सत्यमेव जयते

महाराष्ट्र शासन

State Council Of Educational Research & Training ,Maharashtra

Bridge Course

(Revised)

Class-9 : Mathematics(Part 1 & 2)

Academic Year :2022-2023

ज्ञानसेवा तु साफल्यम्

30 Days

Bridge Course for Std – 9th Maths (Part 1& 2)

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Instructions for Students

Dear students, due to pandemic situation in the last academic year you continued your learning and education through online and in various digital modes. This Bridge Course has been prepared for you with the objective of reviewing the previous year's syllabus at the beginning of the present academic year and helping you to prepare for this year's syllabus.

1. The bridge course lasts for a total of 30 days and consists of three tests after a certain period of time.
2. The bridge course will help you to understand exactly what you have learned in the previous academic year and to understand the curriculum for the next class.
3. This bridge course should be studied on a day-to-day basis.
4. It consists of day-to-day worksheets. You are expected to solve the worksheet on your own as per the given plan.
5. Seek the help of a teacher, parent or siblings if you have difficulty solving the worksheet.
6. The video links are provided to better understand the text and activities given in each worksheet for reference, try to understand the concept using them.
7. Solve the tests provided along with as planned.
8. Get it checked with the teacher after completing the test.
9. Seek the help of teachers, parents or siblings to understand the part that is not understood or seems difficult.

Best wishes to you all for the successful completion of this Bridge Course!

Instructions for Teachers, Parents and Facilitators

As we all are very well aware about the fact that due to pandemic situation, the schools were formally closed during the last academic year and the actual classroom teaching and learning could not take place. There is uncertainty even today as to when schools will restart in the coming academic year. On this background various efforts have been made by the government in the last academic year to impart education to the students through online mode. Accordingly, the Bridge Course has been prepared with the dual objective of reviewing the studies done by the students in the previous academic year and helping them to learn the curriculum of the present class in this academic year.

1. The bridge course lasts for a total of 30 days (Excluding holidays) and consists of two tests. Pre-test is given with this set and posttest will be published before test schedule on website.
2. The bridge course is based on the syllabus of previous class and is a link between the syllabi of previous and the current class.
3. This bridge course has been prepared class wise and subject wise. It is related to the learning outcomes and basic competencies of the previous class' textbook and is based on its components.
4. The bridge course includes component and sub-component wise worksheets. These worksheets are generally based on learning outcomes and basic competencies.
5. The structure of the worksheet is generally as follows.
   - Part One - Learning Outcomes/Competency Statements.
   - Part Two – explaning concept.
   - Part three - Solved Activity/ Demo
   - Part Four - Practice
   - Part Five – little help, DIKSHA Video Link/E-Content/QR Code
   - Part Six- My Take Away/ Today I Learnt
6. This bridge course will be very important from the point of view to revise and reinforce the learning of the students from the previous class and pave the way to make their learning happen in the next class.
7. Teachers/parents and facilitators should help their children to complete this bridge course as per day wise plan.
8. Teachers/parents and facilitators should pay attention to the fact that the student will solve each worksheet on his/her own, help them where necessary.
9. The teacher should conduct the tests from the students after the stipulated time period, assess the test papers and keep a record of the same.
10. Having checked the test papers, teachers should provide additional supplementary help to the students who are lagged behind.

Best wishes to all the children for the successful completion of this Bridge Course!

State Council of Educational Research and Training, Maharashtra

Standard 9th: Mathematics Part 1 and part 2

Bridge Course

INDEX

STUDENT'S FULL NAME :- --

CLASS :- -------------------------

SCHOOL NAME & ADRESS :- --

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DAY :1st

In the world of Numbers

Learning Outcomes -1. Identifies even numbers and odd numbers, prime number and composite numbers. 2. Identifies multiples and factors.

1)Even Number–Number which is divisible by 2, is called as an even number.

Ex. 2,4,6,8...

2) Odd Number–Number which is not divisible by 2, is called as an odd number.

Ex.1,3,5...

3)Multiples–When the division of a dividend by a certain number leaves no remainder, the dividend is said to be a multiple of that number

Ex. $12 \div 4 = 3$. Here remainder is zero, so 12 is said to be multiple of 4.

4)Factors–When the division of a dividend by a number (i.e. divisor) leaves no remainder, the divisor is said to be a factor of the dividend.

Ex. $12 \div 4 = 3$ Here remainder is zero, so 4 is said to be factor of 12.

5) Prime Number–A number which has only two factors, 1 and the number itself, is called a prime number. **Ex.** 2,3,5,7...

6) Composite number–A number which has more than two factors is called a composite number. **Ex.** 4,6,8,9,10 ...

- **1 is a number which is neither prime nor composite.**
- **The number 2 is the only even prime number.**

Exercise

1) Write all the even numbers from 1 to 25.
2) Write all the odd numbers from 25 to 50.
3) Which number is an even number and also prime?
4) How many prime numbers are there from 1 to 100? Write all those numbers.
5) Write all the factors of 24.
6) Write all the factors of 19 and decide whether 19 is a prime number or composite number.
7) Write three numbers which are multiples of 7.

Learning Outcomes – Identifies natural numbers, whole numbers, integers and rational numbers.

1.Natural numbers – The numbers 1,2,3,...are natural numbers or counting numbers.

The collection of natural numbers is denoted by N.

2.Whole numbers – The numbers 0,1,2,3,... are whole numbers.

The collection of whole numbers is denoted by W.

3.Integers – The numbers...,-2,-1,0,1,2,...are integers.

The collection of integers is denoted by I.

4. Rational numbers – The numbers of the form $\frac{m}{n}$ are called rational numbers.

Here, m and n are integers and n is not zero.

The collection of rational numbers is denoted by Q.

Exercise

1) Can you write the largest natural number?

2) Where are integers used in daily life?

3) Do you think there can be some numbers that are not rational numbers?

4) Write a number that is a whole number but not a natural number.

5) Write a number that is a natural number, a whole number and an integer.

DAY: 2nd

Unit : Basic Concepts in Geometry

Learning Outcomes : Identifies points, lines, line segments and rays.

Let's recall: Match the following pairs.

	Group A	Group B
(i)		(A) Point
(ii)		(B) Ray
(iii)		(C) Line segment
(iv)		(D) Line

Important Points:

1) Point, Line, Line Segment, Ray

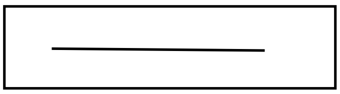
Point: A point (•) is shown by a tiny dot. We can use a pen or a sharp pencil to make the dot.

Capital letters of Roman alphabet are used to name a point.

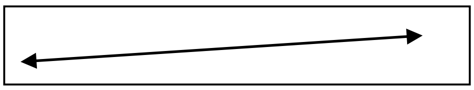
The point has no length, breadth and height.

The points P, Q and R are shown in the figure alongside.

Line: We draw a line while drawing picture, rangoli as shown in the adjacent figure.

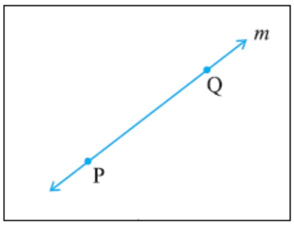


Line : Arrow heads are used at both the ends of a line to indicate that Line can be extended indefinitely on both the sides.



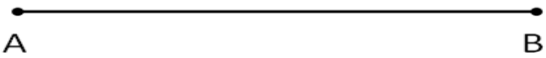
The line can be named in two ways.

The line shown in the adjacent figure is read as line m or line PQ.



Line Segments: A segment is a piece of line.

A line segment has two points showing its limits. They are called endpoints.



We write line segment AB as ‘seg AB’ in short.
A and B are its endpoints.

Ray : A ray is a part of a line. It can be extended indefinitely on one side. The starting point of a ray is called its origin.

Here, P is the origin. An arrowhead is drawn to show that the ray is infinite in the direction of Q. The figure can be read as ray PQ.

The ray PQ is not read as ray QP.

Exercise

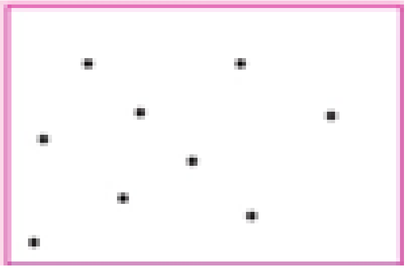
1. Draw the following diagrams
   (i) Point P (ii) Line m (iii) Segment PQ (iv) Ray MN

2. Write the different names of the following line.

Unit: Collinear points and non-collinear points

Learning Outcomes : Identifies collinear points and non-collinear points

Important Points:



There are 9 points in this figure. Name them.

If you choose any two points, how many lines can pass through the pair?

One and only one line can be drawn through any two distinct points.

Which three or more of these nine points lie on a straight line?

Three or more points which lie on a single straight line are said to be **collinear points.**

Of these nine points, name any three or more points which do not lie on the same line.

Points which do not lie on the same line are called **non-collinear points.**

Exercise

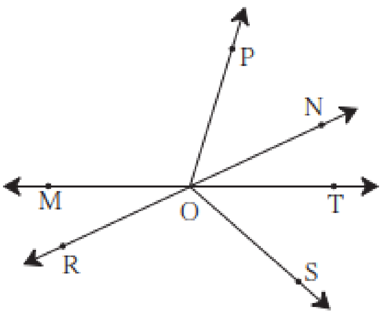
1. Look at the figure alongside and name the following:

(1) Collinear points

(2) Rays

(3) Line segments

(4) Lines



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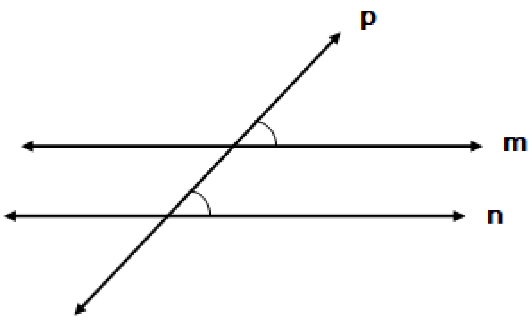
DAY: 3rd

Unit: Parallel lines and transversal

Learning Outcomes: Identifies the types of angles formed by the transversal of two parallel lines as corresponding angles, alternate angles, interior angles.

Let's recall:

Observe the figure and answer the following questions.



Q.1) Write the name of transversal that intersects line m and line n.

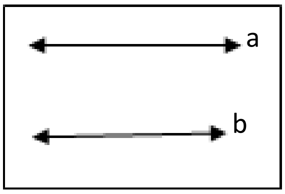
2) In the figure, a pair of angles is shown by identical marks. This pair is which of the following types of angles?

(A) Alternate angles (B) Interior angles (C) Corresponding angles (D) Opposite angles

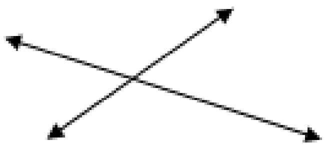
Important Points:

Parallel Lines:The lines in the same plane which do not intersect each other are called parallel lines.

' Line a and line b are parallel lines.' It is written as ' line a || line b'.

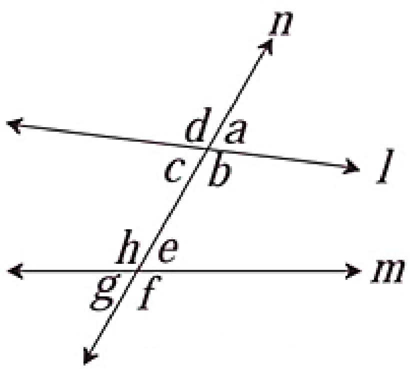


Parallel Lines



Non-Parallel Lines

The pairs of angles formed by two lines and their transversal are as follows.
Figure (1) :



Pairs of corresponding angles:

(i) ∠d, ∠h

(ii) ∠c, ∠g

(iii) ∠a, ∠e

(iv) ∠b, ∠f

Pairs of alternate interior angles:

(i) ∠c, ∠e
(ii) ∠b, ∠h

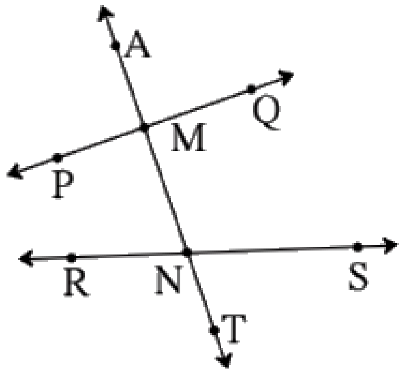
Pairs of alternate exerior angles:

(i) ∠d, ∠f
(ii) ∠a, ∠g

Pairs of interior angles:

(i) ∠c, ∠h
(ii) ∠b, ∠e

Figure (2):



pairs of corresponding angles in the given figure -

(i) ∠AMP and ∠MNR
(ii) ∠PMN and ∠RNT
(iii) ∠AMQ and ∠MNS
(iv) ∠QMN and ∠SNT

pairs of interior angles in the given figure -

(i) ∠PMN and ∠MNR
(ii) ∠QMN and ∠MNS

In the figure, there are two pairs of interior alternate angles and two pairs of exterior alternate angles.

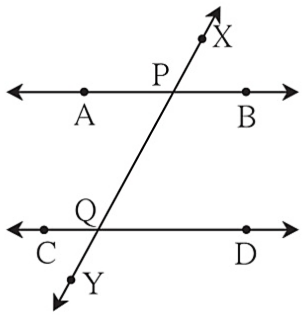
Interior alternate angles
(Angles at the inner side of lines)
(i) ∠PMN and ∠MNS
(ii) ∠QMN and ∠RNM

Exterior alternate angles
(Angles at the outer side of lines)
(i) ∠AMP and ∠TNS
(ii) ∠AMQ and ∠RNT

(i)Property of corresponding angles: If two parallel lines are intersected by a transversal, then angles in each pair of corresponding angles are congruent angles.

In the adjoining figure line AB ||line CD

Line XY is a transversal.



(i) ∠XPA ≅ ∠PQC (ii) ∠APQ ≅ ∠CQY
(iii) ∠XPB ≅ ∠PQD (iv) ∠BPQ ≅ ∠DQY

(ii) Property of alternate angles: If two parallel lines are intersected by a transversal, then angles in each pair of alternate angles are congruent.

Interior alternate angles:

(i) ∠APQ ≅ ∠PQD (ii)∠BPQ ≅ ∠PQC

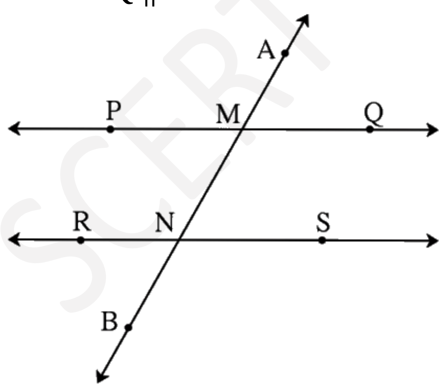
Exterior alternate angles:

(i) ∠XPA ≅ ∠DQY (ii)∠XPB ≅ ∠CQY

(iii) Property of interior angles: If two parallel lines are intersected by a transversal, then angles in each pair of interior angles are supplementary.

