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Constructions

Unit 9 Lesson 7

Students will be able to:

Understand the meanings of

Constructions

Key Vocabulary:

- Constructions

- Tools of Constructions

- Basic geometric constructions

In Geometry **"Construction"** means to draw shapes, angles or lines accurately.

Constructions: The drawing of various lines, angles, and shapes using only pencil, compasses and straightedge. There are no numbers involved. No measurement of lengths or angles is allowed.

Use of Construction: It is useful to draw lines and angles without measuring anything.

TOOLS NEEDED FOR CONSTRUCTION

Constructions use only pencil, compass, and a straightedge.

- **Pencil:** A pencil is a writing medium having narrow construction with a solid pigment inside. Pencil creates marks that can be easily erased by a eraser.

- **Compasses:** Compasses are a drawing instrument used for drawing circles and arcs. It has two legs, one with a point and the other with a pencil. Distance between the point and the pencil can be adjusted according to need.

- **Straightedge:** A straightedge is simply a guide for the pencil when drawing straight lines. Straightedge is the basic form of geometric construction which has no numbers. Most common straight edge is ruler.

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BASIC GEOMETRY CONSTRUCTIONS

1. Bisect a line segment.

2. Construct congruent segments

3. Construct a line perpendicular to given line through a point on line.

4. Construct a line perpendicular to given line through a point not on the line.

5. Construct a line parallel to given line through a point not on the line.

6. Construct a Congruent angle.

7. Construct an angle bisector.

Remark:- Other geometric shapes such as equilateral triangles or right triangles can be constructed using above seven basic constructions

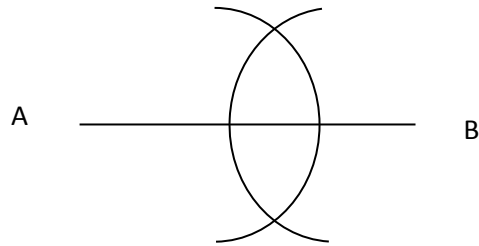# BISECT A LINE SEGMENT

Step1. Draw a line segment.

Step2. With compass set more than half the length and draw an arc with center A.

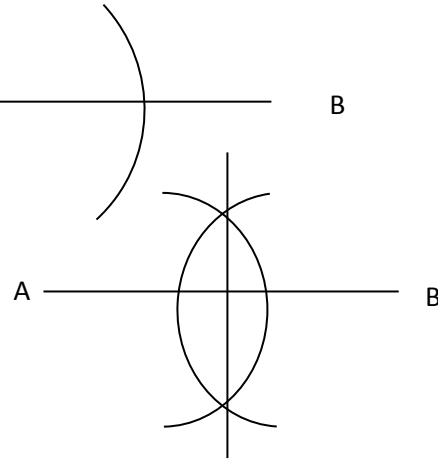**Step3**. With compass set another arc with center B such as two arcs meet each other.

Step4. Join the intersection points of arcs with straightedge; this line bisects the line AB.

BISECT A LINE SEGMENT

A ——————————— B

A ——————×—————— B

A ——————×—————— B

A ——————×—————— B

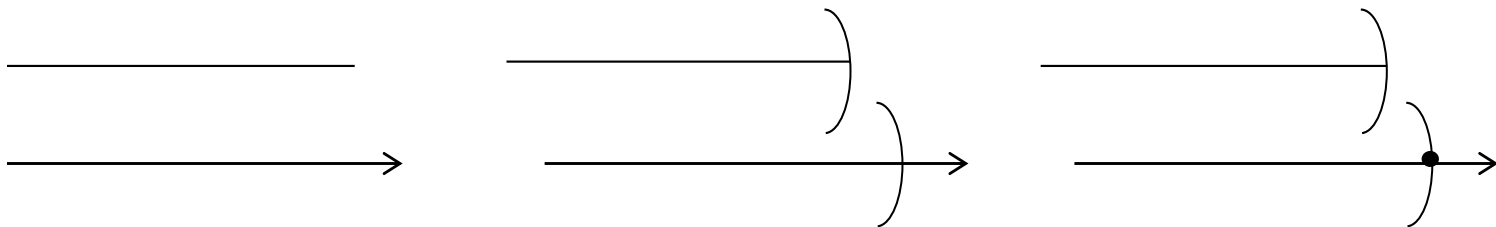## CONSTRUCT CONGRUENT SEGMENTS

Step1. Draw a ray.

Step2. Through compass measure the length of the original line segment.

Step3. Mark the length on the ray.

Step4. To make a congruent line segment mark the intersection of the arc and ray.

