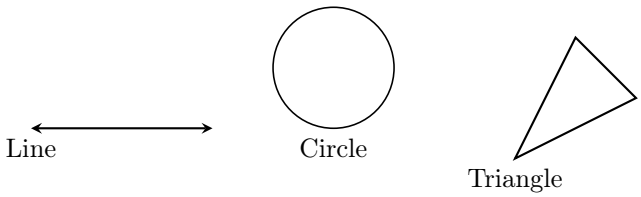
2D SHAPES

A PLANE GEOMETRY

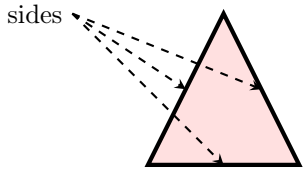
Definition **Plane Geometry**

Plane Geometry is the study of flat shapes that you see in pictures or on paper. These shapes include lines, circles, triangles, squares, and rectangles. They are called flat because they have only length and width.



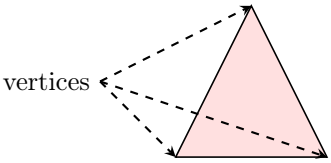
Definition **Side**

A **side** is a straight line on a shape.



Definition

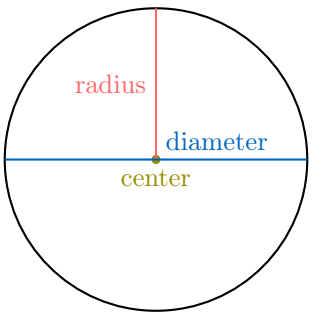
A **vertex** is a point where two sides meet.



B CIRCLES

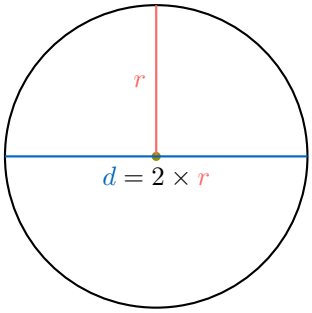
Definition **Circle**

A **circle** is every point on the edge as same distance from the **center**.
The **radius** is a line segment from the center to a point of the circle. The radius is also the length of this segment.
The **diameter** is a line segment that goes across the circle through the center, connecting two points on the circle. The diameter is also the length of this segment.

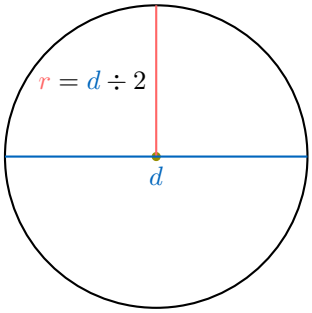


Proposition **Diameter-Radius Rule**

- The diameter is twice the radius: $d = 2 \times r$.



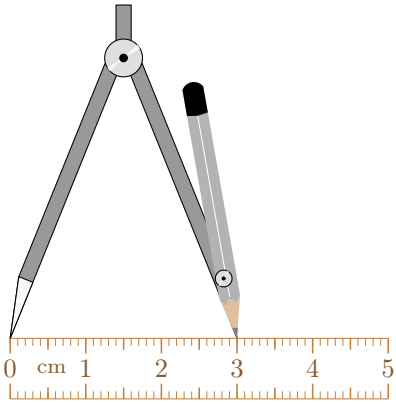
- The radius is half the diameter: $r = d \div 2$



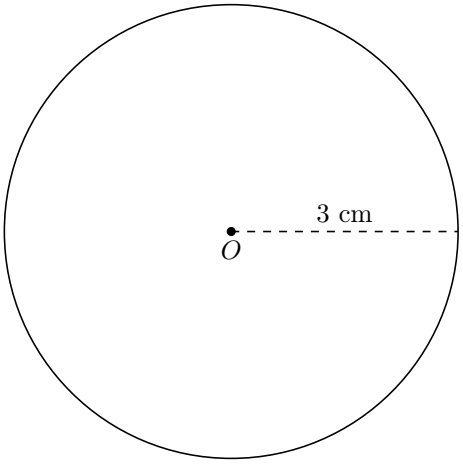
Method **Constructing a Circle**

To construct a circle with a radius of 3 cm at center O:

1. Set your compass to a radius of 3 cm. To do this, open your compass so the distance between the pencil tip and the needle is 3 cm. You can measure this distance using your ruler.



2. Place the needle of your compass on point O. Hold the compass steady and rotate the pencil around O to draw the full circle.



C POLYGONS

Definition Polygon

A **polygon** is a flat shape that is closed, has only straight sides, and has sides that do not cross each other.

Ex: Look at the shapes below. Decide if each one is a polygon.

a)  b)  c)  d) 

Answer:

a) 

Yes

b) 

No, it has a curved side

c) 

No, the sides cross

d) 

No, it is not closed

D TRIANGLES

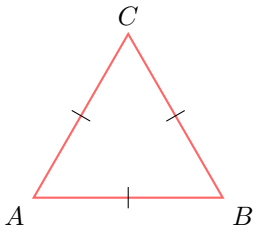
Definition Triangle

A **triangle** is a polygon with three sides.

We can classify triangles according to the number of sides that are equal in length.

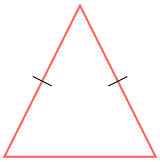
Definition Equilateral triangle

An **equilateral triangle** is a triangle in which all three sides are equal in length and all three angles are equal.



