Performance

Marks	N.A.	0	½	1	1½	2	2½	3	Mean Score
Percentage	46	17	2	6	0	5	2	22	1.6

Quantitative Analysis

- Only 24% of the students were able to answer the question almost correctly while 63% failed to answer.
- 8% of the students committed minor errors and 5% committed major ones.

Common Errors

- Students committed errors in changing trigonometric ratios and simplifying expressions.
- Students could not factorize the expression obtained, using $a^2 - b^2$.

Suggested Remedial Measures

- More emphasis should be laid on proper understanding of trigonometric ratios and their inter-relationship.
- More practice in simplifying trigonometric identities need to be given.

21. Determine the ratio in which the line $3x + 4y - 9 = 0$ divides the line-segment joining the points (1, 3) and (2, 7).

Ans. Let the ratio be K : 1

Let P(x, y) be the point of division

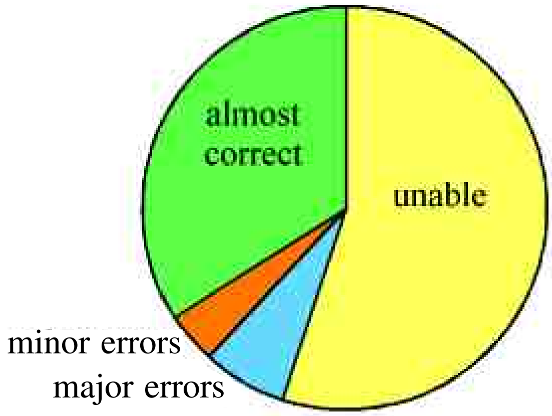
$$\therefore \quad x = \frac{2K+1}{K+1}, \quad y = \frac{7K+3}{K+1}$$ 2½ m

The point p lies on $3x + 4y - 9 = 0$

$$\left.\begin{aligned} (6K + 3) + (28K + 12) &= 9K + 9 \\ 25K = -6 \quad &\Rightarrow \quad K = \frac{-6}{25} \end{aligned}\right\} \quad \tfrac{1}{2}\text{ m}$$

Performance

Marks	N.A.	0	½	1	1½	2	2½	3	Mean Score
Percentage	36	19	3	4	0	4	14	20	1.7



Quantitative Analysis

- 55% students either did not attempt the question or did completely wrong
- 34% students gave almost correct answer.
- 4% students did minor mistakes and 7% did major mistakes.

Common Errors

- Some students found mid point of the line segment journing the given points instead of taking ratio as K:1.
- Some students got confused when ratio came as $-\frac{6}{25} : 1$.

Suggested Remedial Measures

- Concept of section formula should be explained for different situations.

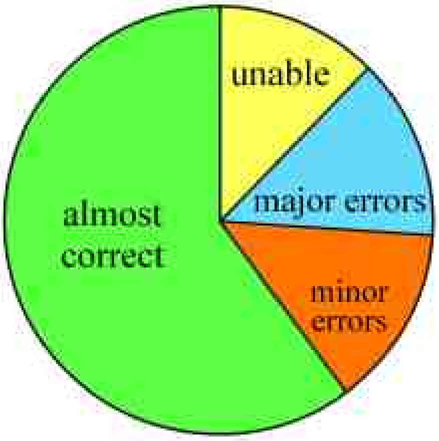
22. Construct a ΔABC in which $AB = 6.5$ cm, $\angle B = 60°$ and $BC = 5.5$ cm. Also construct a triangle $AB'C'$ similar to ΔABC, whose each side is $\frac{3}{2}$ times the corresponding side of the Δ ABC.

Ans. Correct construction of triangle ABC 1 m

Constructing $\Delta AB'C'$ similar to ΔABC, as per given conditions 2 m

Performance

Marks	N.A.	0	½	1	1½	2	2½	3	Mean Score
Percentage	7	5	4	10	8	6	7	53	2.3



Quantitative Analysis

- 60% students gave almost correct answer.
- 12% students either did not attempt or gave completely wrong answer.
- 14% students did minor mistakes and 14% students did major mistakes.

