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Master Lesson Plan

for

12 - Geometrical construction (ଦ୍ଵାର୍ତ୍ତିକ ଅଙ୍କନ)

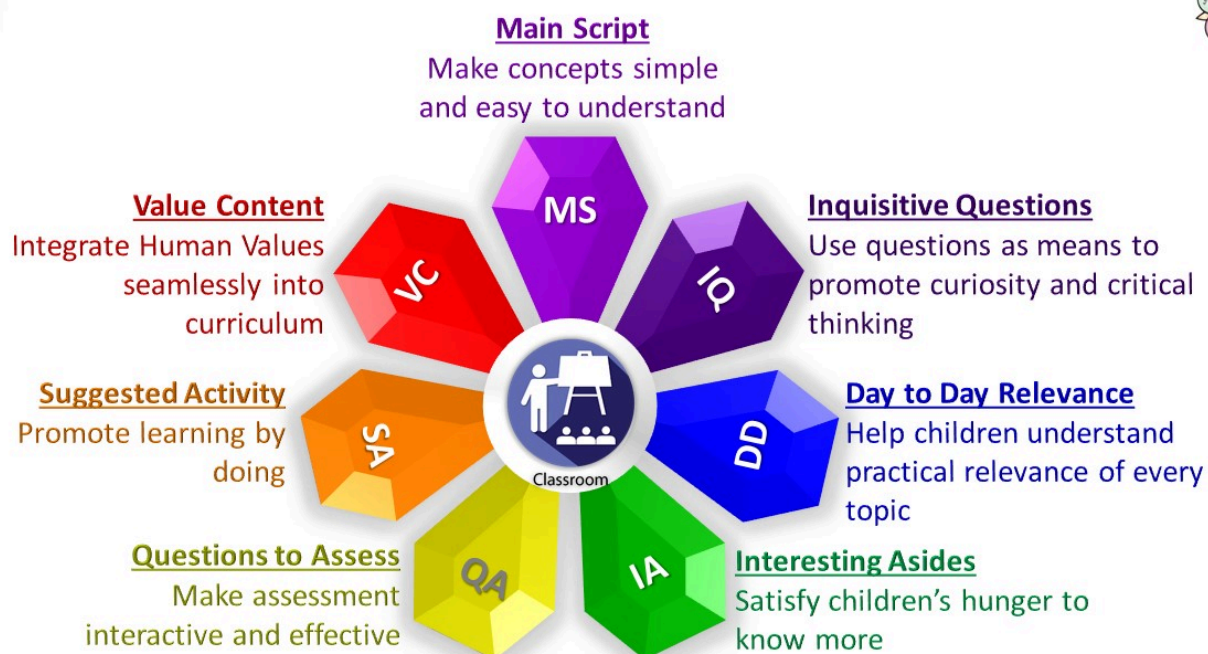
Board	Standard	Subject	Chapter	Language	Creation date
Odisha (English)	STD VII	Mathemat ics	12 - Geometrical construction (ଦ୍ଵାର୍ତ୍ତିକ ଅଙ୍କନ)	English	27-03-2024 13:54:56

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Master Lesson Plan (MLP) - Covers the entire chapter with the help of these 7 asset types



For more information on how to use the lesson plan effectively, please scroll to the guidelines at the end of this document.

MS_Objectives_Practical Geometry

Students will be able to :

Appreciate the need to maintain a healthy balance in our attitude towards life.

Explain construction of parallel lines based on alternate interior angle/corresponding angles property.

Recognise triangles and their properties.

Explain the construction of a triangle when three sides are given.

Explain the construction of a triangle when two sides and an included angle are given.

Explain the construction of a triangle when two angles and an included side are given.

Explain the construction of a right angled triangle.

Construct triangles based on SSS, SAS, ASA and RHS criterion.

Justify triangular shapes seen in daily life.

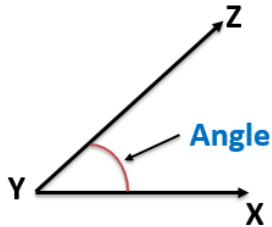
Appreciate interesting facts about triangles in architecture.

Analyse and construct triangles based on different criterion.

Time to teach	Asset type	Theme	Sub Theme
3 minutes	Main Script	Triangle	Construction of triangles

MS_Construction of Angles

We can clearly say that an angle is formed when 2 lines meet at a point. Below is given a picture of an angle.



Where, Y = Vertex

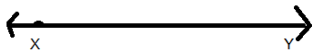
The point where the two lines meet where the angle is formed is called vertex. When we name the angle we name that point in the middle – like $\angle ZYX = \angle Y$

Example 1:

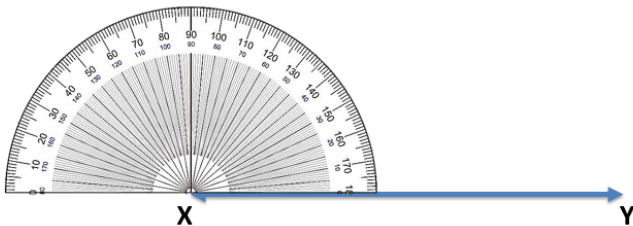
Construct an angle of 60° .

Steps of construction:

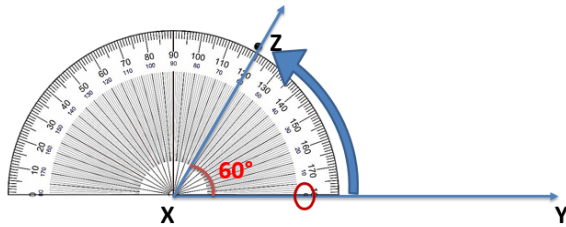
Step 1: A line XY of any length is drawn.



Step 2: The protractor is placed such that the centre of the protractor coincides with the point X of the line segment XY and the base line coinciding with XY.



Step 3: From the 0° of the protractor moving up to 60° , a point Z is marked.



Step 4: The protractor is removed and the points X and Z are joined using scale $\angle ZXY = 60^\circ$.

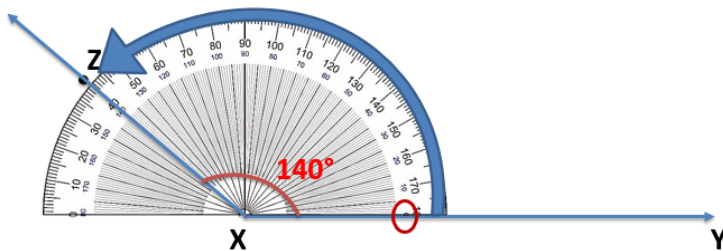
Example 2: Construction of 140° .

Step 1: A line XY of any length is drawn.



Step 2: The protractor is placed such that the centre of the protractor coincides with the point X of XY and the base line coinciding with the line XY.

Step 3: Starting from the 0° of the protractor moving from right to left up to 140° a point Z is marked. Then the points X Z are joined which is the required angle $\angle ZXY = 140^\circ$.



Example 3:

To draw a Reflex angle (i.e. angle greater than 180° and less than 360°), proceed as follows:

Example:

Draw $\angle QPR = 240^\circ$ with rule and protractor

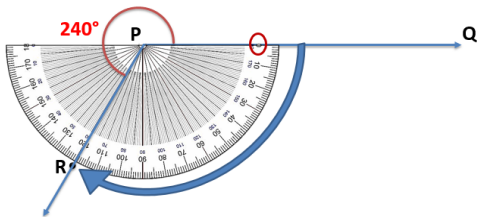
Steps of Construction

1) To draw 240° , first find the difference of the reflex angle from 360° . Then draw the resulting angle 120° in the following manner.

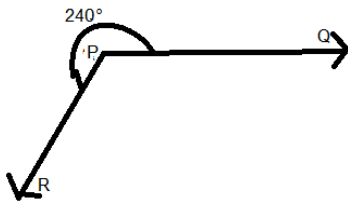
(Note: We cannot measure 240° with the help of the protractor since it has upto 180° only. So, we are keeping the protractor upside down and measure 120° .)

clockwise.)

- 2) Draw a straight line PQ.
- 3) Mark a point P. The point P represents the vertex of the angle.
- 4) Now keep the protractor upside down where the centre of the protractor coincides with the point P and the baseline of the protractor with the arm PQ.
- 5) Then measuring clockwise mark 120° and name the point as R.
- 6) Then with the help of the ruler join the points P and R.



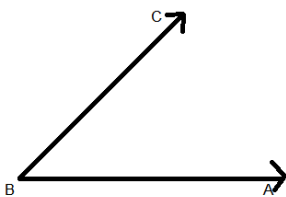
- 7) Mark the angle with a small arc as shown below $\angle QPR = 120^\circ$.



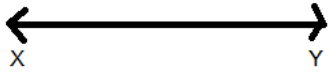
Construction of an angle equal in measure to a given angle of unknown measure

Since we do not know the measure of the given angle and we only have the figure, we cannot draw it using the protractor. Hence, we will be using the ruler and the compass to construct this.
Steps of Construction:

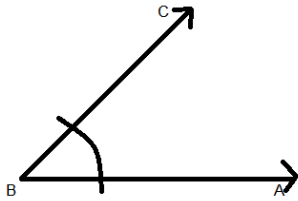
1. Draw an angle with any measure $\angle CBA$.



