

# ICSE Paper 2005

## MATHEMATICS

### SECTION A [40 Marks]

(Answer *all* questions from this Section.)

#### Question 1.

- (a)  $(x - 2)$  is a factor of the expression  $x^3 + ax^2 + bx + 6$ . When this expression is divided by  $(x - 3)$ , it leaves the remainder 3. Find the values of  $a$  and  $b$ . [3]
- (b) What number must be added to each of the numbers 6, 15, 20 and 43 to make them proportional? [3]
- (c) If the interest is compounded half yearly, calculate the amount when the Principal is ₹ 7,400, the rate of interest is 5% per annum and the duration is one year. [4]

#### Solution.

(a) Let

$$p(x) = x^3 + ax^2 + bx + 6$$

As  $(x - 2)$  is a factor of  $p(x)$ ,  $p(2) = 0$

$$\therefore 8 + 4a + 2b + 6 = 0$$

$$\Rightarrow 2a + b + 7 = 0 \quad \dots(1)$$

As  $p(x)$  leaves the remainder 3 when divided by  $(x - 3)$ ,

$$p(3) = 3$$

$$\therefore 27 + 9a + 3b + 6 = 3$$

$$3a + b + 10 = 0 \quad \dots(2)$$

Solving (1) and (2), we get

$$2a + b + 7 = 0$$

$$3a + b + 10 = 0$$

$$\underline{\quad\quad\quad} - a - 3 = 0 \Rightarrow a = -3$$

from (1),

$$2(-3) + b + 7 = 0$$

$$b = -1$$

$$a = -3, b = -1$$

Ans.

(b) Let the number  $x$  be added from each number.

$$\therefore (6 + x) : (15 + x) :: (20 + x) : (43 + x)$$

$$\Rightarrow (6 + x)(43 + x) = (15 + x)(20 + x)$$

$$\Rightarrow 49x + 258 = 35x + 300$$

$$\Rightarrow 14x = 42$$

$$\Rightarrow x = 3$$

$\therefore$  The required number be 3.

Ans.

(c) Given :  $P = ₹ 7,400$ ,  $r = 5\%$ ,  $n = 1$  year.

Since, interest is compounded half yearly.

$$r = \frac{5}{2}\% \text{ and } n = 2 \text{ years.}$$

We know that,

$$\begin{aligned} A &= P \left( 1 + \frac{r}{100} \right)^n \\ &= 7,400 \left( 1 + \frac{5}{200} \right)^2 \\ &= \frac{7,400 \times 41 \times 41}{40 \times 40} \\ &= 7,774.625 \\ &= ₹ 7,774.63 \end{aligned}$$

**Ans.**

### Question 2.

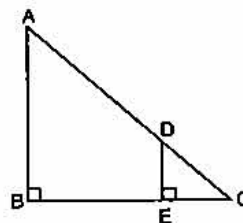
(a) Mr. R. K. Nair gets ₹ 6,455 at the end of one year at the rate of 14% per annum in a recurring deposit account. Find the monthly instalment. [3]

(b)  $A = \{x : 11x - 5 > 7x + 3, x \in R\}$  and

$$B = \{x : 18x - 9 \geq 15 + 12x, x \in R\}$$

Find the range of set  $A \cap B$  and represent it on a number line. [3]

(c) In the given figure,  $AB$  and  $DE$  are perpendicular to  $BC$ . If  $AB = 9$  cm,  $DE = 3$  cm and  $AC = 24$  cm, calculate  $AD$ . [4]



### Solution.

(a) Let the monthly instalment be ₹  $x$ .

Given : Maturity amount = ₹ 6,455, Time ( $n$ ) = 1 year = 12 months, Rate ( $R$ ) = 14% p.a.

$$\begin{aligned} \text{Principle for one month} &= P \frac{n(n+1)}{2} \\ &= \frac{x \times 12(12+1)}{2} \\ &= 78x \end{aligned}$$

$$\begin{aligned} \text{Interest} &= \frac{PRT}{100} \\ &= \frac{78x \times 14 \times 1}{100 \times 12} \end{aligned}$$

$$\text{Actual sum deposited} = 12x$$

$$\text{Maturity amount} = \text{Interest} + \text{Actual sum deposited}$$

$$6,455 = \frac{91x}{100} + 12x$$

$$6,455 = \frac{1,291x}{100}$$

$$\begin{aligned} x &= \frac{6,45,500}{1,291} \\ &= 500 \end{aligned}$$

∴ Monthly instalment be ₹ 500.