(i)∠APQ +∠PQC = 180^0 (ii)∠PQD + ∠BPQ = 180^0

Exercise: In figure line PQ || line RS and line AB is their transversal.



Observe the figure and write the name of appropriate angle in the box.

Corresponding angles: (i)∠AMQ ≅□ (ii) □≅∠RNB

Interior alternate angles: (i) ∠QMN ≅□ (ii) ∠PMN ≅□

Exterior alternate angles: (i) ∠AMQ ≅□ (ii) □≅∠SNB

Interior angles: (i) ∠QMN + □ = 180° (ii) □ + ∠MNR = 180°

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DAY: 5^{th}

Unit: Integers

Learning Outcomes : 1) Can compare the numbers.
2) Can carry out additions and subtractions of positive and negative numbers using appropriate rules.

Let's recall:

(i) 14 > 5 (ii) –29 < 15 (iii) 45 > 0 (iv) –10< 0

Important Points : (i) Zero is greater than all negative numbers.
(ii) All positive numbers are greater than zero.
(iii) On the number line, the number on the right is always greater than the number on the left.

Exercise

Write the proper signs > ,< or = in the boxes below.

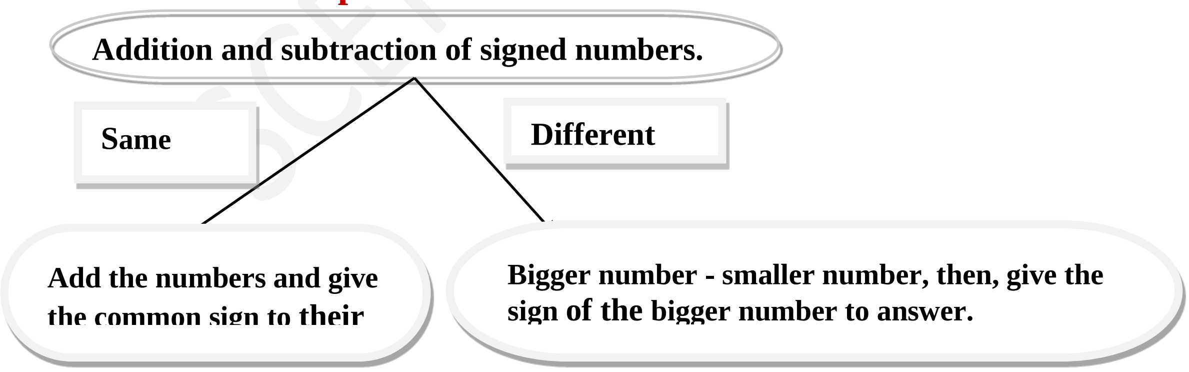
(i) 3 ☐ –3 (ii) 4 ☐ 7 (iii) –17 ☐ 17 (iv) 0 ☐ –10 (v) –8 ☐ –2

Sub-unit: (ii) Addition and subtraction of signed numbers,

Let's recall: Solve the following examples.

(i) 20 – 18 = ? (ii) 23 – (–16) = ? (iii) –(–36) = ?

Important Points:



Ex. (i) 24 + 16 = 40 (i) 24 – 16 = 8 (ii) –24 –16 = –40 (ii) –24 + 16 = – 8

If there is a bracket after the minus sign, change the sign of each term while solving the bracket.

Ex. 25 –(– 10) = 25 + 10 = 35

Exercise

Solve the following examples.

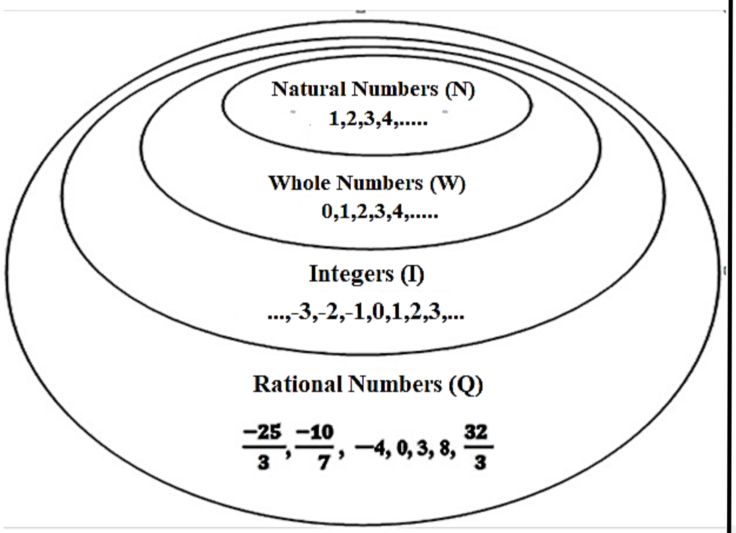
(i) 17 – 12 (ii) 12 – (–17) (iii) 17 – (–12) (iv) 12 – 17 (v) 37 – 28 (vi) 27 – (– 18)

DAY:6^{th}

Unit : Rational Numbers

Learning Outcomes : 1) Generalises properties of addition, subtraction, multiplication and division of rational numbers through patterns.

Let's recall :– **Observe the following diagram.**

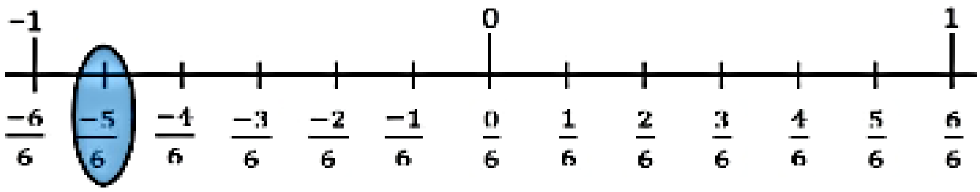


Exercise : Complete the given table.
(Use the correct sign of ✔ or ✖ in the given table. depending on the type of number.)

	-4	$\frac{2}{3}$	-15	$\frac{-3}{10}$	4
Natural Number	✖				
Integer	✔				
Rational Number	✔				

Sub-Unit : To show rational numbers on a number line

Let us observe the following number line.



Observe each point representing the numbers on number line. Observe how many equal parts of the line segment are made between 0 to 1 or 0 to –1. Accordingly observe the rational numbers represented by the points at the equal distances.

Now $\frac{-5}{6} = -5 \times \frac{1}{6}$, therefore each unit on the left and right side of zero is to be divided in six equal parts.The fifth point on the left side from zero shows $\frac{-5}{6}$.

Similarlywrite the number shown by the third point on the right side from zero. Write it in its simplest form. Understand the correlation between the two numbers.

Exercise :- Show the following numbers on a number line.

$$\frac{2}{5}, \frac{-3}{5}, \frac{-7}{5}, \frac{4}{5}, -2, 3$$

DAY: 7^{th}

Sub-Unit: Comparison of rational numbers

Let us study the following examples.

1) Compare the numbers $\frac{3}{2}$ and $\frac{2}{3}$. Write using the proper symbol of <, =, >.

To make same denominator, multiply both numerator and denominator of the first rational number by the denominator of second number. Also multiply both numerator and denominator of the second rational number by the denominator of the first number.

$$\frac{3}{2} = \frac{3\times3}{2\times3} = \frac{9}{6} \qquad \frac{2}{3} = \frac{2\times2}{3\times2} = \frac{4}{6}$$

$$\frac{9}{6} > \frac{4}{6} \qquad \therefore \frac{3}{2} > \frac{2}{3}$$

Let's do this : Now show the numbers $\frac{9}{6}$ and $\frac{4}{6}$ on the number line.

On a number line, the number to the left side is smaller than the number at right side. Also, if the numerator and the denominator of a rational number is multiplied by any non zero number then the value of rational number does not change. It remains the same. That is, $\frac{a}{b} = \frac{ka}{kb}$, $(k \neq 0)$.

Now compare the following rational numbers.

2) $\frac{-4}{5}$, $\frac{3}{2}$ 3) $\frac{-7}{4}$, $\frac{-3}{5}$ 4) $\frac{5}{3}$, $\frac{3}{2}$

Let us study these rules…

1) Negative numbers are always smaller than the positive numbers.

2) While comparing two negative numbers, compare them without considering the negative signs. That meansfor comparing –a and–b , compare a and b.(If a> then –a < – b).

2) $\frac{-3}{2}$, $\frac{-2}{3}$

प्रथम $\frac{3}{2}$ व $\frac{2}{3}$ यांची तुलना कर.

$\frac{9}{6} > \frac{4}{6}$ $\therefore \frac{3}{2} > \frac{2}{3}$

(वरील उदाहरणावरून)

$\therefore \frac{-3}{2} < \frac{-2}{3}$

If $\frac{a}{b}$ and $\frac{c}{d}$ are rational numbers such that b and d are positive, and

जर i) $a\times d < b \times c$ तर $\frac{a}{b} < \frac{c}{d}$

ii) $a\times d > b \times c$ तर $\frac{a}{b} > \frac{c}{d}$

iii) $a\times d = b \times c$ तर $\frac{a}{b} = \frac{c}{d}$

Exercise: Compare the following rational numbers.

1) –3, –5 2) $\frac{2}{7}$, 0 3) $\frac{-5}{7}$, $\frac{-3}{4}$ 4) $\frac{-12}{15}$, $\frac{-3}{5}$

DAY: 8th

Sub-Unit : Decimal representation of rational numbers

Let us study the following examples.

1) $\frac{5}{2} = 2.5$ 2) $\frac{15}{4} = 3.75$

Here in (1) After dividing 5 by 2 and in Q.2 after dividing 15 by 4, the remainder is zero.Hence (1) and (2) are examples of terminating decimal form.

3) $\frac{22}{7} = 3.142857142857... = 3.\underline{142857}$

Here in (3) after dividing 22 by 7, the remainder is not zero.But in quotient, one digit or a group of digits is repeated to the right of decimal point. Hence (3) is example of non-terminatingrecurring decimal form.

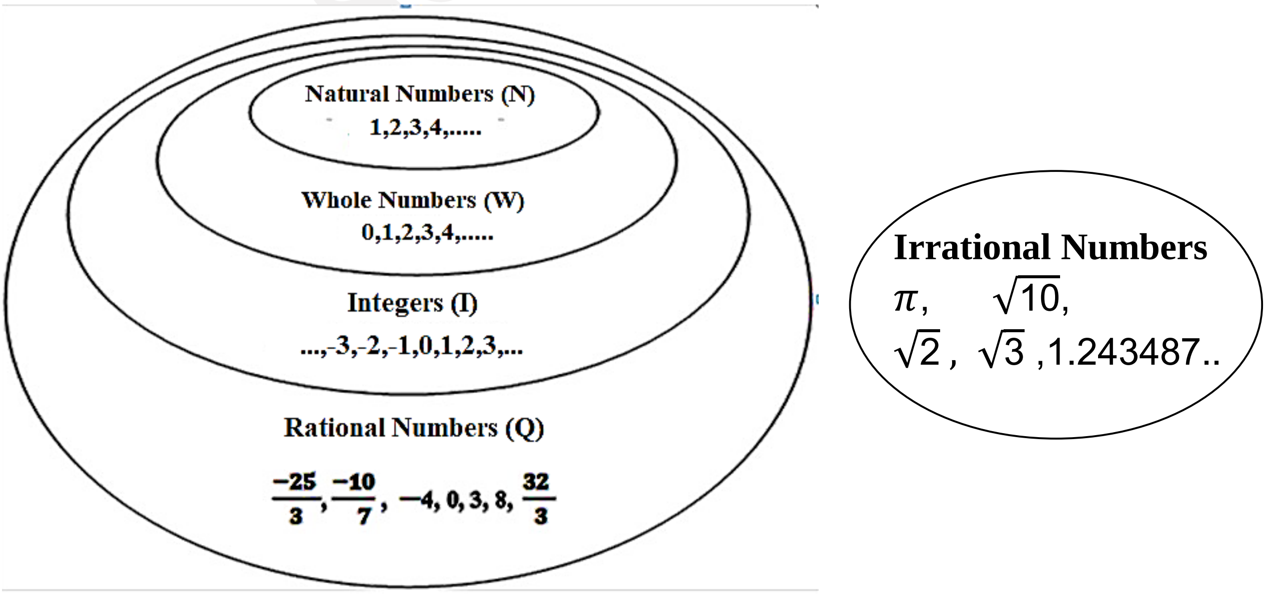
4) Similarly, a terminating decimal form can be written as a non-terminating recurring

Exercise

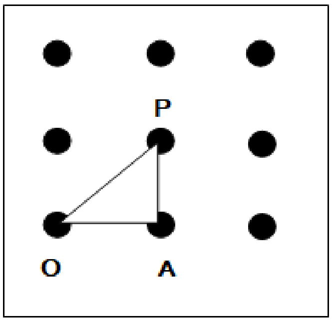
Classify the decimal forms of the given rational numbers as terminating and non-terminating recurring type.

1) $\frac{5}{3}$ 2) $\frac{17}{5}$ 3) $\frac{19}{4}$ 4) $\frac{23}{99}$

Sub-Unit: Irrational Numbers (What does the figure show?)



We shall see how to show the number $\sqrt{2}$ on a number line.



Let us understand the distance $\sqrt{2}$.

Let's use a geoboard or graph paper for this. Make a right-angled $\triangle OAP$ on geoboard with the help of rubber or thread. Or draw a triangle with a pencil on graph paper as shown in the figure.

If OA= AP = 1 unit then by Pythagoras theorem,

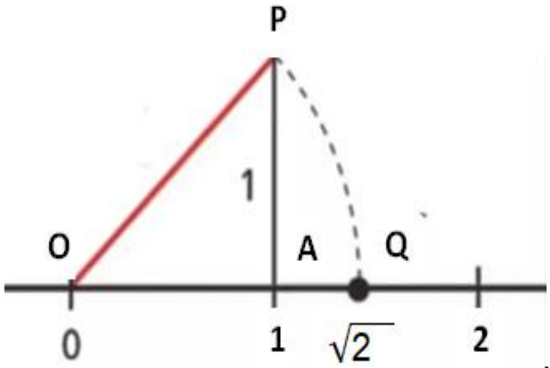
$OP^2 = OA^2 + AP^2$

$OP^2 = 1^2 + 1^2$

$OP^2 = 2$

$\therefore$ OP = $\sqrt{2}$....(taking square roots)

Now observe the following number line. As done on geoboard, draw same triangle on number line. Now, draw an arc with centre O and radius OP. Name the point as Q where the arc intersects the number line. Obviously distance OQ is $\sqrt{2}$.



Try this

If we mark point R on the number line to the left of O, at the same distance as OQ, then what would be the number indicated by that point?

Like $\sqrt{2}$ show irrational numbers $\sqrt{3}, \sqrt{5}, \sqrt{7}$ ....on a number line.

Exercise

1) π is an irrational number, but why its approximate value $\frac{22}{7}$ or 3.14 is rational?