Common Errors

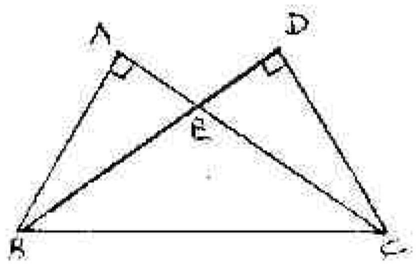
- Some students drew untidy construction.
- Some students drew parallel lines using ruler only.

Suggested Remedial Measures

- Stress should be given about the correct use of ruler and compasses.
- Emphasis should be given on proper labelling of figures.

23. Two Δ's ABC and DBC are on the same base BC and on the same side of BC in which $\angle A = \angle D = 90°$. If CA and BD meet each other at E, show that AE.EC = BE.ED.

Ans.



In Δs AEB and DEC

$\angle BAE = \angle CDE$ (Each $= 90^\circ$) } 1 m

$\angle AEB = \angle DEC$

$\Rightarrow \Delta AEB \sim \Delta DEC$ 1 m

$\therefore \frac{AE}{DE} = \frac{BE}{CE} \Rightarrow AE \times CE = DE \times BE$ 1 m

Performance

Marks	N.A.	0	½	1	1½	2	2½	3	Mean Score
Percentage	67	24	2	0	0	2	2	3	0.6

Quantitative Analysis

- 91% students did not attempt or gave completely wrong answer.
- 5% students gave almost correct answer.
- 2% students did minor mistakes and 2% students did major mistakes.

Common Errors

- Some students could not draw the correct figure.
- Some students did not take appropriate triangles which were similar.

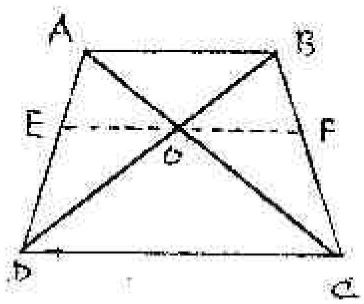
Suggested Remedial Measures

- Emphasis should be given on drawing the correct figure from the given information.
- Concept of similarity and ratios of corresponding sides should be explained properly.

OR

If the diagonals of a quadrilateral divide each other proportionally, prove that it is a trapezium.

Ans.



In quadrilateral ABCD, $\frac{AO}{OC} = \frac{OB}{OD}$ .... (A)

Through O, draw EF || AB, meeting BC in F and AD at E. ½ m

In Δ ABD, OE || AB $\Rightarrow \frac{AE}{ED} = \frac{BO}{OD}$ .... (i) 1 m

Similarly, in Δ ABC, $\frac{BF}{FC} = \frac{AO}{OC}$ .... (ii) 1 m

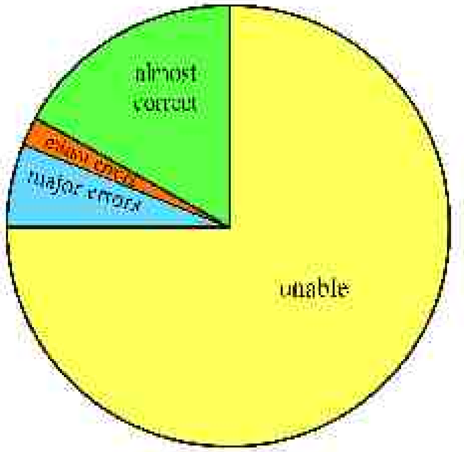
From (A), (i) and (ii), we get

$\frac{AE}{ED} = \frac{BF}{FC} \Rightarrow$ EF is parallel to DC

$\Rightarrow$ ABCD is a trapezium ½ m

Performance

Marks	N.A.	0	½	1	1½	2	2½	3	Mean Score
Percentage	50	25	1	5	0	2	2	15	1.2



Quantitative Analysis

- 75% students either did not attempt or gave completely wrong answer.
- Only 17% students gave almost correct answer.
- 6% students did major and 2% students did minor mistakes.

