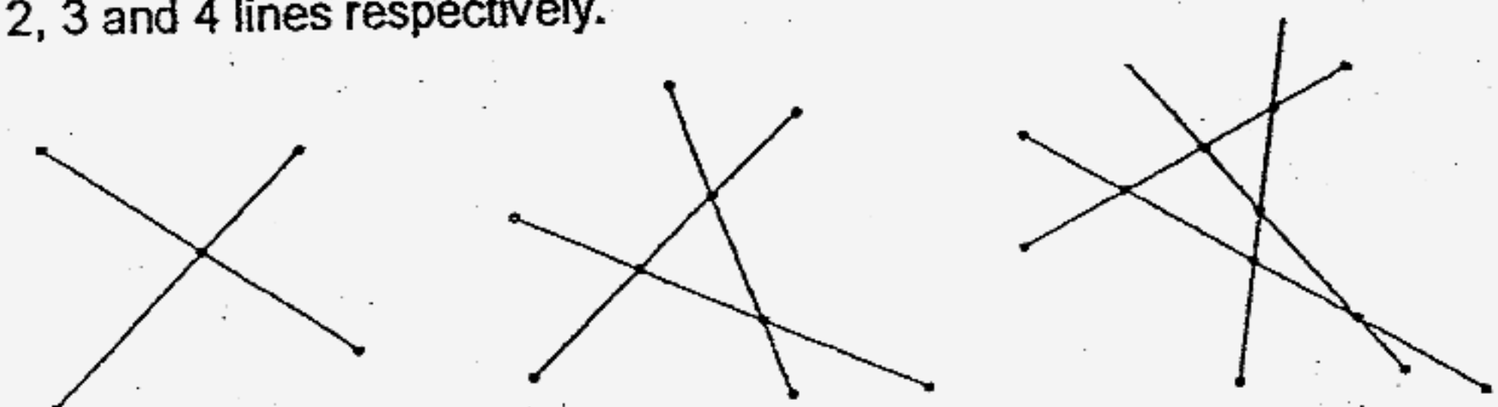
(c) B.

Answer: (a) ..... [1]

(b) ..... [1]

(c) ..... [1]

22. The diagrams below show the maximum number of intersections obtained from 2, 3 and 4 lines respectively.



Number of lines, N	Maximum number of line segments, S	Maximum number of points of intersections, P	Maximum number of Regions obtained, R
1	1	0	2 = 1 + 1
2	$2^2 = 4$	$1 = \frac{2\times1}{2}$	4 = 1 + 3
3	$3^2 = 9$	$3 = \frac{3\times2}{2}$	7 = 1 + 6
4	$4^2 = 16$	$6 = \frac{4\times3}{2}$	11 = 1 + 10
5	25	***b***	16 = 1 + 15
6	***a***	$15 = \frac{6\times5}{2}$	***c***
7			
.	.	.	.
.	.	.	.
N			

(a) Calculate the value of ***a***, of ***b*** and of ***c*** in the above table.
(b) Complete the 7th row in the table.
(c) By observing the pattern carefully, complete the *n*th row of the table.
(d) Show that $n^2 - \frac{n(n-1)}{2} = \frac{n(n+1)}{2}$.

Hence, write down an expression connecting S, P and R.

Answer: (a) ..... [3]
(b) ..... [2]
(c) ..... [2]
(d) ..... [3]

END OF PAPER 1

Anglo-Chinese School
(Independent)

PRELIMINARY EXAMINATION 2006
YEAR FOUR (EXPRESS)

MATHEMATICS
PAPER 2

4017/2

Tuesday **12 September 2006** **2h 30min**

INSTRUCTIONS TO STUDENTS

Write your answers and working on the separate answer paper provided.

Show all your working on the same page as the rest of the answer.

Omission of essential working will result in loss of marks.

Section A
Answer **all** questions.

Section B
Answer only **one** question.

INFORMATION FOR STUDENTS

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

The total number of marks for this paper is 100.

You are expected to use an electronic 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. Answers in degrees should be given to one decimal place.

For π, use either your calculator value or 3.142, unless the question requires the answer in terms of π.

SECTION A (88 MARKS)
Answer all the questions in this section

1. In January 2005, Mr. Tan earned a basic salary of $1300, plus 5% commission on all sales if his sales were more than $10 000. His total sales in January 2005 amounted to $15 000.

In the same month, Mr. Krishnan, a project manager, worked for 180 hours at a rate of $12.50 per hour. He did not work on Saturdays and Sundays, except for a particular Saturday in which he worked 6 hours and one Sunday, in which he worked 8 hours. The payment rate for Saturdays is one-and-a-half times the weekday payment rate; the payment rate for Sundays is double the weekday payment rate.

Calculate

(a) (i) Mr. Tan's salary for January 2005, [2]

(ii) Mr. Krishnan's salary for January 2005. [2]