**Ans.**

(b) Let

$$\begin{aligned} A &= \{x : 11x - 5 > 7x + 3, x \in R\} \\ &= \{x : 4x > 8, x \in R\} \end{aligned}$$

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$$= \{x : x > 2, x \in \mathbb{R}\} \quad \dots(1)$$

and

$$B = \{x : 18x - 9 \geq 15 + 12x, x \in \mathbb{R}\}$$

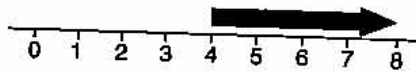
$$= \{x : 6x \geq 24, x \in \mathbb{R}\}$$

$$= \{x : x \geq 4, x \in \mathbb{R}\} \quad \dots(2)$$

from equation (1) and (2), we get

$$A \cap B = \{x : x \geq 4, x \in \mathbb{R}\}$$

Number line :



(c)

$$\Delta ABC \sim \Delta DEC \quad \dots(1)$$

and

$$\angle B = \angle E = 90^\circ$$

∴ from (1),

$$\angle C = \angle C$$

(given)  
(common)

$$\frac{AB}{DE} = \frac{AC}{DC}$$

⇒

$$\frac{9}{3} = \frac{24}{DC}$$

⇒

$$AD = 8 \text{ cm}$$

∴

$$AD = AC - DC = 24 - 8$$

$$= 16 \text{ cm.}$$

Ans.

**Question 3.**

(a) Use a graph paper for this question. (Take 10 small divisions = 1 unit on both axes).

P and Q have co-ordinates (0, 5) and (-2, 4).

(i) P is invariant when reflected in an axis. Name the axis.

(ii) Find the image of Q on reflection in the axis found in (i).

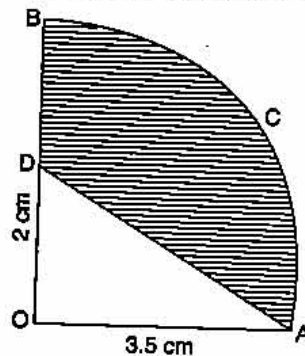
(iii) (0, k) on reflection in the origin is invariant. Write the value of k.

(iv) Write the co-ordinates of the image of Q, obtained by reflecting it in the origin followed by reflection in x-axis. [3]

(b) If the mean of the following distribution is 7.5, find the missing frequency 'f':

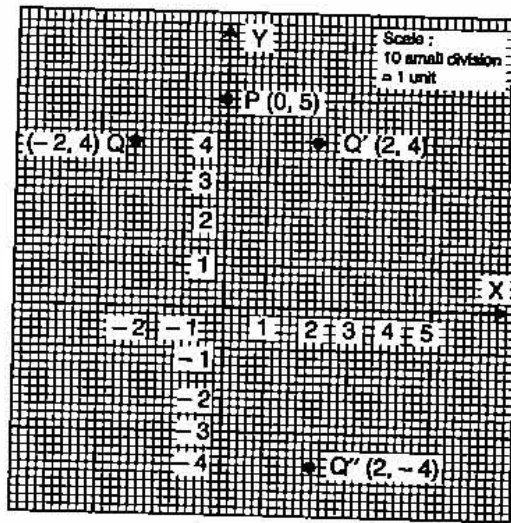
Variable :	5	6	7	8	9	10	11	12
Frequency :	20	17	f	10	8	6	7	6

(c) In the figure given below, OACB is a quadrant of a circle. The radius OA = 3.5 cms. OD = 2 cm. Calculate the area of the shaded portion. [3]



Solution.  
(a)

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- (i) Y-axis.
- (ii)  $Q'(2, 4)$
- (iii)  $k = 0$
- (iv)  $Q''(2, -4)$ .