2) Show the number $-\sqrt{2}$ on the number line.

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DAY: 9th

Unit: An exterior angle of triangle

Learning Outcomes: Understand the properties of the exterior angle of a triangle.

1. **Triangle -**
   A closed figure formed by joining three non-collinear points by segments is called a triangle. The sum of the all angles of a triangle is 180°.

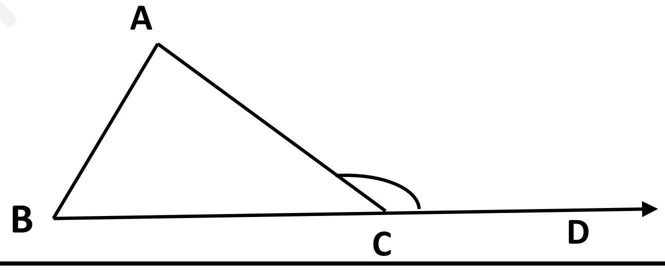
2. **Adjacent angles -**
   Two angles which have a common vertex, a common arm and separate interiors are said to be adjacent angles.

3. **Angles in linear pair-**
   Angles which have a common arm and whose other arms form a straight line are said to be angles in a linear pair.

Sub-unit: Exterior angle of triangle and its properties –

An angle that makes linear pair with the interior angle of a triangle is called an exterior angle of the triangle.

In fig. $\angle ACD$ is exterior angle of ΔABC.



Properties of an exterior angle of triangle–

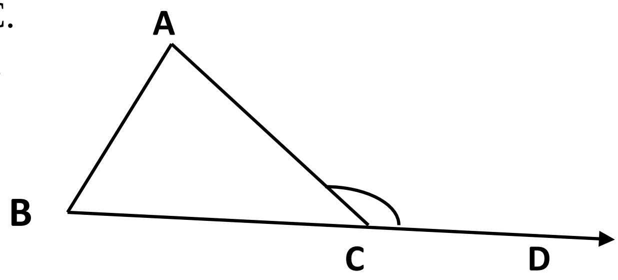
1. The measure of an exterior angle of a triangle is equal to the sum of its remote interior angles.

2. An exterior angle of a triangle is greater than each of its remote interior angles.

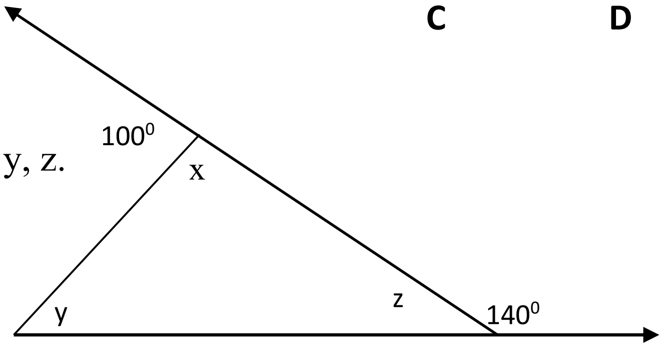
Exercise

1) In fig. ∠ACD is exterior angle of ΔABC.

   $\angle B = 40^0, \angle A = 70^0$ thenm ∠ACD =?



2) From information of angles given in the fig. find out the values of x, y, z.



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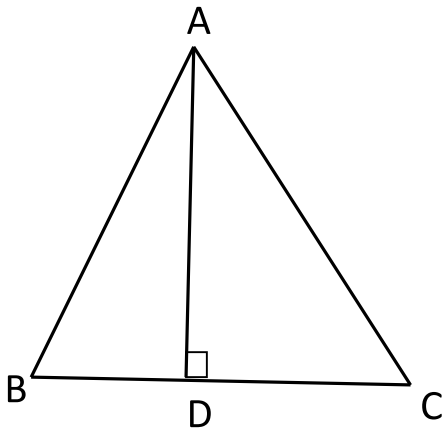
DAY: 10th

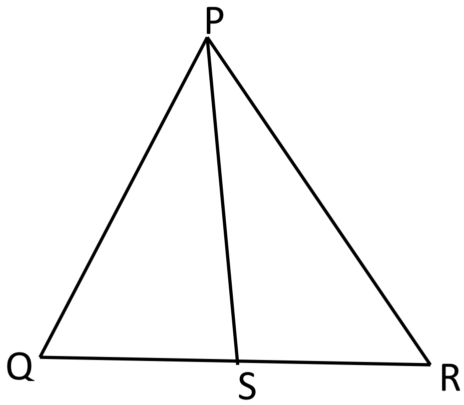
Unit: Altitudes and Medians of a triangle

Let's recall

The perpendicular segment drawn from a vertex of a triangle on the side opposite to it is called an **altitude** of the triangle.

The segment joining the vertex and midpoint of the opposite side is called a **median** of the triangle.



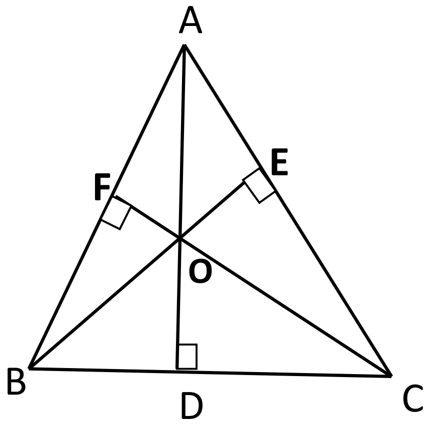


InΔ ABC, AD$\perp$BC, $\therefore$seg AD is an altitude on the base BC.

InΔ PQR, QS = SR , $\therefore$seg PS is a median on the base QR.

Altitudes:

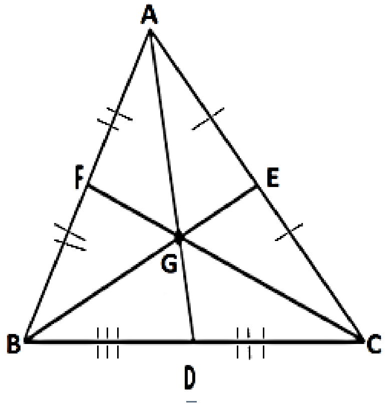
1) The altitudes of a triangle pass through exactly one point; that means they are concurrent. The point of concurrence is called the orthocentre and it is denoted by 'O'.



In Δ ABC,AD $\perp$ BC, BE $\perp$ AC & CF $\perp$ AB

AD, BE, CF are altitudes on the side BC, side AC and side AB respectively.

Medians:



1) The medians of a triangle are concurrent.
2) A median of a triangles divides each ot the other medians in the ratio 2:1.
3) In a right-angled triangle, the length of the median on the hypotenuse is half the length of the hypotenuse.
4) The point of concurrence of the medians is called the centroid and it is denoted by G.

In fig., seg. AD, seg BE, & seg CF are medians and point G is the centroid.

Exercise

1) Draw an acute angled Δ PQR. Draw all of its altitudes. Name the point of concurrence as 'O'.
2) Draw a right angled ΔXYZ. Draw its medians and show their point of concurrence by G.
3) In right angled triangle, if length of hypotenuse is 15 cm, then find the length of the median on the hypotenuse.

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DAY: 11th

Unit: Congruence of triangles

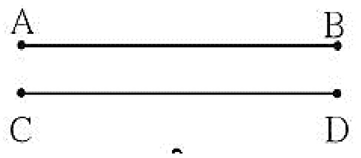
Learning Outcomes: Understand the use of S-S-S, S-A-S, A-S-A, Hypo-side tests of congruence of triangles.

Let's recall:

Congruent segments:

If the length of two segments is equal then the two segments are congruent.

If l (AB) = l (CD) then seg AB ≅ seg CD

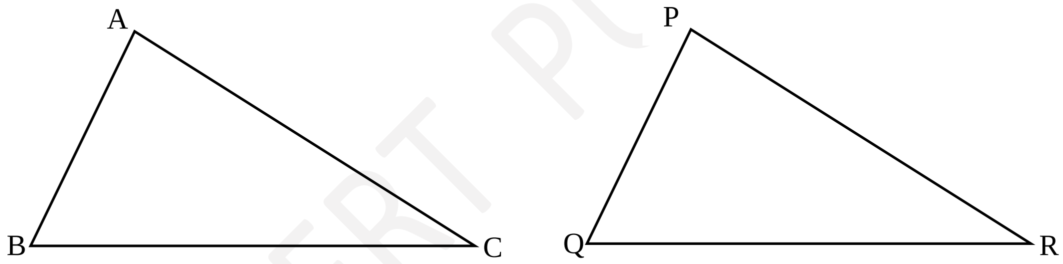


Congruent angles:

If the measures of two angles are equal then the two angles are congruent.

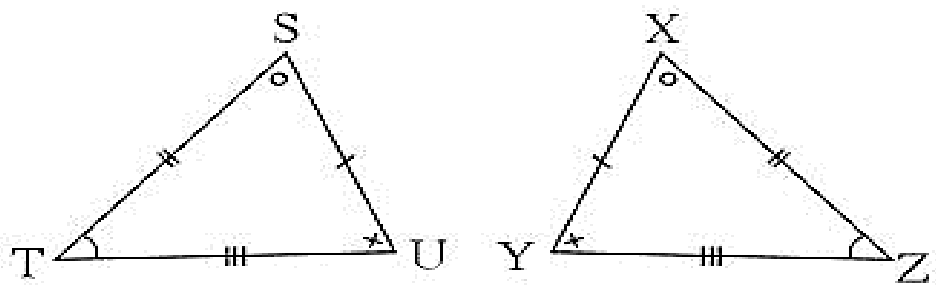
Congruent triangles:

When the triangles coincide exactly with each other, then they are congruent.



If Δ ABC and Δ PQR are congruent then written as ΔABC ≅ ΔPQR

Congruence of triangles:



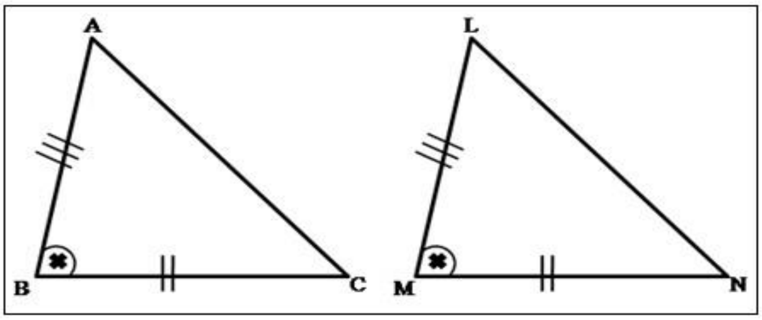
The triangles are congruent for the certain one-to-one correspondence between the vertices and we can write the congruence of triangles using that correspondence.
Thus ΔSUT ≅ ΔXYZ

Definition: If all the corresponding parts of triangles (sides and angles) are congruent for the certain one-to-one correspondence between the vertices then the triangles are congruent.

Tests of congruence:

1) SAS Test-

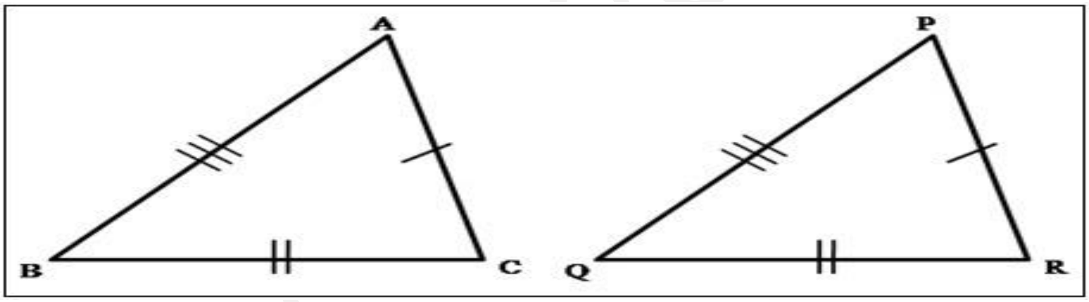
If two sides and the included angle of a triangle are congruent to two corresponding sides and the included angle of the other triangle then the triangles are congruent to each other.



In fig. ΔABC≅ΔLMN

2) SSS test-

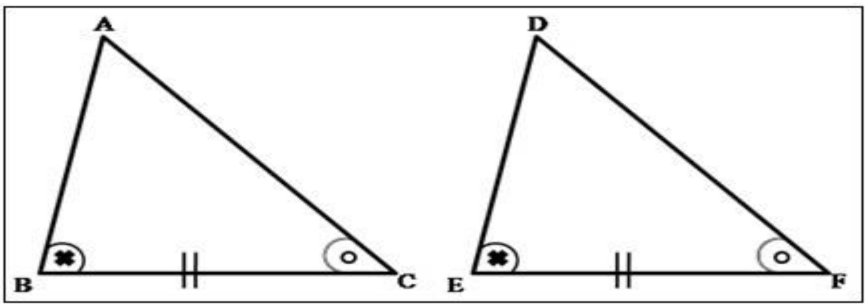
If three sides of a triangle are congruent to three corresponding sides of the other triangle, then the two triangles are congruent to each other.



In fig. ΔABC≅ΔPQR

3) ASA test-

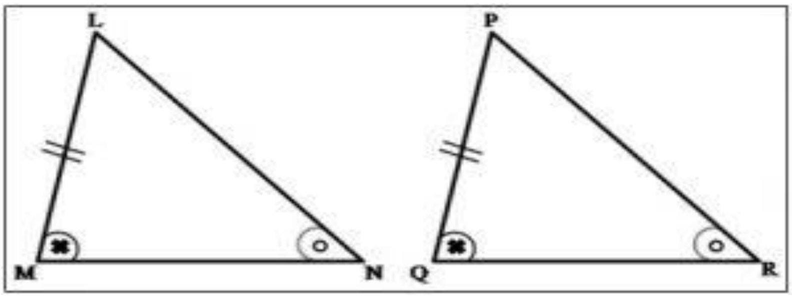
If two angles of a triangle and a side included by them are congruent to corresponding two angles and the side included by them of the other triangle, then the triangles are congruent to each other.



In fig. ΔABC≅ΔDEF

4) AAS (or SAA) test:

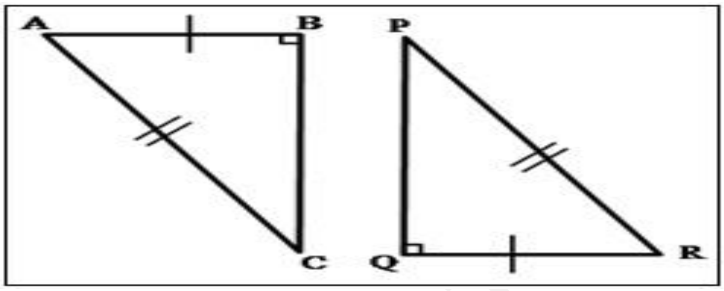
If two angles of a triangle and a side not included by them are congruent to corresponding angles and a corresponding side not included by them of the other triangle then the triangles are congruent to each other.