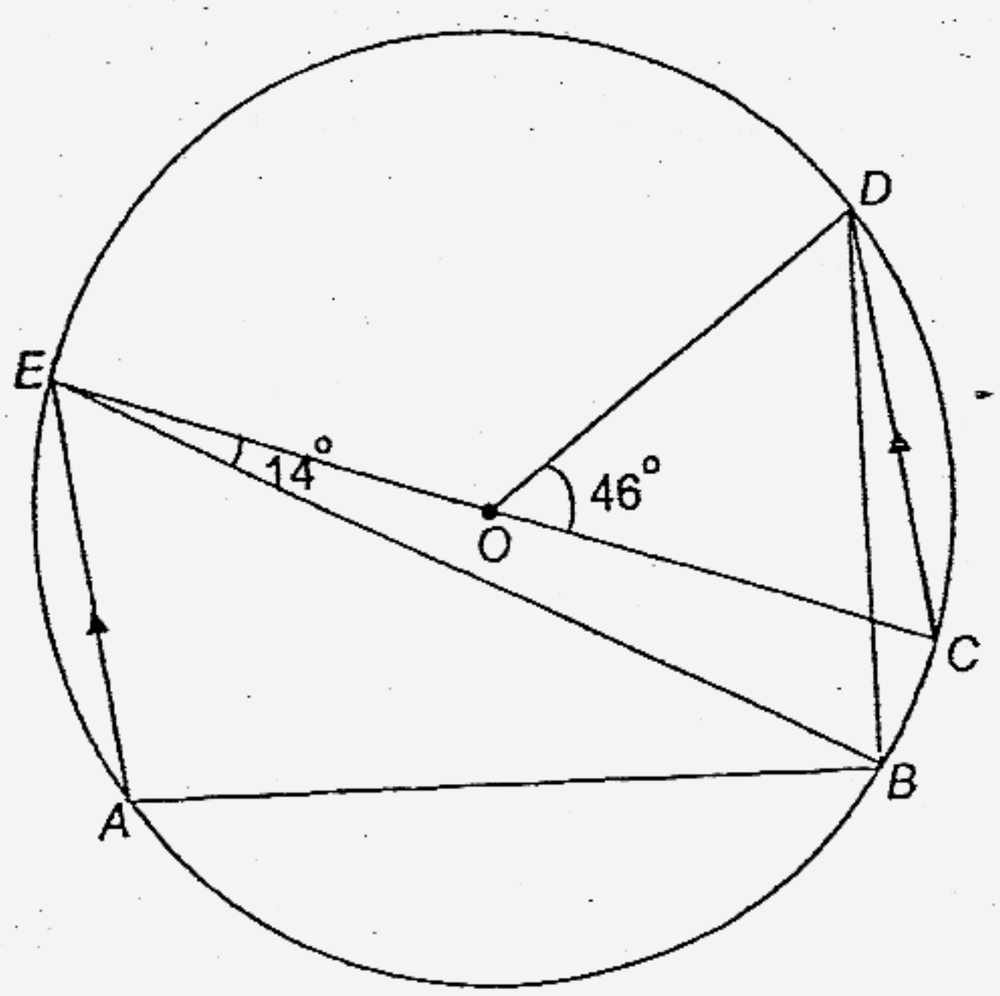
In January 2006, Mr. Tan received an increase of 3% on his basic salary, plus 8% commission on all sales if the total sales were more than $11 000.

(b) Calculate Mr. Tan's total sales for January 2006 if his salary for that month amounted to $2617.80. [3]

Mr. Krishnan's remuneration package (180 hours at $12.50 per hour) for January 2006 remained unchanged. However, he was given a performance bonus of $$P$.

(c) It is given that Mr. Krishnan did not work on any Saturday or Sunday in January 2006.
Calculate the value of P, correct to the nearest dollar, if Mr. Krishnan's salary for January 2006 was 25% more than that in January 2005. [3]

2.



The points A, B, C, D and E lie on a circle, centre O.
CE is a diameter of the circle.
AE is parallel to CD.
$\angle COD = 46^\circ$ and $\angle CEB = 14^\circ$

(a) Giving your reasons, calculate

(i) $\angle AEB$ [2]

(ii) $\angle DBE$ [1]

(iii) $\angle BAE$ [2]

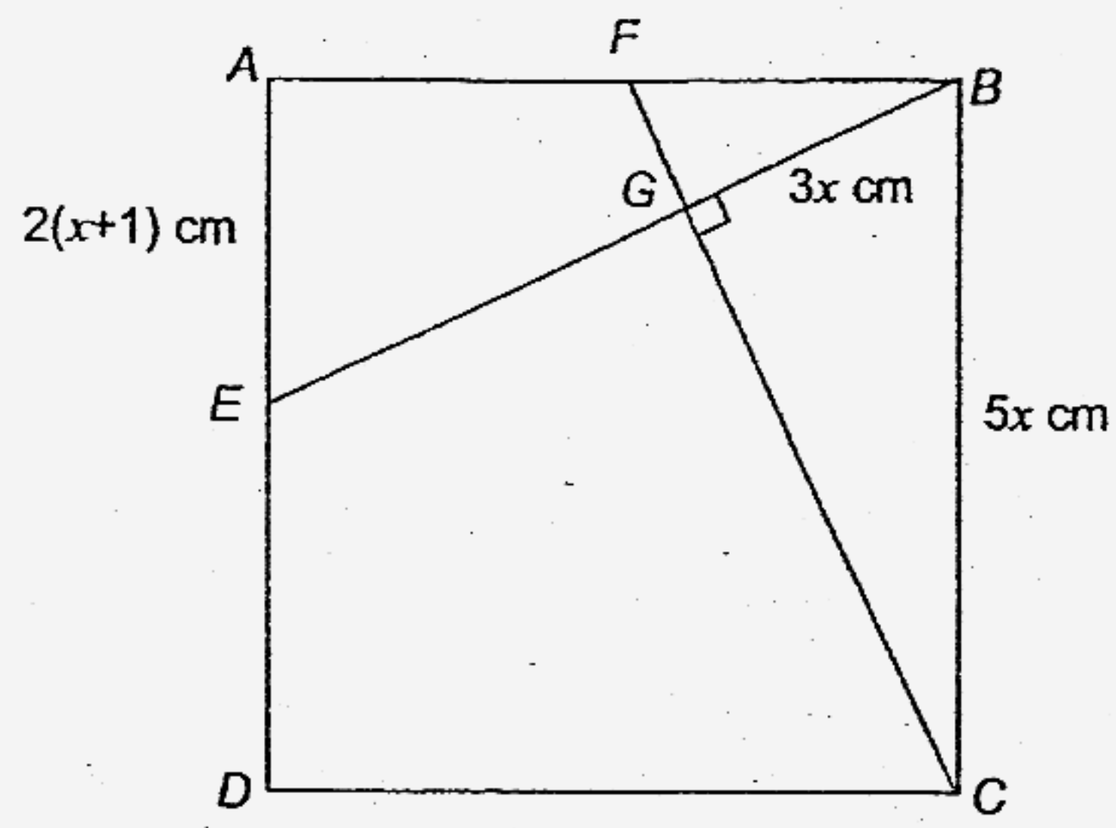
(b) Show that the line DO produced passes through A. [2]

(c) Given the radius of the circle is 10 cm, calculate the distance between the chords AE and CD. [3]

3. (a) Express $\frac{2}{3x-1}+\frac{5}{1-9x^2}$ as a single fraction in its lowest term. [2]

(b) Given that $9x^2-bx+49=0$ has two equal real roots, find the value of b. [2]

(c)



In the diagram, $ABCD$ is a square of side $5x$ cm. BE is drawn to meet CF at G. It is also given that $BG = 3x$ cm, $AE = 2(x + 1)$ cm, $\angle BGC = 90^\circ$ and the area of $CDEG$ is 12 cm^2.