(b)

Variable ( $x$ )	Frequency ( $f$ )	$f \times x$
5	20	100
6	17	102
7	$f$	$7f$
8	10	80
9	8	72
10	6	60
11	7	77
12	6	72
	$\Sigma f = 74 + f$	$\Sigma fx = 563 + 7f$

$$\begin{aligned} \text{Mean} &= \frac{\Sigma fx}{\Sigma f} \\ \Rightarrow 7.5 &= \frac{563 + 7f}{74 + f} \\ \Rightarrow 555 + 7.5f &= 563 + 7f \\ \Rightarrow 0.5f &= 8 \\ f &= 16 \text{ Ans.} \end{aligned}$$

(c)

$$\begin{aligned} \text{Area of quadrant OACB} &= \frac{1}{4} \pi r^2 \\ &= \frac{1}{4} \times \frac{22}{7} \times (3.5)^2 \\ &= 9.625 \text{ cm}^2 \\ \text{Area of } \Delta \text{ OAD} &= \frac{1}{2} \times 2 \times 3.5 \\ &= 3.5 \text{ cm}^2 \\ \text{Required shaded portion} &= 9.625 - 3.5 \\ &= 6.125 \text{ cm}^2. \end{aligned}$$

Ans.

**Question 4.**

(a) Draw a histogram to represent the following data :

[3]

Pocket money in ₹	No. of Students
150 — 200	10
200 — 250	5
250 — 300	7
300 — 350	4
350 — 400	3

(b) Prove that  $(1 + \tan A)^2 + (1 - \tan A)^2 = 2\sec^2 A$ .

[3]

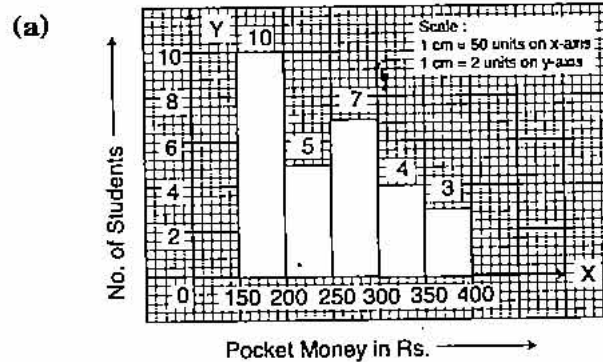
(c) The catalogue price of a computer set is ₹ 45,000. The shopkeeper gives a discount of 7% on the listed price. He gives a further off-season discount of 4% on the balance. However, sales tax at 8% is charged on the remaining amount. Find :

(i) The amount of sales tax a customer has to pay,

(ii) The final price he has to pay for the computer set.

[4]

**Solution.**



(b)

$$\begin{aligned}
 \text{L.H.S.} &= (1 + \tan A)^2 + (1 - \tan A)^2 \\
 &= 1 + \tan^2 A + 2 \tan A + 1 + \tan^2 A - 2 \tan A \\
 &= 2 + 2 \tan^2 A \\
 &= 2(1 + \tan^2 A) \\
 &= 2 \sec^2 A \qquad (\because \sec^2 A - \tan^2 A = 1)
 \end{aligned}$$

**Hence proved.**

(c) Given :  $P = 45,000, r_1 = 7\%, r_2 = 4\%$

$$\begin{aligned}
 \text{S.P. after discount} &= \left( 45,000 - \frac{7}{100} \times 45,000 \right) - \text{further discount} \\
 &= 41,850 - \frac{4}{100} \times 41,850 = ₹ 40,176.00
 \end{aligned}$$

(i) Sales tax =  $\frac{8}{100} \times 40,176$

$$= ₹ 3,214.08$$

(ii) Final price he has to pay = ₹ 40,176 + 3,214.08

$$= ₹ 43,390.08.$$

**Ans**

**SECTION B [40 Marks]**

(Answer any four questions from this Section)

**Question 5.**

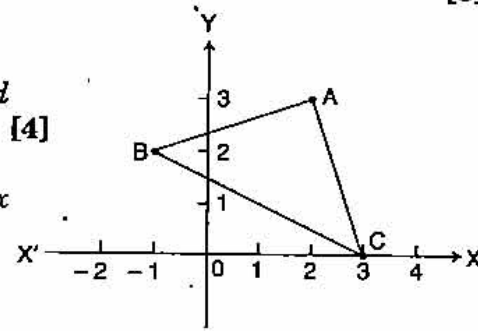
(a) Solve the following equation and give your answer up to two decimal places :

$$x^2 - 5x - 10 = 0 \quad [3]$$

(b) PQR is a right-angled triangle with PQ = 3 cm and QR = 4 cm. A circle which touches all the sides of the triangle is inscribed in the triangle. Calculate the radius of the circle. [3]

(c) In the given figure, write

- (i) the co-ordinates of A, B and C.
- (ii) the equation of the line through A and // to BC.