In fig. ΔLMN≅ΔPQR

5) Hypotenuse side test for right angled triangles: (Hypotenuse-side test)

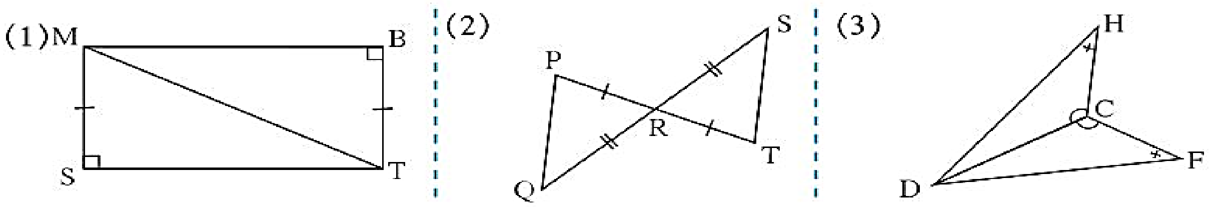
If hypotenuse and side of a tight angles triangle are congruent to hypotenuse and corresponding side of the other right angles triangle, then the two triangles are congruent to each other.



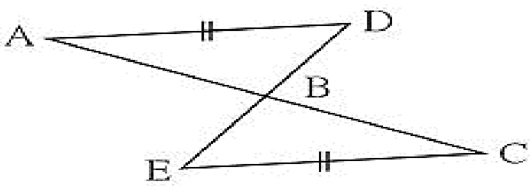
In fig. ΔABC≅ΔPQR

Exercise

1. State the test of congruence for each pair of the triangles given below.



2. In the adjacent figure, seg AD ≅ seg EC Which additional information is needed to show Δ ABD and Δ EBC congruent by A-A-S test?



लिंक;- https://youtu.be/VoHsZwL2TOEhttps://youtu.be/hUl4uc8evk0

https://youtu.be/qgff-nIadDk

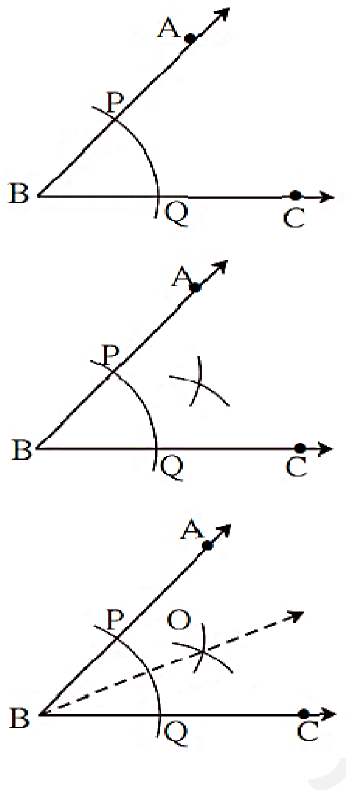
DAY: 12th

Unit: Construction of triangle

Learning Outcomes: 1) Draw the segment with given length and bisect it.
2) Draw the angle with given measurement and bisect it.

(1) To draw an angle bisector using a compass.

Example: Draw any angle ABC. Draw its bisector.

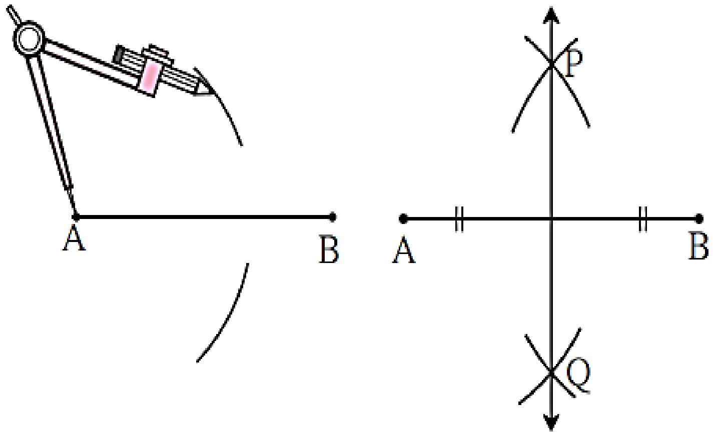


- Draw an angle ∠ABC of any measure.
- Now place the point of a compass on point B and with any convenient distance draw an arc to cut rays BA and BC. Name the points of intersection as P and Q respectively.
- Now, place the point of the compass at P and taking a convenient distance, draw an arc inside the angle. Using the same distance, draw another arc inside the angle from the point Q, to cut the previous arc.
- Name the point of intersection as point O. Now draw ray BO. Ray BO is the bisector of ∠ABC. Measure ∠ABO and ∠CBO.
- Are they of equal measure?

Exercise

1) Bisect the angle of measure 45^{o} .
2) Bisect the angle of measure 120^{o}.

◈ Drawing the perpendicular bisector of a segment, using a compass.



- Draw seg AB.
- Place the compass point at A and taking a distance greater than half the length of seg AB, draw two arcs, one below and one above seg AB.
- Place the compass point at B and using the same distance draw arcs to intersect the previous arcs at P and Q. Draw line PQ.
- The line PQ is the perpendicular bisector of seg AB. Verify.

Exercise

1) Draw a segment of length 5 cm.

2) Draw a segment of length 6.1 cm and bisect it.

3) Draw a segment of length 4.5cm and bisect it.

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DAY: 13^{th} & 14^{th}

Learning Outcomes: Construct the triangle as per the given information.

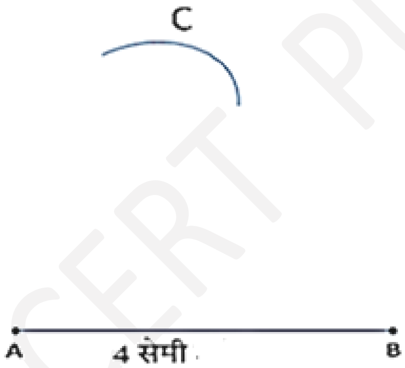
Sub-unit:

To construct a triangle given the lengths of its three sides

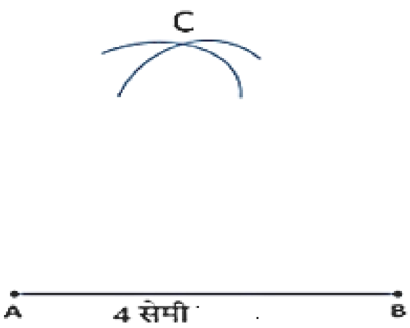
1) Draw an equilateral triangle having side 4 cm.

i) Draw a segment AB of length 4 cm.

ii) Draw an arc on one side of seg AB with the compass opened to 4 cm and with its point at A.

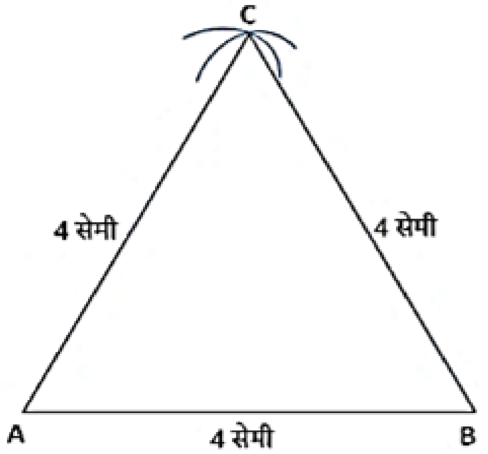


iii)With the point at B and the compass opened to 4 cm, draw an arc to cut the first arc. Name the point of intersection as C.



iv) Join point A and point C, join point B and point C.

ΔABC is the reqired equilateral triangle having side 4 cm.



Exercise:- 1) Construct ΔPQR such that PQ= 5 cm, QR=3 cm, and PR= 4cm.

2) Draw an equilateral triangle having side 5.7 cm.

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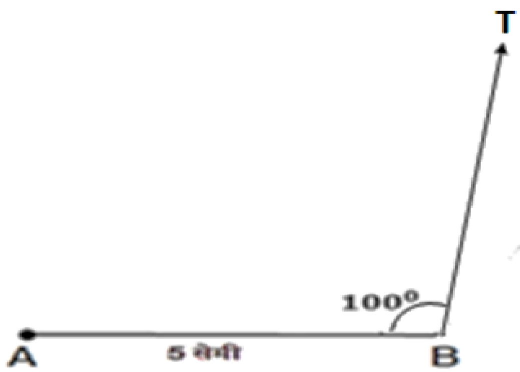
Sub-unit:

To construct a triangle given two sides and the angle included by them.

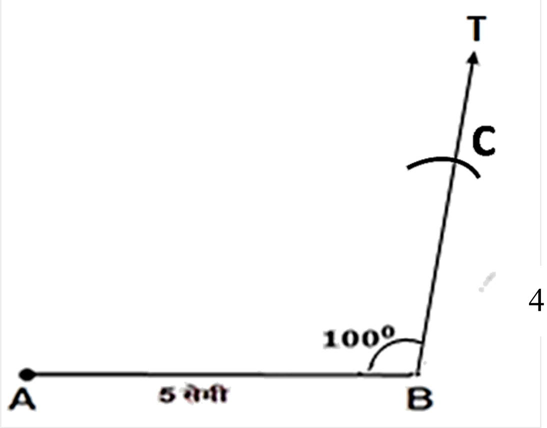
1) Draw ΔABC such that,AB= 5 cm, BC= 4 cm andm∠B=100°

i) Draw a segment AB of length5 cm.

ii) Ray BT is drawn so that m∠ABT = 100°



iii) Open the compass to 5 cm. Placing the compass point on B, draw an arc to cut ray BT at C.



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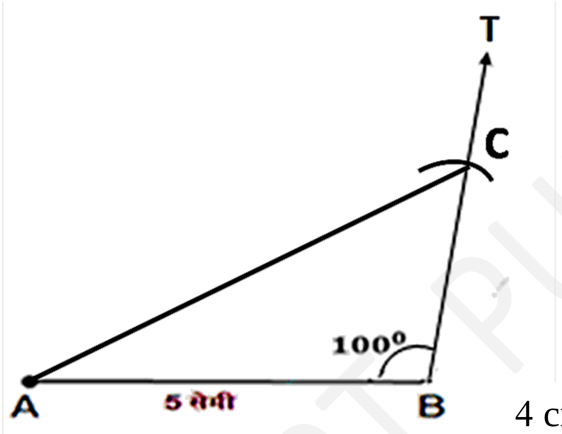
iv) Join the points A and C. ΔABC is the required triangle.



4 cm

Exercise:- 1) Construct ΔXYZ such that, XY =5 cm, m∠ZXY = 80°and XZ = 4 cm.

2) Construct ΔPQR such that, PQ = 6 cm ,m∠PQR = 120° and QR = 4cm.

Sub-unit:

To construct a triangle given two angles and the included side

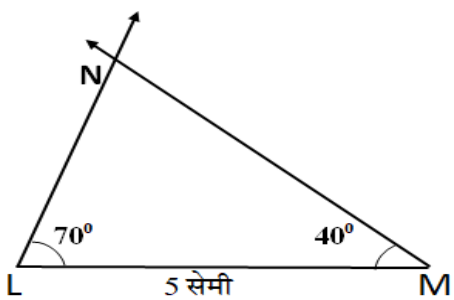
Construct ΔLMN such that LM = 5 cm,

m∠L = 70°, m∠M = 70°

Draw segment LM.

Draw m∠L = 70° and m∠M= 40°.

Name the point of intersection of rays as N.



Exercise:- 1) Construct ΔABC such that, BC = 4.8 cm, m∠B= 40°, ∠C= 90°

2) Construct ΔLMN such that,MN =3.5 cm, m∠M = 110° ,m∠N = 40°

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DAY: 15th

Unit: Polynomials.
Sub-unit: 1.Introduction to Polynomials 2.Degree of the polynomial 3.Operations on polynomials

Learning Outcomes: Identify polynomials and do operations on them.

Let's recall:

1. **Polynomials:**

In an algebraic expression, if the powers of the variables in each term are whole numbers, then that algebraic expression is known as polynomial.

e.g., $x^2 + 2x$, $2y^2 + y + 5$, 9.

Ex.1) $x^2 + 2x + 3$

In this algebraic expression, the powers of variable in each term are 2, 1, and 0.

Ex.2) $3y^3 + 2y^2 + y + 5$

In this algebraic expression, the powers of variable are 3, 2, 1, and 0.

2. **Degree of a polynomial in one variable:**

The highest power of the variable is called the degree of the polynomial.

1) In the polynomial $3x^2 + 4x$ the highest power of the variable is 2.

$\therefore$ Degree of the polynomial is 2.

2) In the polynomial $7x^3 + 5x + 4x^2 + 2$ the highest power of the variable is 3.

$\therefore$ Degree of the polynomial is 3.

3. Operations on polynomials:

Addition of polynomials:

$$\begin{array}{r} 4x^2 + 2x - 6 \\ +\ 5x^2 - 3x + 4 \\ \hline 9x^2 - x - 2 \end{array}$$

Subtraction of polynomials:

$$\begin{array}{rrr} 4x^2 & +\ 2x & -\ 6 \\ -\ 5x^2 & +\ 3x & -\ 4 \\ + & - & + \\ \hline 9x^2 & -\ x & -\ 2 \end{array}$$

Multiplication of polynomials:

$(x + 1)(4x^2 + 2x - 6) = x(4x^2 + 2x - 6) + 1(4x^2 + 2x - 6)$

$= 4x^3 + 2x^2 - 6x + 4x^2 + 2x - 6 = 4x^3 + 6x^2 - 4x - 6$

Let's recall:

Division of Polynomials:

$(6x^3 + 8x^2) \div 2x$

Division

$$\begin{array}{r|l} & 3x^2 + 4x \\ \hline 2x & 6x^3 + 8x^2 \\ & -\,6x^3 \\ \hline & 0 + 8x^2 \\ & \quad -\,8x^2 \\ \hline & \quad 0 \end{array}$$

Explaination

(i) $2x \times 3x^2 = 6x^3$

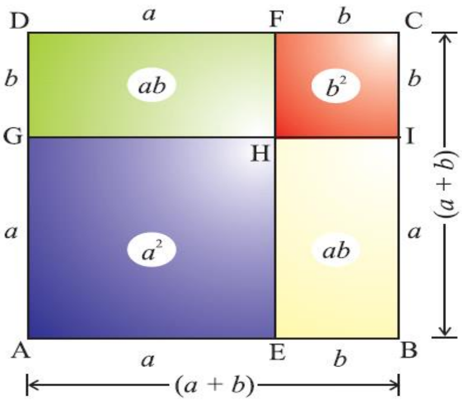
(ii) $2x \times 4x = 8x^2$

Quotient = $3x^2 + 4x$

Reminder = 0

Algebraic identities:

1. Expansion of $(a + b)^2$ –



$(a + b)^2 = a^2 + 2ab + b^2$

In the figure alongside, the side of the square ABCD is $(a + b)$. ∴ A (□ABCD) = $(a + b)^2$
The square ABCD is divided into 4 rectangles having areas a^2,ab,ab, and b^2
∴A(□ABCD) = Sum of areas of 4 rectangles.,

$(a + b)^2 = a^2 + ab + ab + b^2$

$= a^2 + 2ab + b^2$

Ex. $(p + 2q)^2$

$= p^2 + 2 \times p \times 2q + (2q)^2$

$= p^2 + 4pq + 4q^2$

Exercise

1. State whether the given algebraic expressions are polynomials? Justify.

   (i) $y + 1$ (ii) $2 - 5x$ (iii) $x^2 + 7x + 9$

2. Write the degree of the given polynomials.

   (i) 5 (ii) x^5 (iii) $27y - y^3 + y^5$

3. Solve the following examples

   1) $(2y^3 + 4y^2 + 3) + (15y^4 + 10y^3 - 3y^2)$

   2) $(4x - 5) - (3x^2 - 7x + 8)$ 3) $(3x^2 - 2x)(4x^3 - 3x^2)$

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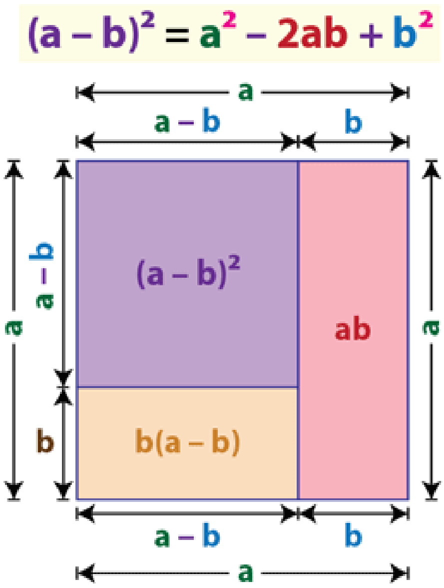
DAY: 16^{th}

Sub-unit: Division of polynomials,algebraic identities

Learning Outcomes: Uses various algebraic identities in solving problems of daily life.