(i) Use this information to form an equation, in terms of x, and show that it reduces to $14x^2-5x-12=0$. [3]

(ii) Solve the equation $14x^2-5x-12=0$, giving your answer correct to two decimal places. [2]

(iii) Hence, calculate the length of GE. [2]

4.

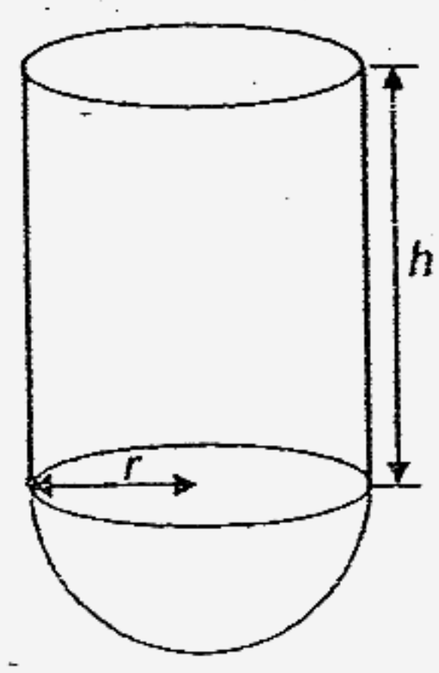


Diagram I

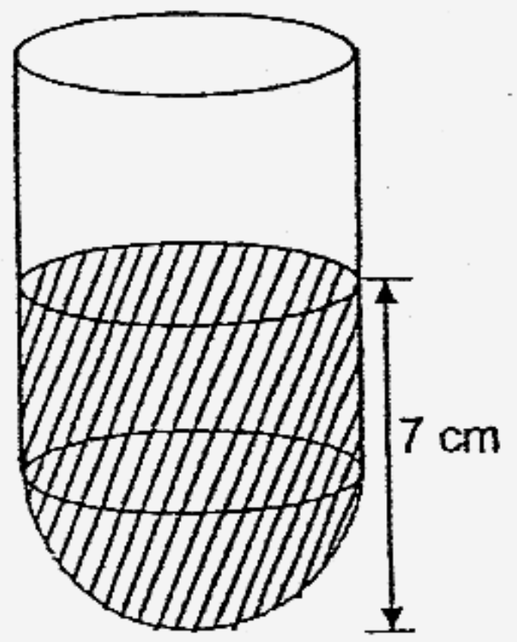


Diagram II

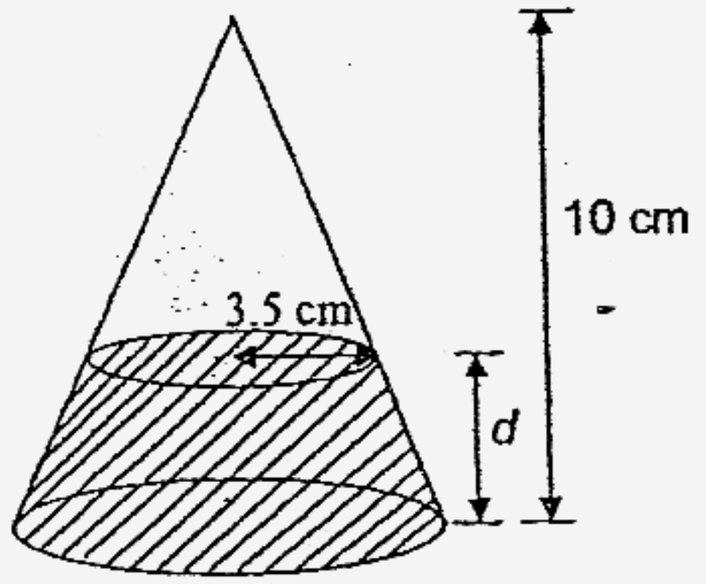


Diagram III

In an Odyssey of the Mind competition, the students are required to construct a container using a drink can and a hemispherical metal bowl, as shown in diagram I. The height of the drink can is h cm and the radius of the bowl is r cm. It is given that the capacity of the container is 18π cm^3 and that the capacity of the hemispherical bowl is $\frac{1}{8}$ that of the container.

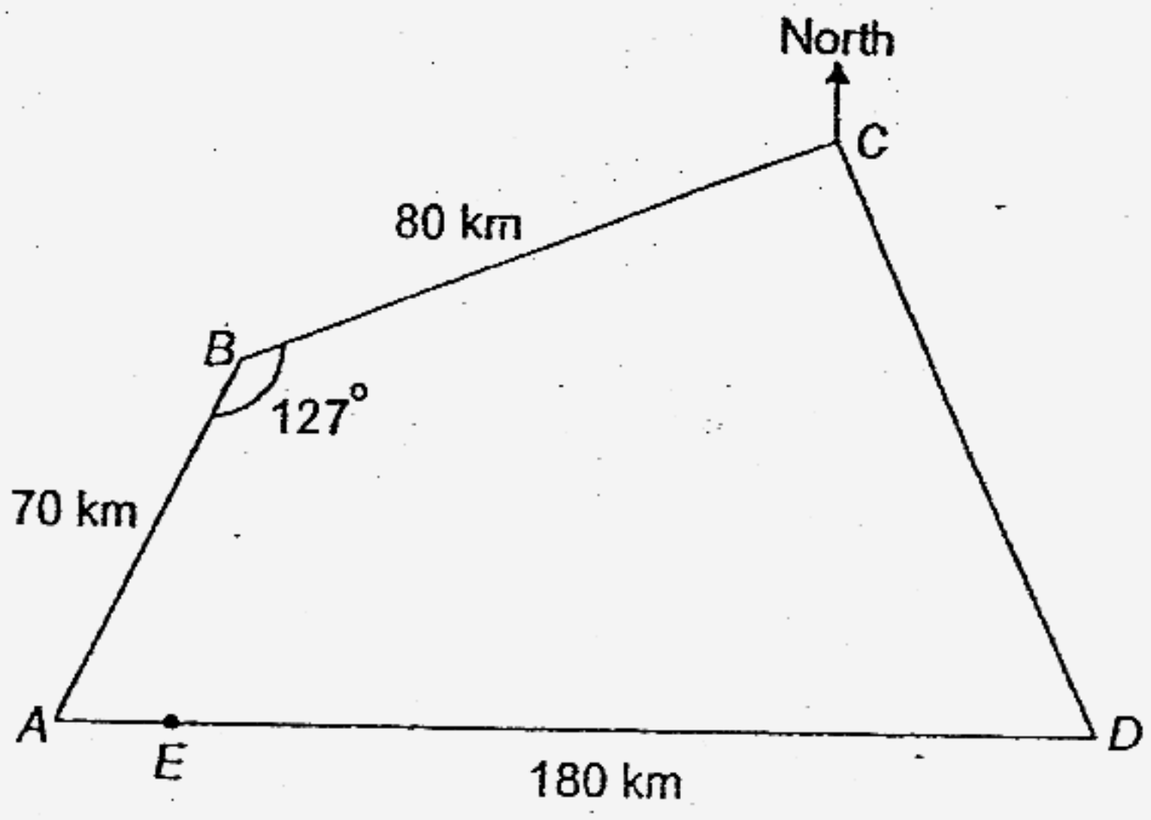
(a) Find the value of r and of h. [3]