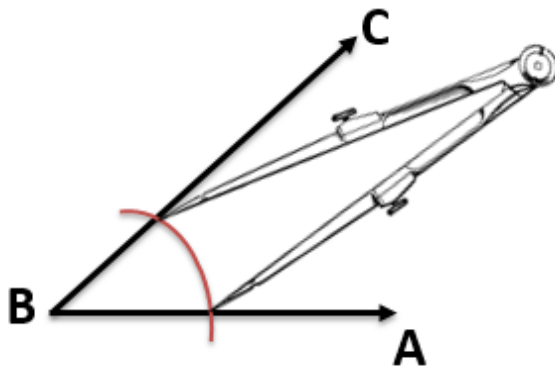
2. Draw a line XY.



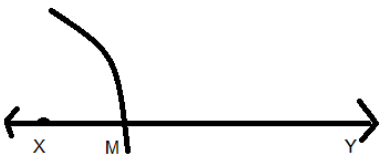
3. Place the compass at the point B and draw an arc which cuts the arms BA and BC.



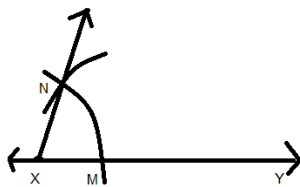
4. Measure the arc length of figure CBA with the compass. (Keep the compass at the intersected points of the arc with BA and BC which is the arc length. Example figure is given below)



5. With the same measurement keep the divider at X and draw an arc. Name the arc which intersect the line XY as M.



6. With the same radius keep the compass at M on XY and draw an arc. Name the intersected arc as N and join XN.



7. Now measure the angle $\angle NXY$ and $\angle CBA$. Both should be equal.

Image of

Protractor: https://commons.wikimedia.org/wiki/File:Protractor_Rapporteur_Degrees_V3.jpg

Divider: <https://pixabay.com/vectors/dividers-compasses-circle-tool-37921/>

All images are original (girijashankeran@gmail.com)

Time to teach	Asset type	Theme	Sub Theme
20 minutes	Main Script	Line, Curve & Angle	Other angles(acute, obtuse and reflex angles)

MS_Angular Bisectors

Angular Bisectors

Bisecting means dividing something into 2 halves.

That which divides the angle into two equal parts is called the Angular bisector.

Just as a line which divides another line perpendicularly and its length into 2 halves is called the perpendicular bisector. Similarly

The line which bisects an angle divides it into 2 equal parts is called the angle bisector.

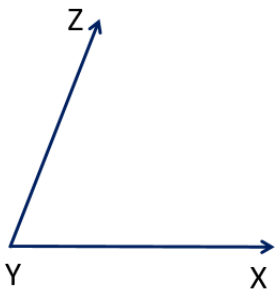
Angle bisectors can be constructed using Ruler and compass.

Bisecting an angle

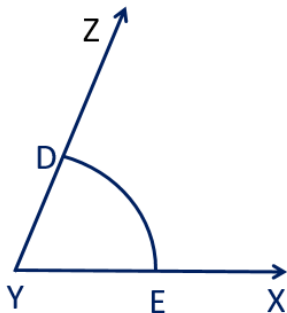
Draw an angle of 70° and bisect it.

Steps of construction:

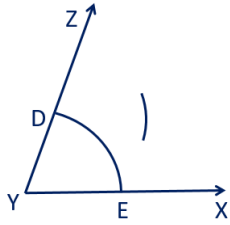
1. Let $\angle XYZ = 70^\circ$ is the given angle. This angle 70° should be bisected.



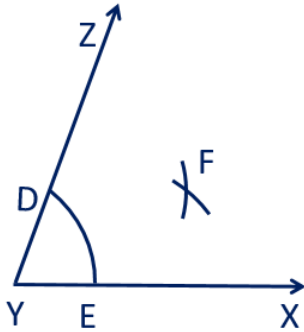
2. On the vertex Y of the angle place the compass. With any convenient radius draw an arc to cut YX at E and ZY at D.



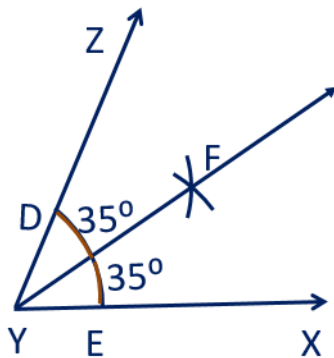
3. Keep the compass point at D and measure more than half of radius of the length DE draw an arc inside the angle.



4. With the same radius keep the compass at E draw another arc which cuts the previous arc. Name it as F.



5. Join Y and F. This line divides the angle $\angle XYZ$.



6. Measure the angle $\angle ZYF$ and $\angle FYX = 35^\circ$.

Constructing Angles of special measures

There are some angles 30° , 45° , 60° and 90° , which can be drawn without a protractor. These are called special angles. These angles can be constructed using ruler and compass. Also we can construct 15° , 75° , 105° and 120° .

A) Constructing 60° angle .

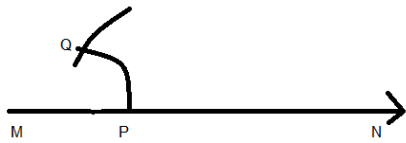
Steps of Construction:

1. Draw any ray MN.

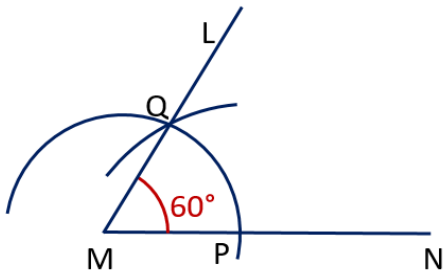


2. Place the point of the compass on M. With any convenient radius draw an arc (big) which cuts MN at P.

3. With P as centre and same radius draw an arc which cuts previous arc at Q.



4. Join MQ and extend to point L of any length.



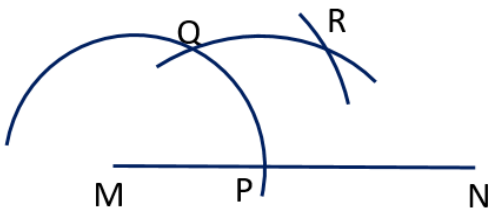
B) Construction of 30° .

Steps of Construction:

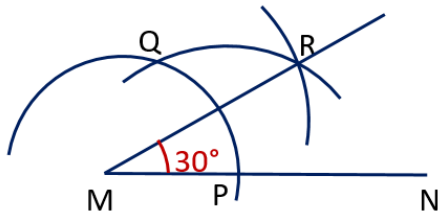
1. Repeat first 2 steps of construction of an angle 60°

2. Without changing the compass width, move the compass to the point P. Draw a broad arc that crosses the first one and goes well to the right. Label the point where the two arcs cross as point Q

3. Without changing the compass width, move the compass to the point Q, and draw an arc across the previous arc, creating point R.



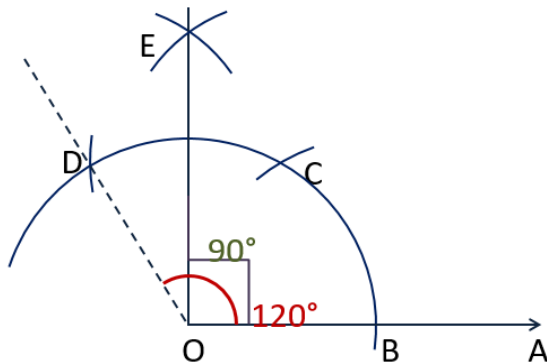
4. Join the points MR. The angle $\angle RMN = 30^\circ$



C) Construction of 120° and 90°

Steps of construction:

1. Take any ray OA.
2. With O as centre and any convenient radius, draw a big arc cutting OA at B.
3. With B as centre and the same radius, draw an arc cutting the first arc at C. With C as centre and the same radius, cut off an arc cutting again the first arc at D.
4. With C and D as centre and radius of more than half of CD, draw two arcs cutting each other at E, join OE.



Hence $\angle DOA = 120^\circ$, $\angle EOA = 90^\circ$.

(Note: Teacher can explain how to draw 45° from 90° .)

All images are original (girijashankeran@gmail.com)

Time to teach	Asset type	Theme	Sub Theme
30 minutes	Main Script	Line, Curve & Angle	Measuring angles using protractor

QA_Test Your Skills

1. Answer the following objective type questions.

- An angular bisector divides the angle into -----.
- A perpendicular to a line makes -----with the line.
- An ----- is the space between two intersecting lines .
- A perpendicular bisector makes ----- with the line and ----- into two.

2. Construct an obtuse angle of any measure and draw the copy of that angle.

3. Draw an angle of 135° using Ruler and Compass and write the steps of construction.

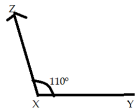
4. Construct an angular bisector for the angle 108° .

Solutions:

1 (a) two equal parts (b) 90° (c) angle (d) 90° ; bisects

2. Steps of Construction

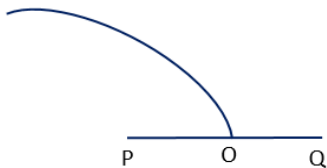
- Draw an obtuse angle of any measure say 110° and then draw the copy of the angle.