2. Expansion of $(a - b)^2$ –



In the figure alongside, the square with side ‘a’ is divided into 4 rectangles, as square with side (a-b), square with side b and two rectangles of sides (a-b) and b.

A (□PQRS) = A [square with side (a-b)] + A [rectangle of side (a-b) and b]
+ A [rectangle of side (a-b) and b]
+ A [square with side b]

$\mathbf{a^2 = (a - b)^2 + ab + b(a - b)}$

$\mathbf{= (a - b)^2 + ab + ab - b^2}$

$\mathbf{= (a - b)^2 + 2ab - b^2}$

$\mathbf{a^2 - 2ab + b^2 = (a - b)^2}$

Ex. $\mathbf{(2m - 5n)^2}$

$\mathbf{=(2m)^2 - 2x2mx5n + (5n)^2}$

$\mathbf{= 4m^2 - 20mn + 25n^2}$

Let’s recall

3. Expansion of (a+b) (a-b) :

$(a - b)(a+b) = a^2 - b^2$

Conversely factorization of $a^2 - b^2$ will be

$a^2 - b^2 = (a - b)(a+b)$

Ex. $(5m + 3n)(5m - 3n) = (5m)^2 - (3n)^2 = 25m^2 - 9n^2$

4. Expansion of $(a + b + c)^2$:

$\mathbf{(a + b + c)^2 = (a + b + c)(a + b + c)}$

$\mathbf{= a^2 + ab + ac + ab + b^2 + bc + ac + bc + c^2}$

$\mathbf{= a^2 + b^2 + c^2 + 2ab + 2bc + 2ac}$

Ex. $(p + q + 3)^2 = p^2 + q^2 + (3)^2 + 2xpxq + 2x\,qx\,3 + 2xpx3$

$= p^2 + q^2 + 9 + 2pq + 6q + 6p$

5. Factors of –

$(x + a)(x + b) = x^2 + ax + bx + ab = x^2 + (a + b)x + ab$

उदा.$x^2 + 5x + 6$

6 चे असे अवयव पाडू की त्यांची बेरीज 5 येईल .

$= x^2 + 3x + 2x + 6 = x(x + 3) + 2(x + 3)$

$= (x + 3)(x + 2)$

6) Expansion of $(a + b)^3$

$(a + b)^3 = a^3 + a^2b + a^2b + a^2b + ab^2 + ab^2 + ab^2 + b^3 = a^3 + 3a^2b + 3ab^2 + b^3$

उदा. $(p + 3)^3 = (p)^3 + 3p^2 \text{ x } 3 + 3p \text{ x } (3)^2 + (3)^3$

$= p^3 + 9p^2 + 27p + 27$

7) Expansion of $(a - b)^3$

$(a - b)^3 = a^3 - a^2b - a^2b - a^2b + ab^2 + ab^2 + ab^2 + ab^2 - b^3 = a^3 - 3a^2b + 3ab^2 - b^3$

$(a - b)^3 = a^3 - 3a^2b + 3ab^2 - b^3$

Exa. **Expansion** of $(p - 2)^3$

$(p - 2)^3 = (p)^3 - 3 \text{ x } p^2 \text{ x } 2 + 3 \text{ x } p \text{ x } (2)^2 - (2)^3 = p^3 - 6p^2 + 12p - 8$

8) Factors of $a^3 + b^3$

$a^3 + b^3 = (a + b)(a^2 - ab + b^2)$

उदा. $x^3 + 27y^3 = x^3 + (3y)^3 = (x + 3y)[x^2 - x(3y) + (3y)^2] = (x + 3y)(x^2 - 3xy + 9y^2)$

9) Factors of $a^3 - b^3$

$a^3 - b^3 = (a - b)(a^2 + ab + b^2)$

उदा. $x^3 - 8y^3 = x^3 - (2y)^3 = (x - 2y)(x^2 + 2xy + 4y^2)$

EXERCISE

1.$n^2 - p^2$. 2. $(m - 4)(m + 6)$. 3. $(m + n - 2)^2$. 4. $(2m - 5)^3$ 5. $(7x + 8y)^3$ 6. $125p^3 + q^3$

7. $x^3 - 64y^3$

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DAY: 17^{th}

Name of unit : Quadrilateral

Sub- unit: Quadrilateral and its components

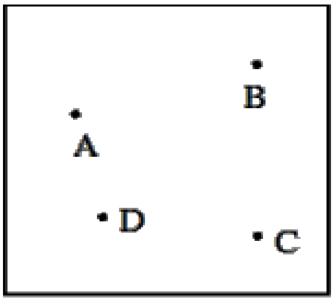
Learning outcomes : 1.Identifies components of a quadrilateral.

2. Solves examples based on angles' sum property of a quadrilateral.

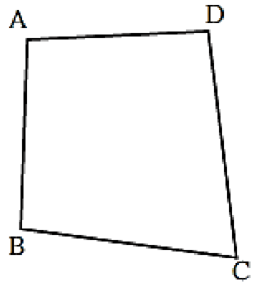
Let's recall:

Quadrilateral:

Take four pointsA, B, C and D on a paper such that no three points are collinear.Joining these four points we have to make one closed figure, such that if we draw line joining any two points then the remaining two points should be on the same side of the line. A closed figure obtained by following this condition is called as a quadrilateral.

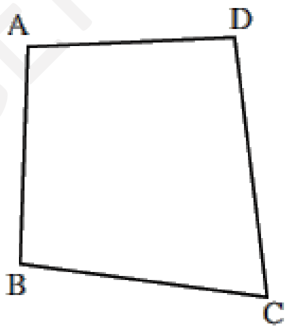


Labelling a quadrilateral: While labelling a quadrilateral start with any vertex – give it some label and go in clockwise or anti-clockwise direction to label all remaining vertices. Starting from any vertex, a quadritaleral can be labelled in 8 different ways.



In the given figure, □ABCD or □ADCB is shown.

In □ ABCD

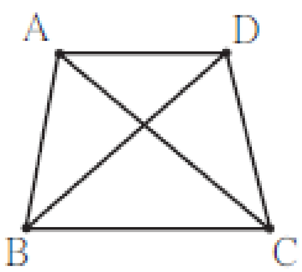


Adjacent sides of quadrilateral:

sideAB and sideAD
sideCD and sideAD
sideBC and sideCD
sideBC and sideAB

Opposite sides of quadrilateral:

sideAB and sideCD
sideAD and sideBC



Adjacent angles of quadrilateral:

∠A and ∠D
∠D and ∠C
∠C and ∠B
∠B and∠A

Opposite angles of quadrilateral:

∠A and∠C
∠B and∠D

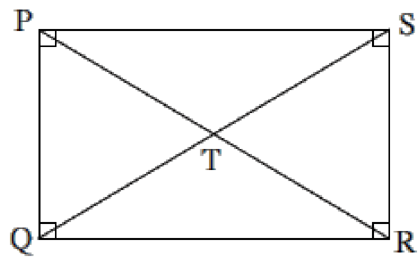
Diagonals Of quadrilateral :

Diagonal AC and Diagonal BD.

Sub- Unit: Rectangle

Learning Outcomes : Verify and apply the properties of rectangle.

Let's Recall :

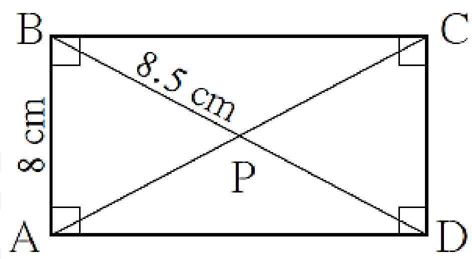


Rectangle :If all angles of a quadrilateral are right angles, it is called a rectangle.

Propertis of rectangle :-

1. Opposite sides of a rectangle are congruent.
2. Diagonals of a rectangle are congruent.
3. Diagonals of a rectangle bisect each other.

Sample Example –



P is the point of intersection of diagonals of rectangle ABCD.

(i) l (AB) = 8 cm then l (DC) =?

(ii) l (BP) = 8.5 cm then find l (BD) and l (BC)

Let us draw a rough figure and show the given information in it.

(i) Opposite sides of a rectangle are congruent.

$\therefore l(AB) = l(DC) = 8$ cm.

(ii) Diagonals of rectangle bisect each other.

$\therefore l(BD) = 2 \times l(BP) = 2 \times 8.5 = 17$ cm

$\triangle$BCD is a right angled triangle.Using Pythagoras theorem, we get,

$\therefore l(BC)^2 = l(BD)^2 - l(CD)$

$\therefore l(BC)^2 = (17)^2 - (8)^2$

$\therefore l(BC)^2 = 289 - 64$

$\therefore l(BC)^2 = 225$

$\therefore l(BC) = \sqrt{225}$

$\therefore l(BC) = 15$ cm.

EXERCISE:-1) Lengths of adjacent sides of a rectangle are 6cm and 8 cm respectively. Find the lengths of remaining sides.

2) If length of one diagonal of rectangle is 26 cm .What is the length of another diagonal?

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DAY: 18^{th}

Sub -Unit : Sqaure

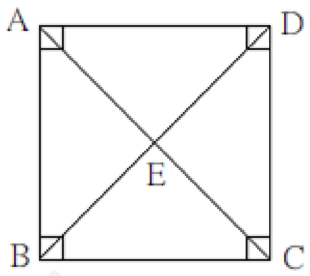
Learning Outcomes : Verify and apply properties of a square.

Let's recall

Square:

If all sides and all angles of a quadrilateral are congruent , it is called a square.

Properties of a square:



1.Diagonals are of equal length.That is they are congruent.

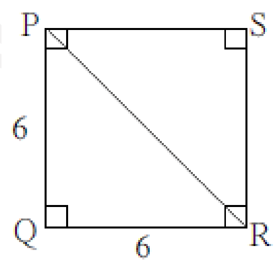
2.Diagonals bisect each other.

3. Diagonals are perpendicular to each other.

4. Diagonals bisect the opposite angles.

Sample Example :

Find the length of a diagonal of a square of side 6 ?



Suppose,□PQRS is a square of side 6,

Seg PR is a diagonal.

□PQRS is a square with side 6 cm.Seg PR is it's diagonal.

△PQR is a right angled triangle, Using Pythagoras theorem,

$$\therefore l\,(PR)^2 = l\,(PQ)^2 + l\,(QR)^2$$

$$\therefore l\,(PR)^2 = (6)^2 + (6)^2$$

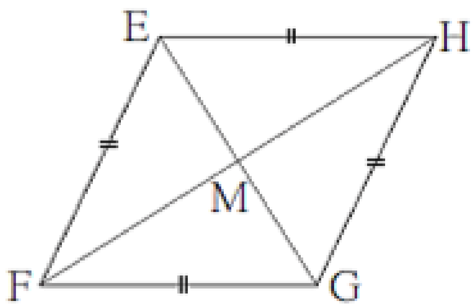
$$\therefore l\,(PR)^2 = 36 + 36$$

$$\therefore l\,(PR)^2 = 72$$

$$\therefore l\,(PR) = \sqrt{72}\text{ cm} = 6\sqrt{2}\text{ cm}$$

Rhombus : If all sides of a quadrilateral are of equal length (congruent) , it is called a rhombus.

Properties of a rhombus :



1. Opposite angles of a rhombus are congruent.
2. Diagonals bisect opposite angles of a rhombus.
3. Diagonals bisect each other and they are

Let's recall

perpendicular to each other.

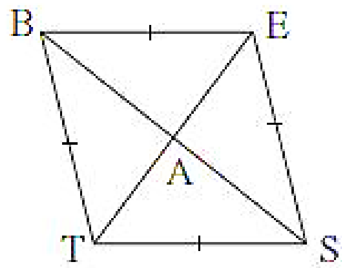
Sample Example :

1) Diagonals of a rhombus BEST intersect at A.

If m∠ BTS = 110°, then find m∠ TBS .

2) Diagonals of a rhombus BEST intersect at A.

If l (TE) = 24, l (BS) = 70, then l (TS) = ?



1) Let us draw rough figure of □BEST and show the point A

Opposite angles of a rhombus are congruent.

∴ m∠ BES = m∠ BTS = 110°

Now, m∠ BTS + m∠ BES + m∠ TBE + m∠ TSE = 360° .

∴ 110° + 110° + m∠TBE + m∠TSE = 360°

∴ m∠TBE + m∠ TSE = 360° - 220°= 140°

∴ 2 m∠TBE = 140°...... Opposite angles of a rhombus are congruent.

∴ m∠TBE = 70°

∴ m∠TBS = $\frac{1}{2}$ x 70° = 35° .... Diagonal of a rhombus bisect the opposite angle.

2) Diagonals of a rhombus are perpendicular bisectors of each other.

∴ In △TAS , m∠TAS = 90°

∴ l(TA) = $\frac{1}{2}$ l(TE)

= $\frac{1}{2}$ X 24 = 12,

∴l (AS) = $\frac{1}{2}$ l (BS)

= $\frac{1}{2}$ X 70 = 35 units

By Pythagoras theorem ,

∴l (TS)^2 = l (TA)^2 + l (AS)^2

∴l (TS)^2 = (12)^2 + (35)^2

∴l (TS)^2 = 144 + 1225

∴l (TS)^2 = 1369

∴ l (TS) = $\sqrt{1369}$

∴ l (TS) = 37 units

Exercise:-1.Find the length of side of a square whose diagonal is 10 cm.