**Solution.**

(a) Comparing  $x^2 - 5x - 10 = 0$  with  $ax^2 + bx + c = 0$ , we have  $a = 1, b = -5, c = -10$

$$\therefore x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\Rightarrow x = \frac{5 \pm \sqrt{25 + 40}}{2 \times 1} = \frac{5 \pm \sqrt{65}}{2}$$

$$x = \frac{5 + 8.06}{2} \text{ or } \frac{5 - 7.08}{2}$$

$$\Rightarrow x = 6.53 \text{ or } -1.53.$$

Ans.

(b) Let O be the centre

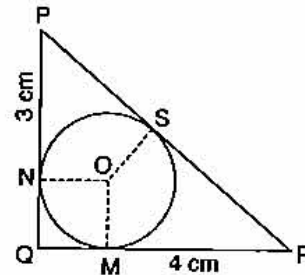
$$\angle OMQ = \angle ONQ = 90^\circ$$

$\therefore$  radius is always  $\perp$  to tangent.

$\therefore$  OMQN is a square.

Let the radius be  $r$  cm.

$$\begin{aligned} \therefore PR &= \sqrt{PQ^2 + QR^2} \\ &= \sqrt{9 + 16} = 5 \text{ cm} \end{aligned}$$



We have,  $PN = PS, SR = MR, QN = QM$

$\therefore$  Tangents are equal in length from an external point.

$$\therefore PN = PS \Rightarrow 3 - r = PS$$

$$SR = MR \Rightarrow 4 - r = SR$$

$$3 - r + 4 - r = PS + SR$$

$$7 - 2r = PR = 5$$

$$7 - 5 = 2r$$

$$r = 1 \text{ cm.}$$

Ans.

(c) (i) A (2, 3), B (-1, 2), C (3, 0)

Ans.

(ii) Slope of BC =  $\frac{2 - 0}{-1 - 3} = -\frac{1}{2}$

Since line is parallel i.e.,  $m = m_1$

$\therefore$  The equation  $y - y_1 = m(x - x_1)$

$$\begin{aligned} \Rightarrow y - 3 &= -\frac{1}{2}(x - 2) \\ \Rightarrow 2y - 6 &= -x + 2 \\ \Rightarrow x + 2y &= 8 \end{aligned}$$

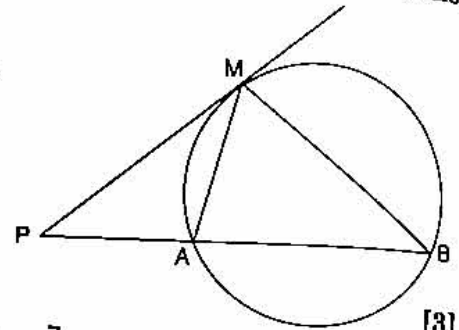
**Question 6.**

(a) In the figure, PM is a tangent to the circle and PA = AM. Prove that :

(i)  $\Delta PMB$  is isosceles.

(ii)  $PA \cdot PB = MB^2$

[3]



Ans.

(b) Find the value of  $x$  given that  $A^2 = B$

$$A = \begin{bmatrix} 2 & 12 \\ 0 & 1 \end{bmatrix} \quad B = \begin{bmatrix} 4 & x \\ 0 & 1 \end{bmatrix}$$

[3]

(c) Write down the relation denoted by the arrow diagram, by listing the ordered pairs. State the domain, co-domain and the range of the relation.

Is the relation a function? If so, state its type. \*\*

[4]

**Solution.**

(a) (i)

$$\angle AMP = \angle APM$$

( $\because PA = AM$  given)

but

$$\angle AMP = \angle PBM$$

$\therefore$  Angle between the tangent and chord is equal to angle subtended by same chord in alternate segment.

$$\therefore \angle APM = \angle PBM$$

$\therefore \Delta PMB$  is an isosceles.

