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10th Maths – Chapter 4 to 6 (Book in One Marks)

Green indicates Thinking Corner, Blue indicates Progress Check

Dear students,

1. Read and kept in mind the Points to Remember in all chapters.

2. Don't muck up the book back one marks answers.

3. Try to know how the answer has come. This method of practicing will help you in many ways.

4. If you have any doubts in this, clarify it with your teachers.

5. If you know the Basic and Logic very well, then Maths will become a Magic.

புரியாமற் படிப்பது எதற்கும் உதவாது
புரிந்து படிப்பது என்றும் மறவாது.

Chapter – 4 GEOMETRY

1. Are square and a rhombus similar or congruent. Discuss. Never
Since in rhombus, the side angles are not equal to 90^0 and the two diagonals are also not equal.
2. Are a rectangle and a parallelogram similar. Discuss. Never
Since in parallelogram, the side angles are not equal to 90^0 and the two diagonals are also not equal.
3. Are any two right angled triangles similar? If so why?
Yes. Since the corresponding sides are proportional.

4. A pair of equiangular triangles are similar.

5. If two triangles are similar, then they are equiangular.

6. If we change exactly one of the four given lengths, then we can make these triangles similar.

7. All circles are similar (congruent/ similar).

8. All squares are similar (similar/ congruent).

9. Two triangles are similar, if their corresponding angles are equal and their corresponding sides are proportional.

10. (a) All similar triangles are congruent – True/False. False
(b) All congruent triangles are similar – True/False. True

11. Give two different examples of pair of non-similar figures.
Squares and Circles, Right triangles and Acute Triangles.

12. A straight line drawn parallel to a side of a triangle divides the other two sides proportionally

13. Basic Proportionality Theorem is also known as Thales Theorem.

14. Let ΔABC be equilateral. If D is a point on BC and AD is the internal bisector of $\angle A$. Using Angle Bisector Theorem, BD/DE is AB/AC.

15. The bisector of an angle of a triangle divides the opposite side internally in the ratio of the corresponding sides containing the angle.

16. If the median AD to the side BC of a ΔABC is also an angle bisector of $\angle A$ then AB/AC is 1.

17. In a right angled triangle, the side opposite to 90° (the right angle) is called the hypotenuse.

18. The other two sides are called legs of the right angled triangle.

19. The hypotenuse will be the longest side of the triangle.

20. In India, Pythagoras Theorem is also referred as "Baudhyana Theorem".

21. Write down any five Pythagorean triplets?
3, 4, 5 6, 8, 10 9, 12, 15 12, 16, 20 5, 12, 13

22. In a right angle triangle the sum of other two angles is 90^0.

23. Can all the three sides of a right angled triangle be odd numbers? No.
Why? Because sum of squares of any two odd numbers becomes an even number. Then the square root of such even number will never be an odd number.

24. Hypotenuse is the longest side of the right angled triangle.

25. The first theorem in mathematics is Thales Theorem.

26. If the square of the longest side of a triangle is equal to sums of squares of other two sides, then the triangle is Right triangle.

27. State True or False. Justify them.
(i) Pythagoras Theorem is applicable to all triangles. False
$AB^2 + AC^2 = BC^2$ will not be applicable for all triangles except right triangle.
(ii) One side of a right angled triangle must always be a multiple of 4. False.
$1^2 + (\sqrt{5})^2 = (\sqrt{6})^2$

28. A straight line cuts the circle is called as a secant.

29. The word "tangent" comes from the latin word "tangere" which means "to touch".

30. The longest chord in a circle is the diameter.

31. We can draw two tangents from a point outside the circle.

32. We can draw only one tangent from a point on the circle.

33. A straight line that touches a circle at a common point is called a tangent.

34. A chord is a sub-section of a secant.

35. The lengths of the two tangents drawn from an exterior point to a circle are equal.

36. No tangent can be drawn from an interior point of the circle.

37. Angle bisector is a cevian that divides the angle, into two equal halves.

38. Can we draw two tangents parallel to each other on a circle? - Yes.
From the end points of the diameter, we can draw two tangents parallel to each other.

