

MATHEMATICS

Question Pool

Standard -IX



State Council of Educational Research and Training
Vidyabhavan, Poojappura, Thiruvananthapuram 695 001

To the Teachers

This collection of problems is based on the chapters Pairs of Equations, Statistics, Geometric Ratios, Similar Triangles, Polynomials, Measures of Circles, Real Numbers and Solids in the Class 9 textbook . We have tried to include problems of various types and levels. Apart from question which test how far the children have assimilated the various concepts discussed in the textbook, there are also questions which serve to indicate further developments of these concepts. New applications and procedures form a part of knowledge generation. These questions must be viewed through the perspective that every assessment is also a learning activity.

In these problems can be seen a synthesis of physical problems and abstract ideas arising out of them. When fractions, proportions, factors, Pythagoras Theorem all come together in this fusion, not only the needs and practical contexts of concepts learned earlier are seen, but a re-reading of these texts also occurs. This general point of view must be maintained in going through these evaluation procedures.

- The exam paper must include proportional number of questions from each chapter
- The time needed for each question must be considered
- The exam paper should be so designed that most of the concepts in each unit is evaluated
- More than one question based on the same concept need not be used
- Questions that can be answered by children at all levels must be included

Chapter 6

Pairs of Equations

Qns : 6.1 - 6.15

Concepts / Ideas : *Various methods of solving pairs of equations.*

Q.6.1

Arun bought 10 candles and a match box for 62 rupees from a shop. At the same rate, Varun bought 6 candles and a match box for 38 rupees. What is the price of a candle? Price of a match box?

Score : 2 Time : 4 minutes

Concepts / Ideas : *Various methods of solving pairs of equations.*

Q.6.2

Beena bought 12 two hundred page note books and 7 one hundred page note books from a store. It cost her 224 rupees in all. Diya bought 7 two hundred page note books and 12 one hundred page note books. It cost her 194 rupees in all. Find out the cost of a note book of each kind.

Score : 3 Time : 5 minutes

Concepts / Ideas : *Various methods of solving pairs equations*

Q.6.3

The total number of coconut trees and arcanut trees in Jose's grove is 40. Hari's grove has twice as many coconut trees and thrice as many arecanut trees as Jose's. If the number of trees in Hari's grove is 96, find how many trees there are of each kind.

Score : 3 Time : 5 minutes

Concepts / Ideas : *Equations involving two unknowns.*

Q.6.4

If the sum of two numbers is 99 and their difference 49, find the numbers.

Score : 2 Time : 4 minutes

Concepts / Ideas : *Various methods of solving pairs of equations.*

Q.6.5

Raghu's age is 34 years more than his son's age. After 2 years, Raghu's age will be three times his son's. Find their present ages.

Score : 4 Time : 7 minutes

Concepts / Ideas : *Equations involving two unknowns*

Q.6.6

When Venu changed a 500 rupee note, he got 30 notes in all, in denominations of 20 rupees and 10 rupees. Find how many notes there are of each denomination.

Score : 3 Time : 6 minutes

Concepts / Ideas : *Equations involving two unknowns*

Q.6.7

1 added to the numerator and denominator of a fraction results in $\frac{1}{2}$. When 1 is subtracted from the numerator and denominator, the result is $\frac{1}{3}$. Find the fraction.

Score : 3 Time : 6 minutes

Concepts / Ideas : *Equations involving two unknowns*

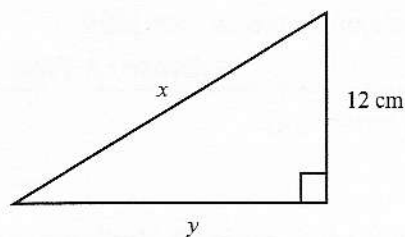
Q.6.8

The sum of the digits of a two - digit number is 10. If the digits are reversed, the number got is 36 more than the first number. Find the number.

Score : 4 Time : 7 minutes

Concepts / Ideas : *Equations involving two unknowns*

Q.6.9



The sum of x and y in the figure is 16. What is x ? what is y ?

Score : 4 Time : 6 minutes

Concepts / Ideas : *Equations involving two unknowns*

Q.6.10

40 children from a school took part in a sub district arts festival. Of them, half the girls and a third of the boys bagged prizes. If 17 got prizes, find the number of girls and boys who participated in the arts festival.

Score : 3 Time : 6 minutes

Concepts / Ideas : *Equations involving two unknowns*

Q.6.11

When asked to draw a rectangle of perimeter 40 centimetres, children draw rectangles of various sizes. But, when asked to draw a rectangle of perimeter 40 centimetres, with length 6 centimetres more than the breadth, all children ended up with rectangles of the same size. Explain the reason. Also find the length and breadth of the second rectangle.

Score : 4 Time : 7 minutes

Concepts / Ideas : *Equations involving two unknowns*

Q.6.12

"4 kg of rice and 2 kg of sugar cost 168 rupees. At the same rate, 6 kg of rice and 3 kg of sugar cost 252 rupees. Can you find the price per kg of each?". To Anu's question, Hasina replied, "using this data, it is impossible to find the cost of each item". Explain why Hasina said so.

Score : 3 Time : 6 minutes

Concepts / Ideas : *Equations involving two unknowns*

Q.6.13

For making a rectangles of perimeter 20 centimetres, children were asked to cut two pairs of eerkil bits, those in a pair being of the same length. Molly had pairs of eerkil bits of length differing by 11 centimetres. Using them, can she make such a rectangle? Why?

Score : 3 Time : 5 minutes

Concepts / Ideas : *Equations involving two unknowns*

Q.6.14

The sum of the perimeters of a square and an equilateral triangle is 76 centimetres. The sum of the perimeters of another square of side half that of this square and another equilateral triangle of side one-third the side of this triangle is 32 cm. If so, find the sides of the first square and equilateral triangle.

Score : 4 Time : 7 minutes

Concepts / Ideas : *Equations involving two unknowns*

Q.6.15

The perimeter of a rectangle is 48 centimetres. If the breadth is 3 centimetres less than half the length, find the length and breadth.

Score : 3 Time : 5 minutes

Chapter 7

Statistics

Qns : 7.1 - 7.10

Concepts / Ideas : *Histogram*

Q.7.1

The quantity of rubber, a planter got in 30 days is tabulated below. Draw a histogram.

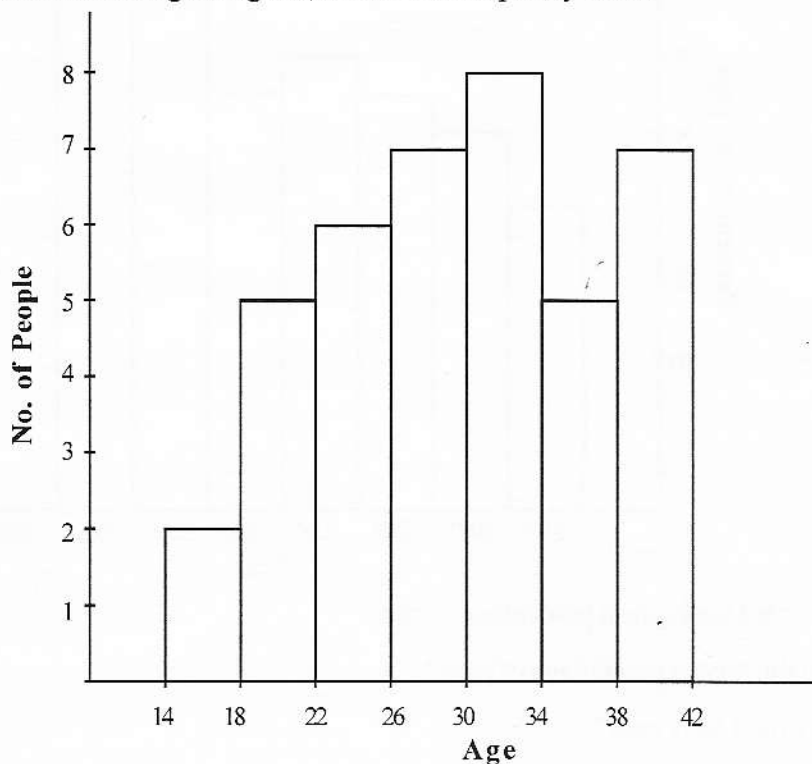
Weight (kg.)	Number of days
10 - 12	3
12 - 14	4
14 - 16	5
16 - 18	7
18 - 20	6
20 - 22	5

Score : 4 Time : 10 Minutes

Concepts / Ideas : *Histogram*

Q.7.2

Based on the following histogram, construct a frequency table.



Score : 4 Time : 8 Minutes

Concepts / Ideas : Frequency polygon

Q.7.3

The scores got by 100 students in the half yearly examination is tabulated below. Draw a frequency polygon.