2.Find the length of diagonal of a square with side 8 cm.

3.Lengths of diagonals of a rhombus ABCD are 16 cm and 12 cm. Find the side and perimeter of the rhombus.

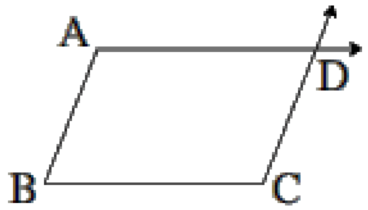
4.Measure of one angle of a rhombus is 50^0, find the measures of remaining three angles.

Sub – Unit : Parallelogram

Learning outcomes: Verify and apply the properties of parallelogram.

Let's recall :

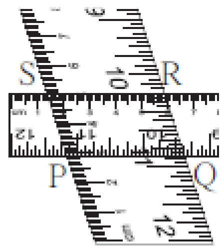
Parallelogram :



A quadrilateral having opposite sides parallel is called a parallelogram.

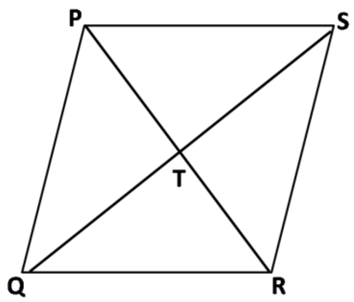
Properties of a parallelogram

1. Measures of opposite angles of the parallelogram are equal means opposite angles are congruent.
2. Lengths of opposite sides are equal means opposite sides are congruent.
3. Diagonals of a parallelogram bisect each other.
4. Adjacent angles of a parallelogram are supplementary.



Sample Examples :

1) □PQRS is a parallogram.T is the point of intersection of its diagonals.Referring the figure, write the answers of the questions given below.



(i) If *l* (PS) = 5.4 cm,then *l* (QR) = ?

(ii) If *l* (TS) = 3.5 cm, then *l* (QS) = ?

2) In parallelogram PQRS, if m∠QRS = 118°,then m∠QPS =?

3) In parallelogram PQRS, if m∠SRP = 72°then m∠RPQ = ?

Ans: 1) In parallelogram PQRS,

(i) *l* (QR) =*l* (PS) = 5.4 cm ..... opposite sides are congruent.

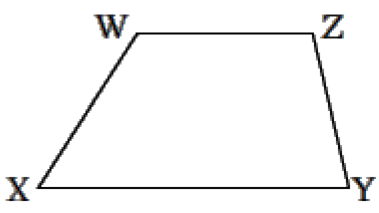
(ii) *l* (QS) = 2 x *l* (TS)

= 2 x 3.5

Let's recall:

Trapezium :

If only one pair of opposite sides of a quadrilateral is parallel then it is called a trapezium.



Property of trapezium :

1.In a trapezium, angles including a non-parallel side are supplementary. Thus two pairs of angles are supplementary.

Sample Example :

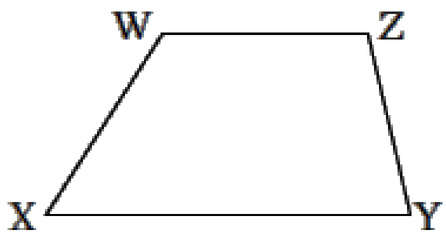
In a trapezium □WZYX

(i) State the pair of parallel sides.

→ side WZ and side XY

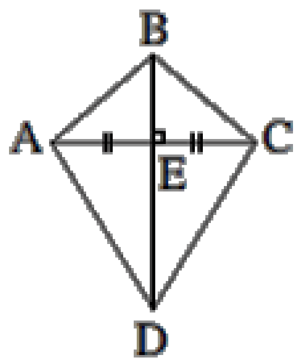
(ii) State the pair of non-parallel sides.

→ side WX and side ZY



Kite :

If one diagonal is the perpendicular bisector of the other diagonal then the quadrilateral is called a kite.



Properties of a kite :

1. Two pairs of adjacent sides are congruent.
2. Angles included by non-congruent sides are congruent. Thus one pair of opposite angles is congruent.

Sample Example :

In a kite ABCD

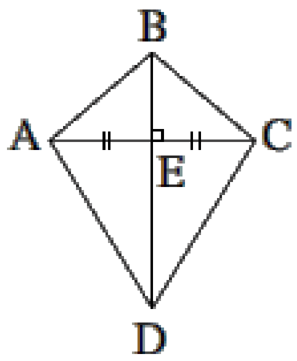
(i) Write pairs of congruent sides.

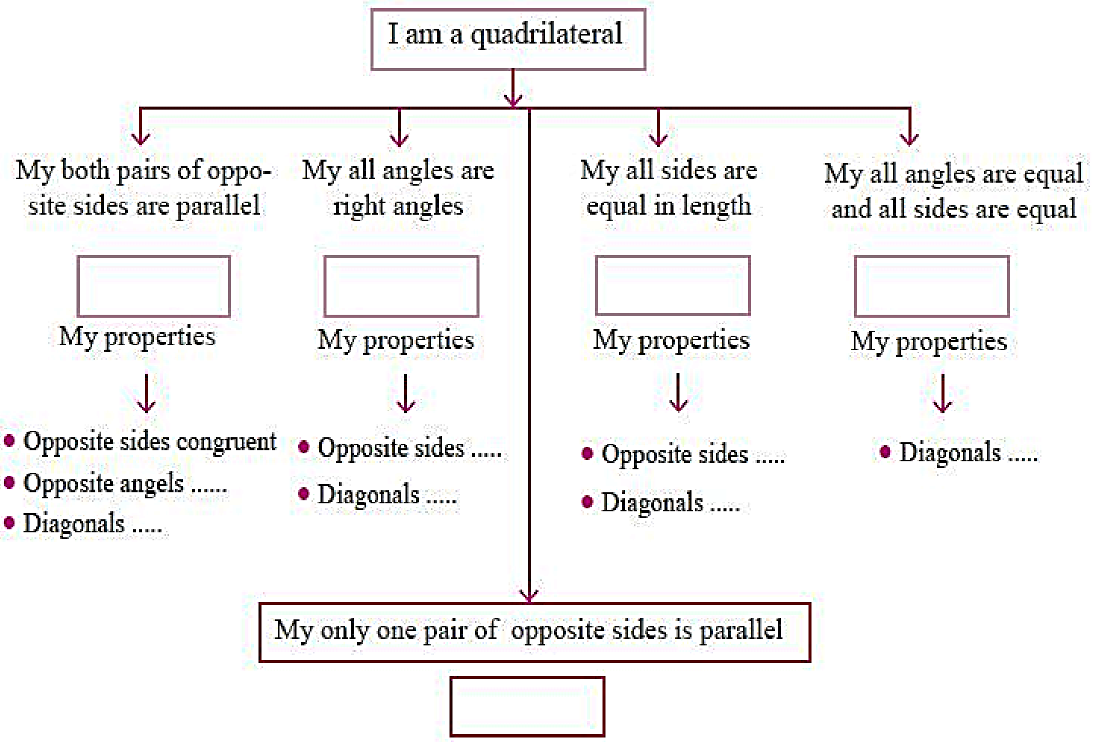
seg AB and seg CB

seg AD and seg CD

(ii) Write a pair of opposite angles which are congruent.

∠ BAD and ∠ BCD





DAY : 19th

Unit: Circle – Chord and Arc

Learning Outcomes : 1) Identifies minor arc and major arc
2) Determines the measure of arcs.

Let's recall : 1) Draw a circle using compass and measure the radius of the circle

Important Points :

Cirlce and parts of the circle :

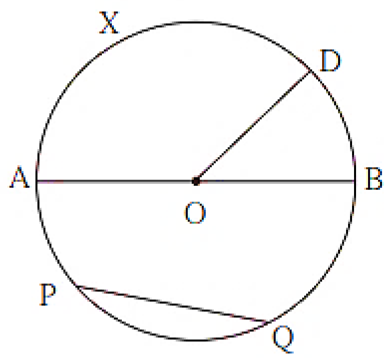
Circle – The set of points in a plane that are equidistant from a fixed point is a circle.

Centre of Circle – The fixed point in the plane from which all the points on the circle are equidistant is called as the centre of the Circle.

Radius (r) – The distance bewteen the centre of the circlce and any point on the circle is called radius of the circle. Also, the line segment joining the centre of the circle and any point on the circle is also known as the radius of the circle.

Chord : The line segment joining any two points on the circle is called as the chord of the circle.

Diameter (d) – The chord passing through the centre of the circle is called as diameter. Among all the chords of a given circle, diameter is the longest chord. The diameter of a circle is twice the radius.In the given figure, O is the center of the circle, seg OD is a radius, PQ is a chord and seg AB is a diamater.



Important formulae –

1) Diameter = 2 × Radius or Radius = $\frac{Diameter}{2}$

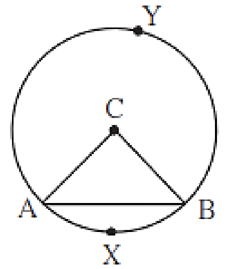
2) Circumeference (c) = $2\pi r$ or Circumference (c) = πd

3) Are of a circle = πr^2

π is an irrational number and the approximate value of π is taken as $\frac{22}{7}$ or 3.14

Central angle –An angle whose vertex is the centre of the circle is called as a central angle.

Arc of circle - A chord of a circle divides the circle in two parts. Each of these parts is called as arc of the circle. There are 3 types of Arcs:
1) Minor arc 2) Major arc and 3) Semi-circular arc.



Minor arc and Major arc – If two parts of a circle formed by a chord are not equal, then the smaller part is called minor arc and the larger part is called major arc.

The centre side arc is called major arc and the non-centre side arc is called minor arc.

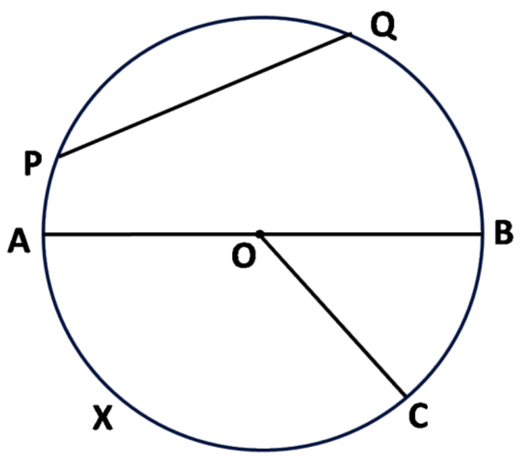
In the diagram, segment AB is the chord of the circle with center C and ∠ACB is central angle. Arc AXB is a minor arc and arc AYB is a major arc.

Semi-circular arc –The diameter of the circle divides the circle in two equal arcs. These arcs are called Semi-circular arcs.

Measure of Arc - 1) Measure of circle = 360°
2) Measure of semi-circular arc = 180°
3) Measure of minor arc = measure of corresponding central angle
4) Measure of major arc = 360°- measure of corresponding minor arc.

Exercise

A) Observe the diagram and complete the table.



Center of circle				
Radii				
Diamater				
Chords				
Minor arcs				
Major arcs				
Semi-circular arcs				
central angles				

DAY : 20th

Sub - unit : Properties of chord of a circle

The Perpendicular drawn from the centre of a circle to its chord bisects the chord.

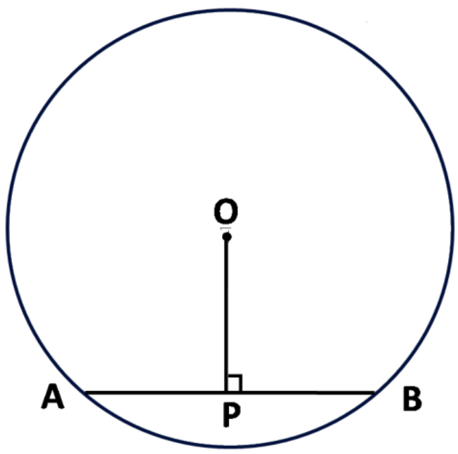
Draw chord AB of a circle with centre O.

Draw perpendicular OP to chord AB.

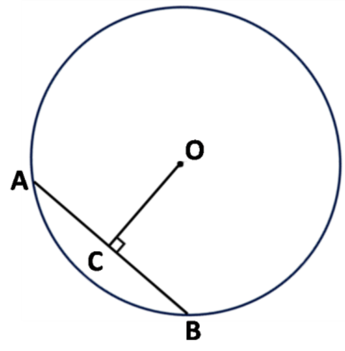
Measure seg AP and seg PB using divider or scale.

After measuring lengths of seg AP and seg BP, you will find them equal. So we get the following property.

The perpendicular drawn from the centre of a circle to its chord bisects the chord**.**



Example: In a circle with center O and seg AB is a chord of length 9 cm. If segment OC $\perp$ chord AB, then find l(AC) ?



Solution: Seg OC $\perp$ chord AB

Perpendicular drawn from the center of the circle to its chord bisects

the chord. Hence perpendicular OC divides the chord AB in two equal parts.Therefore point C is the mid-point of segment AB.

$$\therefore l\,(AC) = \frac{1}{2} l\,(AB)$$

$$= \frac{1}{2} \times 9$$

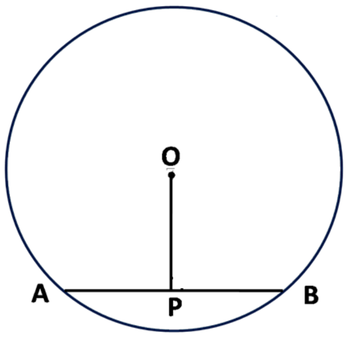
$$l\,(AC) = 4.5 \text{ cm.}$$

Exercise

1)Draw a circle with centre O and chord LM. Draw a perpendicular from centre O to chord LM and label it as OQ. If length of chord LM is 5 cm then find l(LQ)

The segment joining the centre of a circle and midpoint of its chord is perpendicular to the chord.

Draw a circle with center O on a paper. Draw a chord AB. Find the midpoint of the chord and name it as point 'P'. Join centre O and midpoint P. Measure ∠APO and ∠ BPO with set-square or protractor.



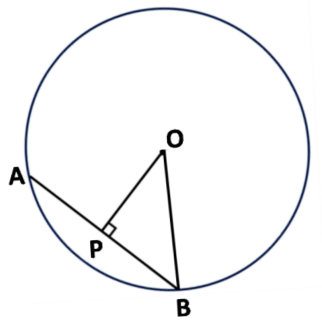
It is found that ∠ APO and ∠ BPO are right angles.

∴ m∠APO = m∠BPO = 90^0

Thus , the segment joining the centre of a circle and midpoint of its chord is perpendicular to the chord.

Example: Radius of a circle with centre O is 5 cm the chord AB is at a distance of 3cm from the centre. seg OP ⊥ chord AB then l(AB) =?