**Proved**

(ii)

$$\Delta PMB \sim \Delta PAM$$

...(1)

$\therefore$

$$\angle PBM = \angle AMP$$

(as proved above)

and

$$\angle MPB = \angle MPA$$

(common)

$\therefore$  from (1),

$$\frac{MP}{PA} = \frac{MB}{AM} = \frac{PB}{PM}$$

$\Rightarrow$

$$PM^2 = PA \cdot PB$$

$\Rightarrow$

$$MB^2 = PA \cdot PB$$

$\therefore$

$$PM = MB$$

**Proved**

(b) Given :  $A^2 = B$

$$\Rightarrow A \cdot A = B$$

$$\begin{bmatrix} 2 & 12 \\ 0 & 1 \end{bmatrix} \begin{bmatrix} 2 & 12 \\ 0 & 1 \end{bmatrix} = \begin{bmatrix} 4 & x \\ 0 & 1 \end{bmatrix}$$

$\Rightarrow$

$$\begin{bmatrix} 4 & 36 \\ 0 & 1 \end{bmatrix} = \begin{bmatrix} 4 & x \\ 0 & 1 \end{bmatrix}$$

$\Rightarrow$

$$x = 36$$

Ans.

\*\* Solution has not given due to out of present syllabus.

Question 7. [www.10yearsquestionpaper.com](http://www.10yearsquestionpaper.com)

- (a) Mr. Tiwari invested ₹ 29,040 in 15% ₹ 100 shares quoted at a premium of 20%. Calculate :
- The number of shares bought by Mr. Tiwari.
  - Mr. Tiwari's income from the investment.
  - The percentage return on his investment. [3]
- (b) From the top of a cliff 92 m high, the angle of depression of a buoy is 20°. Calculate to the nearest metre, the distance of the buoy from the foot of the cliff. [3]
- (c) A circle with center O, diameter AB and a chord AD is drawn. Another circle is drawn with AO as diameter to cut AD at C. Prove that  $BD = 2OC$ . [4]

**Solution.**

(a) (i) Market value of one share =  $100 + 20 = ₹ 120$

$$\therefore \text{No. of shares} = \frac{\text{Invested money}}{\text{Market value}} = \frac{29,040}{120} = 242$$

Ans.

(ii) Income =  $\frac{15}{100} \times 100 \times 242 = ₹ 3,630$

Ans.

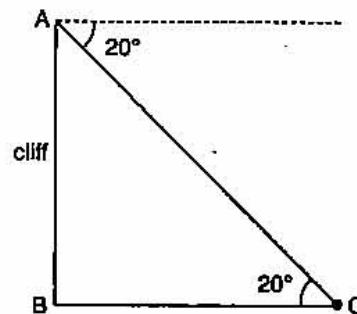
(iii) % Return =  $\frac{3,630}{29,040} \times 100 = 12.5\%$

Ans.

(b) The distance of buoy from foot = BC

$$\begin{aligned} &= \frac{92}{\tan 20^\circ} \\ &= \cot 20^\circ \times 92 \\ &= \tan 70^\circ \times 92 \\ &= 2.748 \times 92 \\ &= 252.8 \text{ m} \end{aligned}$$

Ans.



(c) In  $\Delta OAC$  and  $\Delta BAD$ ,

$$\angle OCA = \angle BAD = 90^\circ$$

$\therefore$  Angle in semi-circle is right angle.

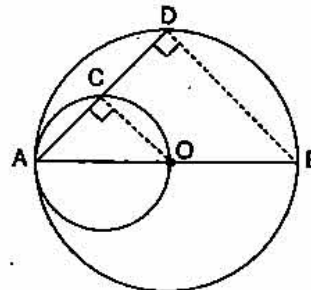
and  $\angle OAC = \angle BAD$  (common)

$\therefore \Delta OCA \sim \Delta BAD$

$$\therefore \frac{OA}{BA} = \frac{OC}{BD}$$

$$\Rightarrow \frac{OA}{2OA} = \frac{OC}{BD} \quad (\because BA = 2AO)$$

$$\Rightarrow BD = 2OC \quad \text{Hence proved.}$$



**Question 8.**

(a) Mr. Rakesh Sharma receives his annual salary as given below : \*\*

- Basic Salary : ₹ 6,000 per month.
- Dearness Allowance : ₹ 5,000 per month.