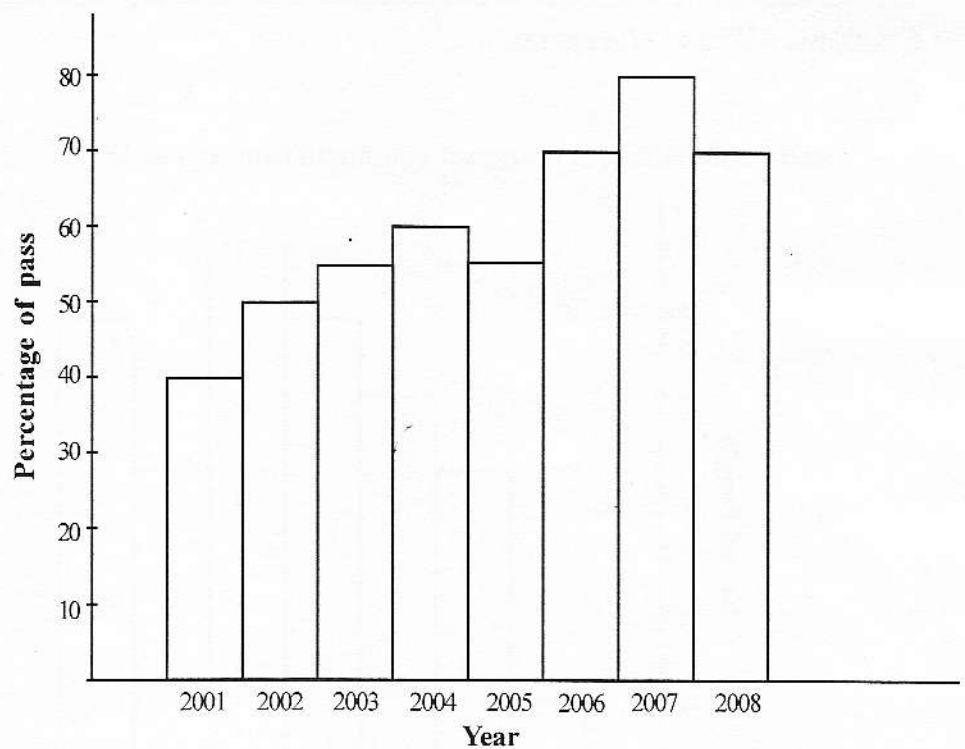
Score	Number of students
10 - 20	8
20 - 30	12
30 - 40	16
40 - 50	26
50 - 60	18
60 - 70	14
70 - 80	6

Score : 4 Time : 10 Minutes

Concepts / Ideas : Histogram

Q.7.4

The histogram given below shows the pass percentage of students of a school in the SSLC examination in various years. Answer the following questions.



- (1) Which year recorded the highest percentage of pass?
- (2) Which year had the lowest percentage of pass?
- (3) Which year recorded 60% pass?
- (4) What was the percentage of pass in 2006?

Score : 4 Time : 5 Minutes

Concepts / Ideas : Mean

Q.7.5

The quantity of milk (in litres) got by the owner of a cattle farm from his cows in 7 days is given below. Find the mean yield.

16, 18, 15, 17, 20, 19, 21

Score : 2 Time : 3 Minutes

Concepts / Ideas : Mean

Q.7.6

The mean height of 9 members of a volley ball team is 188 cm. The heights of 8 of them are given below.

190, 181, 187, 195, 196, 188, 185, 184

Find the height of the 9th member.

Score : 2 Time : 3 Minutes

Concepts / Ideas : Median

Q.7.7

The runs scored by a batsman in 11 matches are given below. Find the median.

54, 49, 37, 23, 55, 30, 65, 68, 34, 75, 16

Score : 2 Time : 3 Minutes

Concepts / Ideas : Median

Q.7.8

The quantity of rice (in kg) sold by a merchant in 12 days is given below. Find the median.

94, 105, 108, 96, 85, 98, 89, 102, 103, 78, 91, 99

Score : 2 Time : 3 Minutes

Concepts / Ideas : Mode

Q.7.9

The number of wickets taken by a bowler in 12 one day matches is given below. Find the mode.

3, 2, 4, 1, 5, 4, 3, 0, 3, 2, 3, 2

Score : 2 Time : 3 Minutes

Concepts / Ideas : Mode

Q.7.10

The amount of rainfall (in mm) in a region on various days is given below. Find the mode.

15, 18, 15, 19, 20, 18, 17, 22, 19, 18, 20, 18, 19, 17

Score : 2 Time : 3 Minutes

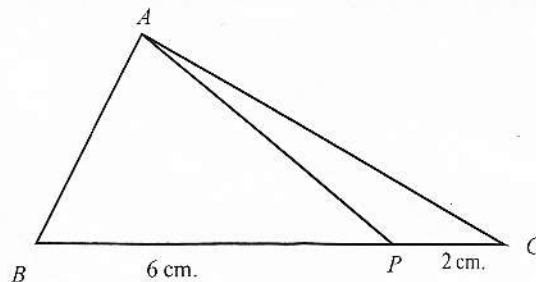
Unit 8

Geometric Ratios

Qns : 8.1 - 8.20

Concepts / Ideas : *The areas of triangles of the same height are proportional to their bases.*

Q.8.1

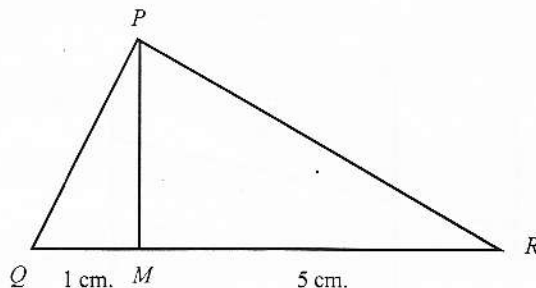


In $\triangle ABC$, $BP = 6$ centimetres. $PC = 2$ centimetres. What is the ratio of area of $\triangle APC$ to the area of $\triangle ABP$? If the area of $\triangle APC$ is 30 square centimetres, find the area of $\triangle ABP$. Also find the area of $\triangle ABC$?

Score : 3 Time : 5 Minutes

Concepts / Ideas : *The areas of triangles of the same height are proportional to their bases.*

Q.8.2



In $\triangle PQR$, $QM = 1$ centimetres, $MR = 5$ centimetres. What is the ratio of the area of $\triangle PQM$ to the area of $\triangle PMR$? The area of $\triangle PQR$ is 120 square centimetres. Find the areas of $\triangle PQM$ and $\triangle PMR$.

Score : 3 Time : 5 Minutes

Concepts / Ideas : *The areas of triangles of the same height are proportional to their bases.*

Q.8.3

The altitude from the vertex A of $\triangle ABC$ equals the altitude from the vertex P of $\triangle PQR$. $BC = 8$ centimetres, $QR = 2$ centimetres. What is the ratio of the area of $\triangle PQR$ to that of $\triangle ABC$? If the area of $\triangle ABC$ is 160 square centimetres, what is the area of $\triangle PQR$?

Score : 2 Time : 4 Minutes

Concepts / Ideas : *The areas of triangles of the same height are proportional to their bases.*

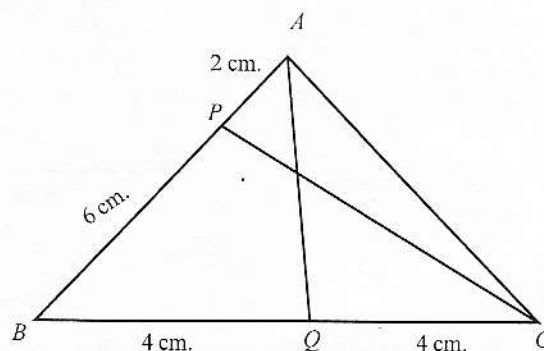
Q.8.4

Draw $\triangle ABC$ with $AB = 5$ centimetres, $BC = 6$ centimetres and $AC = 7$ centimetres. Divide this into three triangles with areas in the ratio $1 : 2 : 4$.

Score : 3 Time : 7 Minutes

Concepts / Ideas : *The areas of triangles of the same height are proportional to their bases.*

Q.8.5

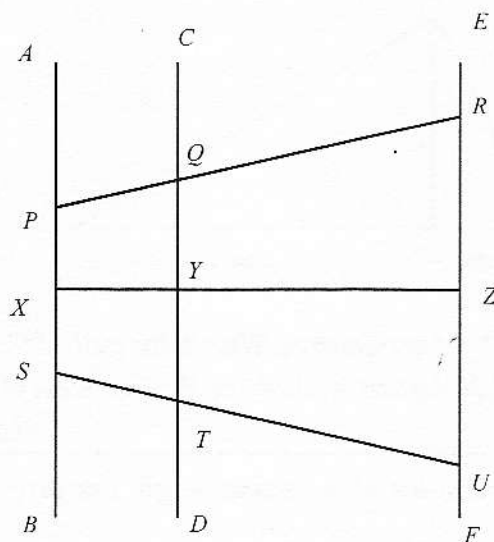


In $\triangle ABC$, $AB = BC = 8$ centimetres, $AP = 2$ centimetres, $BQ = 4$ centimetres. If the area of $\triangle ACP$ is 40 square centimetres, find the area of $\triangle PCB$. What is the area of $\triangle AQB$?

Score : 4 Time : 7 Minutes

Concepts / Ideas : *Three or more parallel lines divide any two lines in the same ratio.*

Q.8.6

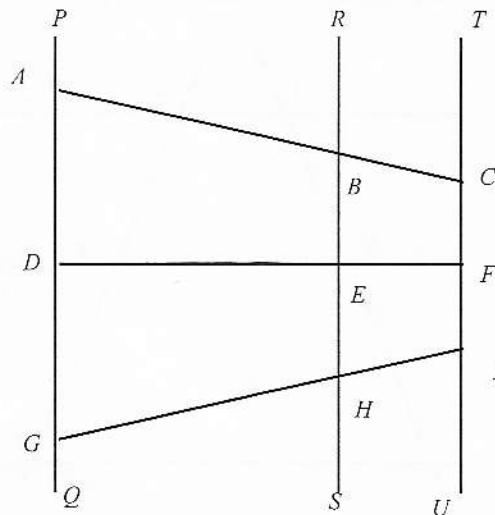


AB , CD , EF are parallel lines. $XY = 1$ centimetres, $YZ = 3$ centimetres, What is $PQ : QR$? If $ST = 1.5$ centimetres what is TU ?

Score : 4 Time : 6 Minutes

Concepts / Ideas : Three or more parallel lines divide any two lines in the same ratio.

Q.8.7



In the figure, PQ, RS, TU are parallel lines. If $AB : BC = 2 : 3$, $DF = 10$ centimetres, find DE, EF . If $HI = 9$ centimetres, find GH and GI .

Score : 4 Time : 6 Minutes

Concepts / Ideas : Dividing a line in a given ratio.

Q.8.8

Draw a line 13 centimetres long. Divide it in the ratio $1 : 2 : 4$. Divide $\frac{4}{7}$ of the line into 4 equal parts.

