2D SHAPES

A PLANE GEOMETRY

A.1 FINDING THE SIDES
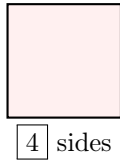
Ex 1: How many sides does this shape have?

$\boxed{3}$ sides

Answer: Count each straight line to find the number of sides.

3 sides

Ex 2: How many sides does this shape have?

$\boxed{4}$ sides

Answer: Count each straight line to find the number of sides.

4 sides

Ex 3: How many sides does this shape have?

$\boxed{4}$ sides

Answer: Count each straight line to find the number of sides.

4 sides

Ex 4: How many sides does this shape have?

$\boxed{5}$ sides

Answer: Count each straight line to find the number of sides.

5 sides

Ex 5: How many sides does this shape have?

$\boxed{4}$ sides

Answer: Count each straight line to find the number of sides.

4 sides

Ex 6: How many sides does this shape have?

$\boxed{6}$ sides

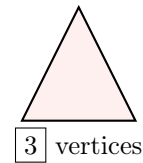*Answer:* Count each straight line to find the number of sides.

6 sides

A.2 FINDING THE VERTICES
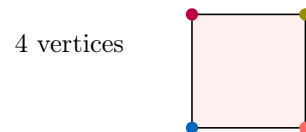
Ex 7: How many vertices does this shape have?

$\boxed{3}$ vertices

Answer: Count each point where two sides meet

3 vertices

Ex 8: How many vertices does this shape have?

$\boxed{4}$ vertices

Answer: Count each point where two sides meet.

4 vertices

Ex 9: How many vertices does this shape have?

$\boxed{4}$ vertices

Answer: Count each point where two sides meet.

4 vertices

Ex 10: How many vertices does this shape have?

$\boxed{5}$ vertices

Answer: Count each point where two sides meet.

5 vertices

Ex 11: How many vertices does this shape have?

$\boxed{6}$ vertices

Answer: Count each point where two sides meet.

6 vertices

Ex 12: How many vertices does this shape have?

$\boxed{4}$ vertices
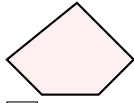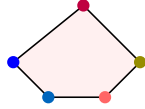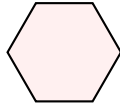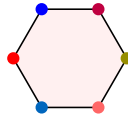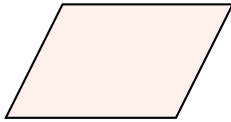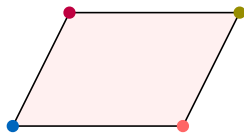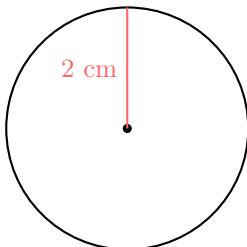
Answer: Count each point where two sides meet.

4 vertices

B CIRCLES

B.1 FINDING DIAMETERS

Ex 13: What is the radius and what is the diameter of this circle?

2 cm

Radius = $\boxed{2}$ cm
Diameter = $\boxed{4}$ cm

Answer:

- The drawn segment is a radius of length 2 cm.
  Radius = 2 cm

- The diameter of the circle is twice the radius.

$$d = 2 \times r$$
$$= 2 \times 2 \text{ cm}$$
$$= 4 \text{ cm}$$

Diameter = 4 cm

Ex 14: The wheel of a child's bicycle is a circle with a radius of 15 cm. What is its diameter?

Diameter = $\boxed{30}$ cm

Answer:

- The radius of the wheel is 15 cm.

$r = 15$ cm

- The diameter of the circle is twice the radius.

$$d = 2 \times r$$
$$= 2 \times 15 \text{ cm}$$
$$= 30 \text{ cm}$$

$d = 30$ cm

Diameter = 30 cm

Ex 15: A pizza is a circle with a radius of 15 cm. What is its diameter?
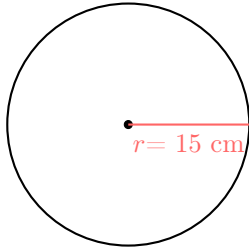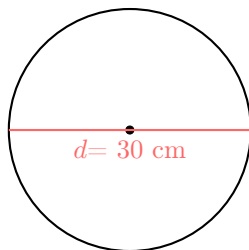
Diameter = $\boxed{30}$ cm

Answer:

- The radius of the pizza is 15 cm.

r= 15 cm

- The diameter of the circle is twice the radius.

$$d = 2 \times r$$
$$= 2 \times 15 \text{ cm}$$
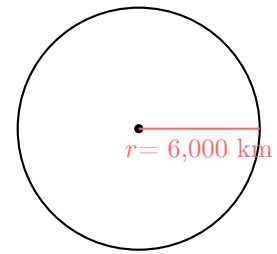$$= 30 \text{ cm}$$

d= 30 cm

Diameter = 30 cm

Ex 16: The Earth is a sphere with a radius of 6,000 km. What is its diameter?

Diameter = $\boxed{12000}$ km

Answer:

- The radius of the Earth is 6 000 km.

r= 6,000 km

- The diameter is twice the radius.

$$d = 2 \times r$$
$$= 2 \times 6\,000 \text{ km}$$
$$= 12\,000 \text{ km}$$

Diameter = 12,000 km

d= 12 000 km

B.2 FINDING RADII

Ex 17: What is the radius and what is the diameter of this circle?