\*\* Solution has not given due to out of present syllabus.



**Savings :** [www.10yearsquestionpaper.com](http://www.10yearsquestionpaper.com)

- Contribution towards provident Fund : ₹ 13,200 per year.
- Contribution towards L.I.C. premium : ₹ 5,000 per year.

**Donations :**

- To Prime Minister's Relief Fund : ₹ 2,000 (eligible for 100% tax exemption)

**Calculate :**

- (i) Mr. Sharma's taxable income,
- (ii) The Mrs. Sharma has to pay for the financial year.

**Tax slab :**

Upto ₹ 50,000	:	No tax.
₹ 50,001 to ₹ 60,000	:	10% of income exceeding ₹ 50,000
₹ 60,001 to ₹ 1,50,000	:	₹ 1,000 + 20% of the income exceeding ₹ 60,000.
Above ₹ 1,50,000	:	₹ 19,000 + 30% of the income exceeding ₹ 1,50,000.
Standard Deduction	:	₹ 20,000.
Rebate in tax	:	20% of the total savings or ₹ 14,000 whichever is less.
CESS	:	2% of the tax payable after rebate.

[6]

- (b) A metallic sphere of radius 10.5 cm is melted and then recast into small cones, each of radius 3.5 cm and height 3 cm. Find the number of cones thus obtained.

[4]

**Solution :**

$$(b) \quad \text{No. of cones} = \frac{\text{Volume of sphere}}{\text{Volume of one cone}} = \frac{\frac{4}{3} \pi R^3}{\frac{1}{3} \pi r^2 h} = \frac{4R^3}{r^2 h} = \frac{4 \times (10.5)^3}{(3.5)^2 \times 3} = 126.$$

Ans.

**Question 9.**

- (a) Use a graph paper for this question.

The graph of a linear equation in  $x$  and  $y$ , passes through A  $(-1, -1)$  and B  $(2, 5)$ . From your graph, find the values of  $h$  and  $k$ , if the line passes through  $(h, 4)$  and  $(\frac{1}{2}, k)$ .

[3]

- (b) In an isosceles triangle ABC, with  $AB = AC$ , BD is the perpendicular from B to the side AC. Prove that  $BD^2 - CD^2 = 2CD \cdot AD$ .

[3]

- (c) A page from the passbook of Mrs. Rama Bhalla is given below :

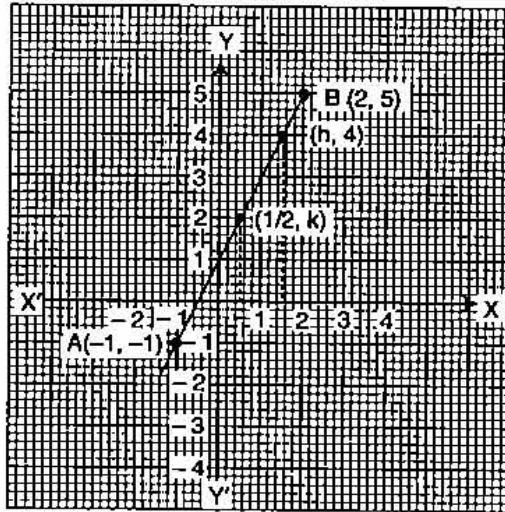
Date	Particulars	Withdrawals		Deposit		Balance		Signature
		₹	Ps.	₹	Ps.	₹	Ps.	
Year 2004								
January 1	B/F	—	—	—	—	20000.00		
January 9	By cash	—	—	200.00	—	2200.00		
February 10	To cheque	500.00	—	—	—	1700.00		
February 24	By cheque	—	—	300.00	—	2000.00		
July 29	To cheque	200.00	—	—	—	1800.00		
November 7	By cash	—	—	300.00	—	2100.00		
December 8	By cash	—	—	200.00	—	2300.00		

Calculate the interest due to Mrs. Bhalla for the period from January 2004 to December 2004, at the rate of 5% per annum.