Score : 5 Time : 12 Minutes

Concepts / Ideas : Dividing a line in a given ratio.

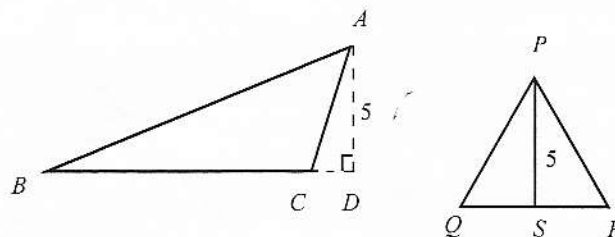
Q.8.9

Draw a triangle of perimeter 11 centimetres and sides in the ratio $2 : 3 : 4$.

Score : 5 Time : 10 Minutes

Concepts / Ideas : The area of triangles, of the same height are proportional to their bases.

Q.8.10

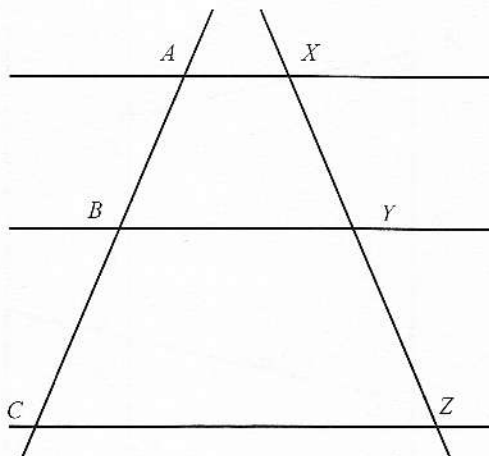


If, in the figure, $AD = PS$, the ratio of the areas of $\triangle ABC$ and $\triangle PQR$ are in the ratio $3 : 1$ and $QR = 2$ centimetres, find the length of BC .

Score : 2 Time : 4 Minutes

Concepts / Ideas : Three or more parallel lines divide any two lines in the same ratio.

Q.8.11

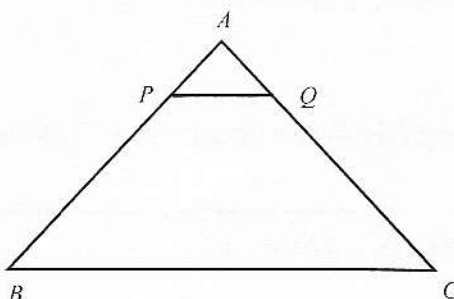


AX, BY, CZ are parallel. If $AB : BC = 2 : 5$, $XY = 6$ centimetres, Find YZ and XZ ?

Score : 2 Time : 4 Minutes

Concepts / Ideas : Any line parallel to one side of a triangle cuts the other two sides in the same ratio.

Q.8.12

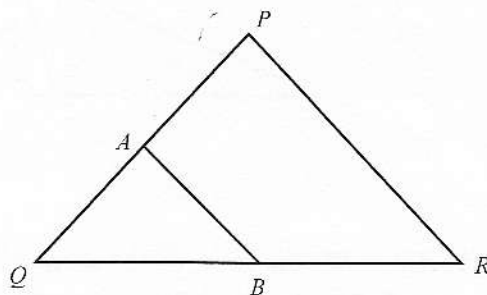


In $\triangle ABC$, PQ is parallel to BC . $AB = 10$ centimetres, $AC = 12$ centimetres and $AP = 4$ centimetres. Find PB . What is $AP : PB$? $AQ : QC$? Calculate AQ and QC .

Score : 5 Time : 8 Minutes

Concepts / Ideas : Any line parallel to one side of a triangle cuts the other two sides in the same ratio.

Q.8.13

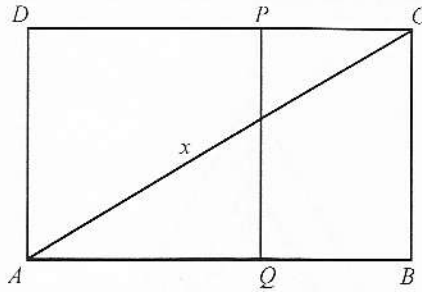


In $\triangle PQR$, AB is parallel to PR . A is the midpoint of PQ and $QR = 15$ centimetres. What is $QB : BR$? Find QB and BR .

Score : 2 Time : 4 Minutes

Concepts / Ideas : Three or more parallel lines divide any two lines in the same ratio.

Q.8.14

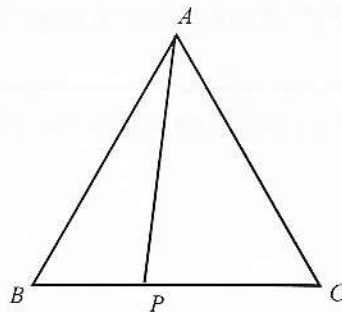


In the figure, the rectangle has length 15 centimetres, breadth 8 centimetres and PQ is parallel to AD . If $CP = 5$ centimetres, find DP . What is $CP : DP$? Find AC , AX , CX .

Score : 5 Time : 10 Minutes

Concepts / Ideas : The bisector of an angle of a triangle divides the opposite side in the ratio of the arms of the angle.

Q.8.15



In $\triangle ABC$, AP is the bisector of $\angle A$. If $AB = 12$ centimetres, $BC = 16$ centimetres, $AC = 8$ centimetres what is $BP : PC$? Find BP and PC . What is the ratio of the areas of $\triangle ABP$ and $\triangle APC$?

Score : 4 Time : 7 Minutes

Concepts / Ideas : Any line parallel to one side of a triangle cuts the other two sides in the same ratio.

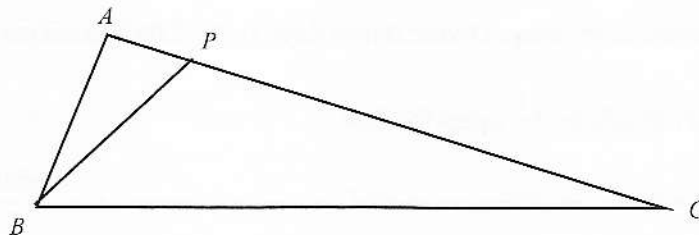
Q.8.16

Draw $\triangle ABC$ in which $AB = 9$ centimetres, $BC = 11$ centimetres, $AC = 10.5$ centimetres. Draw a line of length 5.25 centimetres between any two sides of the triangle, without measuring. Explain the mathematical concept used to do so.

Score : 4 Time : 7 Minutes

Concepts / Ideas : The bisector of an angle of a triangle divides the opposite side in the ratio of the arms of the angle.

Q.8.17

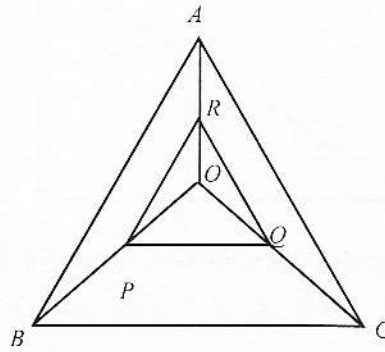


If, in $\triangle ABC$, $AB = 5$ centimetres, $BC = 7.5$ centimetres, $\angle ABP = \angle PBC = 40^\circ$, find $AP : PC$. What is the ratio of the areas of $\triangle APB$ and $\triangle BPC$? Also find the ratio of the area of $\triangle APB$ and $\triangle ABC$?

Score : 3 Time : 5 Minutes

Concepts / Ideas : The line joining the midpoints of any two sides of a triangle is half the third side and parallel to it.

Q.8.18

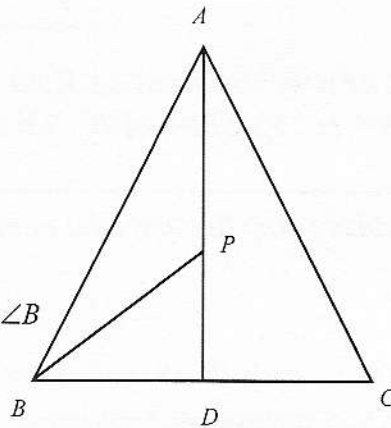


The bisectors of the angles of the equilateral triangle ABC meet at O . P, Q, R are the midpoints of OB, OC, OA respectively. Prove that $\triangle PQR$ is an equilateral triangle.

Score : 4 Time : 8 Minutes

Concepts / Ideas : The bisector of an angle of a triangle divides the opposite side in the ratio of the arms of the angle.

Q.8.19



In the figure, AP and BP are the bisectors of $\angle A$ and $\angle B$ respectively of $\triangle ABC$.

Prove that $\frac{AC}{DC} = \frac{AP}{PD}$

Score : 4 Time : 8 Minutes

Concepts / Ideas : Dividing a line in a given ratio.

Q.8.20

Draw a line 11 centimetres long. Divide it into three parts. The second part should be $1\frac{1}{2}$ times the first. The third part should be $2\frac{1}{2}$ times the first.