39. Can we draw two tangents perpendicular to each other on a circle? - Yes.

40. The term cevian comes from the name of Italian engineer Giovanni Ceva,

41. A cevian is a line segment that extends from one vertex of a triangle to the opposite side.

42. A cevian that divides the opposite side into two congruent(equal) lengths is known as median.

43. A cevian that is perpendicular to the opposite side is known as altitude.

44. A cevian that bisects the corresponding angle is known as angle bisector.

45. The cevians do not necessarily lie within the triangle, although they do in the diagram.

Activity 1

Let us try to construct a line segment of length $\sqrt{2}$.

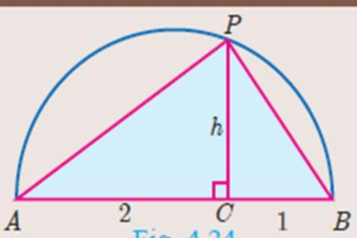


Fig. 4.24

For this, we consider the following steps.

Step1: Take a line segment of length 3 units. Call it as AB.

Step2: Take a point C on AB such that $AC=2$, $CB=1$.

Step3: Draw a semi-circle with AB as diameter as shown in the diagram

Step4: Take a point 'P' on the semi-circle such that CP is perpendicular to AB.

Step5: Join P to A and B. We will get two right triangles ACP and $B\cancel{CP}$. PCB

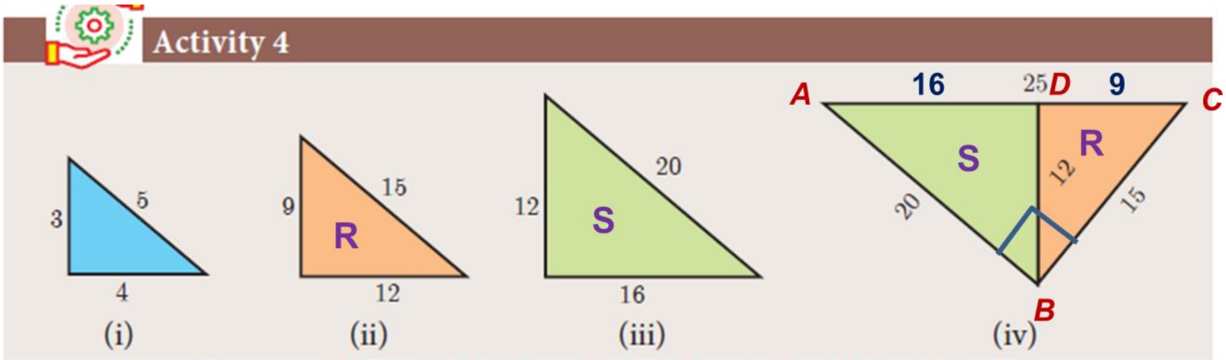
Step6: Verify that the triangles ACP and $B\cancel{CP}$ PCB are similar. ∠ACP = ∠PCB = 90^0; ∠PAC = ∠BPC; ∠CPA = ∠CPB

Step7: Let $CP = h$ be the common altitude. Using similarity, find h. $h/2 = 1/h$; $h^2 = 2$; $h = \sqrt{2}$

Step8: What do you get upon finding h? $h = \sqrt{(AC \times CB)}$

Repeating the same process, can you construct a line segment of lengths $\sqrt{3}$, $\sqrt{5}$, $\sqrt{8}$.

Yes, we can construct a line segment of lengths $\sqrt{3}$, $\sqrt{5}$, $\sqrt{8}$ by taking a line segment of lengths of 3+1, 5+1, 8+1 units respectively.



From fig. (iv) $25^2 = 20^2 + 15^2$; $20^2 = 16^2 + 12^2$; $15^2 = 12^2 + 9^2$

$\therefore (16 + 9)^2 = (16^2 + 12^2) + (12^2 + 9^2)$

$16^2 + 9^2 + 2 \times 16 \times 9 = 16^2 + 12^2 + 12^2 + 9^2$

$2 \times 16 \times 9 = 2 \times 12^2$

$16 \times 9 = 12^2$; ie $BD^2 = AD \times DC$

Activity 5

(i) Take two consecutive odd numbers.