Common Errors

- Some students could not draw the figure correctly.
- Many students could not proceed in the right direction.

Suggested Remedial Measures

- Emphasis should be given on the basic concepts of geometry.
- Stress should be given on the concept of basic proportionality theorom and its converse.
- Practice should be given to draw appropriate figure from the written statements.

24. If the distances of P(x, y) from the points A(3, 6) and B(-3, 4) are equal, prove that $3x + y = 5$.

Ans. $PA = PB \Rightarrow PA^2 = PB^2$

$\therefore (x-3)^2 + (y-6)^2 = (x+3)^2 + (y-4)^2$ } 1½ m

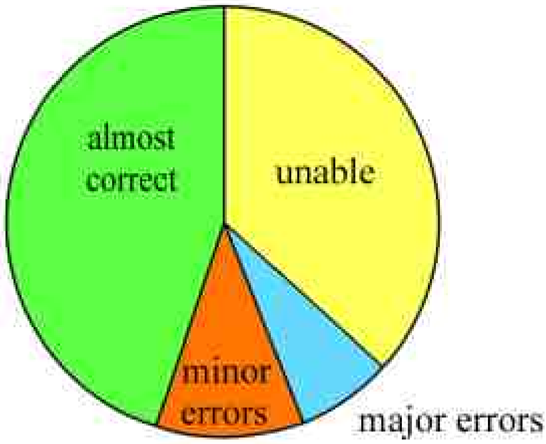
or $x^2 - 6x + 9 + y^2 - 12y + 36 = x^2 + 6x + 9 + y^2 - 8y + 16$ 1 m

or $12x + 4y = 20$

or $3x + y = 5$ which is the required condition } ½ m

Performance

Marks	N.A.	0	½	1	1½	2	2½	3	Mean Score
Percentage	15	22	2	5	6	5	6	39	1.8



Quantitative Analysis

- 45% students gave almost correct answer.
- 37% students either did not attempt or gave completely wrong answer.
- 11% students did minor mistakes and 7% students did major mistakes.

Common Errors

- Some students found mid point of the line begment AB
- Some students did the mistake as writing $(x-3)^2 = x^2 - 9$

Suggested Remedial Measures

- Stress should be given on translating word problem into mathematical model.
- Distance formula should be used appropriately.

25. In Fig. 6, find the perimeter of shaded region where ADC, AEB and BFC are semi-circles on diameters AC, AB and BC respectively.

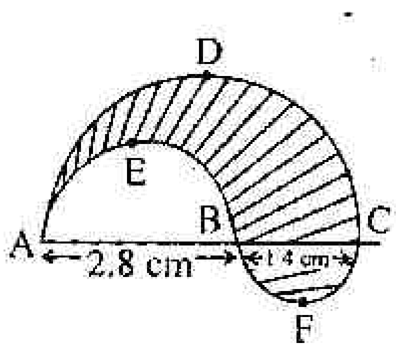


Fig. 6

Ans. Perimeter of shaded region

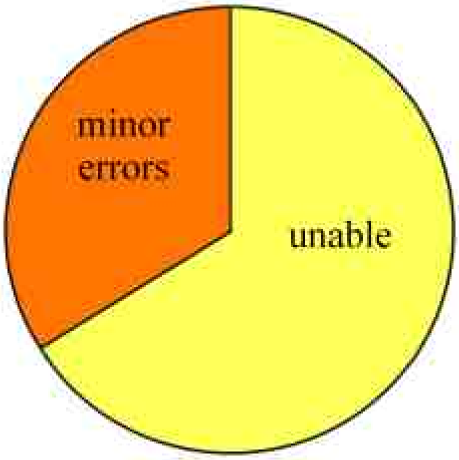
$= \pi[2.1] + \pi[1.4] + \pi[0.7]$ cm 1½ m

$= \pi[2.1 + 1.4 + 0.7]$ cm ½ m

$= \left(\frac{22}{7} \times 4.2\right)$cm $= 13.2$ cm 1 m

Performance

Marks	N.A.	0	½	1	1½	2	2½	3	Mean Score
Percentage	33	33	0	0	0	34	0	0	2.1



Quantitative Analysis

- None of the students gave correct answer.
- 66% students either did not attempt or gave completely wrong answer.
- 34% students did minor miskakes.