Score : 4 Time : 9 Minutes

Chapter 9

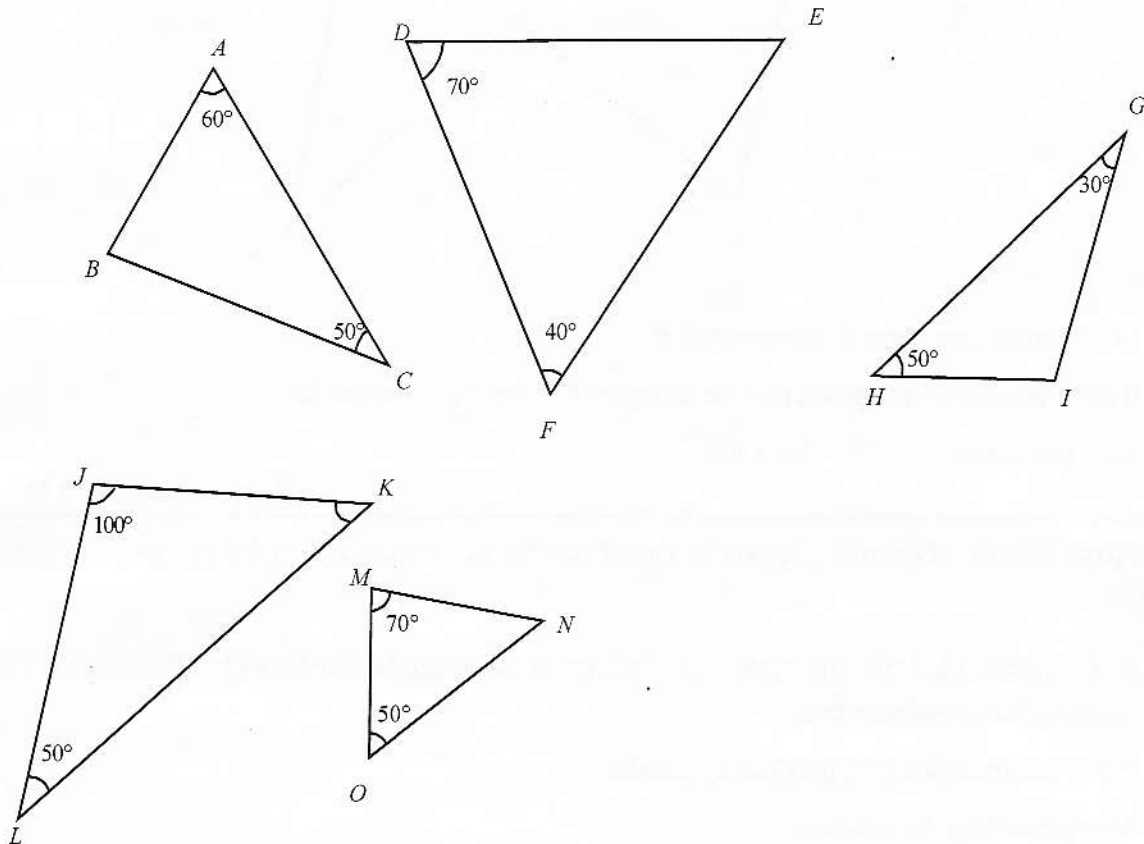
Similar Triangles

Qns : 9.1 - 9.13

Concepts / Ideas : If the angles of a triangle are equal to the angles of another triangle, then the sides opposite equal angles are proportional.

Q.9.1

Some triangles and the measures of their angles are given below.

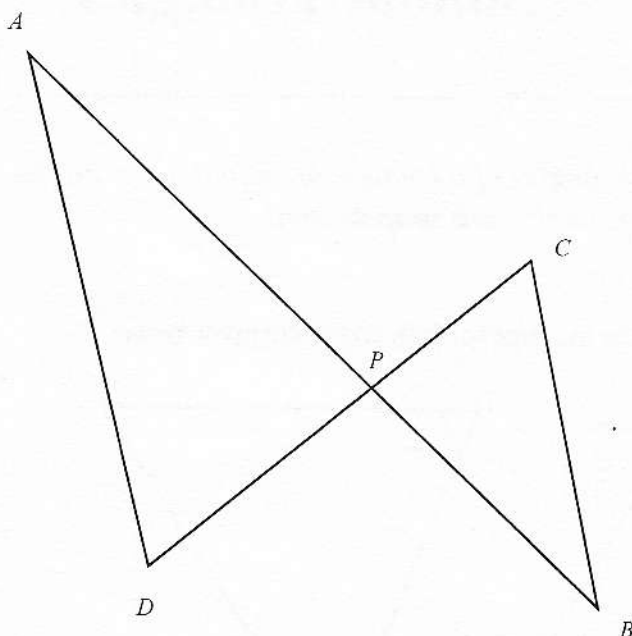


Find out pairs of similar triangles from them. Write down the ratio of their corresponding sides.

Score : 4 Time : 8 Minutes

Concepts / Ideas : *If the angles of a triangle are equal to the angles of another triangle, then the sides opposite equal angles are proportional.*

Q.9.2



In the figure, lines AB , CD intersect at P .

If BC is parallel to AD , prove that the triangles PAD and PBC are similar.

Also prove that $PA \times PC = PB \times PD$.

Score : 4 Time : 7 Minutes

Concepts / Ideas : *The sides opposite equal angles of similar triangles are proportional.*

Q.9.3

In the right angled triangle PQR , $\angle Q = 90^\circ$, QS is the perpendicular from Q to the side PR . Draw a rough figure using these data.

Prove that triangles QPS and QSR are similar.

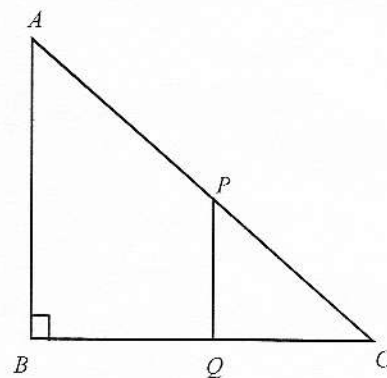
Also prove that $SP \times SR = QS^2$.

Score : 5 Time : 9 Minutes

Concepts / Ideas : *The sides opposite equal angles of similar triangles are proportional.*

Q.9.4

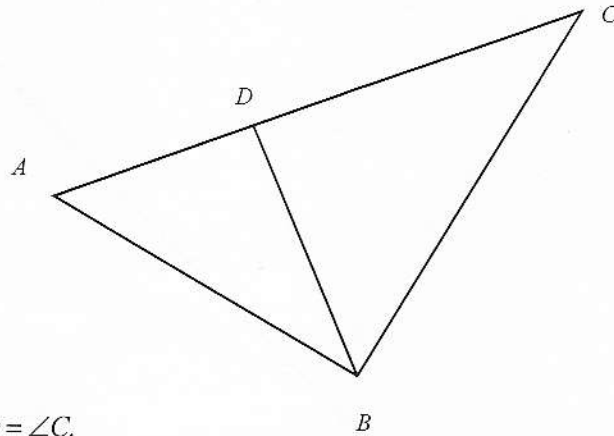
In the right angled triangle ABC , PQ is parallel to AB . If $AP : PC = 2 : 3$, $AB = 15$ centimetres, $BQ = 6$ centimetres, prove that $\triangle ABC$ is isosceles. Prove that triangles PQC , ABC are similar. Also find the lengths of AP and PC .



Score : 5 Time : 9 Minutes

Concepts / Ideas : *The sides opposite equal angles of similar triangles are proportional.*

Q.9.5



In the figure, $\angle ABD = \angle C$.

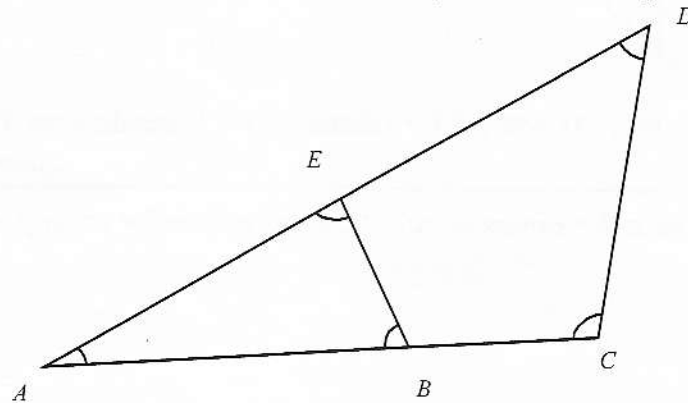
Prove that triangles ABD, ABC are similar.

Also prove that $AD \times AC = AB^2$.

Score : 4 Time : 7 Minutes

Concepts / Ideas : *The sides opposite equal angles of similar triangles are proportional.*

Q.9.6



In the figure, if $\angle ABE = \angle D$, prove that triangles ABE, ACD are similar.

Also prove that $AB \times AC = AE \times AD$.

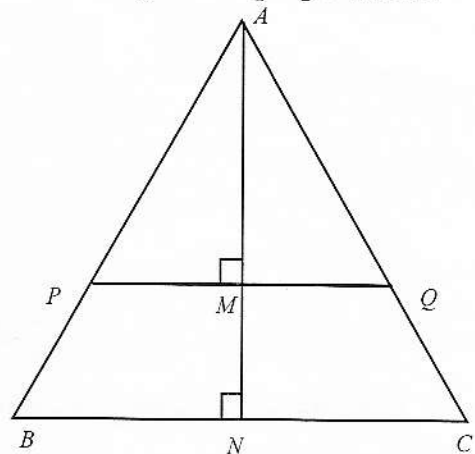
Score : 4 Time : 8 Minutes

Concepts / Ideas : *The sides opposite equal angles of similar triangles are proportional.*

Q.9.7

In $\triangle ABC$, PQ is parallel to BC . AN is the altitude from the vertex A to the side BC . Prove that triangles APM, ABN are

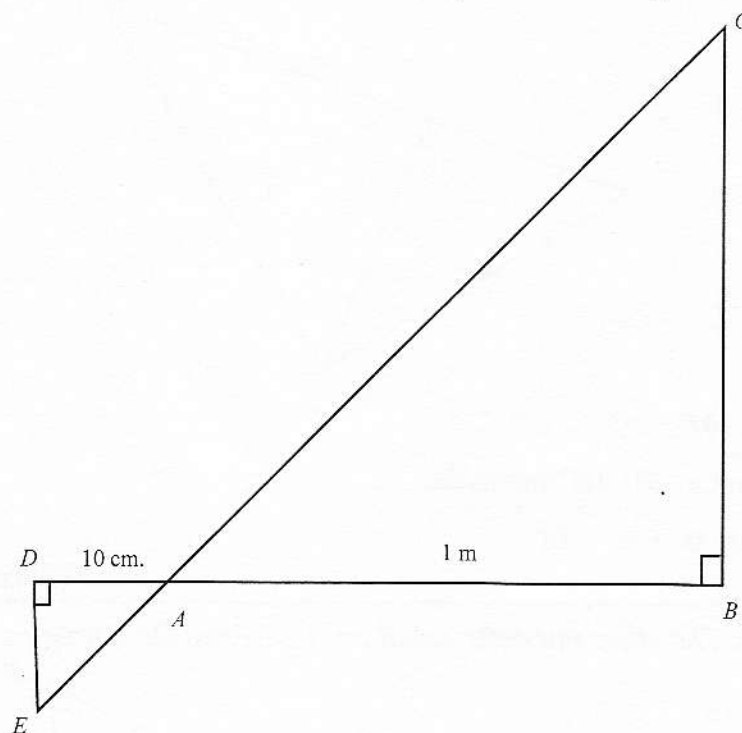
similar. Also prove that $AN = \frac{AM \times BN}{PM}$.