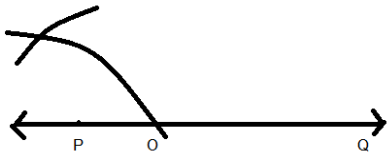
- Draw a line PQ.



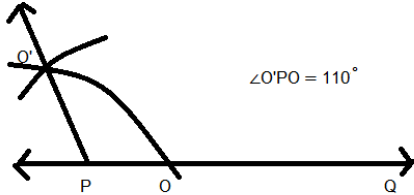
- Keep the compass at X (from step a) and draw an arc. With the same radius keep the compass at P and draw an arc which cuts the line PQ at O.



- Keep the compass at O and with the same radius cut the arc. The intersected point is O'. Join P and O'.



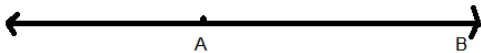
f. $\angle O'PO = 110^\circ$ which is the copy of the angle $\angle ZXY$.



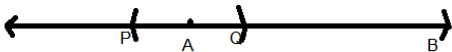
3. Steps of Construction.

(First, construct the perpendicular at a point A on a line, with the help of ruler and compass method and bisect the angle)

a. Draw a big line and mark a point A approximately in the middle of the line and name the other end of the line as B.

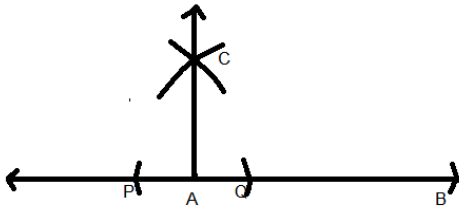


b. With any convenient radius draw arcs with the help of compass on both sides of A.



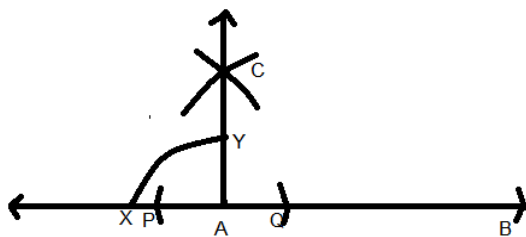
c. Keeping the compass and taking more than the length of PA, draw an arc above the line. With the the same measurement keep the compass at Q and draw the arc which intersects the arc. Name it as C.

d. Join the points A and C, which is the perpendicular line.

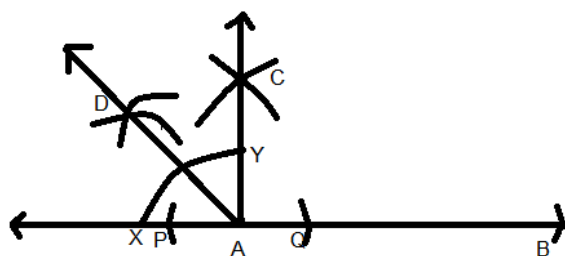


(ii) Bisect the angle 90° to the left of A.

e. Keep the compass at A and with any convenient radius draw an arc which cuts the line AP and AC at X and Y respectively.

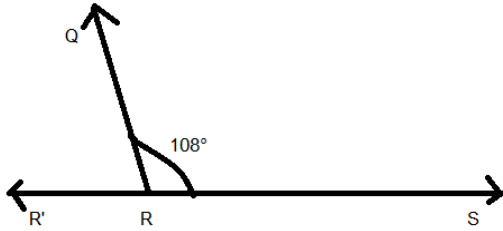


f. Keep the compass at X and taking more than half of length XY draw an arc. With the same measurement keep the compass at Y and draw an arc which intersects the previous arc. Name the point as D. Now join the points A and D. This is the required angle $\angle DAB = 135^\circ$.

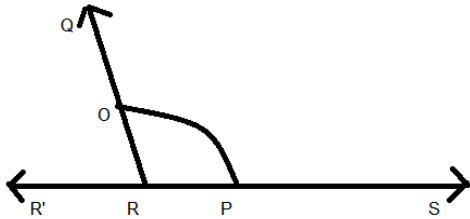


4) Steps of construction

a. Construct an angle $\angle QRS = 108^\circ$ with the help of a protractor.

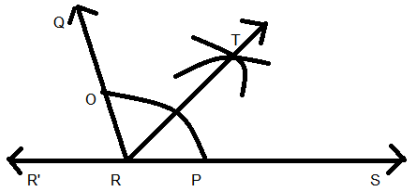


b. Keep the compass at R and draw an arc with convenient radius. The arc intersects the lines RS and RQ at P and O respectively.



c. Keep the compass at P and taking more than half of the length of OP draw an arc. With the same measurement keep the compass at O and draw an arc.

d. The arcs drawn will intersect and name the point as T. Hence, $\angle \text{ORT} = \angle \text{TRP} = 54^\circ$



Note: In all the above construction questions teacher can guide the children to follow the steps in order and to construct neatly.

All images are original (girijashankeran@gmail.com)

Time to teach	Asset type	Theme	Sub Theme
20 minutes	Questions to Assess	Line, Curve & Angle	Bisectors of an angle

MS_Construction of parallel lines

Construction of Parallel lines

Introduction

Parallel lines are seen on pages of a ruled notebook. These lines never intersect.

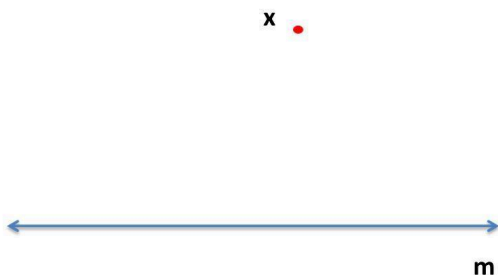
It is observed that if a transversal cuts any two lines such that their alternate interior angles are equal, then the two lines must be parallel.

The above property is used to construct parallel lines.

Construction-1(based on alternate interior angle property)

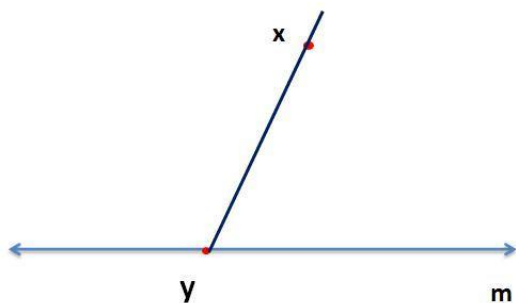
Step-1

Consider a point X outside the line m .



Step-2

Take any point Y on the line m . Join the points X and Y .

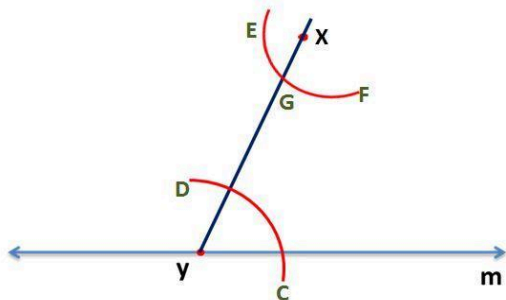


Step-3

With Y as centre and any radius draw an arc cutting line m at C and XY at D .

Step-4

With X as centre and same radius as in step-3, draw an arc EF cutting XY at G .

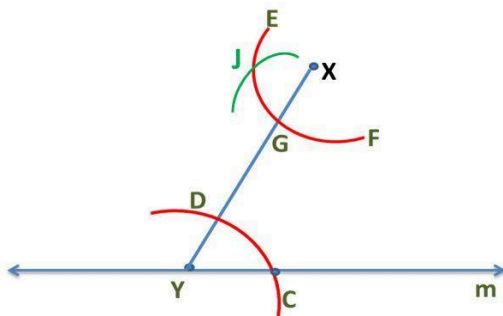


Step-5

Place the tip of the compass at C and measure the arc CD.

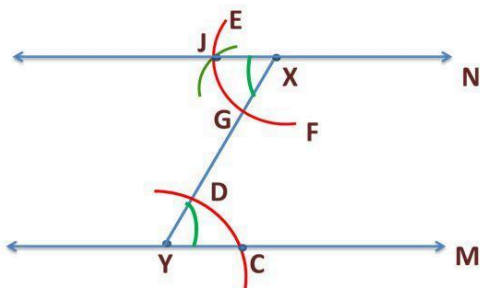
Step-6

With G as centre and same measure as in step-5, draw an arc cutting EF at J.



Step-7

Join J and X to form line n .



Observe that $\angle YXJ = \angle XYZ$ (alternate interior angles).

Hence the line m and line n are parallel to each other.

The parallel lines are constructed based on alternate interior angles property.

Construction-2(based on corresponding angle property)

It is observed that if a transversal cuts any two lines such that their corresponding angles are

equal, then the two lines must be parallel.

The above property is used to construct parallel lines.

Step-1

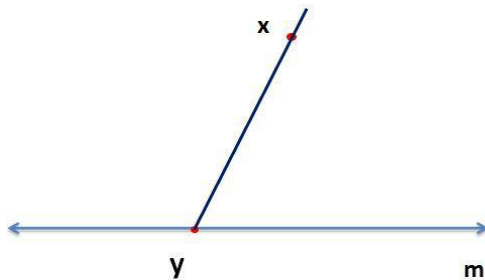
Consider a point X outside the line m .

x



Step-2

Take any point Y on the line m . Join the points X and Y .