CONSTRUCT CONGRUENT SEGMENTS

CONSTRUCT A LINE PERPENDICULAR TO A GIVEN LINE THROUGH A POINT ON THE LINE
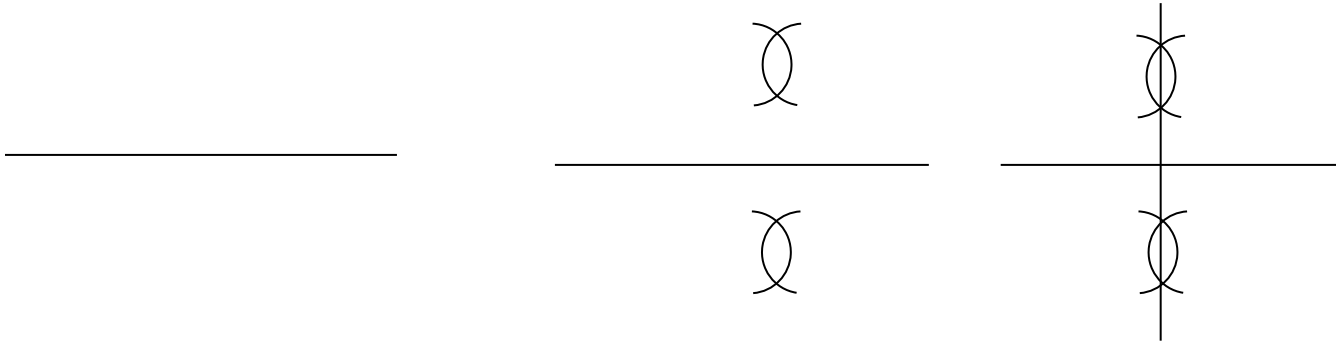
Step1. Draw a Line segment

Step2. With compass set more than half the length of line segment.

Step3. Put the point of the compass on one end of the segment and construct an arc above or below the segment.

Step4. With same measure of compass put the point of the compass on the other end of the segment and construct an arc above or below the segment.

Step5. Draw a segment connecting the intersection of the arcs.

CONSTRUCT A LINE PERPENDICULAR TO A GIVEN LINE THROUGH A POINT ON THE LINE

Step1. – Put the point of the compass on the point and construct an arc crossing the line twice once on each side of the point. Construct a perpendicular bisector of the line segment.

Step2. With compass set more than half the length of line segment.

Step3. Put the point of the compass on one end of the segment and construct an arc above or below the segment.

Step4. With same measure of compass put the point of the compass on the other end of the segment and construct an arc above or below the segment.

Step5. Draw a segment connecting the intersection of the arcs.

# CONSTRUCT A LINE PERPENDICULAR TO A GIVEN LINE THROUGH A POINT NOT ON THE LINE
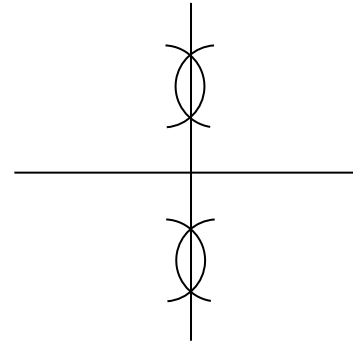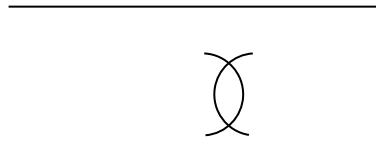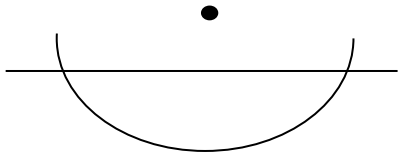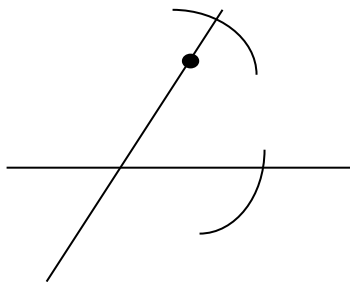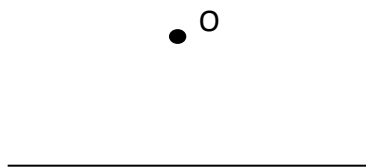
CONSTRUCT A LINE PARALLEL TO A GIVEN LINE THROUGH A POINT NOT ON THE LINE

Step1. Draw any line through point O that meets the line.

Step2. Copy the angle at point P on the other side of the line drawn with vertex O.

Step3. Extend the side of the new angle through O that will give parallel line.

CONSTRUCT A LINE PARALLEL TO A GIVEN LINE THROUGH A POINT NOT ON THE LINE

O
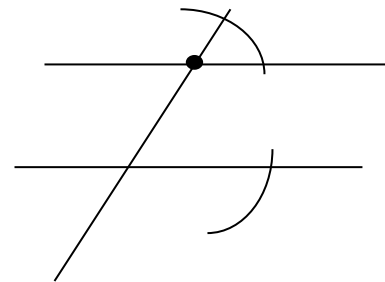
CONSTRUCT A CONGRUENT ANGLE

Step1. Draw a ray.