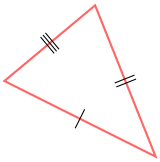
Definition Isosceles triangle

An **isosceles triangle** is a triangle in which two sides are equal in length.



Definition Scalene triangle

A **scalene triangle** is a triangle in which all three sides have different lengths.



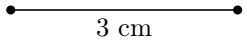
Definition Right-angled triangle

A **right-angled triangle** is a triangle with one right angle (90°).

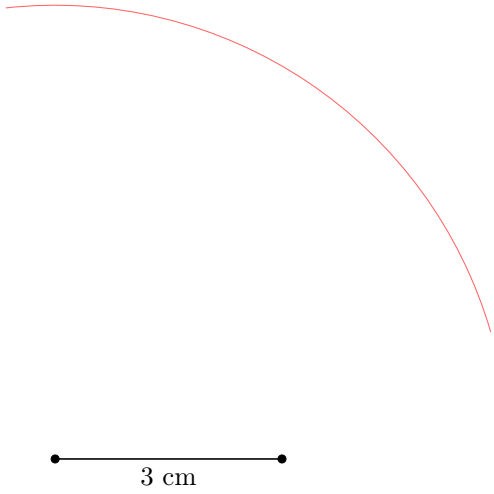
Method **Constructing a triangle with a Ruler and Compass**

To construct a triangle ABC with $AB = 3$ cm, $AC = 6$ cm, and $BC = 5$ cm:

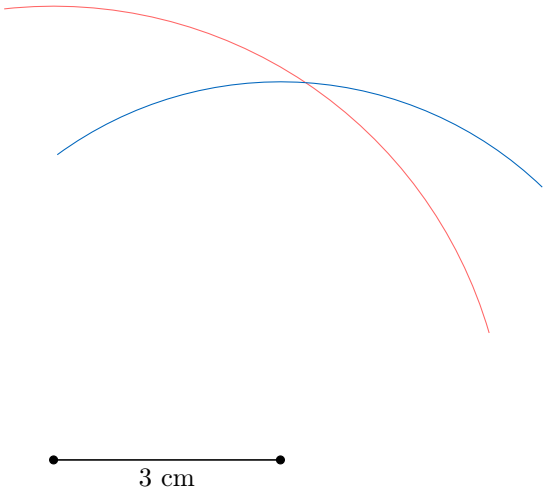
1. Draw the segment $\overline{AB}$ of length 3 cm using your ruler.



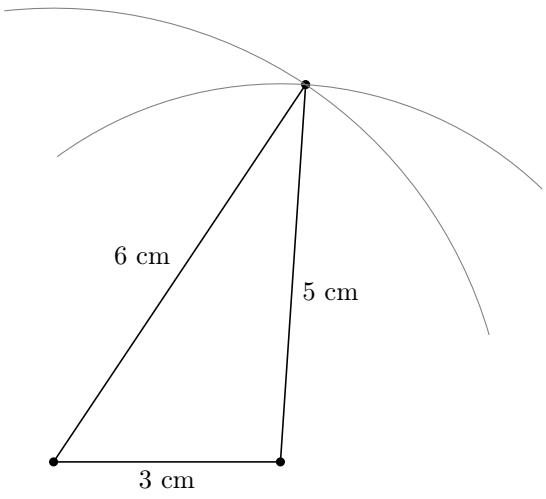
2. Draw an arc with center A and radius 6 cm using your compass.



3. Draw an arc with center B and radius 5 cm using your compass.



4. Mark the point C at the intersection of the two arcs, then draw the segments $\overline{AC}$ and $\overline{BC}$ using your ruler.



E QUADRILATERALS

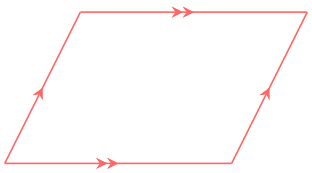
Definition Quadrilateral

A **quadrilateral** is a polygon with four sides.

Some quadrilaterals are given special names, based on their side lengths, angles, and whether opposite sides are parallel.

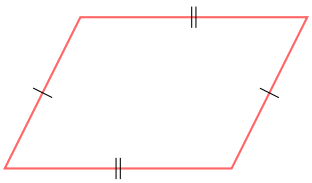
Definition Parallelogram

A **parallelogram** is a quadrilateral in which opposite sides are parallel.



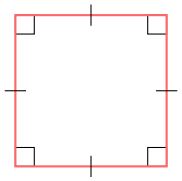
Proposition Property of a parallelogram

The opposite sides of a parallelogram are equal in length.



Definition Square

A **square** is a quadrilateral with four right angles and four equal sides.

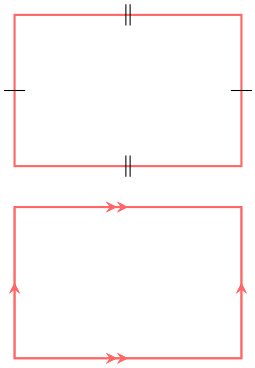


Definition Rectangle

A **rectangle** is a quadrilateral with four right angles.

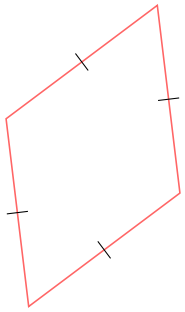
Proposition Properties of a rectangle

The opposite sides of a rectangle are equal in length and parallel.



Definition **Rhombus**

A **rhombus** is a quadrilateral with four equal sides.



Proposition **Property of a rhombus**

The opposite sides of a rhombus are parallel.