(ii) Write the reciprocals of the above numbers and add them. You will get a number of the form $\frac{p}{q}$.

(iii) Add 2 to the denominator of $\frac{p}{q}$ to get $q+2$.

(iv) Now consider the numbers $p, q, q+2$. What relation you get between these three numbers?

Try for three pairs of consecutive odd numbers and conclude your answer.

Taking 5 and 7, their

Reciprocals are 1/5, 1/7

1/5 + 1/7 = 12/35

Now, p = 12, q = 35, q+2 = 37

The relation is $12^2 + 35^2 = 37^2$

144 + 1225 = 1369

$\therefore$ p, q, q+2 are the Pythagorean Triplet

Chapter – 5 COORDINATE GEOMETRY

1. Apollonius is hailed as "The Great Geometer". His greatest work was called "conics".

2. Coordinate geometry, also called Analytical geometry.

3. The first degree equation in two variables ax +by +c = 0 represents a straight line in a plane.

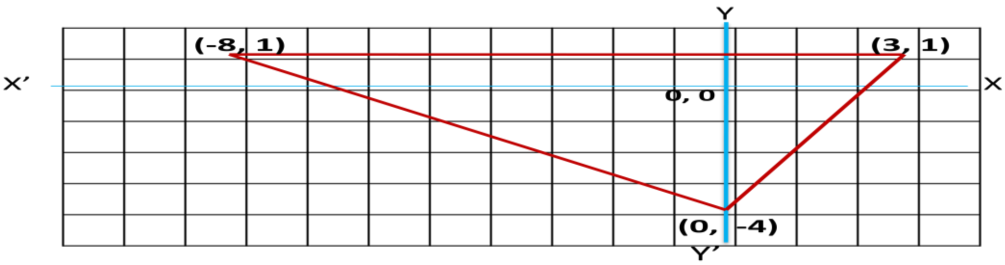
The vertices of DPQR are P(0,-4) , Q(3,1) and R(-8,1)

4. Draw ΔPQR on a graph paper. Graph drawn.

5. Check if ΔPQR is equilateral. It is not an equilateral triangle.

6. Find the area of ΔPQR . Area = 27.5 sq.unit

7. Find the coordinates of M, the mid-point of QP. (3/2, -3/2)



8. Find the coordinates of N, the mid-point of QR. **(-5/2, 1)**

9. Find the area of ΔMPN. **6.875sq.unit**.

10. What is the ratio between the areas of ΔMPN and ΔDPQR ? **1 : 4**.

Progress Check

1. Complete the following table.

S.No.	Points	Distance	Mid Point	Internal Point	Internal Ratio	External Point	External Ratio
(i)	(3, 4), (5, 5)	√5	4, 4.5	19/5, 22/5	2:3	- 1, 2	2:3
(ii)	(−7,13),(−3,1)	4√10	- 5, 7	$\left(-\frac{13}{3}, 5\right)$	2 : 1	31 $(-13, \cancel{15})$	3 : 5

2. $A(0,5)$, $B(5,0)$ and $C(-4,-7)$ are vertices of a triangle then its centroid will be at <u>1/3, -2/3</u>.

11. How many triangles exist, whose area is zero? <u>None</u>

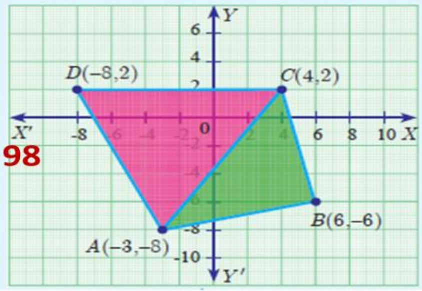
12. If the area of a quadrilateral formed by the points (a, a), (–a, a), (a, –a) and (–a, –a), where a ≠ 0 is 64 square units, then identify the type of the quadrilateral. <u>Square.</u>