(b) Water is poured into the container until it reaches 7 cm above the base of the container, as shown in Diagram II. Calculate the volume of the water in the container, leaving your answer in terms of π. [2]

(c) The water in the container in Diagram II is poured into a right circular cone placed upside down, as shown in Diagram III. If the radius of the water surface is 3.5 cm and the capacity of the cone is $35\frac{5}{8}\pi$ cm^3, find the height of the water level, d cm, in the cone. [3]

(d) A similar container as in diagram I is to be constructed so that it will be able to hold 54π cm^3 of liquid. Calculate the radius of the new container. [2]

5.



The diagram shows four towns, A, B, C and D on level ground.

D is 180 km due east of A and E is a rest station along AD such that $AE = \frac{1}{9}AD$.

The bearing of B from C is 261°.
$\angle ABC = 127^\circ$, $AB = 70$ km and $BC = 80$ km.

(a) Calculate

(i) the distance of A from C, [2]

(ii) $\angle ACB$, [2]

(iii) the bearing of A from C. [2]

(b) In Town A, the highest peak has a height of 7 500 m. Find the angle of elevation of the peak from the rest station at E. [2]

6. **Answer the whole of this question on a sheet of plain paper.**

Three buoys, P, Q and R are positioned in a lake such that Q is due east of P. $PQ = 900$ m, $\angle PQR = 55^\circ$, $\angle QPR = 64^\circ$ and S is the point on PQ which is 400 m from P.

(a) Using a scale of 1 cm to 100 m, construct an accurate drawing of the triangle PQR.

Measure and write down the length of PR. [3]

(b) Measure and write down the actual distance, in m, of the buoy R from S. [2]

(c) In a competition, canoes are to go from Q to a point A.
The point A is within the triangle PQR, 500 m from Q and equidistant from PQ and QR. On your diagram, construct the locus of points within the triangle PQR which are

(i) 500 m from Q, [1]

(ii) equidistant from PQ and QR. [1]

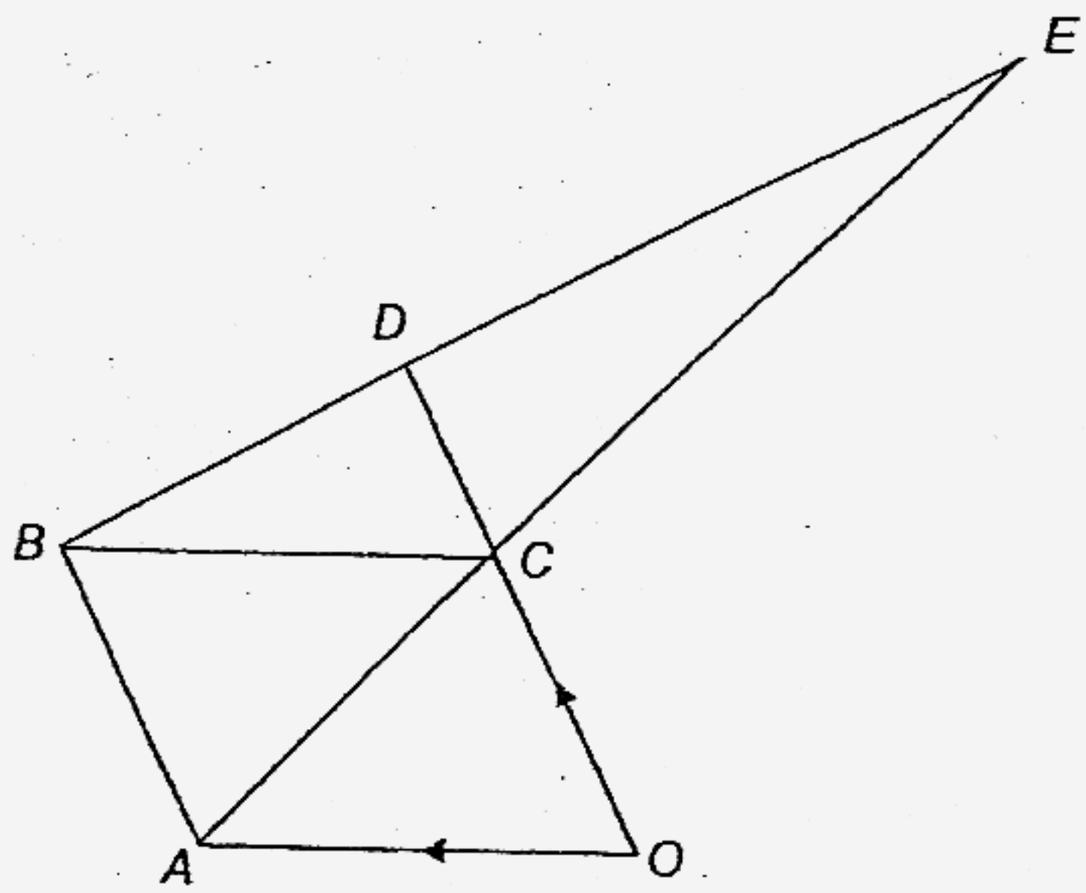
(d) (i) Mark clearly the position of A. [1]

(ii) Write down the bearing of A from R. [1]

(e) A canoe capsized within the triangle PQR, such that it is nearer to P than R and its distance from Q is less than 500m.