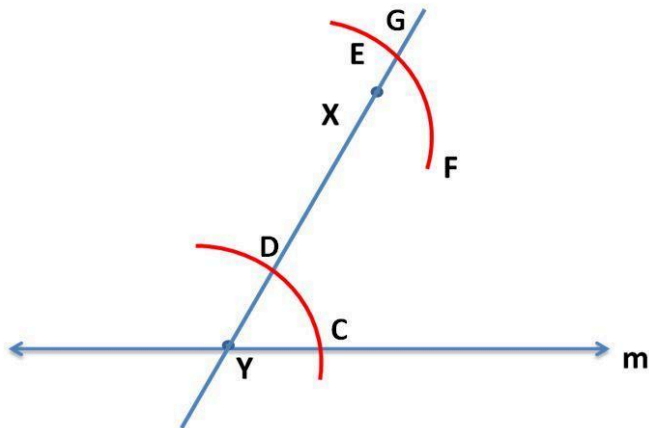


Step-3

With Y as centre and any radius draw an arc cutting line m at C and XY at D .

Step-4

With X as centre and same radius as in step-3, draw an upper arc EF cutting XY at G .

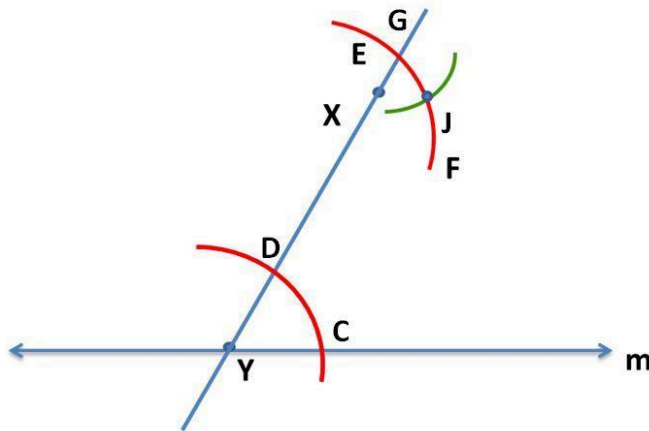


Step-5

Place the tip of the compass at C and measure the arc CD .

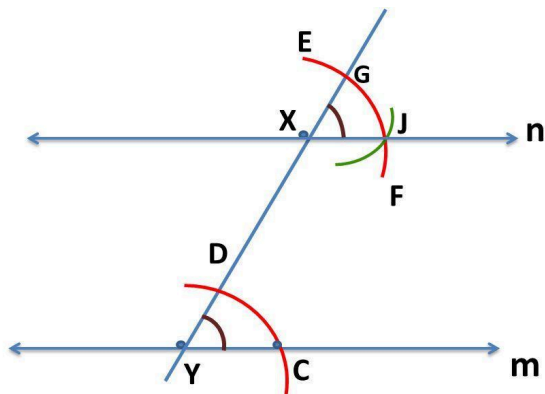
Step-6

With G as centre and same measure as in step-5, draw an arc cutting EF at J.



Step-7

Join J and X to form line n .



Observe that $\angle GXJ = \angle XYZ$ (corresponding angles).
Hence the line m and line n are parallel to each other.

Image Source: Original contribution by surekhapsarathy@gmail.com

Time to teach	Asset type	Theme	Sub Theme
15 minutes	Main Script	Triangle	Construction of triangles

SA_Do You Remember

Aim -To recall different triangles and their properties

Materials Required -Activity sheet, pen, pencil and eraser(one each per person)

Setting of Activity - Indoor

Type of activity -Individual activity, Demonstration by students

Instruction to teacher -The teacher could prepare the activity sheet and take print outs before the start of activity.

Procedure –

1)Teacher distributes the activity sheet to each student and asks few questions before starting the activity.

Questions to recall

Q 1) Name the different triangles based on their sides?

Expected answer- Scalene, Equilateral, Isosceles

Q 2) Name the different triangles based on their angles?

Expected Answer- Obtuse angled, Acute angled and Right angled triangle.

2)Teacher asks each student to complete the activity sheet shown below:

Activity Sheet

Description	Name of the Triangle	Diagram
Triangle ABC with sides $AB=BC$		
Triangle XYZ with sides $XY=YZ=ZX$		
Triangle PQR with $\angle Q=90^\circ$		
Triangle RST with $RS \neq ST \neq TR$		

Recognise it

1. A closed plane figure bound by three line segments is _ _ i _ _ _ e.
2. The longest side of a right angled triangle is _ y _ o _ e _ _ s _.
3. The sum of three angles of a triangle is _ _ _ degrees.
4. The _ x _ _ _ _ r angle is equal to sum of opposite interior angles of a triangle.

3) Teacher asks the students to complete the activity sheet in 7 mins.

4) At the end of the activity, the teacher discusses the answers.

Observation

Activity sheet with Answers

Identify the triangles and draw it out

Description	Name of Triangle	Diagram
Triangle ABC with side $AB = BC$	Isosceles	
Triangle XYZ with side $XY = YZ = ZX$	Equilateral	
Triangle PQR with $\angle Q = 90^\circ$	Right Triangle	
Triangle RST with $RS \neq ST \neq TR$	Scalene Triangle	

Recognize It

A closed plane figure bound by three line segments

TRIANGLE

The longest side of a Right Angled Triangle

HYPOTENUSE

The sum of 3 angles of a triangle

180°

The **EXTERIOR** angle is equal to the sum of opposite interior angles.

Conclusion

Different triangles and their properties are recalled.

Note to the teacher : Activity Sheet attached. Kindly print it before starting the activity.

Image source: Original Contribution by sailakshmi1973@gmail.com

Time to teach	Asset type	Theme	Sub Theme
10 minutes	Suggested Activity	Triangle	Properties of triangles

IQ_Think and Answer

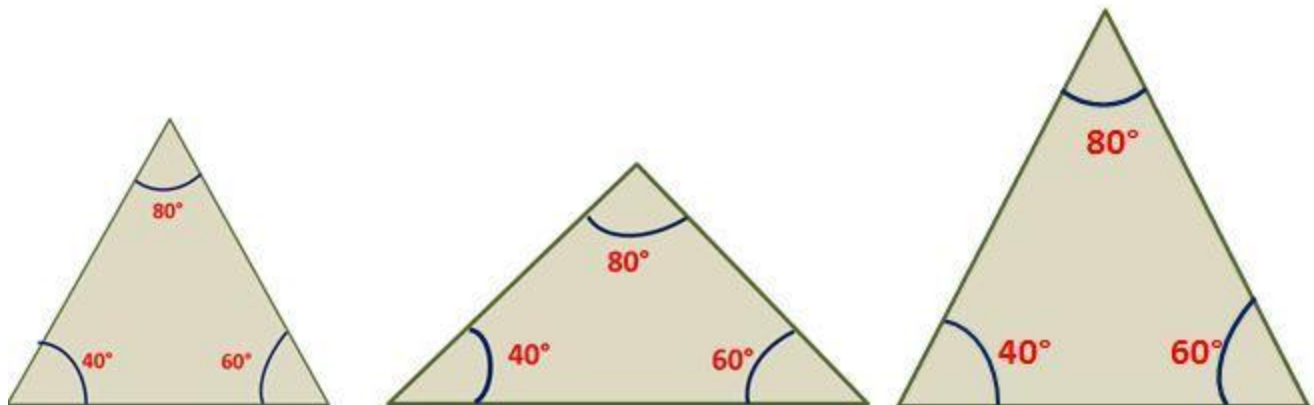
Think and Answer

Answer the following

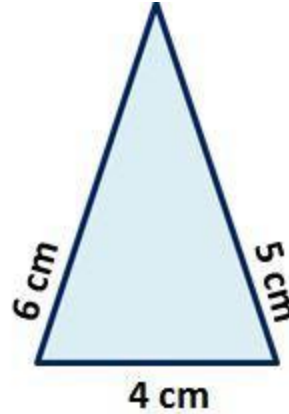
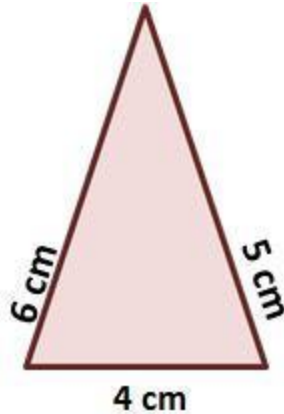
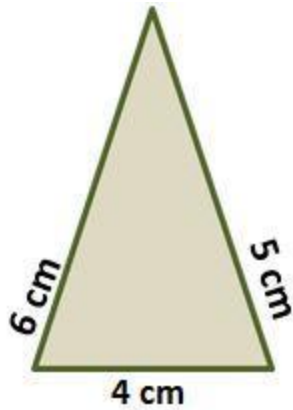
- 1) Is it possible to draw a unique triangle if the three angles are known?
- 2) Is it possible to draw a unique triangle if the three sides are known?
- 3) Construct an isosceles right triangle whose one angle is 45° and one side is 5 cm. State the criteria used for construction.
- 4) Construct an isosceles triangle XYZ in which one of the equal sides is 5.8 cm and vertex angle is 50° . State the criteria used for construction. Measure the other two angles.

SOLUTIONS

1) We can draw a triangle given its angles. However it will not be unique. Many triangles could be drawn with the same measure of angles. These triangles will have the same shape but differ in size as shown below.