Score : 4 Time : 8 Minutes

Concepts / Ideas : *The sides opposite equal angles of similar triangles are proportional.*

Q.9.8

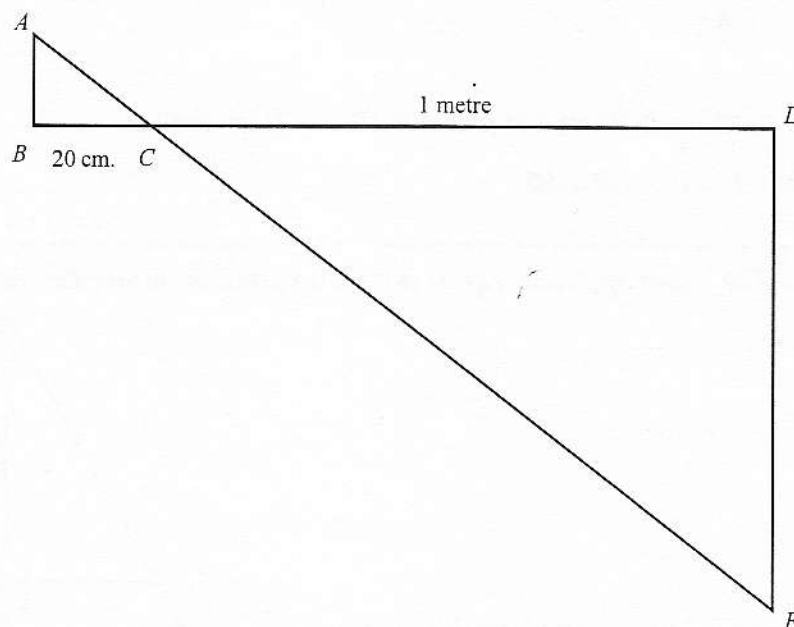


In the figure, $\angle B = 90^\circ$, $\angle D = 90^\circ$, $AB = 1$ metre, $AD = 10$ centimetres. Prove that $BC = 10 \times DE$.

Score : 4 Time : 8 Minutes

Concepts / Ideas : *The sides opposite equal angles of similar triangles are proportional.*

Q.9.9

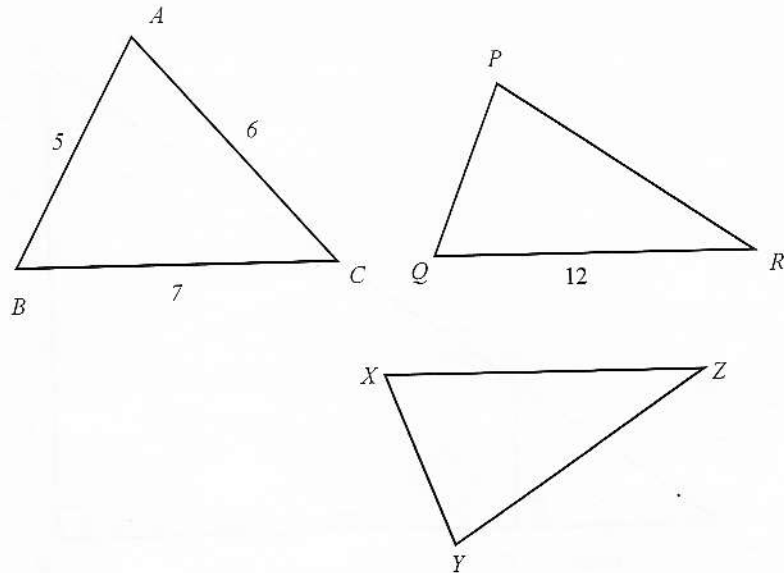


In the figure, $\angle B = 90^\circ$, $\angle D = 90^\circ$, $CD = 1$ metre and $BC = 20$ centimetres. Prove that $DE = 5 \times AB$.

Score : 4 Time : 8 Minutes

Concepts / Ideas : The sides opposite equal angles of similar triangles are proportional.

Q.9.10



PQR and XYZ are triangles with angles equal to those of triangle ABC . Fill in the blanks.

$$\angle P = \angle B$$

$$\angle Z = \angle A$$

$$\angle R = \angle A$$

$$\angle Y = \angle B$$

$$\angle Q = \dots\dots\dots$$

$$ZY = 7.5$$

$$PQ = \dots\dots\dots$$

$$XY = \dots\dots\dots$$

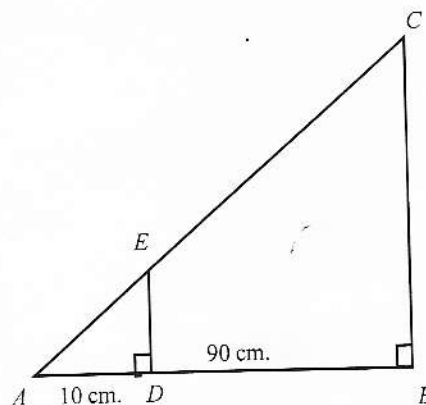
$$PR = \dots\dots\dots$$

$$XZ = \dots\dots\dots$$

Score : 5 Time : 8 Minutes

Concepts / Ideas : The sides opposite equal angles of similar triangles are proportional.

Q.9.11

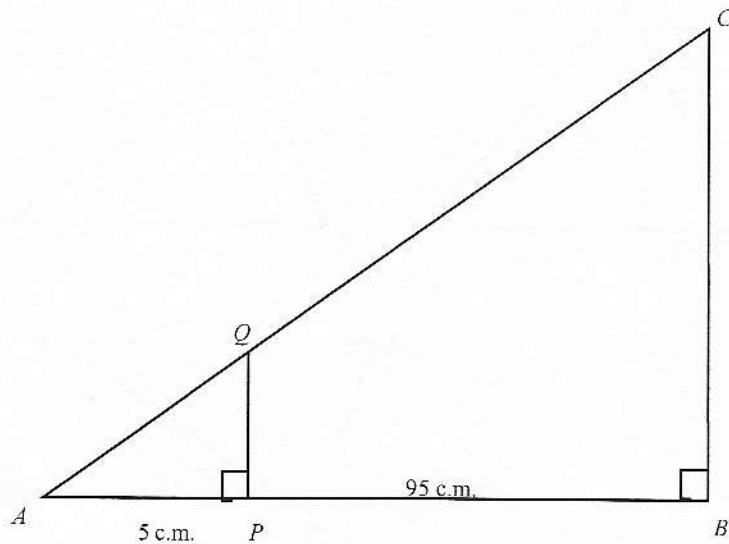


In the figure, $\angle B = 90^\circ$, $\angle D = 90^\circ$ $AD = 10$ centimetres, $BD = 90$ centimetres. Prove that triangles ADE and ABC are similar. Also, prove that $BC = 10 \times ED$.

Score : 4 Time : 7 Minutes

Concepts / Ideas : *The sides opposite equal angles of similar triangles are proportional.*

Q.9.12



In the figure $\angle P = 90^\circ$, $\angle B = 90^\circ$, $AP = 5$ centimetres, $PB = 95$ centimetres. Prove that $BC = 20 PQ$.

Score : 4 Time : 7 Minutes

Concepts / Ideas : *The sides opposite equal angles of similar triangles are proportional*

Q.9.13

If, in triangles ABC and PQR , $\angle A = \angle Q$, $\angle B = \angle R$, complete the following.

$$\frac{BC}{\dots\dots} = \frac{\dots\dots}{PQ}$$

Score : 2 Time : 3 Minutes

Chapter 10

Polynomials

Qns : 10.1 - 10.17

Concepts / Ideas : *The concept of a polynomial*

Q.10.1

When asked to write an algebraic expression, Venu wrote $\frac{3}{2}x^2 + 5x - 1$.

- (a) Is this a polynomial? Justify your claim.
- (b) Write down a polynomial of degree three.

Score : 2 Time : 4 Minutes

Concepts / Ideas : *The value of a polynomial*

Q.10.2

If $P(x) = 2x^2 - 8x + 7$, find $P(2)$, $P(-1)$.

Score : 2 Time : 4 Minutes

Concepts / Ideas : *The value of a polynomial*

Q.10.3

In the polynomial $P(x) = 3x^2 - 4x + k$,

- (a) if $P(1) = 0$, what is the value of k ?
- (b) what is $P\left(\frac{1}{3}\right)$?

Score : 3 Time : 4 Minutes

Concepts / Ideas : *The value of a polynomial*

Q.10.4

If $P(x) = x^3 + ax^2 - bx + 1$, $P(1) = 1$ and $P(-1) = 5$, What are the values of a and b ?

Score : 3 Time : 5 Minutes

Concepts / Ideas : *The value of a polynomial*

Q.10.5

In the polynomial $P(x) = x^3 + 2x^2 + ax - 2$, if $P(1) = P(-1)$, what is the value of a ?