Common Errors

- Some students found area instead of perimeter.
- Some students took porimeter of circle in place of perimeter of semi-crcle.

Suggested Remedial Measures

- Students should be encouraged to visualize, analyse the figure and then use appropriate formulae.

OR

Find the area of the shaded region in Fig. 7, where ABCD is a square of side 14 cm.

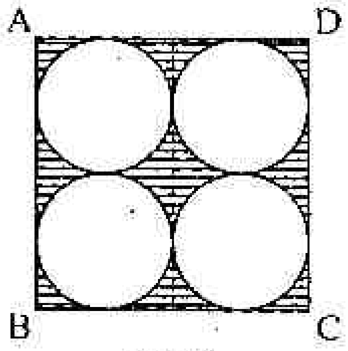


Fig. 7

Shaded Area = Area of square – 4 × Area of a circle — 1 m

Area of square = $(14)^2$ cm^2 = 196 cm^2 — ½ m

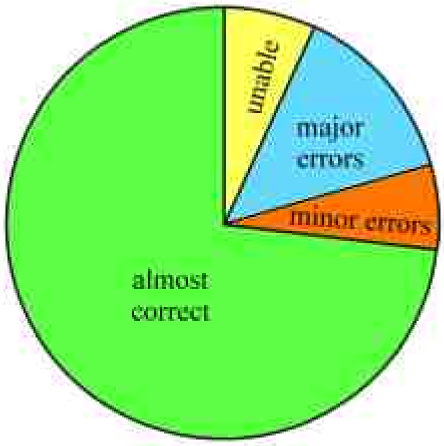
Area of one circle = $\left(\frac{22}{7}\times\frac{7}{2}\times\frac{7}{2}\right)$ cm^2

$\therefore$ Area of four such circles = $\left(\frac{22\times 7}{4}\times 4\right)$ = 154 cm^2 — 1 m

$\therefore$ Shaded Area = (196 – 154) cm^2 = 42 cm^2 — ½ m

Performance

Marks	N.A.	0	½	1	1½	2	2½	3	Mean Score
Percentage	2	5	3	11	3	3	3	70	2.5



Quantitative Analysis

- 73% Students gave almost correct answer.
- 7% students either did not attempt or gave completely wrong answer.
- 6% students did minor mistakes and 14% students did major mistakes.

Common Errors

- Same students used the value of diameter of the circle as radius.

Suggested Remedial Measures

- Emphasis should be given to analyse the figure and use appropriate data.

SECTION – D

Question numbers 26 to 30 carry 6 marks each.

26. In a class test, the sum of the marks obtained by P in Mathematics and Science is 28. Had he got 3 more marks in Mathematics and 4 marks less in Science, the product of marks obtained in the two subjects would have been 180. Find the marks obtained in the two subjects separately.