13. Find all possible values of a. **(4, 4), (–4, 4), (4, –4) and (–4, –4)**.

Progress Check

Given a quadrilateral $ABCD$ with vertices $A(-3,-8)$, $B(6,-6)$, $C(4,2)$, $D(-8,2)$

1. Find the area of ΔABC. **38**
2. Find the area of ΔACD. **60**
3. Calculate area of ΔABC + area of ΔACD. **98**
4. Find the area of quadrilateral $ABCD$. **98**
5. Compare the answers obtained in 3 and 4. **Both are equal.**



14. The inclination of X axis and every line parallel to X axis is <u>0°</u> .

15. The inclination of Y axis and every line parallel to Y axis is <u>90°</u> .

16. The measure of steepness is called <u>slope</u> or <u>gradient</u>.

17. The slope of a vertical line is <u>undefined</u>.

18. Two non-vertical lines are <u>parallel</u> if and only if their <u>slopes are equal</u>.

19. When the line l_1 is parallel to l_2 if and only if <u>$m_1 = m_2$</u>.

20. When the line l_1 is perpendicular to line l_2 then <u>$m_1 m_2 = -1$</u> .

21. In any triangle, <u>exterior angle</u> is <u>equal to sum of the opposite interior angles</u>.

Progress check		
S.No.	Points	Slope
1	$A(-a, b)$, $B(3a, -b)$	-b/2a
2	$A(2, 3)$, $B(4, 7)$	2
3	$A(5, 8)$, $B(10, 8)$	0
4	$A(7, 3)$, $B(7, 10)$	Undefined

22. If the slopes of both the pairs of opposite sides are equal then the quadrilateral is a parallelogram.

23. Provide three examples of using the concept of slope in real-life situations.
 1. Ghot road in the hilly area. 2. Ramps at the entrance of the house for vehicles.
 3. Ramps at hospitals for handicapped persons.

24. For, the point (x, y) in a xy plane, the x coordinate x is called "Abscissae" and the y coordinate y is called "Ordinate".

25. Is it possible to express, the equation of a straight line in slope-intercept form, when it is parallel to Y axis?
 Not possible. (Since slope is not defined for lines parallel to Y axis.)

Progress check				
S.No.	Equation	Slope	x intercpt	y intercept
1	$3x - 4y + 2 = 0$	3/4	-2/3	1/2
2	$y = 14x$	14	0	0
3	$3x - 2y - 6 = 0$	3/2	2	-3

Progress check					
S.No.	Equation	Parallel or Perpendicular	S.No.	Equation	Parallel or Perpendicular
1	$5x + 2y + 5 = 0$ $5x + 2y - 3 = 0$	Parallel	3	$8x - 10y + 11 = 0$ $4x - 5y + 16 = 0$	Parallel
2	$3x - 7y - 6 = 0$ $7x + 3y + 8 = 0$	Perpendicular	4	$2y - 9x - 7 = 0$ $27y + 6x - 21 = 0$	Perpendicular

26. How many straight lines do you have with slope 1? Infinite Lines.

27. Find the number of point of intersection of two straight lines.
 One point.

28. Find the number of straight lines perpendicular to the line $2x - 3y + 6 = 0$.

 Infinite Perpendicular lines can be drawn.

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Activity 1

(i) Take a graph sheet.

(ii) Consider a triangle whose base is the line joining the points (0,0) and (6,0)

(iii) Take the third vertex as (1,1), (2,2), (3,3), (4,4), (5,5) and find their areas. Fill in the details given:

Third vertex	Area of Triangle
(1,1)	$A_1 =$ 3 Sq.unit.
(2,2)	$A_2 =$ 6 Sq.unit.
(3,3)	$A_3 =$ 9 Sq.unit.
(4,4)	$A_4 =$ 12 Sq.unit.
(5,5)	$A_5 =$ 15 Sq.unit.