Score : 3 Time : 5 Minutes

Concepts / Ideas : *The sum of polynomials*

Q.10.6

$$p(x) = x^2 - 3x + 1$$

$$q(x) = 2x^2 + 5x - 3$$

- (a) If $r(x) = p(x) + q(x)$, what is the value of $r(x)$?
- (b) Find $p(1) + q(1)$.

Score : 3 Time : 4 Minutes

Concepts / Ideas : *Addition of polynomials*

Q.10.7

$$p(x) = x^3 - 3x^2 + 5x + 1$$

$$\text{If } p(x) + q(x) = 0,$$

- (a) write down $q(x)$;
(b) If $p(a) = k$, find $q(a)$.

Score : 2 Time : 3 Minutes

Concepts / Ideas : *The concept of the degree of a polynomial*

Q.10.8

If the degree of $p(x)$ is 3 and the degree of $p(x) + q(x)$ is 4,

- (a) What is the degree of $q(x)$?
(b) What is the degree of $p(x) - q(x)$?
(c) What is the degree of $p(x) \times q(x)$?

Score : 3 Time : 4 Minutes

Concepts / Ideas : *Multiplication of polynomials*

Q.10.9

$$p(x) = x^2 - 2x + 1, q(x) = 2x + 1$$

Find $p(x) \times q(x)$.

Score : 2 Time : 3 Minutes

Concepts / Ideas : *Addition and subtraction of polynomials*

Q.10.10

$$p(x) = 5x^3 + mx^2 + 3x + 1$$

$$q(x) = nx^3 - 5x^2 + 3x + 4$$

$$r(x) = p(x) + q(x)$$

If the degree of $r(x)$ is 1, find the values of m and n and compute $p(x) - q(x)$.

Score : 3 Time : 5 Minutes

Concepts / Ideas : *Multiplication and division of polynomials*

Q.10.11

$$\text{If } (ax + b)(x + 2) = 2x^2 + 7x + 6,$$

- (1) what are the values of a and b ?
(2) when $2x^2 + 7x$ is divided by $x + 2$,
what is the remainder? what is the quotient?

Score : 4 Time : 8 Minutes

Concepts / Ideas : *Division of polynomials*

Q.10.12

Write down a polynomial of degree 3. Find the quotient and remainder when it is divided by $x - 1$.

Score : 4 Time : 8 Minutes

Concepts / Ideas : *Division of polynomials*

Q.10.13

If $(x^2 + mx + 1)(2x + n) = 2x^3 - 7x^2 + 8x - 3$,

- (1) find the values of m and n .
- (2) find the quotient and remainder when $2x^3 - 7x^2 + 10x - 6$ is divided by $2x - 3$.

Score : 5 Time : 10 Minutes

Concepts / Ideas : *Multiplication and division of polynomials*

Q.10.14

$P(x) = 2x^2 - 7x - 1$, $q(x) = x + 2$

- (a) find $P(x) \times q(x)$
- (b) find the remainder on dividing $2x^3 - 3x^2 - 15x - 2$ by $2x^2 - 7x - 1$?
- (c) Which first degree polynomial added to $2x^3 - 3x^2 - 16x - 3$ leaves a remainder zero on division by $2x^2 - 7x - 1$?

Score : 5 Time : 11 Minutes

Concepts / Ideas : *Multiplication and division of polynomials*

Q.10.15

If, on dividing a polynomial by $x - 3$, the quotient is $x^2 - 1$ and remainder is 7,

- (a) write down the polynomial
- (b) What is the remainder on dividing this polynomial by $x - 1$?

Score : 4 Time : 7 Minutes

Concepts / Ideas : *Multiplication of polynomials*

Q.10.16

The length of a rectangular box is 3 units more than the breadth. The height is 1 unit more than twice the breadth. If the breadth is x units, write down the polynomial denoting the volume of the box.

Score : 3 Time : 4 Minutes

Concepts / Ideas : *The value of polynomial*

Q.10.17

If $P(x) = (x^2 - 1)(x + 2) + 5$,

- (a) find $P(1)$, $P(-1)$
- (b) Write down a polynomial that leaves a remainder 4 on division by $x + 1$ and $x - 1$.

Score : 3 Time : 6 Minutes

Unit 11

Measures of Circles

Qns : 11.1 - 11.21

Concepts/Ideas : *The length of an arc of a circle is that part of the circumference of the circle as the central angle of the arc is part of 360° .*

Q.11.1

If the central angle of an arc of a circle of radius 6 centimetres is 60° ,

- find the length of the arc
- find the perimeter of the sector.

Score : 4 Time : 5 Minutes

Concepts/Ideas : *The length of an arc is part of the circle.*

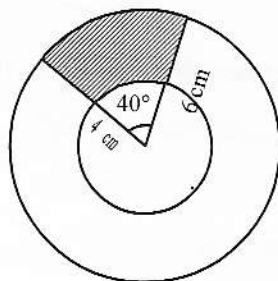
Q.11.2

If an arc of a circle is 7 centimetres long and it subtends an angle 60° at the centre, find the circumference of the circle.

Score : 3 Time : 4 Minutes

Concepts/Ideas : *Area of a sector*

Q.11.3



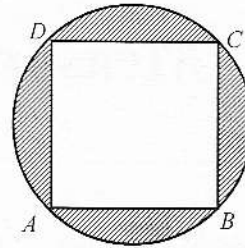
Both circles in the figure have the same centre. The radius of the larger circle is 6 centimetres and that of the smaller 4 centimetres. The sectors subtend a central angle 40° .

- What is the area of the larger sector?
- What is the area of the smaller sector?
- What is the area of the shaded part?

Score : 4 Time : 6 Minutes

Concepts/Ideas : *Area of a circle*

Q.11.4



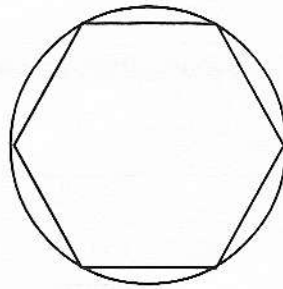
The figure shows a square inscribed in a circle of radius 6 centimetres.

- a) What is the area of the circle?
- b) What is the area of the square?
- c) What is the area of the shaded part?

Score : 4 Time : 6 Minutes

Concepts/Ideas : *Area of a circle*

Q.11.5



The figure shows a regular hexagon inscribed in a circle. If the radius of the circle is 4 centimetres,

- a) what is the length of the side of the regular hexagon?
- b) what is the area of the circle?
- c) what is the area of the regular hexagon?

Score : 4 Time : 6 Minutes

Concepts/Ideas : *The relation between the length of an arc and the radius of the circle*

Q.11.6

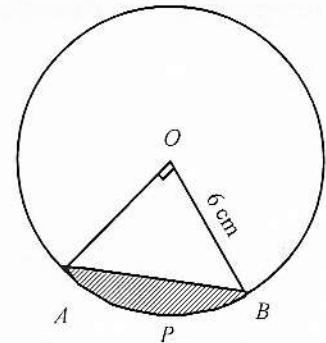
An arc of a circle is 6 centimetres long.

- a) What is the length of an arc subtending the same central angle in a circle of radius three times that of this circle?
- b) What is the relation between the lengths of the arcs of the two circles?

Score : 2 Time : 3 Minutes

Concepts/Ideas : *Area of a circle, area of a sector*

Q.11.7



In the figure, the radius of the circle centred at O is 6 centimetres and the central angle of the arc APB is 90° .

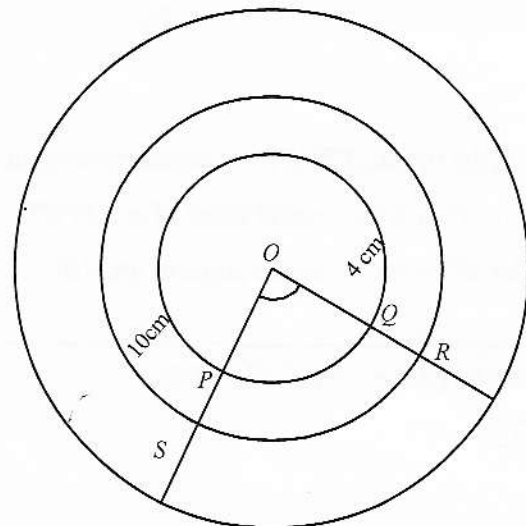
- a) What is the area of $\triangle AOB$?
- b) What is the area of the sector AOB ?
- c) What is the area of the circle excluding the sector AOB ?

Score : 4 Time : 6 Minutes

Concepts/Ideas : *Area of a sector*

Q.11.8

The figure shows a movable model prepared for the mathfest. Three concentric circles are placed one above the other. The radius of the smallest circle is 4 centimetres and that of the largest circle is 10 centimetres.

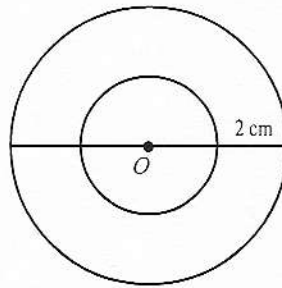


- a) If the central angle of the smallest sector OPQ is 60° , what is the area of $PQRS$?
- b) If the central angle of the smallest sector is made 90° , what is the area of $PQRS$?

Score : 4 Time : 6 Minutes

Concepts/Ideas : *Circumferences of circles*

Q.11.9



Both circles in the figure have centre O . If the difference between the radii of the two circles is 2 centimetres, what is the difference between the circumferences of the two circles?

Score : 3 Time : 5 Minutes

Concepts/Ideas : *To know the circumference of a circle*

Q.11.10

A wheel of radius 10 centimetres rolls along. Find the distance covered in 20 revolutions.

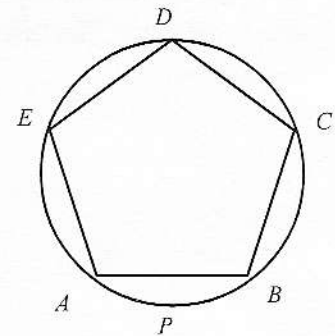
Score : 3 Time : 5 Minutes

Concepts/Ideas : *The central angle of an arc*

Q.11.11

In the figure, $ABCDE$ is a regular pentagon.