Ans. Let marks in Mathematics be x and those in Science be y

$\therefore \quad x + y = 28$ .... (i)

Also, $(x + 3)(y - 4) = 180$ ....(ii) — 2 m

From (i), $x = 28 - y$

$\therefore$ From (ii), $(28 - y + 3)(y - 4) = 180$ — 1½ m

or $y^2 - 35y + 304 = 0$

$(y - 16)(y - 19) = 0 \quad \Rightarrow \quad y = 16, 19$ — 1 m

when $y = 16, x = 12$

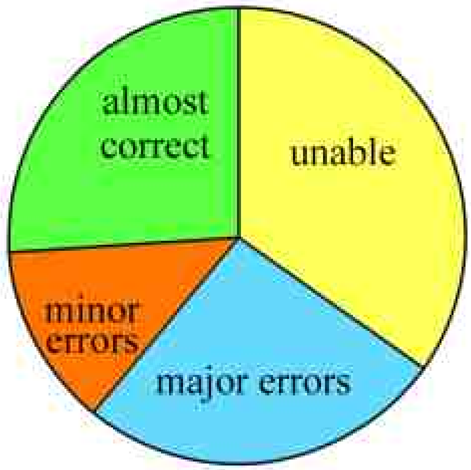
when $y = 19, x = 9$ — 1 m

$\therefore$ Marks in Mathematics = 12, and Science = 16

or Mathematics = 9, Science = 19 — ½ m

Performance

Marks	N.A.	0	½	1	1½	2	2½	3	3½	4	4½	5	5½	6	Mean Score
Percentage	23	12	2	10	3	11	0	5	2	3	3	0	0	26	3.1



Quantitative Analysis

- 26% students attempted the question correctly.
- 35% students either did not attempt or gave completely wrong answer.
- 13% students did minor mistakes and 26% students did major mistakes.

Common Errors

- Some students could not make the correct equations.
- Some students could not solve the equations i.e., $x + y = 28$ and $(x + 3)(y - 4) = 180$

Suggested Remedial Measures

- Practice should be given to convert word problems into mathematical equations.
- Students should be encouraged to analyse the situation and discuss with pear groups.

OR

The sum of the areas of two squares is 640 m^2. If the difference in their perimeters be 64 m, find the sides of the two squares.

Let x and y be the sides of two squares, where $x > y$

$\therefore \quad x^2 + y^2 = 640$ .... (i) 1 m and, $4(x - y) = 64 \Rightarrow x - y = 16$

$\Rightarrow x = y + 16$ .... (ii) 1 m

From (i) and (ii), $(y + 16)^2 + y^2 = 640$

$\Rightarrow y^2 + 16y - 192 = 0$ 1 m

$\Rightarrow (y + 24)(y - 8) = 0$

1 m

$\Rightarrow y = 8$ [Rejecting $y = -24$]

$\therefore x = 24$ 1 m

$\therefore$ the side of larger square = 24 m

1 m

smaller square = 8 m

Performance

Marks	N.A.	0	½	1	1½	2	2½	3	3½	4	4½	5	5½	6	Mean Score
Percentage	29	18	4	2	2	2	0	2	0	2	0	5	0	34	3.6

Quantitative Analysis

- 39% students attempted the question correctly.
- 47% students either did not attempt the question or gave completely wrong answer.
- 10% students did minor mistakes and 4% students did major mistakes.

Common Errors

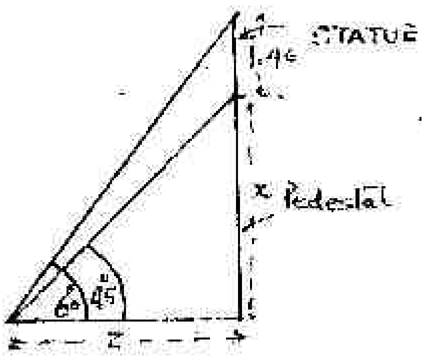
- Some students could not form the correct equations, $x^2 + y^2 = 640$ and $4x - 4y = 64$.
- Some students took $x - y = 64$ in place of $4x - 4y = 64$.
- Some students could not solve the simultaneous eqations.

Suggested Remedial Measures

- Practice should be given in forming equations by translating the word problems.
- Practice should be given in solving one linear and one quadratic equation.

27. A statue 1.46 m tall, stands on the top of a pedestal. From a point on the ground, the angle of elevation of the top of the statue is 60° and from the same point, the angle of elevation of the top of the pedestal is 45°. Find the height of the pedestal (use $\sqrt{3}$ = 1.73).