(iv) Do you see any pattern with A_1, A_2, A_3, A_4, A_5 ? If so mention it. **It is an A.P. Sequence**

(v) Repeat the same process by taking third vertex in step (iii) as (1,2), (2,4), (3,8), (4,16), (5,32)

(vi) Fill the table with these new vertices

Third vertex	Area of Triangle
(1,2)	$A_1 =$ 6 Sq.unit.
(2,4)	$A_2 =$ 12 Sq.unit.
(3,8)	$A_3 =$ 24 Sq.unit.
(4,16)	$A_4 =$ 48 Sq.unit.
(5,32)	$A_5 =$ 96 Sq.unit.

(vii) What pattern do you observe now with A_1, A_2, A_3, A_4, A_5 ? **It is a G.P. Sequence**

Activity 2

Find the area of the shaded region

= 1/2x7x(6 – 4)

= 7 sq.unit.

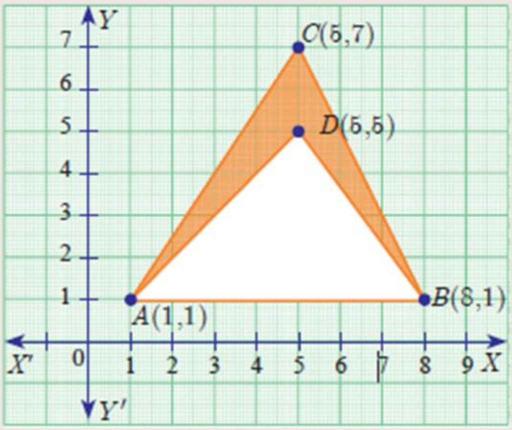


Fig. 5.15

Activity 3

The diagram contain four lines l_1, l_2, l_3 and l_4.

(i) Which lines have positive slope?

(ii) Which lines have negative slope?

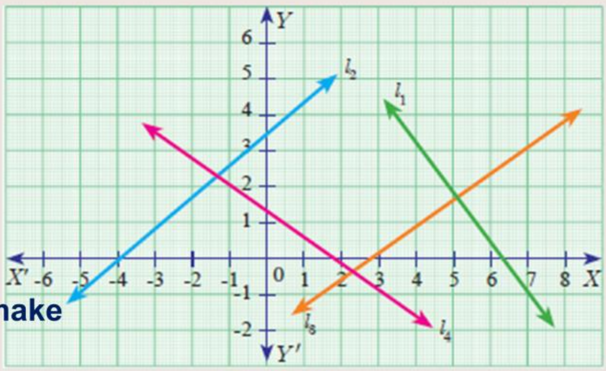


Fig. 5.19

(i). l_2, l_3 have positive slopes, because they make acute angles with X-axis

(ii). l_1, l_4 have negative slopes, because they make obtuse angles with X-axis

Activity 4

If line l_1 is perpendicular to line l_2 and line l_3 has slope 3 then

(i) find the equation of line l_1

(ii) find the equation of line l_2

(iii) find the equation of line l_3

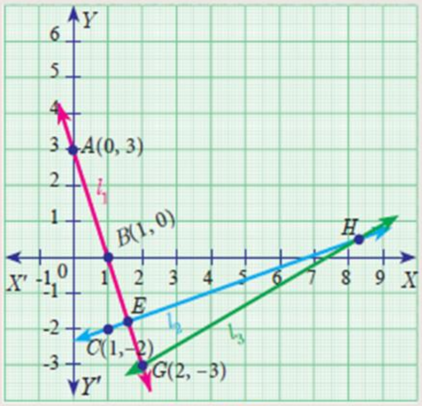


Fig. 5.38

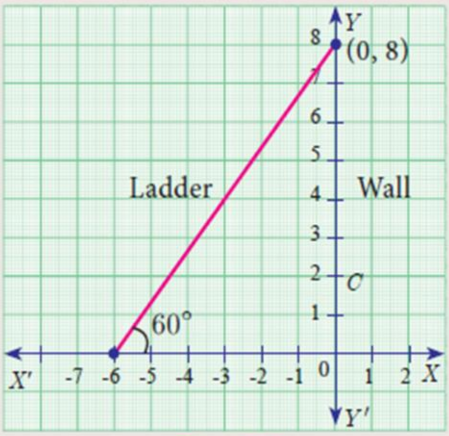
(i) Line l_1 equation : Here x-intercept = 1, y-intercept = 3, Using two intercept form $x/1 + y/3 = 1$ from this $3x + y - 3 = 0$