Solution: Distance of the chord from the centre of the circle is the length of perpendicular drawn from the centre of the circle to the chord.



AB is the chord of the circle with centre O.

seg OP ⊥ chord AB

Radius of the circle l (OB) =5cm. l (OP) = 3 cm

ΔOPB is a right angled triangle.

According to Pythagoras theorem,

$$l(\text{OP})^2 + l(\text{PB})^2 = l(\text{OB})^2$$

$$l(\text{PB})^2 = l(\text{OB})^2 - l(\text{OP})^2$$

$$= 5^2 - 3^2$$

$$l(\text{PB})^2 = 25 - 9$$

$$l(\text{PB})^2 = 16$$

l(PB) = 4 cm (by taking square roots on both sides)

The perpendicular drawn from centre of the circle to the chord bisects the chord.

l (AB) = l(AP) + l(PB)

But, l(AP) = l(PB)

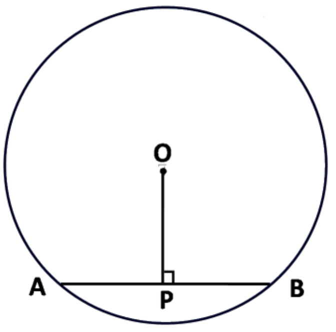
∴ l (AB) = 2 × l(PB)

∴ l (AB) = 2 × 4

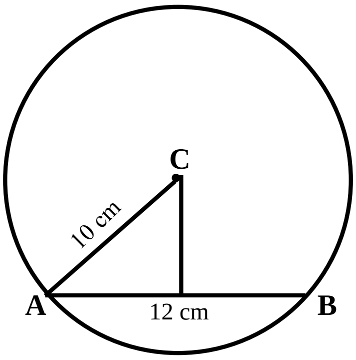
∴ l (AB) = 8 cm

Exercise :

1)O is centre of circle.Find the length of radius , if the chord of length 16cm is at a distance of 9 cm from the centre of the circle.



2) C is the centre of the circle whose radius is 10cm. Find the distance of the chord from the centre if the length of the chord is 12cm.



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DAY : 21st

Area – Commercial Mathematics.

Name of the unit – Ratio and Propartion

Sub- Unit - 1) Factorization.

2) Different units in measuring systems and their conversions.

Learning Outcomes: 1) Find the prime factors of the given numbers.

2) Write the the given ratio in its simplest form.

3) Find relation between the units in different measuring systems.

Let's recall :

Sub - Unit 1) Factorization of a number .

Following numbers are expressed as product of prime numbers.

(i) $14 = 7 \times 2$

(ii) $27 = 3 \times 9 = 3 \times 3 \times 3$

(iii) $36 = 3 \times 12 = 3 \times 3 \times 4 = 3 \times 3 \times 2 \times 2$

2) Simplest form of ratio :

Find the factors of numerator and denominator, then cancel the common factors from both. Write the ratio in its simplest form.

(i) $\frac{4}{8} = \frac{4 \text{ X } 1}{4 \text{ X } 2} = \frac{1}{2} = 1:2$ (ii) $\frac{28}{7} = \frac{7 \; X \; 4}{7 \; X 1} = \frac{4}{1} = 4:1$

3)Different units of measurements and their conversions :

e.g. 1 metre = 100 cm, 1 year = 12 months, 1 hour = 60 min, 1 Re = 100 paise

(i)1 Dozen = ☐ things (ii) 1 cm = ☐ mm

EXERCISE

1. Factorise the following numbers.

   (i) 45 = 5 X □ = 5 X □ X □

   (ii) 38 = 2 X □

   (iii) 48 = 3 X □ = 3 X 4 X □ = 3 X 2 X □ X 2 X □

   (iv) 98 = ?

   (v) 120 = ?

2. Write the simplest form of following ratios.

   (i) $\frac{32}{40} = \frac{8 \times \square}{8 \times \square} = \frac{\square}{\square}$ (ii) $\frac{66}{88} = \frac{\square \times \square}{\square \times \square} = \frac{\square}{\square}$

   (iii) $\frac{63}{45} = \frac{\square \times \square}{\square \times \square} = \frac{\square}{\square}$ (iv) $\frac{72}{48}$ =? (v) $\frac{65}{39}$ =?

3. Fill in the boxes with correct number.

   (i) 1 litre= □ ml (ii) 1 Kg = □ gram

   (iii) 1 min = □ second (iv) 1 Rupee = □ paise

DAY : 22 st

Sub- Unit - Linear equations in one variable

Learning outcomes: Solve problems on linear equation with one variable using proper rules and able to get value of the variable.

Let's recall:

Linear equation in one variable :

(i) If product of one number and 6 is 30 then find the number.

(ii) Eight times of a number is 40 , find that number.

Ex: i) $6x = 30$

$\therefore \quad x = \frac{30}{6}$ (dividing both sides by 6)

$\therefore \quad x = 5$

The required number is 5

Ex. ii) $8y = 40$

$\therefore \quad y = \frac{40}{8}$ (dividing both sides by 8)

$\therefore \quad y = 5$

The required number is 5

Solve the following equations and get the value of the variable.

(i) $7x = 35$

$\therefore \quad x = \frac{35}{7}$

$\therefore \quad x = 5$

(ii) $5x = 45$

$\therefore x = \frac{45}{\square}$

$\therefore \quad x = \square$

(iii) $12y = 96$

$\therefore y = \frac{\square}{\square}$

$\therefore \quad y = 8$

(iv) $9x = 180$

(v) $18y = 144$

Observe the solved equation and solve the remaining equations accordingly

(i) $\frac{3}{7} = \frac{x}{21}$

$\therefore 3 \times 21 = x \times 7$

$\therefore \frac{3 X 21}{7} = x$

$\therefore \quad x = 3 \times 3$ .... (dividing 21 by7)

$\therefore \quad x = 9$

(ii) $\dfrac{5}{8} = \dfrac{x}{48}$

$\therefore \quad 5 \times 48 = x \times \square$

$\therefore \quad \dfrac{5 \times 48}{\square} = x$

$\therefore \quad x = 5 \text{ x } 6$............... (dividing 48 by 8)

$\therefore \quad x = \square$

(iii) $\dfrac{2}{5} = \dfrac{14}{x}$

$\therefore \quad 2 \times x = 14 \times 5$

$\therefore \quad x = \dfrac{14 \ X \ 5}{2}$

$\therefore \quad x = 7 \times 5$ ....(dividing 14 by 2)

$\therefore \quad x = 35$

(iv) $\dfrac{5}{7} = \dfrac{15}{y}$

$\therefore \quad 5 \times y = 15 \times \square$

$\therefore \quad y = \dfrac{15 \ X \ \square}{\square}$

$\therefore \quad y = \square \text{ X } \square$

$\therefore \quad y = \square$

EXERCISE

Solve the following examples.

(i) $\dfrac{7}{6} = \dfrac{x}{30}$ (ii) $\dfrac{4}{9} = \dfrac{y}{63}$ (iii) $\dfrac{3}{8} = \dfrac{18}{x}$ (iv) $\dfrac{4}{8} = \dfrac{24}{y}$

DAY : 23rd

Sub – Unit : Direct Variation and Inverse Variation

Learning Outcome: Solve problems based on direct variation and inverse variation.

Let's recall :

Direct Variation and Inverse Variation :

Complete the following table .

If $x \propto y$ then

x	1	4	☐	12
y	8	32	56	☐

If $a \propto \frac{1}{b}$ then

a	20	12	60	☐
b	6	10	☐	40

Importanat points: If there is direct variation between x and y, then symbolically it is written as $x \propto y$ and $\frac{x}{y} =$ constant

Similarly, if there is inverse variation between a and b, then it can be written as $a \propto \frac{1}{b}$ and $a \times b =$ Constant

In the first example $\frac{x}{y} = \frac{1}{8}$ and in the second example $a \times b = 120$ are the constans.

Try to understand the following solved examples.

Ex. (i) $m \propto n$. n = 7 when m = 154, then find m if n = 14.

Solution: $m \propto n$

$\therefore m = k\,n$ ....(k is constant of variation)

$\therefore 154 = k \times 7$

$\therefore k = \frac{154}{7}$........... Dividing both sides by 7

$\therefore k = 22$

$\therefore m = 22 \times n$ ....(I) Equation of variation

Now n = 14 is given. Put n = 14 in equation (I)

$$m = 22 \times 14$$

$$m = 308$$

(ii) $a \propto \frac{1}{b}$. b = 3when a = 40. Find b when a = 15.

Solution: $a \propto \frac{1}{b}$

$\therefore$ $a = k \times \frac{1}{b}$ ....(k is constant of variation)

$\therefore$ $a \times b = k$

$\therefore$ $k = 40 \times 3$

$\therefore$ $k = 120$

$\therefore$ $a \times b = 120$ ....(I) Equation of variation

Now a = 15 is given. Putting the value of a in equation (I).

$15 \times b = 120$

$\therefore$ $b = \frac{120}{15}$....... Dividing both sides by 15

$\therefore$ $b = 8$

Exercise

Complete the following table

(i) If $m \propto n$ then

m	2	5	□	18
n	10	□	60	□

(ii) If $x \propto \frac{1}{y}$ then

x	4	5	□	50
y	25	□	10	□

DAY :24th

Sub – Unit - Squares and cubes of numbers

Learning Outcome : Find square and cube of numbers using different methods .

Let's recall :

Squares and cubes of numbers :

Square of a number is the result of multiplying a number by itself.

For ex.: (i) $5^2 = 5 \times 5 = 25$. (ii) $(-3)^2 = (-3) \times (-3) = 9$

If a number is written 3 times and multiplied, then the product is called the cube of the number.

For ex : (i) $4^3 = 4 \times 4 \times 4 = 16 \times 4 = 64$

(ii) $(-7)^3 = (-7) \times (-7) \times (-7) = 49 \times (-7) = -343$

Expansion formulae :

Observe the following expansion formulae and try to understand how to use these formulae to solve examples .

(i) $(a + b)^2 = a^2 + 2ab + b^2$

$(8 + x)^2 = 8^2 + (2 \times 8 \times x) + x^2 = 64 + 16x + x^2$

(ii) $(a - b)^2 = a^2 - 2ab + b^2$

$(y - 4)^2 = y^2 - (2 \times y \times 4) + 4^2 = y^2 - 8y + 16$

Exercise :- Complete the following table .

Number	Square	Cube	Number	Square	Cube
1			-1		
2			-2		
3			-3		
4			-4		
5			-5		
6			-6		
7			-7		
8			-8		
9			-9		
10			-10		

Expand.

(i) $(x + 6)^2$ (ii) $(x - 7)^2$ (iii) $(5 - x)^2$ (iv) $(x + 11)^2$

DAY: 25^{th}

Sub - Unit: Square root and Cube root.

Learning Outcome: Find square root and cube root by factorisation method.

Let's recall:

Square root and cube root:

(i) Generally square of 'a' can be written as a^2 and square root of 'a' can be written as $\sqrt{a}$

For ex: $3^2 = 9$ $\therefore \sqrt{9} = \sqrt{3 \times 3} = 3$

(ii) Similarly cube of 'a' can be written as a^3 and cube root of 'a' can be written as $\sqrt[3]{a}$

For ex: $5^3 = 5 \times 5 \times 5 = 125$ $\therefore \sqrt[3]{125} = \sqrt[3]{5 \times 5 \times 5} = 5$

Exercise :- Solve the following examples.

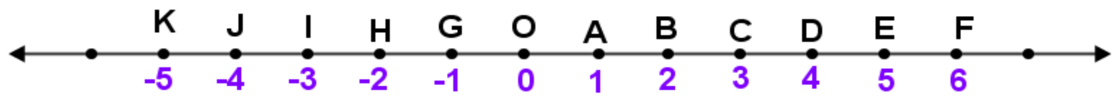
(i) $\sqrt{36}$ (ii) $\sqrt[3]{512}$ (iii) $\sqrt{81}$ (iv) $\sqrt[3]{1000}$ (v) $\sqrt{256}$

DAY: 26th

Sub – Unit: Co-ordinate Geometry

Learning outcome: Represent integers on a number line.

Let's recall :



Number line:

1) Point 'O' on a number line is known as 'origin'.

2) Point 'O' represents number zero (0) on a number line.

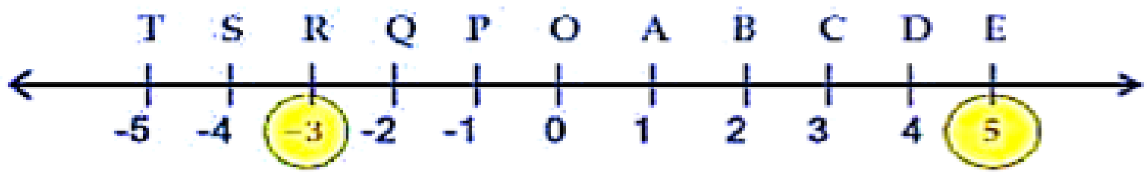
3) On a number line positive numbers are on a right side of zero (0).

4) Similarly negative numbers are on a left side of zero (0).

" The number zero (0) is neither positive nor negative."

Practice: To show the numbers on a number line.

Represent the numbers – 3 and 5 on a number line.



Q.1: Classify the following numbers as positive and negative numbers.

-5, - 7, 4, 8, + 32, - 25, 10, 7, - 29

Solution: Positive numbers: 4, 8, + 32, 10, 7

Negative numbers: - 5, - 7, - 25, - 29

Exercise

1. Write the numbers in the following examples using the proper signs.

a) Akshay's airplane is flying at a distance of 50 m from the ground.

b) A fish is at a depth of 512 metres below the sea level.

c) The height of Mt. Everest, the highest peak in the Himalayas, is 8848 m.

DAY: 27^{th}

Unit: Linear eauations in two variables

Sub - Unit: Algebraic expressions, Equations, Solution of equations.

Learning Outcomes: 1) Explain the concept of algebraic expressions.
2) Finds out the solution of equations .

Let's recall:

Constant: A constant is a value or a number that never changes in expression, it's constantly the same.

For ex: 2, -50, $2\sqrt{3}$, $\sqrt{3}$ etc.

Variable: A variable is an alphabet or term that represents an unknown value or unknown quantity. That means a variable is a quantity that can change.

Letters are used to represent these changing, unknown quantities.

For ex: x, y, m, netc.

Algebraic Expression: An algebraic expression is an expression which is made up of variables and constants, along with algebraic operations (addition, subtraction, multiplication and division)

For ex: $3x + 2y - 5$,$x - 20$,$2x^2 - 3xy + 5$

Equation:

An algebraic equation can be defined as a mathematical statement in which two expressions are set equal to each other.

Foe ex: $3x + 2 = 5$, $x + 4 = 7$, $x^2 + 2x + 7 = 0$

Solution of equations :

The value of variable which satisfies the given equation is called the solution of the equation.

For ex: If we put $x = 3$ in equation $2x + 7 = 13$, equation gets satisfied for

$x = 3$ therfore $x = 3$ is the solution of the equation $2x + 7 = 13$.