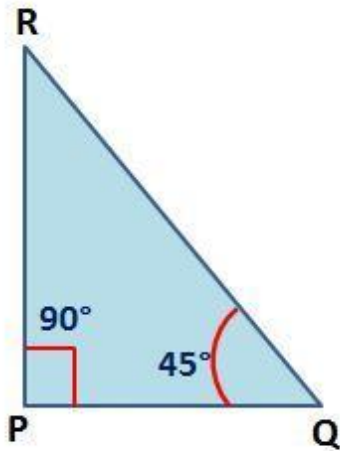


2) We can draw a triangle given its three sides. The triangle will be unique by SSS criteria. Each of the triangles shown below is the same in size and shape.



3) Steps of construction

1. Draw a rough diagram indicating the given values.



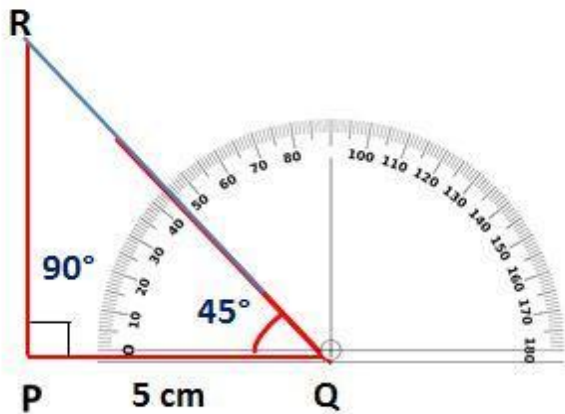
2. Draw a line segment $PQ = 5$ cm.

3. Using the protractor draw an angle 90° at point P.

4. Using the protractor draw an angle 45° at point Q.

5. Produce the angular lines such that they meet at R.

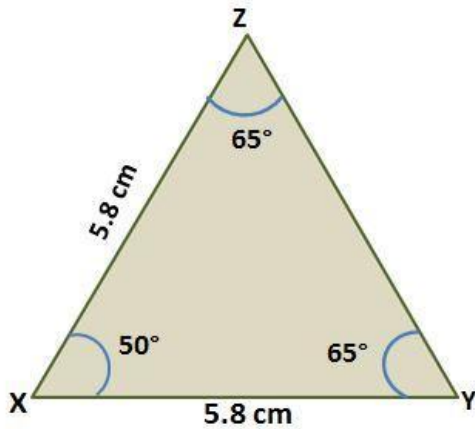
6. $\triangle RPQ$ is an isosceles right triangle.



ASA Criteria is used for construction.

4) Steps of construction

1. Draw a rough diagram indicating the given measurements in it.



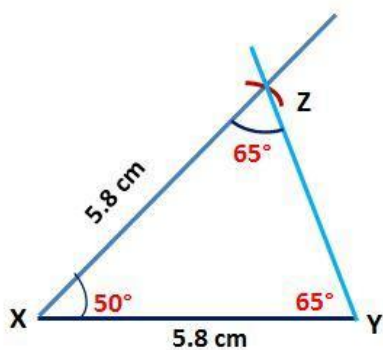
2. Draw a line segment XY of length 5.8 cm.

3. With X as centre draw an angle of 50° .

4. With X as centre and a radius of 5.8 cm draw an arc cutting the angular line at Z.

5. Join ZY.

6. $\triangle XYZ$ is the required triangle.



SAS criteria is used for construction. The other two angles $\angle Y$ and $\angle Z$ measure 65° each.

Image Source:

Original Contribution by surekhapsarathy@gmail.com

Time to teach	Asset type	Theme	Sub Theme
15 minutes	Inquisitive Questions	Triangle	Construction of triangles

DD_Triangles around us

Triangles are seen almost everywhere in the world around us. They are commonly found on bridges, rooftops of buildings, billiard ball racks, sign posts on roads, design of products etc.,

1. Bridges

We often observe that the metallic bridges over railway tracks or flyovers are designed using triangles.

The triangular structure adds to the strength of the bridge.



2. Rooftops

The rooftops of buildings are often made triangular so that rain water or snow falls off the building easily.





3.Road signs

We find road signs are often triangular in shape. These are warning signs that indicate to the driver about the possible hazard ahead on the road.



4.Billiard ball racks

On a billiard table, the pool balls are arranged in the shape of equilateral triangle using the Billiard ball racks.



5.Design of articles

Many products are designed in triangular shape for aesthetics. Example : Samosas in shape of

triangle, Clothes Hangers etc.



Image Sources :

<https://pixabay.com/en/railway-bridge-truss-bridge-bridge-1594192/>
<https://pixabay.com/en/city-roofs-house-roofs-architecture-3632286/>
<https://pixabay.com/en/snow-winter-mountains-the-alps-3137271/>
<https://pixabay.com/en/signs-turn-right-road-signs-2761122/>
<https://pixabay.com/en/billiards-game-3d-balls-play-1167221/>
<https://pixabay.com/en/samosa-fast-food-sri-lanka-indian-165850/>
<https://pixabay.com/en/clothes-hanger-traditional-429279/>

Time to teach	Asset type	Theme	Sub Theme
4 minutes	Day-to-day Relevance	Triangle	

MS_Construction of Triangles-SSS Criterion

Introduction

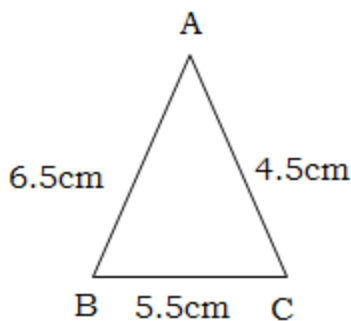
It is a known fact that SSS rule of congruency holds good for all triangles. Hence, it is understood that if three sides of a triangle are known, then a unique triangle could be constructed.

Construction of a triangle when all its sides are known

Suppose we have to construct a $\triangle ABC$ given its sides :

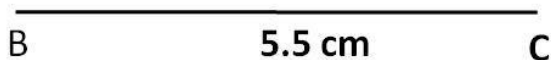
$BC = 5.5$ cm; $AC = 4.5$ cm and $AB = 6.5$ cm.

Step 1: Draw a rough figure of the $\triangle ABC$ and mark the given measurements on it.



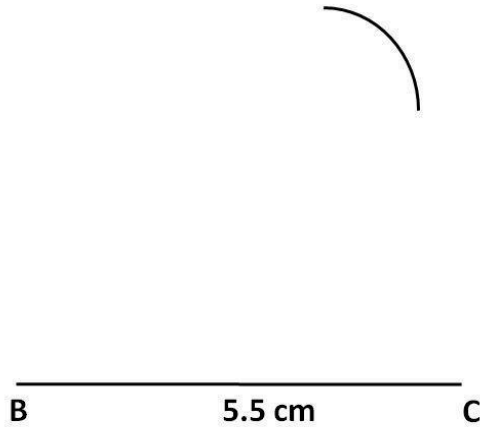
Step-2

Draw a line $BC = 5.5$ cm using a ruler.



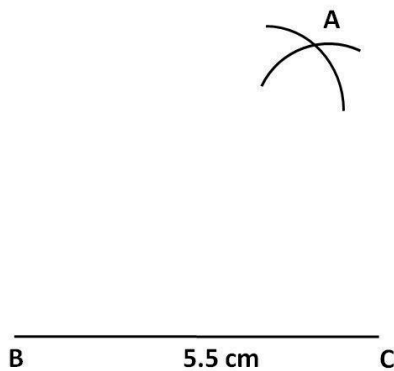
Step-3

With B as centre and radius 6.5 cm draw an arc.



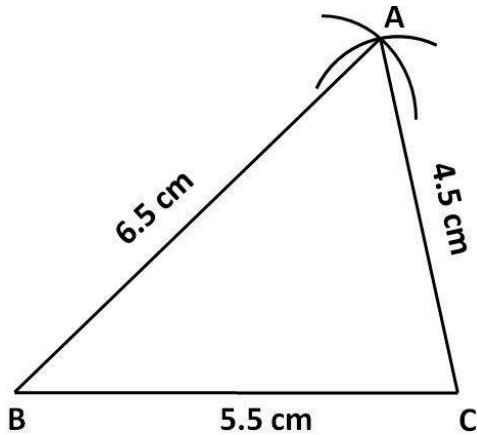
Step-4

With C as centre and radius 4.5 cm, draw an arc cutting the previous one at the point A.



Step-5

Join AB and AC.



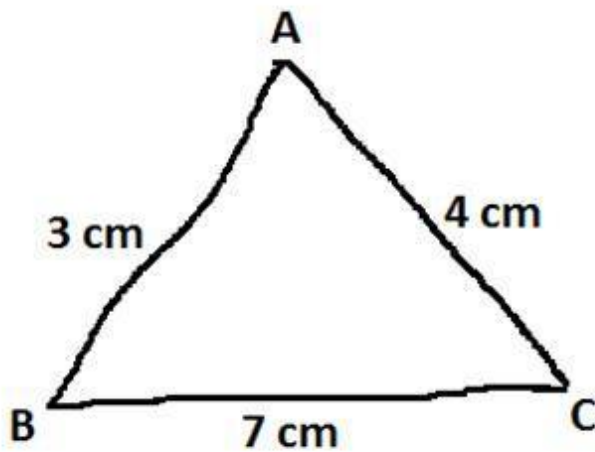
The required triangle ABC is constructed.