On your diagram, shade the region in which the canoe can be found. [1]

7.



In the diagram, $OABC$ is a parallelogram. E is a point on AC produced such that $AC : CE = 2 : 3$. It is given that $\overrightarrow{OA} = \mathbf{a}$ and $\overrightarrow{OC} = \mathbf{c}$.

(a) Express as simply as possible, in terms of $\mathbf{a}$ and/or $\mathbf{c}$,

(i) $\overrightarrow{OB}$, [1]

(ii) $\overrightarrow{AE}$, [1]

(iii) $\overrightarrow{OE}$, [1]

(iv) $\overrightarrow{BE}$. [1]

(b) Show that triangle OAC is congruent to triangle BCA. [1]

(c) OC is produced to D such that $\frac{BD}{BE} = k$, where k is a scalar.

Show that $2\overrightarrow{OD} = (2 - 5k)\mathbf{a} + (2 + 3k)\mathbf{c}$ [2]

(d) Given that $\frac{OD}{OC} = h$, where h is a scalar, and using the results in (c), find the values of h and of k.

[3]

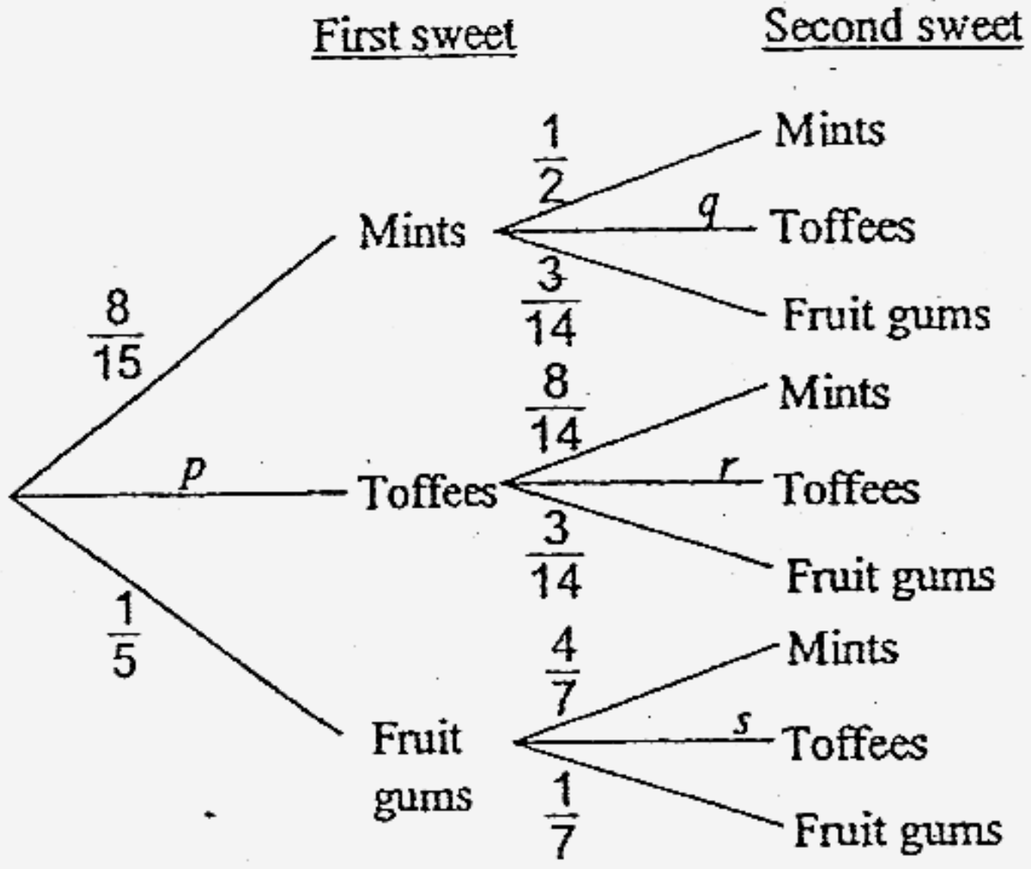
(e) Hence, find the numerical value of

(i) $\frac{CD}{OC}$, [1]

(ii) $\frac{\text{Area of triangle } DCE}{\text{Area of triangle } BAE}$ [1]

8. On a visit to an orphanage, Mr. Lim decides to give some of the boys a treat. Mr. Lim has three types of sweets, namely, mints, toffees and fruit gums in a container. There are eight mints, four toffees and three fruit gums. A boy takes two sweets at random from the container, one after the other.

The tree diagram below shows the possible outcomes and some of their probabilities.



(a) Calculate the values of p, of q, of r and of s shown on the tree diagram. [2]

(b) Expressing each of your answers as a fraction in its lowest terms, calculate the probability that

(i) the two sweets are of different types, [2]

(ii) the second sweet is a toffee. [2]

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

The vertices of triangle ABC are $A(-2, 2\frac{1}{2})$, $B(-2, 3)$ and $C(-1, 3)$. The vertices of triangle $A_1B_1C_1$ are $A_1(-2, -2)$, $B_1(-2, -3)$ and $C_1(-4, -3)$.

(a) Using a scale of 2 cm to represent 1 unit on each axis, draw x and y axes for $-4 \leq x \leq 5$ and $-5 \leq y \leq 5$. Draw and label triangle ABC and $A_1B_1C_1$. [3]

(b) Describe fully the single transformation which map triangle ABC onto triangle $A_1B_1C_1$. [1]

(c) Triangle $A_1B_1C_1$ can be mapped onto triangle $A_2B_2C_2$ by a reflection in the y-axis. Draw and label triangle $A_2B_2C_2$. Describe fully another transformation which map triangle $A_1B_1C_1$ onto triangle $A_2B_2C_2$. [2]

(d) T is a translation represented by the column vector $\begin{pmatrix}1\\1\end{pmatrix}$ and R is a reflection in the line $y = -x$. Triangle $A_1B_1C_1$ can be mapped onto triangle $A_3B_3C_3$ by RT. Draw and label triangle $A_3B_3C_3$. [2]

(e) Triangle $A_2B_2C_2$ can be mapped onto triangle $A_3B_3C_3$ by a single transformation S. Describe S fully. [1]

(f) Triangle $A_3B_3C_3$ can be mapped onto triangle $A_4B_4C_4$ by a shear parallel to the x-axis, invariant line $y = 0$ and shear factor -1. Draw and label triangle $A_4B_4C_4$.
Find the ratio of the area of triangle ABC to the area of triangle $A_4B_4C_4$. [2]

SECTION B (12 MARKS)
Answer ONE question in this section.