**Step2**. Construct an arc on the original angle with the vertex of the angle A.

Step3. With the same measure of compass, construct the same arc on the ray putting the point of the compass on the point B of ray.

Step4. Measure the width of the original angle using the compass.

Step5. With the same measure of compass, mark width on ray.

Step6. Join the mark with point B.

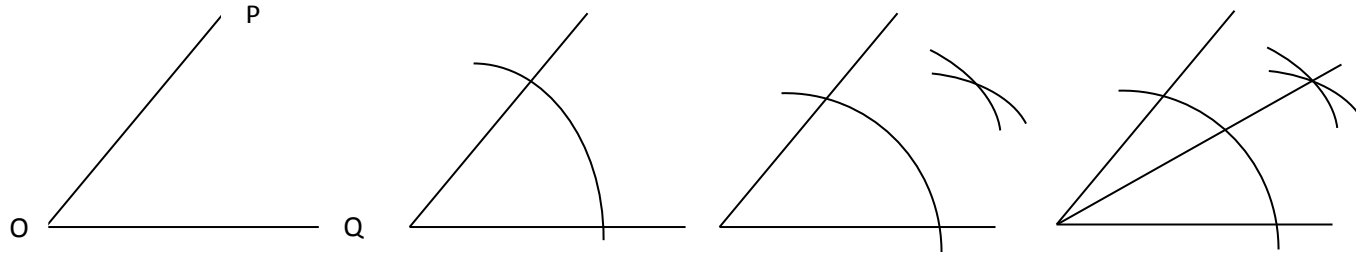# CONSTRUCT A CONGRUENT ANGLE

Original angle
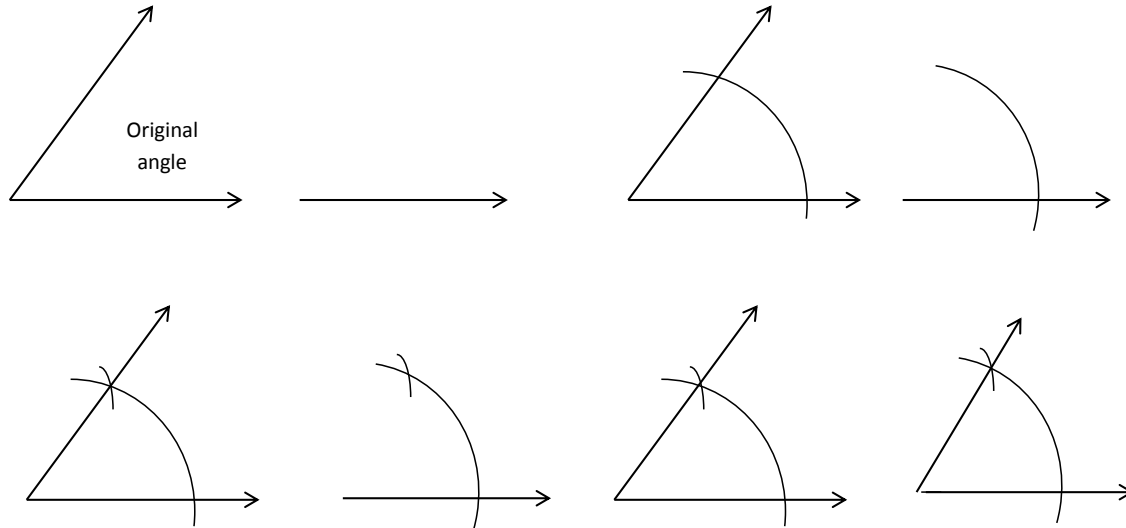
CONSTRUCT AN ANGLE BISECTOR

Step1. Draw an arc with center O of any radius.

Step2. Draw an arc with center P of any radius greater than half of PQ. Repeat this with center Q using same radius such as arc crosses.

Step3. Join O to the point where arc crosses.

CONSTRUCT AN ANGLE BISECTOR

EXERCISE

1. Write steps to bisect an angle.

2. Write steps to construct a parallel line through point.

ANSWERS

1. Step1. Draw an arc with center O of any radius.

Step2. Draw an arc with center P of any radius greater than half of PQ. Repeat this with center Q using same radius such as arc crosses.

Step3. Join O to the point where arc crosses.

2. Step1. Draw any line through point O that meets the line.

Step2. Copy the angle at point P on the other side of the line drawn with vertex O.

Step3. Extend the side of the new angle through O that will give parallel line.