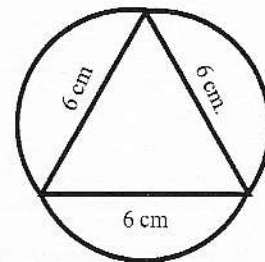
- a) What is the central angle of arc APB ?
- b) What is the central angle of arc ABC ?



Score : 3 Time : 4 Minutes

Concepts/Ideas : *Area of a sector*

Q.11.12

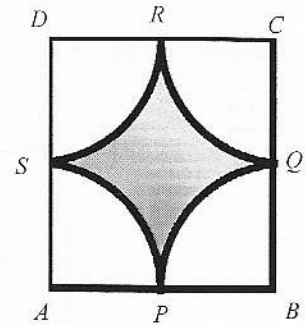


The curved lines in the figure are arcs of circles centred on the vertices of the triangle. What is the perimeter of this shape?

Score : 4 Time : 6 Minutes

Concepts/Ideas : *Area of a sector*

Q.11.13



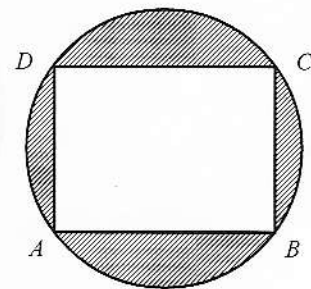
In the figure, ABCD is a square. P, Q, R, S are the mid points of the sides. A side of the square is 10 centimetres. The arcs in the square have centres on the vertices of the square and pass through the mid points of the sides.

- What is the area of the square?
- What is the area of a sector?
- What is the area of the shaded part?

Score : 4 Time : 8 Minutes

Concepts/Ideas : *Area of a sector*

Q.11.14



The figure shows a rectangle ABCD inscribed in a circle. If the length of the rectangle is 8 centimetres and the breadth 6 centimetres,

- what is the area of the rectangle?
- what is the diameter of the circle?
- what is the area of the circle?

Score : 3 Time : 5 Minutes

Concepts/Ideas : *Area of a circle*

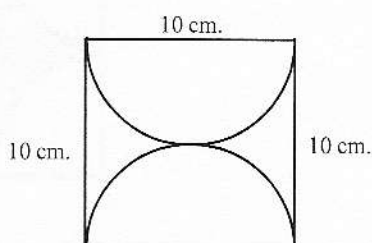
Q.11.15

A thread of length 100 centimetres is made into a circle. What is the area of the circle?

Score : 3 Time : 5 Minutes

Concepts/Ideas : *Area of a sector*

Q.11.16



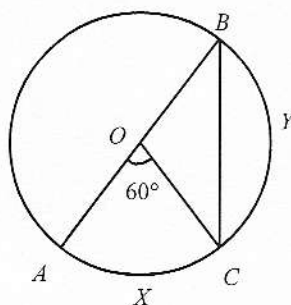
The figure shows a square of side 10 centimetres in which two semi circles are drawn on sides as diameter.

- What is the area of a semicircle?
- What is the area of the part excluding the semicircles?

Score : 3 Time : 5 Minutes

Concepts/Ideas : *The concept of central angle of an arc*

Q.11.17



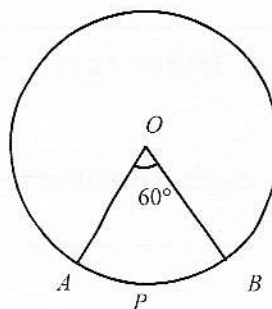
In the figure, O is the centre of the circle. If $\angle AOC = 60^\circ$,

- what is the central angle of arc BYC ?
- what is $\angle B + \angle C$?
- what is the measure of $\angle B$?

Score : 4 Time : 7 Minutes

Concepts/Ideas : *Area of a circle*

Q.11.18



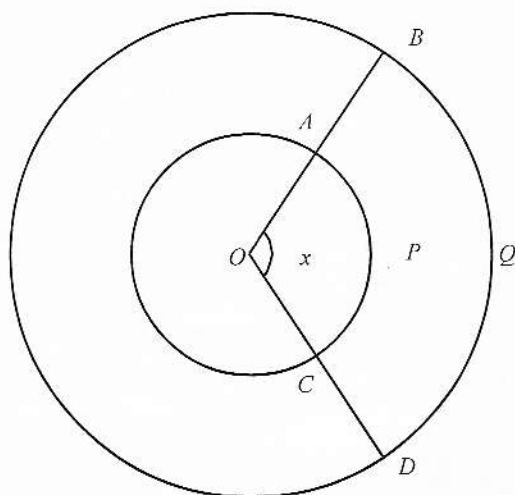
In the figure, O is the centre of the circle. If $\angle AOB = 60^\circ$ and arc APB is of length π units,

- find the circumference of the circle.
- find the area of the circle.

Score : 3 Time : 5 Minutes

Concepts/Ideas : *Area of a circle*

Q.11.19



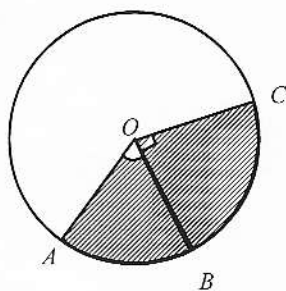
In the figure, both circles have the same centre O . If $OA = 10$ centimetres, $OB = 15$ centimetres and $\angle AOC = x$,

- find the lengths of arcs APC and BQD .
- find the relation between the ratio of the arc lengths and the ratio of the radii.

Score : 4 Time : 8 Minutes

Concepts/Ideas : *Area of a sector*

Q.11.20



In the figure, O is the centre of the circle. If $\angle AOB = 45^\circ$, $\angle BOC = 90^\circ$, $OA = 8$ centimetres,

- what is the area of the sector with central angle 45° ?
- what is the area of the shaded part?

Score : 3 Time : 5 Minutes

Concepts/Ideas : *The central angle of a sector, length of arc and area of a sector.*

Q.11.21

A circular sheet of area 400π square centimetres is divided into two sectors. The area of the smaller sector is 50π square centimetres. What is the ratio of the central angles of the sectors? What is the central angle of the smaller sector? What is the length of arc of the smaller sector?

Score : 4 Time : 8 Minutes

Chapter 12

Real Numbers

Qns : 12.1 - 12.20

Concepts / Ideas : *Real number*

Q.12.1

Write down two rational numbers and two irrational numbers between 3 and 4.

Score : 2 Time : 2 Minutes

Concepts / Ideas : *Real number, Number line*

Q.12.2

What are the integer values of x so that $-2 < x < 3$? Mark on the number line the part showing $-2 < x < 3$.

Score : 3 Time : 5 Minutes

Concepts / Ideas : *Number line*

Q.12.3

Draw the number line and mark the position of $\sqrt{5}$ on it.

Score : 3 Time : 5 Minutes

Concepts / Ideas : *Number line*

Q.12.4

Draw the number line and mark the positions of the numbers $\sqrt{2}$, $\sqrt{2} + 1$, $\sqrt{2} - 1$.

Score : 4 Time : 6 Minutes

Concepts / Ideas : *Number line*

Q.12.5

Meena drew a number line and drew a line through the point zero, perpendicular to it. On it, she marked a point P one unit away from zero. At what points will a circle centred at P and of radius 2 intersect the number line?

Score : 3 Time : 5 Minutes

Concepts / Ideas : *Absolute value*

Q.12.6

What are the numbers for which the absolute value is 7? What are the numbers on the number line which are 6 units away from 0.

Score : 2 Time : 3 Minutes

Concepts / Ideas : *Absolute value*

Q.12.7

For what values of x will $|x - 1| = 5$ be true?

Score : 2 Time : 3 Minutes

Concepts / Ideas : *Number line*

Q.12.8

Draw the number line and mark on it the part showing values of x so that $|x| < 3$.

Score : 2 Time : 4 Minutes

Concepts / Ideas : *Absolute value, the distance between points on the number line.*

Q.12.9

Find the value of x such that $|x + 2| = |x - 6|$.

Score : 3 Time : 4 Minutes

Concepts / Ideas : *Distance between points on the number line.*

Q.12.10

Are the numbers -3, 10 at the same distance from the number 4 on the number line? Why?

Score : 2 Time : 3 Minutes

Concepts / Ideas : *Distance between points on the number line.*

Q.12.11

The points -5, 1 on the number line are the ends of a diameter of a circle. What is the diameter? What number denotes the centre of the circle?

Score : 2 Time : 3 Minutes

Concepts / Ideas : *Distance between points on the number line.*

Q.12.12

Each pair of the numbers given below lies on the number line. Find the distance between them.

(a) $\frac{1}{2}, \frac{1}{3}$ (b) $\sqrt{3} + 1, \sqrt{3} - 1$

Score : 2 Time : 3 Minutes

Concepts / Ideas : *Absolute value*

Q.12.13

Write down two pairs of values for x and y satisfying $|x + y| < |x| + |y|$.

Score : 2 Time : 3 Minutes

Concepts / Ideas : *Distance between points on the number line.*

Q.12.14

What is the distance between the points -4, -7 on the number line? Write down two other numbers with the same distance between them.

Score : 2 Time : 3 Minutes

Concepts / Ideas : *Absolute value*

Q.12.15

Write down two pairs of values for x and y such that $|x - y| = |x| + |y|$.

Score : 3 Time : 4 Minutes

Concepts / Ideas : *Distance between two points on the number line.*

Q.12.16

In the equilateral triangle PQR the points P and Q denote the numbers $-4, 5$ on the number line. What is PQ ? Find the perimeter of the triangle.