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

400 candidates sat for an admission test at Anglo-Chinese School (Independent). The report on the test gave the following information:

None of the students obtained less than 5 marks.
The median score was 45 marks.
The upper quartile of the distribution was 58 marks.
The inter-quartile range of the distribution was 26 marks.
None of the students scored 85 marks or more.

(a) Calculate the lower quartile of the distribution. [1]

(b) Using a vertical scale of 4 cm to represent 100 candidates and a horizontal scale of 2 cm to represent 10 marks, draw a smooth cumulative frequency curve for the distribution based on the above information. [3]

(c) Use your graph to estimate the 30^{th} percentile of the distribution. [1]

(d) If 5% of the candidates qualified for the admission, use your graph to estimate the qualifying mark (correct to the nearest whole number). [1]

(e) If the qualifying mark is 70, how many candidates failed to qualify for the admission by a score difference of 2 marks? [2]

(f) The top 10% of the candidates are classified as 'High Achiever' and the bottom 30% of the candidates are classified as 'Under Achiever'. The remaining candidates are classified as 'Average'. Find an estimate for the least possible difference in the mark between a candidate classified as 'Under Achiever' and the mark of a candidate classified as 'High Achiever'. [2]

(g) The same candidates sat for a similar test in another school. It was noticed that each of the candidates scored 3 marks more. State what adjustment, if any, should be made to give the value of

(i) the median, [1]

(ii) the inter-quartile range. [1]

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

The variable x and y are connected by the equation $y=\frac{x^2-9x+24}{x}$.

The table below gives some values of x and the corresponding values of y.

x	2	2.3	2.6	3	4	5	6	7	8
y	5	3.7	2.8	2	1	0.8	1	1.4	2

(a) Taking 2 cm to represent 1 unit on the x-axis for $0 \leq x \leq 8$ and 4 cm to represent 1 unit on the y-axis for $0 \leq y \leq 5$, draw the graph of $y=\frac{x^2-9x+24}{x}$.

[3]

(b) Showing your method clearly, use your graphs to find the solutions of the equation $4x^2-41x+96=0$. [4]

(c) Using your graph, find the range of values of x for which $\frac{x^2+24}{x} \geq -\frac{1}{2}x+13$.

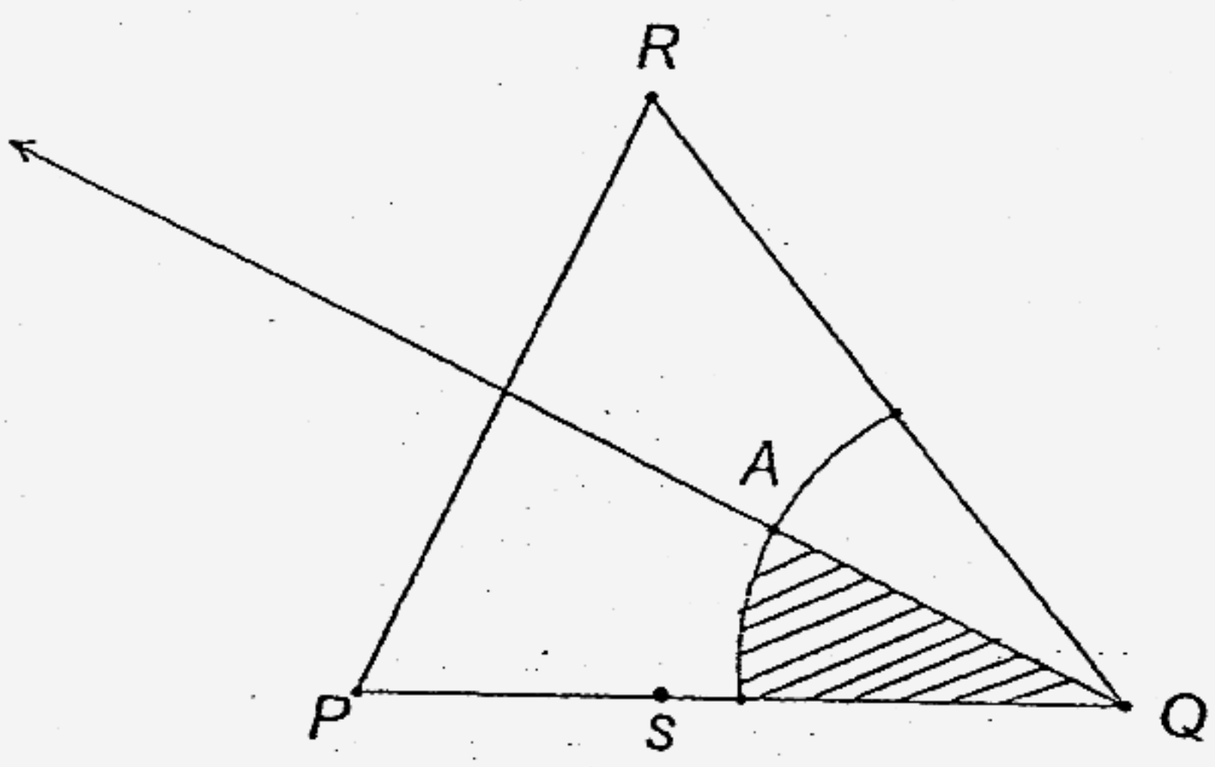
[3]

(d) The line $y=-\frac{1}{2}x+c$ is a tangent to the curve. Use your graph to find the value of c. [2]