Special case

Suppose we have to construct a $\triangle ABC$ given its sides $BC = 7$ cm; $AC = 4$ cm and $AB = 3$ cm.

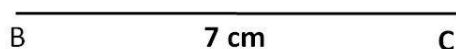
Following the steps of construction we get,

Step 1: Draw a rough figure of the $\triangle ABC$ and mark the given measurements on it.



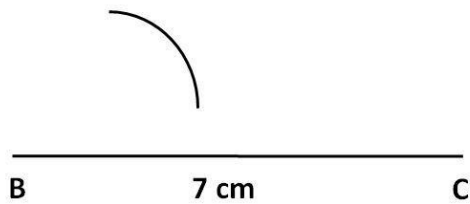
Step-2

Draw a line $BC = 7$ cm using a ruler.



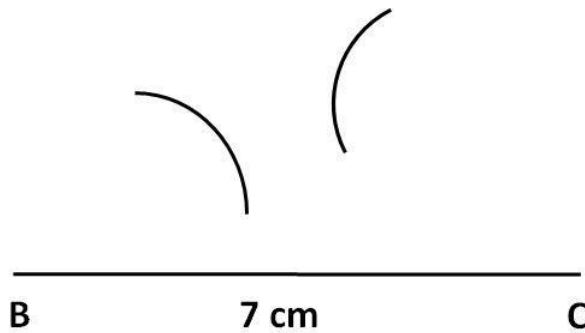
Step-3

With B as centre and radius 3 cm draw an arc.



Step-4

With C as centre and radius 4 cm draw an arc cutting the previous arc.



The two arcs do not intersect. Hence, the triangle cannot be constructed.

Reason it out

Consider the sum of the sides of the above triangle ABC.

Sum of any two sides	Third Side	Sum of two sides > Third side (YES/NO)
$AB + BC = 3 + 7 = 10$	$AC = 4$	$10 > 4$ Yes
$BC + AC = 7 + 4 = 11$	$AB = 3$	$11 > 3$ Yes
$AB + AC = 3 + 4 = 7$	$BC = 7$	$7 = 7$ NO

The construction of a triangle is possible only if the sum of any two sides is always greater than the third side.

From the table it is evident that this condition is not satisfied. Hence, the construction of the triangle is not possible.

Image Source: Original Contribution by sailakshmi1973@gmail.com

Time to teach	Asset type	Theme	Sub Theme
15 minutes	Main Script	Triangle	Construction of triangles by SSS

MS_Construction of Triangles-SAS Criterion

Construction of triangle-SAS Criterion

Introduction

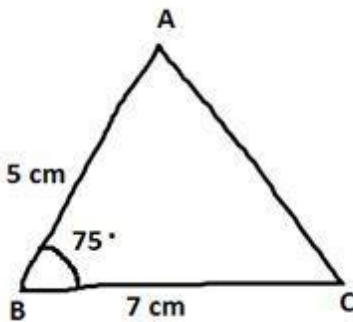
It is a known fact that SAS rule of congruency holds good for all triangles. Hence, it is understood that if two sides and an included angle of a triangle is known, then a unique triangle could be constructed.

Construction of a triangle when two sides and an included angle are given

Consider a $\triangle ABC$ in which two sides $AB = 5$ cm, $BC = 7$ cm and the included angle $\angle B = 75^\circ$ are known. In order to construct the triangle, the following steps are to be followed.

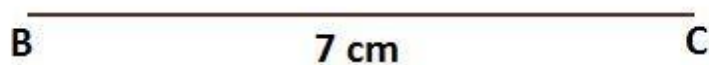
Step-1

Draw a rough diagram indicating the given measurements in it.



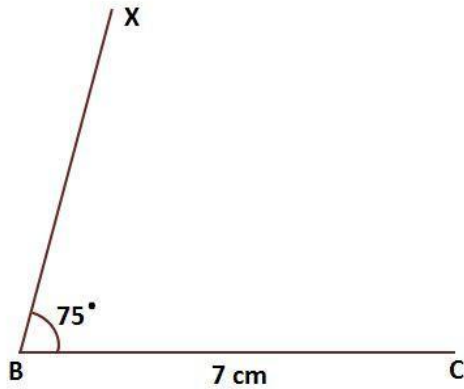
Step-2

Draw a line segment BC of length 7 cm.



Step-3

With B as centre, draw a ray BX making an angle of 75° at B.

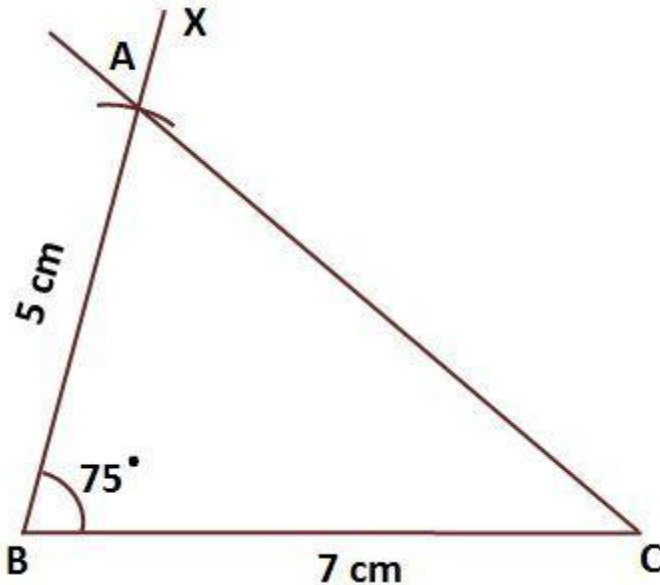


Step-4

With B as centre and a radius of 5 cm, draw an arc cutting the ray BX at A.

Step-5

Join AC.



The required triangle ABC is obtained.

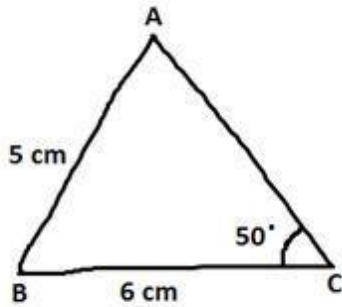
Special Case- Construction of triangle when two sides and a non-included angle are known

Consider a $\triangle ABC$ in which two sides $AB = 5$ cm, $BC = 6$ cm and the non-included angle $\angle C = 50^\circ$ are known.

In order to construct the triangle, the following steps are to be followed.

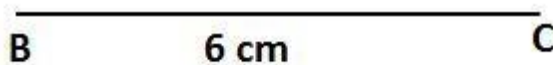
Step-1

Draw a rough diagram indicating the given measurements in it.



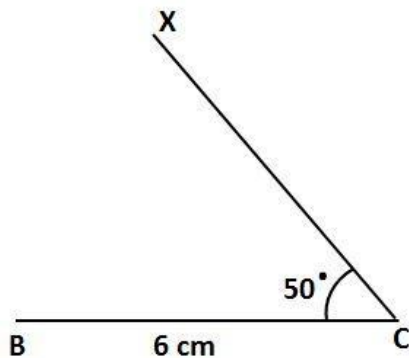
Step-2

Draw a line segment BC of length 6 cm.



Step-3

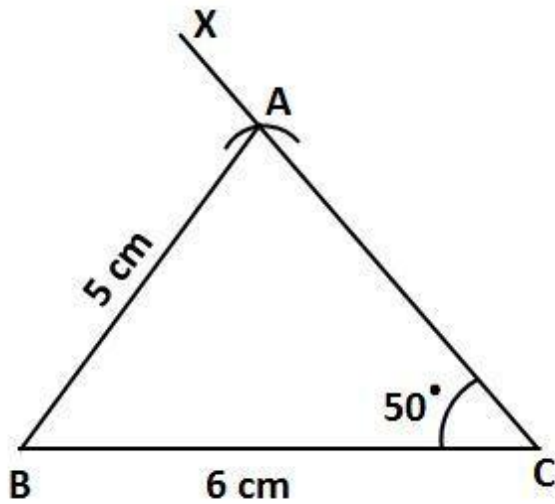
With C as centre, draw a ray CX making an angle of 50° at C.



Step-4

With B as centre and a radius of 5 cm draw an arc cutting the ray CX at A.

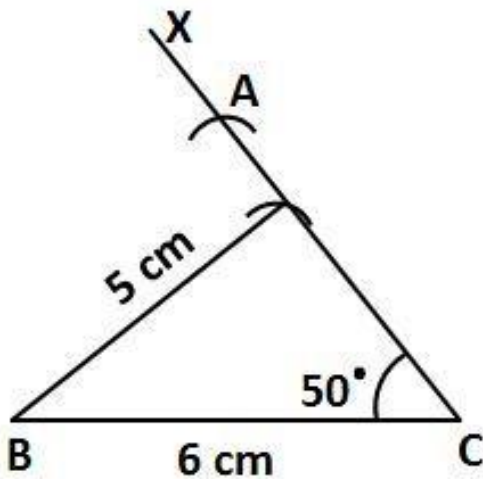
Step-5
Join AB



The required triangle ABC is obtained but this triangle is not unique.