(ii) Line l_2 equation : Here l_2 is perpendicular to l_1; Slope l_1 = -3 ; ∴ Slope l_2 = 1/3 and it passes through C(1, -2) ; Using Slope point form $y - y1 = m(x - x1)$ $y + 2 = 1/3\,(x - 1)$ from this $x - 3y - 7 = 0$

(iii) Line l_3 equation : Here Slope l_3 = 3; and it passes through C(2, -3) ; Using Slope point form $y - y1 = m(x - x1)$; $y + 3 = 3\,(x - 2)$ from this $3x - y - 9 = 0$

Activity 5

A ladder is placed against a vertical wall with its foot touching the horizontal floor. Find the equation of the ladder under the following conditions.

No.	Condition	Picture	Equation of the ladder
(i)	The ladder is inclined at 60° to the floor and it touches the wall at (0,8) **Slope of ladder = 8/6 = 4/3** **It passes through (0, 8)** **$y - 8 = 4/3\,(x - 0)$**	 Fig. 5.39	**$4x - 3y + 24 = 0$**
(ii)	The foot and top of the ladder are at the points (2,4) and (5,1)	**Using two point form** **$(y - 4)/(1 - 4) = (x - 2)/(5 - 2)$**	**$x + y - 6 = 0$**

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Activity 6

Find the equation of a straight line for the given diagrams

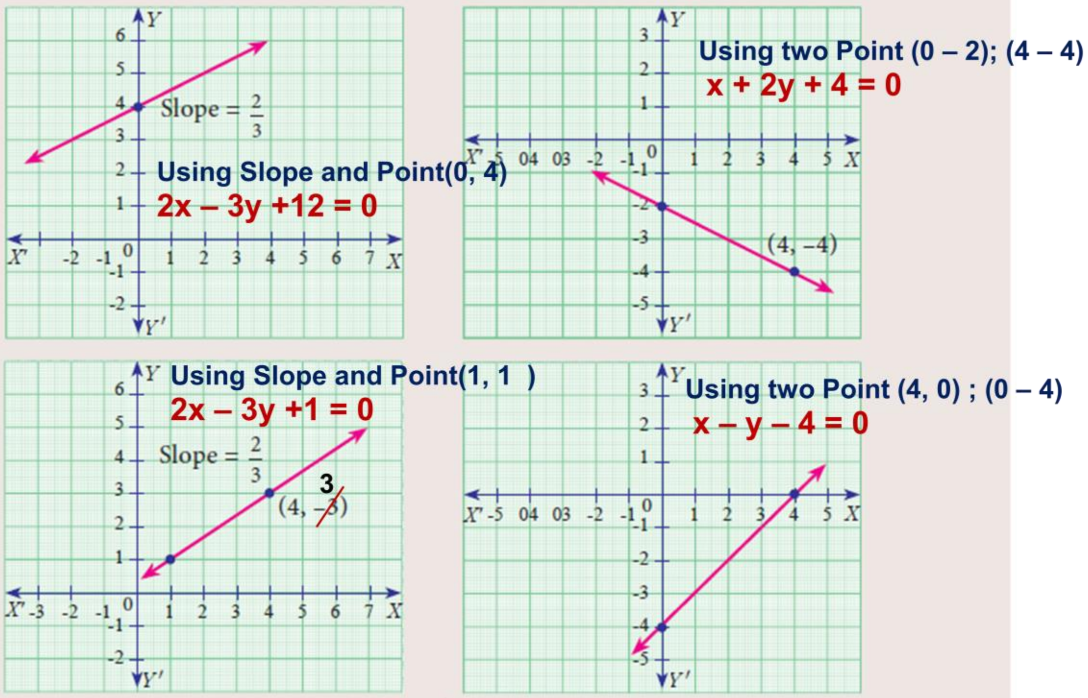

Fig. 5.41

Chapter – 6 TRIGONOMETRY

1. Hipparchus of Rhodes around 200 BC is considered as "The Father of Trigonometry"

2. When will the values of sin Ø and cos Ø be equal? Ø = 45°

3. For what values of Ø, sinØ = 2 ? No. (Since sinØ varies from 0 to 1 only.)

4. Among the six trigonometric quantities, as the value of angle increase from 0° to 90° , which of the six trigonometric quantities has undefined values?
   tan 90^0, cosec 0^0, sec 90^0, cot 0^0

5. Is it possible to have eight trigonometric ratios? No.
   (Since triangle has 3 sides only.From this we can make only 6 ratios)

6. Let 0°≤ Ø ≤ 90° . For what values of Ø does
   (i) sin Ø > cos Ø (ii) cos Ø > sin Ø (iii) sec Ø = 2 tan Ø (iv) cosec Ø = 2 cot Ø
   (i) 45°< Ø ≤ 90° (ii) 0°≤ Ø < 45° (iii) Ø = 30° iv) Ø = 60°

7. The number of trigonometric ratios is 6.

8. 1− $\cos^2$ Ø is $\sin^2$Ø.