Score : 2 Time : 4 Minutes

Concepts / Ideas : *Distance between points on the number line.*

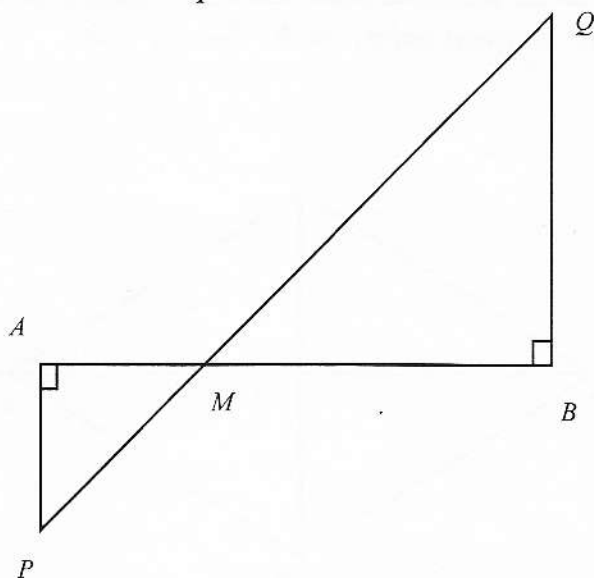
Q.12.17

A circle centred at P cuts the number line at the points $-5, 11$. If the radius of the circle is 10 units, find the distance from the centre of the circle to the number line.

Score : 4 Time : 6 Minutes

Concepts / Ideas : *Distance between points on the number line.*

Q.12.18



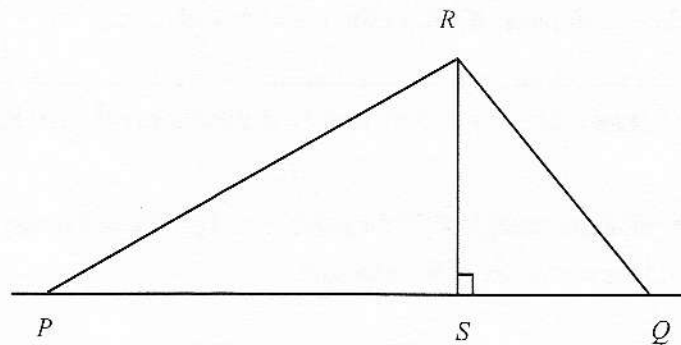
In the figure, A, B denote the points $-5, 7$ respectively, of the number line. If $AP : BQ = 1 : 3$,

- what is AB ?
- what number does the point M denote?

Score : 4 Time : 6 Minutes

Concepts / Ideas : *Distance between points on the number line.*

Q.12.19



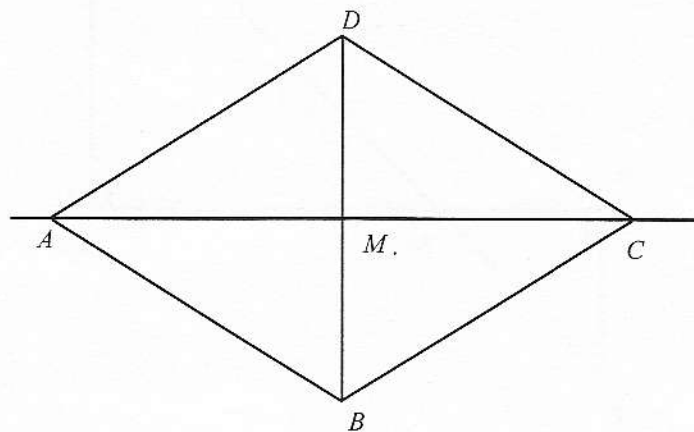
In the figure, $\angle PRQ = 90^\circ$; P, S denote the numbers $-8, 1$ respectively, on the number line. If $RS = 6$ units

- a) what is PS ?
- b) what number does Q denote?

Score : 4 Time : 6 Minutes

Concepts / Ideas : *Distance between points on the number line.*

Q.12.20



In the figure, $ABCD$ is a rhombus.

$AB = 10$ units, $BD = 12$ units

If M denotes the number 3,

- a) find AM ?
- b) what numbers do A and C denote?

Score : 4 Time : 6 Minutes

Chapter 13

Solids

Qns : 13.1 - 13.20

Concepts / Ideas : *Surface area of solids*

Q.13.1

An equilateral triangular prism has base area 120 square centimetres and the area of a lateral face is 75 square centimetres. Find its total surface area.

Score : 3 Time : 5 Minutes

Concepts / Ideas : *Surface area of solids*

Q.13.2

The perimeter of the base of a prism is 36 centimetres and the height is 15 centimetres. Find its lateral surface area.

Score : 2 Time : 3 Minutes

Concepts / Ideas : *Surface area of solids*

Q.13.3

A square prism has a lateral edge of length 12 centimetres and a base edge of length 7 centimetres.

- (a) Find the base area of the prism
- (b) Find the lateral surface area of the prism.

Score : 3 Time : 5 Minutes

Concepts / Ideas : *Surface area of solids*

Q.13.4

The area of a lateral face of a square prism is 25 square centimetres and the height is 10 centimetres.

- (a) What is the lateral surface area?
- (b) What is the perimeter of the base?

Score : 2 Time : 4 Minutes

Concepts / Ideas : *Surface area of solids*

Q.13.5

The base of a prism is a regular hexagon. If an edge of the base is 6 centimetres and the height is 20 centimetres, find its lateral surface area.

Score : 2 Time : 4 Minutes

Concepts / Ideas : *Surface area of solids*

Q.13.6

A chalkbox is in the shape of a square prism. An edge of the base is 12 centimetres and the height is 18 centimetres. How many square centimetres of thick paper will be required to make 100 such chalk boxes?

Score : 4 Time : 8 Minutes

Concepts / Ideas : Volume of solids

Q.13.7

- (a) A water reservoir in the shape of a square prism of height 50 centimetres, breadth 1 metre and length 2 metres. How many litres of water will it hold?
- (b) What modification would you suggest so as to increase the capacity of the reservoir to 2000 litres.

Score : 3 Time : 4 Minutes

Concepts / Ideas : Volume of solids

Q.13.8

The mathematics teacher gave Suresh and Satyan a wax block each, in the shape of a square prism of the same size. They were asked to make the maximum number of cubical blocks out of them. An edge of the cubical block should be 2 centimetres. The area of the given wax block was 36 square centimetres and the height was 11 centimetres.

- (a) If Suresh cut out cubical blocks, how many blocks would he get?
- (b) If Satyan melted the block and then made cubical blocks, how many would he get?

Score : 4 Time : 8 Minutes

Concepts / Ideas : Surface area of a cylinder

Q.13.9

How many square metres of tin sheet will be required to make cylindrical vessels with perimeter of base 16π centimetres and height 10 centimetres? Assume the vessels have lids.

Score : 4 Time : 8 Minutes

Concepts / Ideas : Volume of a cylinder

Q.13.10

If the base area of a cylinder is 314 square centimetres and the height is 20 centimetres, what is the volume?

Score : 2 Time : 3 Minutes

Concepts / Ideas : Volume of a cylinder

Q.13.11

Two cylinders have radii in the ratio 1 : 2 and heights in the ratio 2 : 3. What is the ratio of their volumes?

Score : 3 Time : 5 Minutes

Concepts / Ideas : Volume of a cylinder

Q.13.12

A water reservoir, cylindrical in shape, has perimeter of base 100π centimetres and height 6 metres. How many litres of water will it hold?

Score : 3 Time : 5 Minutes

Concepts / Ideas : *Surface area of a triangular prism*

Q.13.13

A triangular prism has a base in the shape of an equilateral triangle of perimeter 36 centimetres. The height of the prism is 25 centimetres. Find the expense involved to paint its lateral surfaces at the rate of 50 paise per square centimetre?

Score : 2 Time : 4 Minutes

Concepts / Ideas : *Volume of a cylinder*

Q.13.14

A cylindrical vessel has base area 314 square centimetres and height 30 centimetres. The vessel contains water to a height of 10 centimetres. Find how many litres of water will it contain. How many more litres of water should be poured into the vessel to fill it.

Score : 3 Time : 5 Minutes

Concepts / Ideas : *Surface area of a cylinder*

Q.13.15

The base area of a cylinder is 64π square centimetres and the curved surface area is 240π square centimetres.

- (a) Calculate the total surface area of the cylinder.
- (b) If the cylinder is cut into two cylinders of half the height, what will be the surface area of each of them?

Score : 3 Time : 5 Minutes

Concepts / Ideas : *Volume of a cylinder*

Q.13.16

A block of wood is in the shape of a square prism, with perimeter of base 120 centimetres and height 2 metres. A cylindrical pillar of maximum size is carved out of it. Find the volume of wood that was chopped away to make the pillar.

Score : 5 Time : 8 Minutes

Concepts / Ideas : *Volume and curved surface area of a cylinder*

Q.13.17

If the radius of a cylinder is 14 centimetres and height 21 centimetres,

- (a) what is the area of the curved surface?
- (b) what is the volume?

Score : 2 Time : 4 Minutes

Concepts / Ideas : *Volume of prism*

Q.13.18

A triangular prism has base edges 13 centimetres, 21 centimetres and 20 centimetres. Find the volume of the prism.

Score : 3 Time : 5 Minutes

Concepts / Ideas : *Volume of a prism*

Q.13.19

Ammu cut out a square from each of 4 corners of a rectangular piece of thick paper, 12 centimetres long and 8 centimetres broad. The ends were then folded upwards and a box was made. If the height of the box is 2 centimetres, what is the volume of the box?

Score : 3 Time : 5 Minutes

Concepts / Ideas : *Volume of a prism*

Q.13.20

There are two prisms of the same height, one with an equilateral triangular base and the other with a regular hexagonal base. The base areas of the two prisms are equal.

- (a) What is the ratio of their volumes?
- (b) What is the ratio of their lateral surface areas?

Score : 4 Time : 8 Minutes