Step-7

The arc drawn in step-4 could cut the ray CX at another place too. So, the other possible triangle would be



Conclusion

A unique triangle can be constructed only when two sides and an included angle are given.

A unique triangle cannot be constructed when two sides and a non- included angle are given.

Image Source:

Original contribution by sailakshmi1973@gmail.com

Time to teach	Asset type	Theme	Sub Theme
15 minutes	Main Script	Triangle	Construction of triangles by SAS

MS_Construction of Triangles-ASA Criterion

Construction of Triangle-ASA Criterion

Introduction

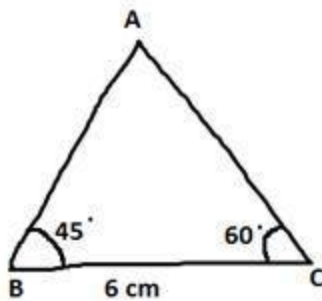
It is a known fact that ASA rule of congruency holds good for all triangles. Hence, it is understood that if two angles and an included side of a triangle is known, then a unique triangle could be constructed.

Example

In order to construct $\triangle ABC$ given two angles $\angle B = 45^\circ$, $\angle C = 60^\circ$ and an included side $BC = 6$ cm, the steps followed are as given below.

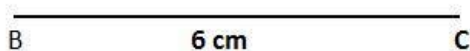
Step-1

Draw a rough diagram of the triangle indicating the given measurements.



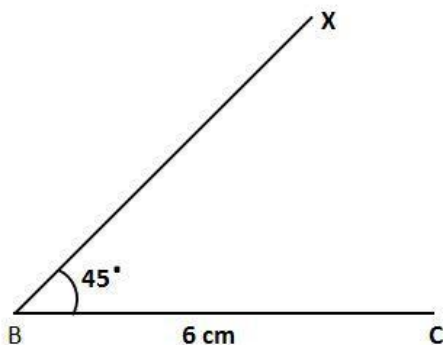
Step-2

Draw a line segment $BC = 6$ cm.



Step-3

Draw a ray BX making an angle of 45° at B.

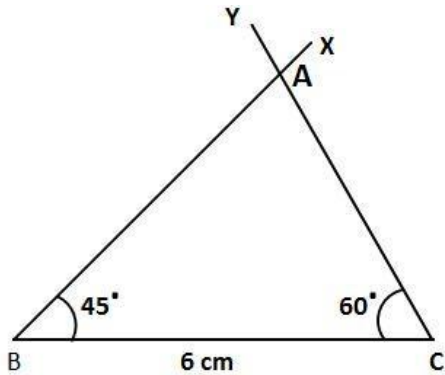


Step-4

Draw a ray CY making an angle of 60° at C.

Step-5

Produce the ray BX and CY lines such that they intersect at A.



This is the required triangle ABC.

Conclusion

A unique triangle can be drawn when two angles and an included side of a triangle are known.

Image Source : Original Contribution by sailakshmi1973@gmail.com

Time to teach	Asset type	Theme	Sub Theme
8 minutes	Main Script	Triangle	Construction of triangles by ASA

MS_Construction of Triangles-RHS Criterion

Construction of Triangles-RHS Criteria

Observe the picture and recall the elements of a right angled triangle.



Here, in this picture we see ladder forming a right angled triangle when placed against the wall. The ladder is the longest side of the triangle and is called the hypotenuse.

We can construct a right angled triangle if we know the length of one side and the hypotenuse. The construction criterion is called RHS. It stands for Right angle-Hypotenuse-Side.

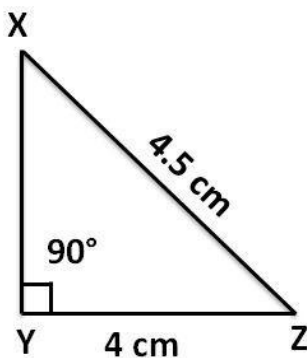
Given one side and the hypotenuse, a Right angled triangle can be constructed.

Let us construct a right angled triangle XYZ such that $\angle Y = 90^\circ$, $YZ = 4$ cm and $XZ = 4.5$ cms.

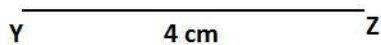
Steps of construction are as follows.

Step-1

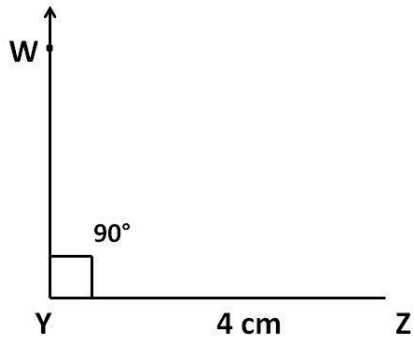
1) Draw a rough diagram of the triangle indicating the measurements.



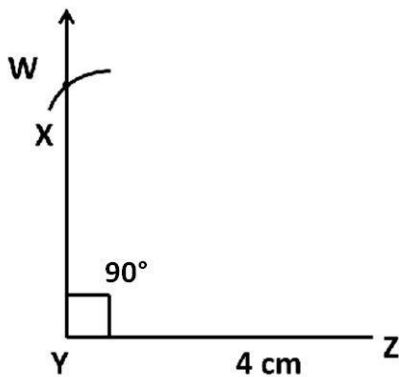
2) Draw line segment $YZ = 4$ cm.



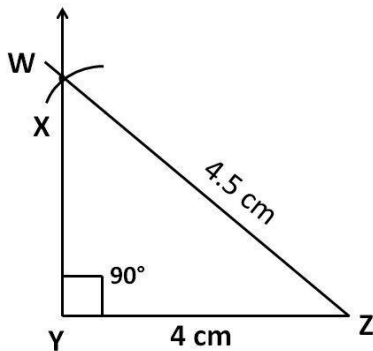
3) Place the protractor on Y and draw ray YW so that $\angle Y = 90^\circ$.



4) Place the compass at Z and with radius = hypotenuse (4.5 cm), draw an arc to cut ray YW at X.



5) Join points X and Z to get the $\triangle XYZ$.



ΔXYZ is the Right Angled Triangle.

Image Source:

All construction diagrams are original contribution by sailakshmi1973@gmail.com

Wall: <https://pixabay.com/photos/hallway-empty-office-quiet-95771/>

Time to teach	Asset type	Theme	Sub Theme
10 minutes	Main Script	Triangle	Construction of triangles by RHS

QA_Assessment on construction of triangles

Construct the Triangles

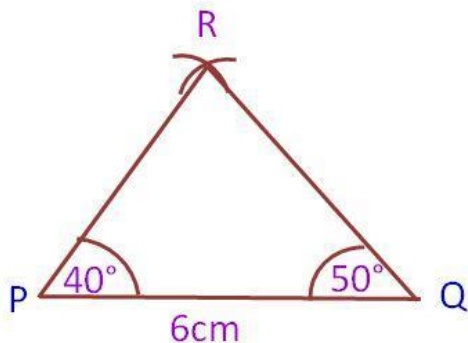
Construct each of the following triangles:

- 1) $\triangle PQR$ with $PQ = 6$ cm, $\angle PQR = 50^\circ$ and $\angle QPR = 40^\circ$. Find the measure of $\angle PRQ$.
- 2) $\triangle ABC$ with $AB = 5$ cm, $\angle BAC = 85^\circ$ and $AC = 7$ cm.
- 3) An equilateral triangle XYZ in which $XY = 5$ cm.
- 4) $\triangle ABC$ with $BC = 5.5$ cm, $AB = 6.5$ cm and $\angle C = 90^\circ$.

Solution

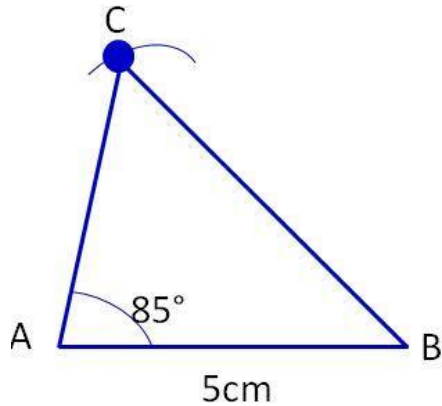
1) Steps of construction

1. Draw a rough diagram indicating the given values.
2. Draw a line segment $PQ = 6$ cm.
3. Using the protractor draw an angle 40° at point P .
4. Using the protractor draw an angle 50° at point Q .
5. Produce the angular lines such that they meet at R .
6. Measure $\angle PRQ$



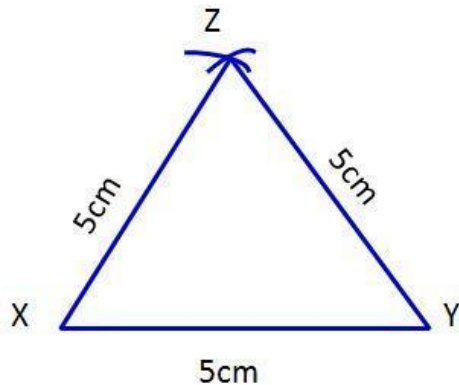
2) Steps of construction

1. Draw a rough diagram indicating the given measurements in it.
2. Draw a line segment AB of length 5 cm.
3. With A as centre draw an angle of 85° .
4. With A as centre and a radius of 7 cm draw an arc cutting the angular line at C .
5. Join BC .