Ans. Correct Fig. — 1 m



Writing the trigonometric equations

$$\frac{x}{z} = \tan 45^\circ$$

$$\text{or } \frac{x}{z} = 1 \Rightarrow x = z$$ — 1½ m

$$\text{Again } \frac{x + 1.46}{x} = \tan 60^\circ$$ — 1 m

$$\text{or } x + 1.46 = \sqrt{3}\,x$$

$$\Rightarrow .73x = 1.46$$ — 1 m

$$\Rightarrow x = 2$$ — 1 m

$\therefore$ the height of pedestal = 2m — ½ m

Performance

Marks	N.A.	0	½	1	1½	2	2½	3	3½	4	4½	5	5½	6	Mean Score
Percentage	6	10	0	5	3	4	2	1	0	6	4	11	2	44	4.3

Quantitative Analysis

- 57% students attempted the question almost correctly.
- 16% students either did not attempt or gave completely wrong answer.
- 11% students did minor mistakes and 14% student did major mistakes.

Common Errors

- Some students could not draw the correct figure.
- Some students did not know which angle to be taken as 60° and which as 45°.
- Some students took wrong values of trigonometric ratios.
- Some students did mistakes in calculations.

Suggested Remedial Measures

- Importance of correct diagram should be emphasized.
- Sufficient practice should be given for translating word problems involving application of trigonometric ratios.
- Importance of writing the proper units in the final answer should be given.

28. Prove that the ratio of the areas of two similar triangles is equal to the ratio of squares of their corresponding sides.

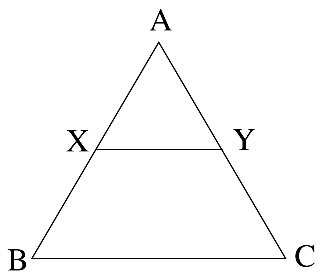
Using the above result, prove the following:

In a ΔABC, XY is parallel to BC and it divides Δ ABC into two parts of equal area.

Prove that $\frac{BX}{AB} = \frac{\sqrt{2}-1}{\sqrt{2}}$

Ans. Correct Figure, Given, To Prove, Construction : (½ + ½ + ½ + ½) 2 m

Correct Proof 2 m



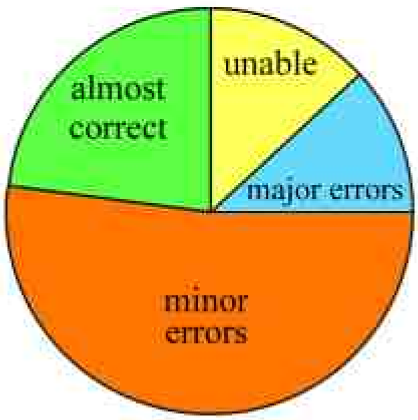
$$\text{ar}\ (\Delta\ ABC) = 2\text{ar}\ (\Delta\ AXY)$$ ½ m

$$\therefore \left(\frac{AX}{AB}\right)^2 = \frac{1}{2} \Rightarrow \frac{AX}{AB} = \frac{1}{\sqrt{2}}$$ ½ m

$$\frac{BX}{AB} = 1 - \frac{AX}{AB} = 1 - \frac{1}{\sqrt{2}} = \frac{\sqrt{2}-1}{\sqrt{2}}$$ ½+½ m

Performance

Marks	N.A.	0	½	1	1½	2	2½	3	3½	4	4½	5	5½	6	Mean Score
Percentage	11	2	1	0	1	6	4	5	4	42	1	5	2	16	4.0



Quantitative Analysis

- 23% students gave almost correct answer.
- 13% students either did not attempt or gave completely wrong answer.
- 52% students did partially and 12% students did major mistakes.

Common Errors

- Majority of students attempted the theorem correctly but did not attempt the rider based on theorem.
- Some students approached the rider correctly but could not simplfy the expression to get the correct result.