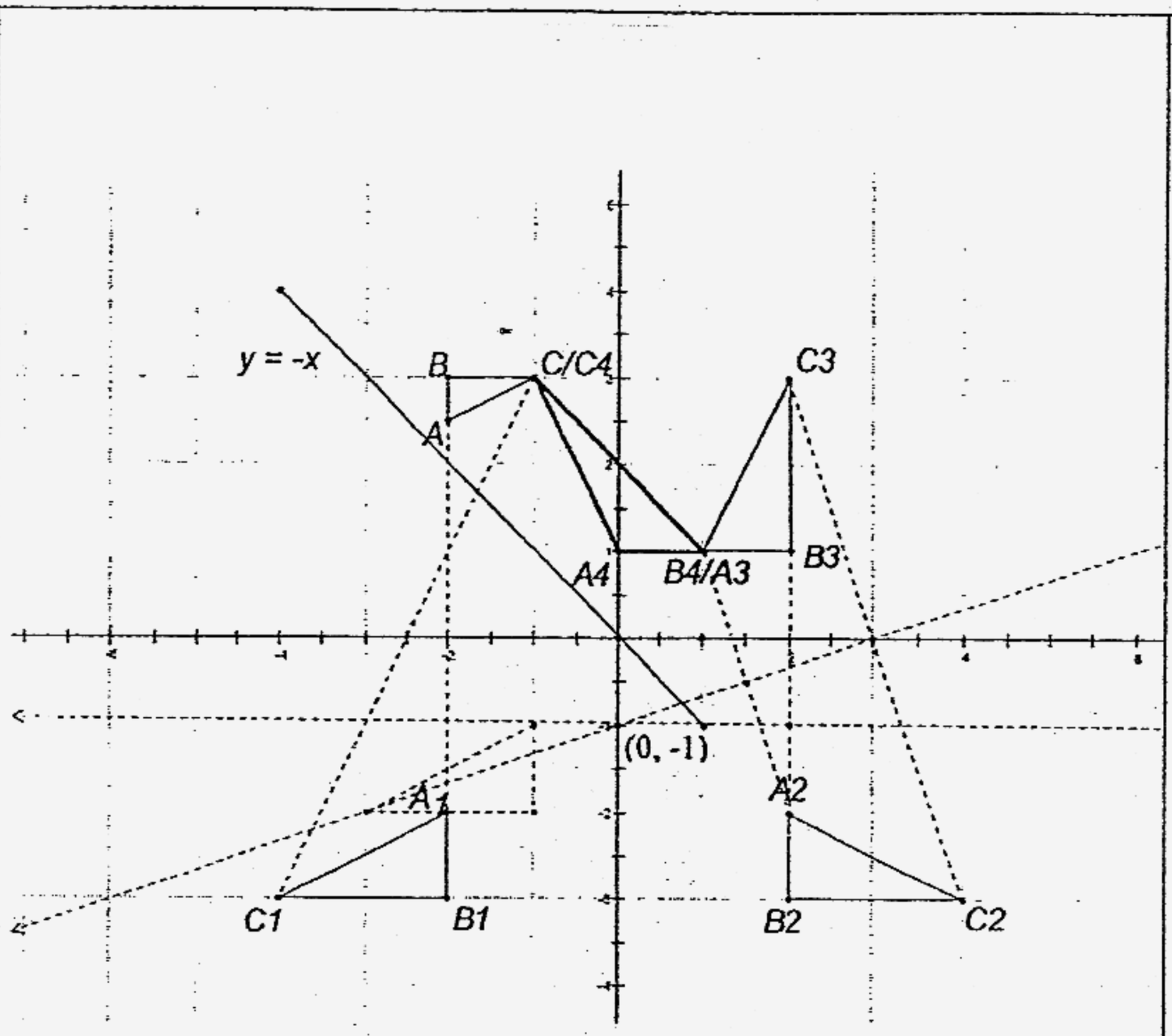
-- END OF PAPER --

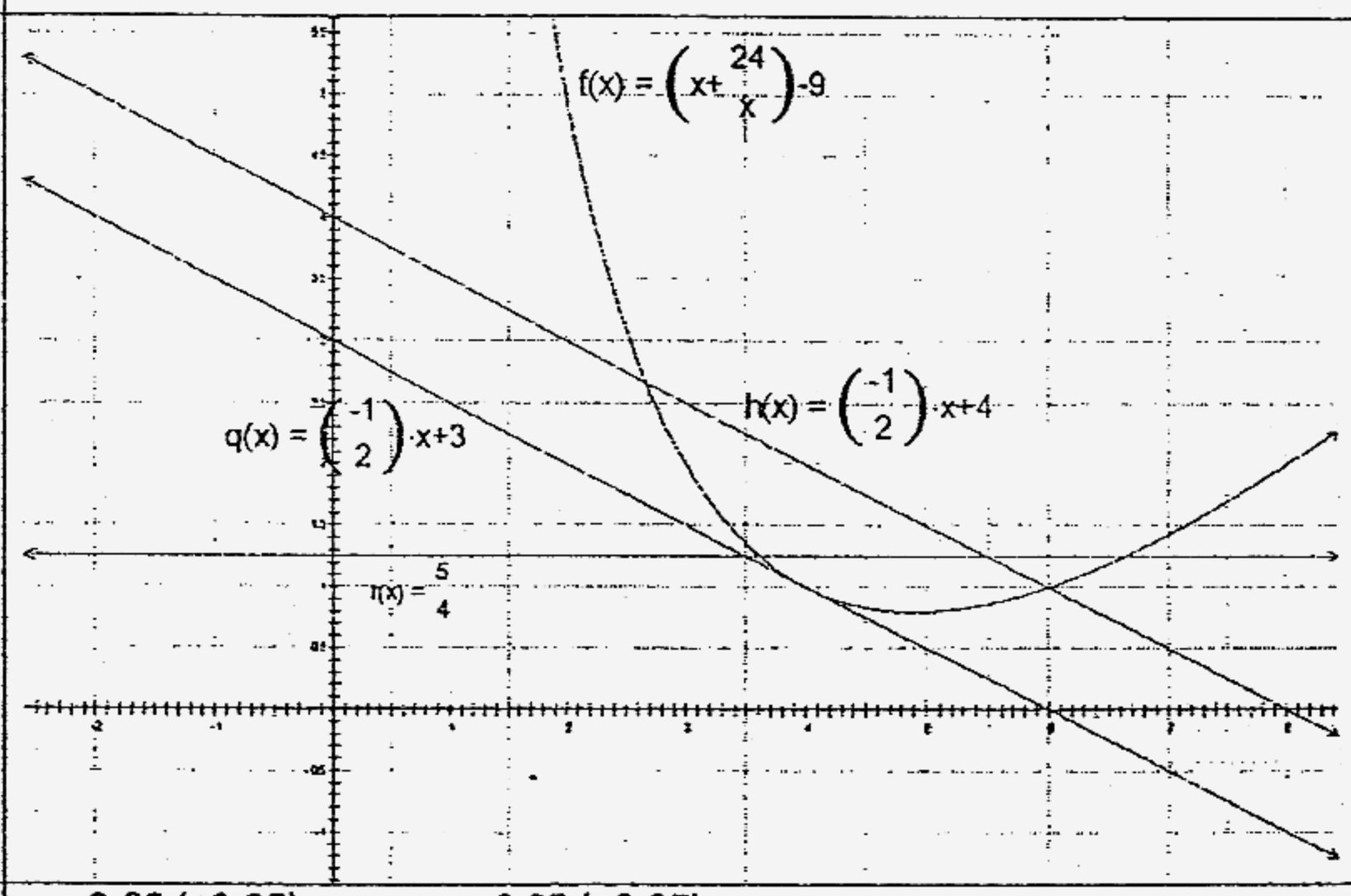
Answer Key

1. (a)(i)	$2050	
(ii)	$2562.50	
1 (b)	$15985	
1 (c)	$953 (correct to the nearest dollar)	
2(a) (i)	$\angle AEB = 53^\circ$	
2(a) (ii)	$\angle DBE = 67^\circ$ (Angle at centre = 2 x Angle at circumference)	
2(a) (iii)	$\angle BAE = 180^\circ - 76^\circ = 104^\circ$ (Opposite angles, cyclic quad)	
2 (b)	If DO produced passes through A which is on the circumference, then $\angle BDO = \angle BEA$, angles in the same segment $\angle BDO = \angle BDE - \angle ODE$ $\angle BDO = (180^\circ - 104^\circ) - \frac{180^\circ - 134^\circ}{2} = 53^\circ = \angle BEA$	
2 (c)	Distance btw chords AE and CD = <u>18.4 cm</u>	
3 (a)	$\frac{6x-3}{(3x-1)(3x+1)}$ OR $\frac{3(2x-1)}{(3x-1)(3x+1)}$	
3 (b)	b = ±42	
3 (c)(i)	Area of ABCD = $25x^2$ Area of triangle BAE = $\frac{1}{2}[2(x+1)](5x) = 5x(x+1)$ CG = $\sqrt{(5x^2)-(3x^2)} = 4x$ Area of triangle BGC = $\frac{1}{2}(3x)(4x) = 6x^2$ $25x^2 - 5x(x+1) - 6x^2 = 12$ $25x^2 - 5x^2 - 5x - 6x^2 = 12$ $14x^2 - 5x - 12 = 0$	
3 (c)(ii)	x = 1.12 or -0.76	

3 (c)(iii)	GE = 3.66 cm	
4 (a)	$r = 1\frac{1}{2} cm, \quad h = 7 cm$	
4 (b)	Volume of water = $14\frac{5}{8}\pi \ cm^3$	
4 (c)	Height of water level in the cone, d = 4.86 cm	
4 (d)	2.16 cm	
5 (a)(i)	AC = 134 km	
5 (a)(ii)	$\angle ACB = 24.7^o$	
5 (a)(iii)	Bearing of A from C = 236.3°	
5 (b)	Angle of elevation of the mountain from E = 20.6°	
6		
6 (a)	PR = 8.5 cm (±0.1 cm)	
6 (b)	RS = 7.6 cm (±0.1 cm) Actual distance = 760 m	
6 (c)(i)	Arc of radius 5 cm, centre Q	
6 (c)(ii)	Angle bisector of angle PQR	