3) Steps of construction

1. Draw a rough figure of the $\triangle XYZ$ and mark the given measurements on it.
2. Draw a line $XY = 5$ cm using a ruler.
3. With X as centre and radius 5 cm draw an arc.
4. With Y as centre and radius 5 cm draw an arc cutting the previous one at the point Z.
5. Join XZ and YZ.
6. Thus, the required triangle XYZ is constructed.



4) Steps of construction

1. Draw a rough diagram indicating the values in it.
2. Draw line segment $CB = 5.5$ cm.
3. Place the protractor on C and draw an angle of 90° .
4. Place the compass at B and with radius = hypotenuse (6.5 cm), draw an arc to cut the angular line at A.
5. Join points A and B to get the $\triangle ACB$.

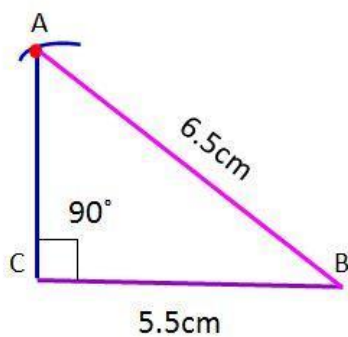


Image Source: Original Contribution by sailakshmi1973@gmail.com

Time to teach	Asset type	Theme	Sub Theme
20 minutes	Questions to Assess	Triangle	Construction of triangles

VC_Triangle - Maintaining a healthy balance in our attitude

A triangle is basically the strongest construction with a strong base. Similarly, we need to have a strong mental base in life. We should not allow any event, good or bad in our lives, to upset our mental balance and peace.

The teacher gives a situation:

1. Your Maths teacher returns your test papers and you find that you have not fared well and got less grades. Maths is your favourite subject. You normally top the class. How would you feel?

Let children come out with their views.

2. The next day your Chemistry teacher returns your test paper. You have always had an aversion for Chemistry. Surprisingly, you find that you have topped the class in this. How would you feel?

Let children come out with answers

The suggested answer:

It is quite natural to feel sad when you score less marks and delighted when you top the class. We all have 2 sides of us. A very happy side and a downhearted one. When we are not very overjoyed during happy moments and not very depressed during sad moments, we are said to be in equanimity. Here is a story to prove this.

Once upon a time there was a farmer in a central region of China.

He didn't have much money, and instead of a tractor he used an old horse to plough his field.

One afternoon, while working in the field, the horse dropped dead.

Everyone in the village said, "Oh, what a horrible thing to happen." The farmer said simply, "We'll see."

He was so at peace and so calm that everyone in the village got together, and, admiring his attitude, gave him a new horse as a gift.

Everyone's reaction now was, "What a lucky man." But the farmer said, "We'll see."

A couple of days later, the new horse jumped a fence and ran away. Everyone in the village shook their heads sadly and said, "What a poor fellow."

The farmer smiled and said, "We'll see."

Eventually, the horse found his way home, and everyone again said happily, "What a fortunate man."

Again, the farmer said, "We'll see."

Later in the year, the farmer's young boy went out riding on the horse and fell and broke his leg.

Everyone in the village said, "What a shame for the poor boy."

The farmer said, "We'll see."

Two days later, the army came into the village to draft new recruits. When they saw that the farmer's son had a broken leg, they decided not to take him.

Everyone said, "What a fortunate young man."

The farmer smiled again and said, "We'll see."

The farmer never lost his equilibrium in spite of the events that befell him. He did not become

overly ecstatic or terribly upset. He maintained equanimity.

Children! You felt sad when you received less marks in Maths and felt happy when you topped the class in Chemistry. Now that you learnt about Equanimity, how could you have reacted?

(Let children come out with their ideas).

The teacher can add:

In the case of Maths paper where you got less marks, you can resolve to put in more hard work and do better next time and not to worry too much.

In the case of topping the class in science, you can resolve not to allow the success to go to your head so that you work less and get less marks next time.

Story from : http://media.radiosai.org/journals/Vol_04/01MAY06/we_will_see.htm

Time to teach	Asset type	Value	Sub Value
5 minutes	Value Content	Peace	Inner Silence

MS_Summary_Practical Geometry

- If a transversal cuts any two lines such that their alternate interior angles are equal, then the two lines are parallel. This property is used to construct parallel lines.
- If a transversal cuts any two lines such that their corresponding angles are equal, then the two lines are parallel. This property is used to construct parallel lines.
- If three sides of a triangle are known, then a unique triangle can be constructed. This is indirectly based on the SSS criterion for congruency of triangles.
- If two sides and an included angle of a triangle are known, then a unique triangle can be constructed. This is indirectly based on the SAS criterion for congruency of triangles.
- If two angles and an included side of a triangle are known, then a unique triangle can be constructed. This is indirectly based on ASA criterion for congruency of triangles.
- If one side and hypotenuse of a right angled triangle are known, then a unique right angled triangle can be constructed. This is indirectly based on RHS criterion for congruency of triangles.
- We should maintain a strong mental base.

Time to teach	Asset type	Theme	Sub Theme
5 minutes	Main Script	Triangle	Construction of triangles

Master Lesson Plan

Seven Asset Methodology for MLP

What is the purpose of this Master lesson Plan?	This Master Lesson Plan (MLP) prepared by Sri Sathya Sai Vidya Vahini (SSSVV), covers the entire chapter for the given board. The MLP for the chapter given in the textbook is broken down into smaller modules known as assets. Any chapter can be taught using the 7 asset types in SSSVV methodology. Several different assets together complete the entire chapter. Depending on the requirement, each asset is supported by teaching aids such as animated presentation, audio, video, and learning aids such as worksheets. The MLP is for the teacher's preparation and the teaching aids are for use in the classroom.
How to use it?	You can prepare for your class with this MLP by following 3 simple steps: 1. Read your textbook; 2. Go through the information given in the assets (document & multimedia); 3. Prepare your teaching notes. Great! Now you are ready to transact the chapter.
Duration	Kindly note the duration given for each asset. Due care has been taken in planning the assets, to ensure the chapter is completed within the time specified by the Board. Note: Preparation time is not included in the asset duration. The teaching time depends on the duration of the teaching aids and is not impacted by the length of the MLP.
What is a 'Main Script' (MS) Asset?	The Main Script asset is there for explaining the main concepts of the chapter clearly. The information given in the textbook is simplified, organised and structured to give more clarity. Additionally, you may find a video or mnemonics or a graphic organiser to deepen the understanding of the concept.
How to teach using the MS asset?	Please use the blackboard, slides and interaction to develop the concept.
What is an 'Inquisitive Questions' (IQ) asset?	The Inquisitive Questions asset uses questions to promote higher order thinking like the n^{th} why, what-if, new perspectives, cause-effect, and others, creating curiosity.
How to teach using the IQ asset?	You may use the questions to connect with the students, encourage exploration to engage them in the learning process. You may allow multiple responses and instead of rejecting any of the responses, ask why, before revealing the suggested answer or hints.
What is a 'Day to day Relevance' (DD) Asset?	The Day to Day Relevance asset helps students understand the practical relevance of every topic, making them eager participants in the classroom. If students connect the concepts to their environment, they would learn meaningfully without dislike or simply memorizing for exams.

How to teach using the DD asset?	You may use the asset by asking questions about their experience and use it to establish why they are learning the topic. If necessary you may substitute with a recent or local example.
What is an 'Interesting Aside' (IA) asset?	The Interesting Aside asset uses attention grabbing titbits or anecdotes to bring joy and satisfy the child's hunger to know more. This is a quick/short asset intended to bring attention back to the main concept being taught.
How to teach using the IA asset?	You may use this asset to give a piece of interesting information relevant to the topic, without prolonged explanation/discussion. You may suggest appropriate books for further reading.
What is a 'Suggested Activity' (SA) Asset?	The Suggested Activity asset provides a detailed step by step procedure for the teacher to conduct a hands-on activity. This promotes Activity Based Learning.
How to teach using the SA asset?	You may use this asset to energise your students to learn by doing simple, fun-filled activities based on the topic. The asset includes - preparation, activity, and follow-up. You may engage the students in the preparation and follow-up stages to develop collaboration and responsibility. You could try it once, yourself, before the actual delivery to be more comfortable with it. Note: The duration mentioned in the asset is usually for the activity part only.
What is a 'Value Content' (VC) Asset?	The Value Content asset integrates Universal Human Values (such as empathy, inclusivity, respect for nature that translates into responsible behaviour) seamlessly into the curriculum, as the "End of education is character".
How to teach using the VC asset?	You may use this asset to engage with the students to bring out their innate values and connect with the intrinsic values in the topic/concept. The asset includes pointers on the specific pedagogical technique followed.
What is a 'Questions to Assess' (QA) asset?	The Questions to Assess asset uses an interactive approach to check learning of different types of learners, and provides feedback to the teacher for appropriate action. The questions cater to all the levels of Bloom's Taxonomy. Questions from 'Apply' level and above enable students to reflect on their learning.
How to teach using the QA asset?	You may go through the slides to understand its flow and know when to click for the answer (slides include suggested answers). While presenting in the class, you may display the question and encourage multiple responses, before revealing the answer. In some cases, this asset may include extra questions/worksheet that can be given as homework.