9. (sec Ø + tan Ø)(sec Ø − tan Ø) is 1. (= $\sec^2$ Ø − $\tan^2$ Ø ∵ $(a+b)(a-b) = a^2 - b^2$)

10. (cot Ø + cosec Ø)(cot Ø −cosec Ø) is –1 . (= $\cot^2$ Ø − cosec^2 Ø)

11. cos 60° sin 30° + cos 30° sin 60° is 1.
(cos 60° = sin 30°; sin 60° = cos 30°; ∴ It is = $\sin^2 30 + \cos^2 30 = 1$)

12. tan 60° cos 60° + cot 60° sin 60° is (√3 +1)/2.

13. (tan 45°+ cot 45°)+(sec 45° cosec45°) is 4.

14. (i) sec Ø = cosec Ø if Ø is 45°. (ii) cot Ø = tan Ø if Ø is 45°.

15. What type of triangle is used to calculate heights and distances? Right Triangle.

16. When the height of the building and distances from the foot of the building is given, which trigonometric ratio is used to find the angle of elevation?
tan Ø = Height/Distance.

17. If the line of sight and angle of elevation is given, then which trigonometric ratio is used
(i) to find the height of the building. Height = sin Ø x Line of sight.
(ii) to find the distance from the foot of the building. Distance = cos Ø x Line of sight.

18. What is the minimum number of measurements required to determine the height or distance or angle of elevation? Two.

19. The line drawn from the eye of an observer to the point of object is Line of sight.

20. Which instrument is used in measuring the angle between an object and the eye of the observer? Theodolite.

21. When the line of sight is above the horizontal level, the angle formed is Angle of elevation.

22. The angle of elevation increases as we move towards the foot of the vertical object (tower). (Note : The angle of elevation decreases as we move away from the Tower).

23. When the line of sight is below the horizontal level, the angle formed is Angle of depression.

24. Angle of Depression and Angle of Elevation are equal since they are alternative angles.

Identity	Equal forms
$\sin^2Ø + \cos^2Ø = 1$	$\sin^2Ø = 1 - \cos^2Ø$ (or) $\cos^2Ø = 1 - \sin^2Ø$
$1+ \tan^2Ø = \sec^2Ø$	$\tan^2Ø = \sec^2Ø - 1$ (or) $\sec^2Ø - \tan^2Ø = 1$
$1+ \cot^2Ø = \text{cosec}^2Ø$	$\cot^2Ø = \text{cosec}^2Ø - 1$ (or) $\text{cosec}^2Ø - \cot^2Ø = 1$