[4]

**Solution.**

(a)



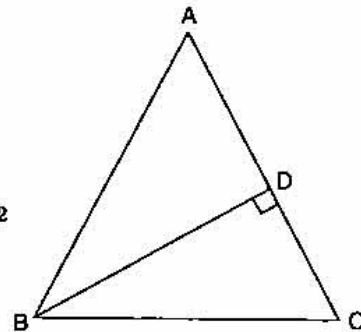
$$h = \frac{3}{2}, k = 2$$

**Ans.**

(b) In  $\triangle ABD$ ,  $BD^2 = AB^2 - AD^2$  ... (i)  
 In  $\triangle BDC$ ,  $CD^2 = BC^2 - BD^2$  ... (ii)

Subtracting (ii) from (i),

$$\begin{aligned} BD^2 - CD^2 &= (AB^2 - AD^2) - (BC^2 - BD^2) \\ &= AB^2 - (AC - DC)^2 - BC^2 + BD^2 \\ &= AB^2 - AC^2 - DC^2 + 2AC \cdot DC - BC^2 + BD^2 \\ &= 2AC \cdot DC - DC^2 - (BC^2 - DB^2) \\ &= 2AC \cdot DC - 2DC^2 \quad (\because AB = AC) \\ &= 2DC (AC - DC) \\ &= 2DC \cdot AD \end{aligned}$$



**Hence Proved.**

(c)

Qualifying amount	= ₹	2,200	January
	= ₹	1,700	February
	= ₹	2,000	March
	= ₹	2,000	April
	= ₹	2,000	May
	= ₹	2,000	June
	= ₹	1,800	July
	= ₹	1,800	August
	= ₹	1,800	September
	= ₹	1,800	October
	= ₹	2,100	November
	= ₹	2,300	December

Total ₹ 23,500

$$\begin{aligned} \text{S.I.} &= \frac{P \times R \times T}{100} \\ &= \frac{23,500 \times 5 \times 1}{12 \times 100} = 97.916 \\ &= ₹ 97-92 \end{aligned}$$

**Ans.**

**Question 10.** [www.10yearsquestionpaper.com](http://www.10yearsquestionpaper.com)

(a) Using a ruler and compass only :

- (i) Construct a triangle ABC with  $BC = 6$  cm,  $\angle ABC = 120^\circ$  and  $AB = 3.5$  cm.
- (ii) In the above figure, draw a circle with BC as diameter. Find a point 'P' on the circumference of the circle which is equidistant from AB and BC.  
Measure  $\angle BCP$ .

[4]

(b) Using a graph paper, draw an Ogive for the following distribution which shows a record of the weight in kilograms of 200 students.

Weight	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80
Frequency	5	17	22	34	51	31	20	9

Use your Ogive to estimate the following :

- (i) The percentage of students weighing 55 kg or more.
- (ii) The weight above which the heaviest 30% of the students fall,
- (iii) The number of students who are :
  - (1) under-weight and
  - (2) over-weight, if 55.70 kg is considered as standard weight.

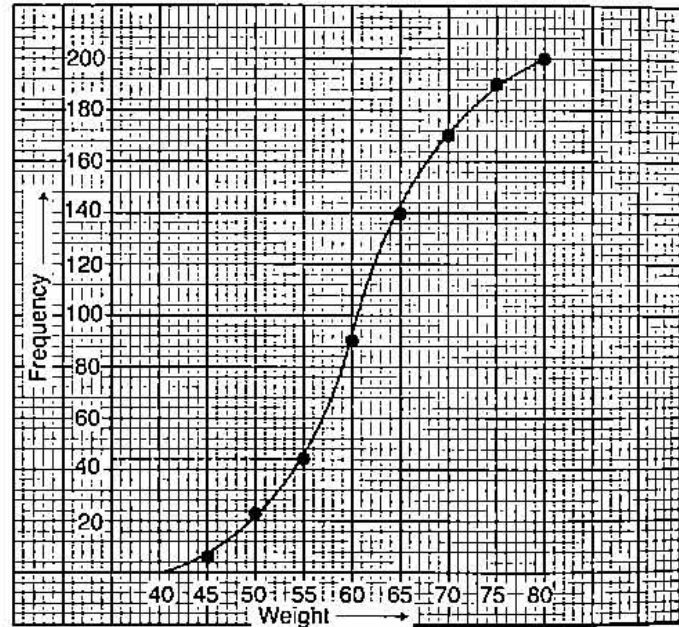
[6]

**Solution.**

(a) Refer Answer 10. (a), 2013.