6 (d)(i)	As shown in the diagram	

6 (d)(ii)	Bearing of A from R is 170.5°	
6 (e)	As shown in the diagram	
7 (a)(i)	$\overrightarrow{OB} = \mathbf{a} + \mathbf{c}$	
7 (a)(ii)	$\overrightarrow{AE} = \frac{5}{2}(\mathbf{c} - \mathbf{a})$	
7 (a)(iii)	$\overrightarrow{OE} = \frac{1}{2}(5\mathbf{c} - 3\mathbf{a})$	
7 (a)(iii)	$\overrightarrow{BE} = \frac{1}{2}(3\mathbf{c} - 5\mathbf{a})$	
7 (b)	Proof	
7 (c)	Proof	
7 (d)	$k = \frac{2}{5}$, $h = \frac{8}{5}$	
7 (e)(i)	$\frac{CD}{OC} = \frac{3}{5}$	
7 (e)(ii)	$\frac{Area\ of\ triangle\ DCE}{Area\ of\ triangle\ BAE} = \frac{9}{25}$	
8 (a)	$p = \frac{4}{15}$, $q = \frac{4}{14} = \frac{2}{7}$, $r = \frac{3}{14}$, $s = \frac{4}{14} = \frac{2}{7}$	
8 (b)(i)	p(both sweets are different) = $\frac{68}{105}$	
8 (b)(ii)	p(second sweet is a toffee)= $\frac{4}{15}$	

9		
9 (a)	Axes with the required scale and range Triangle ABC correctly drawn Triangle $A_1B_1C_1$ correctly drawn	
9 (b)	Enlargement with centre (-2, 1), scale factor -2	
9 (c)	Stretch parallel to x-axis, invariant line y-axis, stretch factor -1	
9 (d)	As shown in the diagram	
9 (e)	90° anticlockwise rotation about (0, -1)	
9 (f)	Area of triangle ABC : Area of triangle $A_4B_4C_4$ = $\underline{1:4}$	
10 (a)	Lower quartile =32	
10 (b)	Graph	
10 (c)	30^{th} percentile = 35	

10 (d)	Qualifying mark = 72	
10 (e)	Number of candidates who failed to qualify by 2 marks = 10	
10 (f)	Difference in mark = 33 (±1)	
10 (g)(i)	Add 3 more marks. Median = 48	
10 g)(ii)	No change	
11 (a)		[A3]
11 (b)	x = 3.65 (±0.05) or x = 6.65 (±0.05)	
11 (c)	$x \leq 2.65 \pm 0.1$ or $x \geq 6 \pm 0.1$	
11 (d)	c = 3	

-- END OF PAPER --