For ex :(1) Decide whether $x = -1$ is the solution of equation $x - 4 = 3$ or not ?

$\therefore x - 4 = 3$

L.H.S. = x – 4

= –1 – 4 .... Putting x = -1

= –5 ...... (I)

R.H.S.= 3 ... (II)

From (I) and (II) , –5 ≠ 3

∴ x = –1 is not the solution of equation x – 4 = 3 .

(2) Solve : $2(x - 3) = \frac{3}{5}(x + 4)$

Solution : Multiplying both sides by 5 .

∴ 10(x - 3) = 3(x + 4)

∴ 10x - 30 = 3x + 12

Adding 30 to both sides .

∴ 10x - 30 + 30 = 3x + 12 +30

∴ 10x = 3x + 42

Subtracting 3x from both sides .

∴ 10x - 3x = 3x + 42 - 3x

∴ 7x = 42

Dividing both sides by 7

∴ x = 6

Exercise

1. Each equation is followed by the values of the variable. Decide whether these values are the solutions of that equation.

(1) 9m = 81, m = 9 (2) 2a + 4 = 0, a = - 2

2. Solve the following equations.

(1) 2m + 7 = 9 (2) 3x + 12 = 2x – 4 (3) 5(x - 3) = 3(x + 2)

Link

Algebraic equations :**https://youtu.be/kN0Y9soK2YQ**

Solution of equations :**https://youtu.be/CYFH8wWtpNU**

https://youtu.be/3WPcyvVwUx4

DAY: 28th

Sub – Unit: Word Problems

Learning outcome: Uses various algebraic identities in solving problems of daily life.

Let's recall :

Frame the equation by using the variable x from the given information

1) Govind has some money. Mother gave him 7 rupees. Govind now has 10 rupees .

Solution: Let the initial amount with Govind be Rs. x .

$$x + 7 = 10$$

2) There are some pedhas in a box. If some Childern are given 2 pedhas each, the pedhas would be enough for 20 children .

Solution :Let the total number of pedhas be x .

$$\frac{x}{2} = 20$$

3) Haraba owns some sheep. After selling 34 of them in the market, he still has 176 sheep .

Solution :Let Haraba has x sheep .

$$x - 34 = 176$$

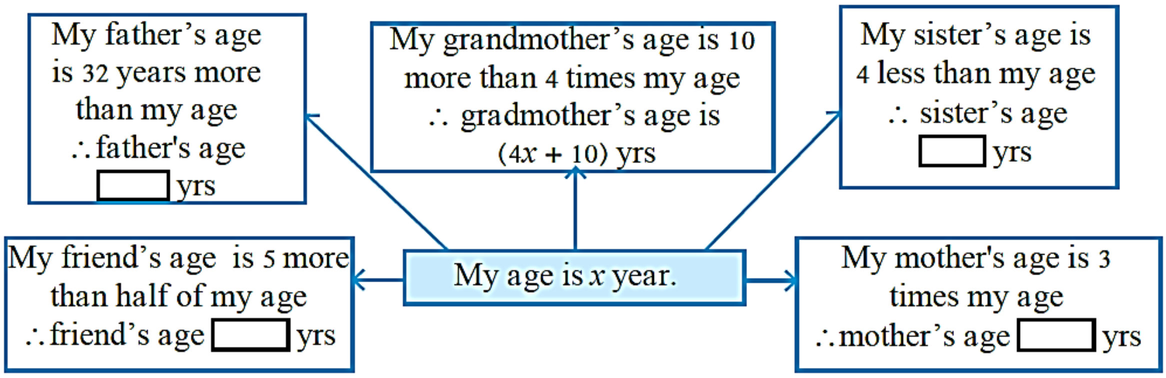
4) Raghav's age is three times that of his younger brother. Sum of their ages is 8 years

Solution: Let's suppose that Raghav's younger brother is 'x' years old.

∴ Raghav's age = 3x years

$$x + 3x = 8$$

Conversion of word problem into an algebraic expression



Exercise

1) Mother is 25 year older than her son . Find son's age if after 8 years ratio of son's age to mother's age will be $\frac{4}{9}$.

2) The denominator of a fraction is greater than its numerator by 12. If numerator is decreased by 2 and denominator is increased by 7, the new fraction is equivalent with $\frac{1}{2}$.Find the fraction.

3) Joseph's weight is two times the weight of his younger brother . Find Joseph's weight if sum of their weights is 63 kg.

Link :

https://youtu.be/evJgTKwuh-M

https://www.youtube.com/playlist?list=PLvV4ZMCOwwT3seyfjJjmbLT25iVoMOos_

DAY:29th

Unit : Pythagoras Theorem **Sub-Unit :** Right angled triangle

Learning outcomes : 1) Identifies right angled triangle.

2) Identifies hypotenuse and sides forming right angle in a right angled triangle.

Revision

Q 1. What are the types of triangles based on angles?

Q 2. What is the sum of measures of all the three angles of a triangle?

Q 3. If measure of one of the angle in a right angled triangle is 40^0, then find the measure of other acute angle .

Q4. In a right angled triangle, what is side opposite to right angle called?

In ΔABC , $\angle ABC$ is a right angle .

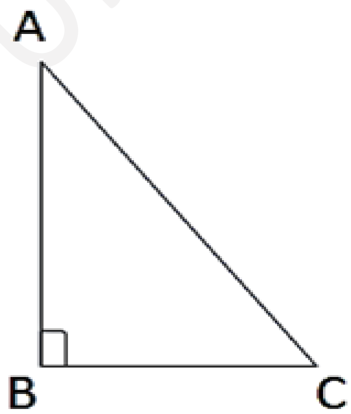
Opposite side of $\angle A$: side BC

Adjacent side of $\angle A$: side AB

Opposite side of $\angle C$: side AB

Adjacent side of $\angle C$: side BC

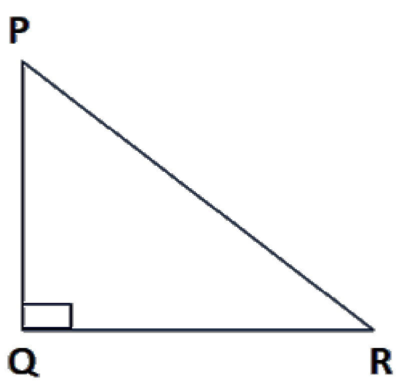
Hypotenuse of ΔABC: side AC



Exercise

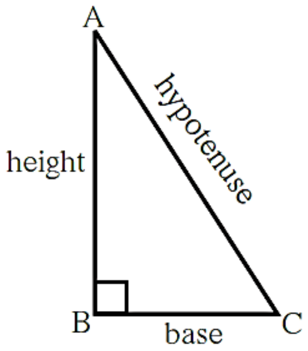
In the adjoining figure ,

1) Write the names of sides forming right angle .
2) Hypotenuse =........
3) Opposite side of $\angle P$ =.......
4) Opposite side of $\angle R$ =........
5) Adjacent side of $\angle P$ = ...
6) Adjacent side of $\angle R$ =........



Learning outcomes: 1. Tell Pythagoras theorem .

2. Solve problems by using Pythagoras theorem .



With reference to the figure alongside, the theorem of Pythagoras can be written as follows:

In ΔABC, if $\angle B$ is a right angle, then $[l(AC)]^2 = [l(AB)]^2 + [l(BC)]^2$

Generally, in a right-angled triangle, one of the sides forming the right angle is taken as the base and the other as the height.

Then, the theorem can be stated as

$(\text{hypotenuse})^2 = (\text{base})^2 + (\text{height})^2$.

1)In a right angled triangle , lengths of sides forming right angle are 9 cm and 12 cm respectively . Find the length of its hypotenuse .

$(\text{Hypotenuse})^2 = (\text{First side})^2 + (\text{Second side})^2$...... Pythagoras theorem .

$= (9)^2 + (12)^2$

$= 81 + 144$

$= 225$

Hypotenuse = 15cm .... Taking square roots of both sides

2) In a right angled triangle , lengths of sides forming right angle are 6 cm. and 8 cm. respectively . Find the length of its hypotenuse .

$(\text{Hypotenuse})^2 = (\text{First side})^2 + (\text{Second side})^2$...... Pythagoras theorem .

$= (6)^2 + (8)^2$

$= 36 + 64$

$= 100$

Hypotenuse = 10 cm .... Taking square roots of both sides

Exercise

1) Which is the largest side of the right angled triangle ?

2) In a right angled triangle , lengths of sides forming right angle are 11 cm and 60 cm respectively . Find the length of its hypotenuse .

3) Decide whether 9,12,15 are sides of a right angled triangle or not ? Can the length of hypotenuse be determined from this? What will be the length of hypotenuse ?

DAY:30th

Learning outcome : Tells the Pythagorean triplets .

1)Pythagorean Triplet :

If, in a triplet of natural numbers, the square of the biggest number is equal to the sum of the squares of the other two numbers, then the three numbers form **a Pythagorean triplet.** If the lengths of the sides of a triangle form such a triplet, then the triangle is a right-angled triangle.

For ex :.(3,4,5) and (6,8,10) etc.

(3, 4, 5) is a Pythagorean triplet.

Multipling each of these numbers by 2, gives the new Pythagorean triplet (6, 8, 10).

Multipling each of these numbers by 3, gives the new Pythagorean triplet (9, 12, 15).

Study this and make another Pythgorean triplets.

Exercise

1.Make Five Pythagorean triplets .

2.Trace a set square on a paper using pencil . Measure the lengths of three sides of figure so formed . Examine whether Pythagoras theorem is applicable for this triangle .

Link :

https://diksha.gov.in/play/content/do_31316523882319052815675

Answers

1) Sets

Day- 1^{st}

1) 2,4,6,8,10,12,14,16,18,20,22,24 2) 27,29,31,33,35,37,39,41,43,45,47,49 3) 2

4) Total -25, (2,3,5,7,11,13,17,19,23,29,31,37,41,43,47,53,59,61,67,71,73,79, 83,89,97)

5)1,2,3,4,6,8,12,24 6)1, 19 prime 7)14,21,70

2) Geometrical Concept

Day-2^{nd} (2) line AB, line AC, line CD, line AD, line BC

Day-2^{nd} (Page no. 11)

(1)Points M, O, T and Points R, O, N(2) Ray OP,Ray ON, Ray OS, Ray OR(3)seg MT

(4) line MT and line RN

Day – 3^{rd}

(i) ∠MNS (ii) ∠PMN

(i) ∠MNR (ii) ∠MNS

(i) ∠RNB (ii) ∠AMP

(i) ∠MNS (ii) ∠PMN

4) Real Numbers (Day 5^{th})

(2) (i) > (ii) < (iii) < (iv) > (v) <

(3) (i) 5 (ii) 29 (iii) 29 (iv) -5 (v) 9 (vi) 45

5) Rational numbers

Day 6^{th} - Natural number :4, Integers : -4,-15,4, Rational numbers :- -4,2/3,-15,-3/10, 4.

Day 7^{th} - 1) -3 > -5 2) 2/7 > 0 3) -5/7 > -3/4 4) -12/15 < - 3 / 5

Day 8^{th} - 1) 5/3 = Non - terminating recurring decimal form . 2) 17/ 5 = Terminating decimal form. 3)19/4 = Terminating decimal form. 4) 23/ 99 = Non - terminating recurring decimal form

Day 8^{th} (Page no .20) $\frac{22}{7}$ and 3.14these rational numbers are the approximate values of irrational number π.

4) Triangle (**Day 9^{th}) 1. 110^0 2. $\angle x = 80^0$ $\angle y = 60^0$ $\angle z = 40^0$**

Day 11^{th}

1.Hypotenuse – side test 2. SAS Test 3. AAS Test

7) Polynomials

Day 15^{th} 1. 1. (i) No (ii) Yes (iii) Yes

2. (i) 0 (ii) 5 (iii) 5 3. (1)$15y^4 + 12y^3 + y^2 + 3$

3. 1)$15y^4 + 12y^3 + y^2 + 3$ 2)$-3x^2 + 11x - 13$ 3)$12x^5 - 17x^4 + 6x^3$

4. 1) $3y^2 + 2y - 1$ 2) $x^2 + 2xy + y^2$ 3) $p^2 - 2pq + q^2$

Day 16^{th}

1. (n–p) (n +p) 2.$m^2 - 2m - 24$ 3. $m^2 + n^2 + 4 + 2mn - 4n - 4m$

4. $8m^3 - 60m^2 + 150m - 125$ 5. $343x^3 + 1176x^2y + 1344xy^2 + 512y^3$

6. $(5p + q)(25p^2 - 5pq + q^2)$ 7. $(x - 4y)(x^2 + 4xy + 16y^2)$

8) Quadrilateral

Day 17th

1) 6 cm. 8 cm. 2)26 cm.

Day 18th

1) $5\sqrt{2}$ 2) $8\sqrt{2}$ 3) Side = 10cm. 4. Perimeter = 40 cm. 3.$50^0 130^0 130^0$

9) Circle

Day 20th

Centre of circle - ORadius –seg OA, seg OC, seg OB.Daimeter– segABChord – seg PQ, seg AB. Minor arc – arcAP, arcAPQ, arcQB, arc AX, arc BC. Semicirculararc –arcAQB, arc AXB.Central angle –∠AOC, ∠BOC.

Day 20th (Page No.45)

ℓ(lQ) = 2.5 cm.

Day 20th (Page No. 47)

1) Radius of circle = 10 cm. 2) Distance of a chord from the centre is 8 cm .

10) Ratio and Proportion

Day 21st

1) (i) 9, 3, 3 (ii) 19 (iii) 16, 4, 2, 2 (iv) 98 = 7 X 7 X 2 (v) 120 = 2 X 2 X2X 3 X 5

2) (i) $\frac{4}{5}$, $\frac{4}{5}$ (ii) $\frac{11 X 6}{11 X 8} = \frac{6}{8} = \frac{2}{3}$ (iii) $\frac{9 X 7}{9 X 5} = \frac{7}{5}$ (iv) $\frac{2}{3}$ (v) $\frac{5}{3}$

3) (i) 1000 (ii) 1000 (iii) 60 (iv) 100

11)

Day 22nd Ratio and Propartion

i) 35 ii) 28 iii) 48 iv) 48

Day – 23rd Ratio and Propartion

(i) 25, 12, 90 (ii) 20, 10, 2

Day - 25th Ratio and Propartion

(i) 6 (ii) 8 (iii) 9 (iv) 10 (v) 16

11) Co-ordinate Geometry

Day – 26th (a) + 50 m. b) - 512 m c) + 8848 m.)

12) Linear equation in two variables

Day – 27th

2. 1. m= 1 2. x= -16 3. x= 10.5

Day – 28th

1. 12 years 2. 23/35 3. 42 kg

13) Right angled triangle **Day – 29th**

1.side PQ and sideQR 2.Hypotenuse PR 3.side QR 4.side PQ 5. side PQ 6. Side QR

Day – 30th (1. Hypotenuse 2. 61 3. 15)