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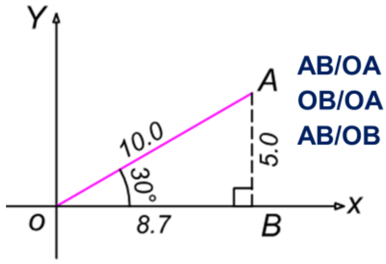
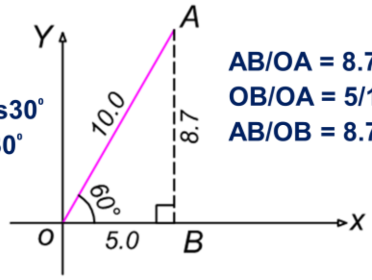
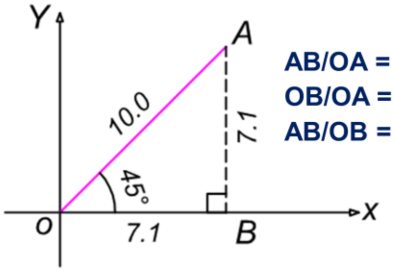
Activity 1



AB/OA = 5/10 = ½ = sin30°
OB/OA = 8.7/10 = 0.87 = cos30°
AB/OB = 5/8.7 = 0.57 = tan30°



AB/OA = 8.7/10 = 0.87 = sin60°
OB/OA = 5/10 = ½ = cos60°
AB/OB = 8.7/5 = 1.74 = tan60°

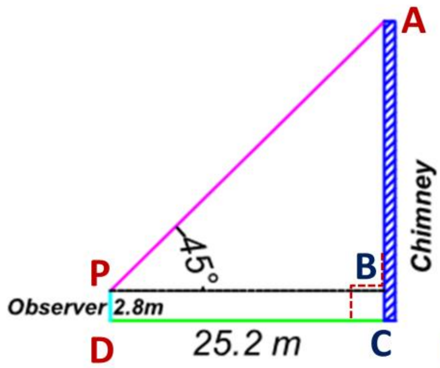


AB/OA = 7.1/10 = 0.71 = sin45°
OB/OA = 7.1/10 = 0.71 = cos45°
AB/OB = 7.1/7.1 = 1 = tan45°

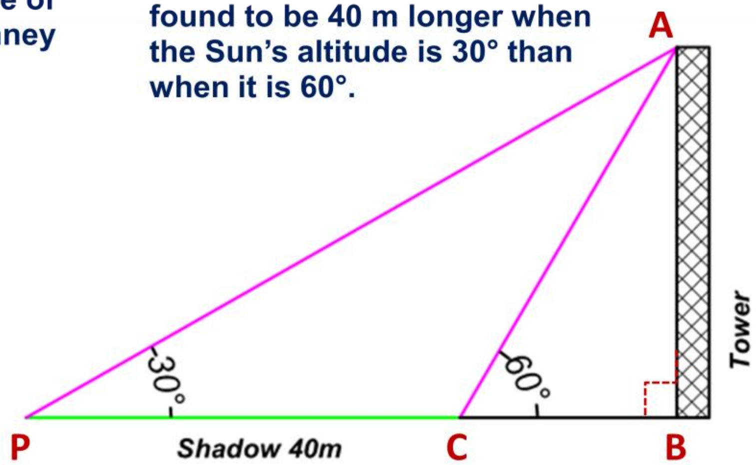
From these, we conclude that
sin30° = cos60° ; sin60° = cos30°
Sin 45° = cos45°
tan30° = 1/tan60° = cot60°

Activity 2

(ii) An observer 2.8 m tall is 25.2 m away from a chimney. The angle of elevation of the top of the chimney from her eyes is 45°.



(iv) The shadow of a tower standing on a level ground is found to be 40 m longer when the Sun's altitude is 30° than when it is 60°.



(iii) From a point P on the ground the angle of elevation of the top of a 20 m tall building is 30°. A flag is hoisted at the top of the building and the angle of elevation of the top of the flagstaff from P is 55° .