(b)

Weight	$f$	$c.f.$
40-45	5	5
45-50	17	22
50-55	22	44
55-60	45	89
60-65	51	140
65-70	31	171
70-75	20	191
75-80	9	200



- (i) Number of students weighing 55 kg or more =  $200 - 44 = 156$ .

$$\begin{aligned} \text{Percentage (\%)} &= \frac{156}{200} \times 100 \\ &= 78\% \text{ (app.)} \end{aligned}$$

Ans.

- (ii)  $\frac{30}{100} \times 200 = 60$

$$\begin{aligned} \text{Heaviest weight} &= \text{weight of } (200 - 60) \text{ students} \\ &= 140 \text{ students.} \end{aligned}$$

$$\therefore \text{the weight of 140 students} = 65 \text{ kg}$$

- (iii) (1) Under weight = 45  
(2) Over weight =  $200 - 45 = 155$ .

Ans.

Question 11. [www.10yearsquestionpaper.com](http://www.10yearsquestionpaper.com)

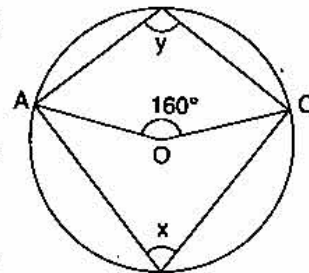
(a) In the alongside figure,  $O$  is the centre of the circle and  $\angle AOC = 160^\circ$ .

Prove that  $3 \angle y - 2 \angle x = 140^\circ$ . [3]

(b) Without using mathematical tables, find the value of  $x$  if

$$\cos x = \cos 60^\circ \cos 30^\circ + \sin 60^\circ \sin 30^\circ. \quad [3]$$

(c) By increasing the speed of a car by 10 km/hr, the time of journey for a distance of 72 km. is reduced by 36 minutes. Find the original speed of the car. [4]



**Solution.**

(a) 
$$\angle x = \frac{1}{2} (160^\circ) = 80^\circ$$

$$\angle y = \frac{1}{2} (360^\circ - 160^\circ) = 100^\circ$$

$\therefore$  The angle at the centre is twice the angle at the circumference.

$$\begin{aligned} \therefore 3 \angle y - 2 \angle x &= 3 \times 100^\circ - 2 \times 80^\circ \\ &= 300^\circ - 160^\circ = 140^\circ \end{aligned}$$

**Hence proved.**

(b) Given :  $\cos x = \cos 60^\circ \cos 30^\circ + \sin 60^\circ \sin 30^\circ$

$$\cos x = \frac{1}{2} \times \frac{\sqrt{3}}{2} + \frac{\sqrt{3}}{2} \times \frac{1}{2}$$

$$= 2 \times \frac{\sqrt{3}}{4} = \frac{\sqrt{3}}{2}$$

$$\cos x = \cos 30^\circ$$

$$\Rightarrow x = 30^\circ.$$

**Ans.**

(c) Let the speed of car be  $x$  km/hr.

$$\text{Time} = \frac{72}{x}, \text{ when original speed}$$

$$\text{Time} = \frac{72}{x+10}, \text{ when speed increased by 10 km/hr.}$$

$$\therefore \frac{72}{x} - \frac{72}{x+10} = \frac{36}{60} = \frac{3}{5}$$

$$72 \left[ \frac{x+10-x}{x(x+10)} \right] = \frac{3}{5}$$

$$\Rightarrow 240 \times 5 = x^2 + 10x$$

$$x^2 + 10x - 1200 = 0$$

$$x^2 + (40 - 30)x - 1200 = 0$$

$$x^2 + 40x - 30x - 1200 = 0$$

$$x(x+40) - 30(x+40) = 0$$

$$(x+40)(x-30) = 0$$

$$x - 30 = 0 \text{ or } x + 40 = 0$$

$$x = 30 \quad x = -40 \text{ (not possible)}$$

$\therefore$  Speed of car be 30 km/hr.

**Ans.**