4 cm

Radius = $\boxed{2}$ cm
Diameter = $\boxed{4}$ cm

Answer:

- The drawn segment is a diameter of length 4 cm.
  Diameter = 4 cm

- The radius of the circle is half the diameter.

$$r = d \div 2$$
$$= 4 \text{ cm} \div 2$$
$$= 2 \text{ cm}$$

Radius = 2 cm

Ex 18: The wheel of a child's bicycle is a circle with a diameter of 30 cm. What is its radius?

Radius = $\boxed{15}$ cm

Answer:

- The diameter of the wheel is 30 cm.

$d= 30$ cm

- The radius of the circle is half the diameter.
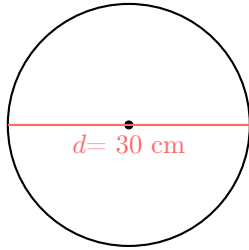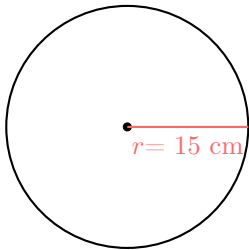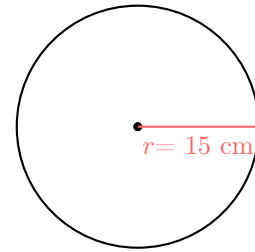
$$r = d \div 2$$
$$= 30 \text{ cm} \div 2$$
$$= 15 \text{ cm}$$

$r= 15$ cm

Radius = 15 cm

Ex 19: A pizza is a circle with a diameter of 30 cm. What is its radius?

Radius = $\boxed{15}$ cm

Answer:

- The diameter of the pizza is 30 cm.

$d= 30$ cm

- The radius of the circle is half the diameter.

$$r = d \div 2$$
$$= 30 \text{ cm} \div 2$$
$$= 15 \text{ cm}$$

$r= 15$ cm

Radius = 15 cm

Ex 20: The Earth is a circle with a diameter of 12,000 km. What is its radius?

Radius = $\boxed{6000}$ km

Answer:

- The diameter of the Earth is 12,000 km.
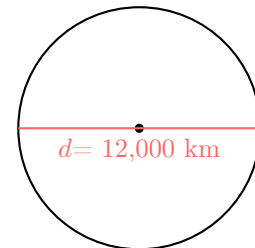

$d= 12{,}000$ km

- The radius is half the diameter.

$$r = d \div 2$$
$$= 12{,}000 \text{ km} \div 2$$
$$= 6{,}000 \text{ km}$$

$r= 6{,}000$ km

Radius = 6,000 km

B.3 CONSTRUCTING CIRCLE WITH A RULER AND COMPASS

Ex 21: Construct a circle with a radius of 2 cm at center O, using a compass.

Answer: To construct a circle with a radius of 2 cm at center O:

1. Draw a point O.

•

2. Set your compass to a radius of 2 cm. To do this, open your compass so the distance between the pencil tip and the needle is 2 cm. You can measure this distance using your ruler.

3. Place the needle of your compass on point O. Hold the compass steady and carefully rotate the pencil around O to draw the full circle with a radius of 2 cm.

2 cm
O

Ex 22: Construct a circle with a radius of 3 cm at center O, using a compass.

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

1. Draw a point O.

•
O

2. 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.

3. Place the needle of your compass on point O. Hold the compass steady and rotate the pencil around O to draw the full circle with a radius of 3 cm.
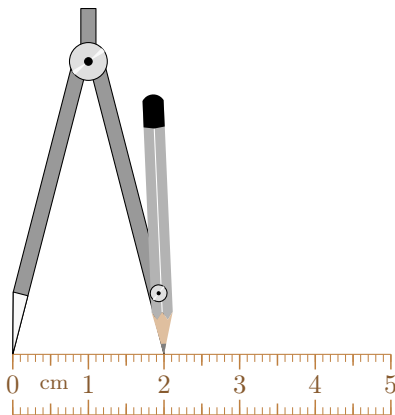
3 cm
O

Ex 23: Construct a circle with a radius of 2.5 cm at center O, using a compass.

Answer: To construct a circle with a radius of 2.5 cm at center O:
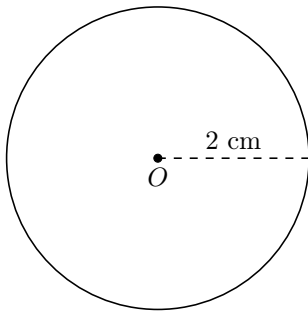
1. Draw a point O.

•

2. Set your compass to a radius of 2.5 cm. To do this, open your compass so the distance between the pencil tip and the needle is 2.5 cm. You can measure this distance using your ruler.

3. Place the needle of your compass on point O. Hold the compass steady and carefully rotate the pencil around O to draw the full circle with a radius of 2.5 cm.
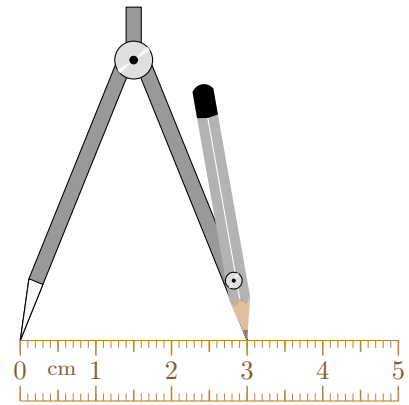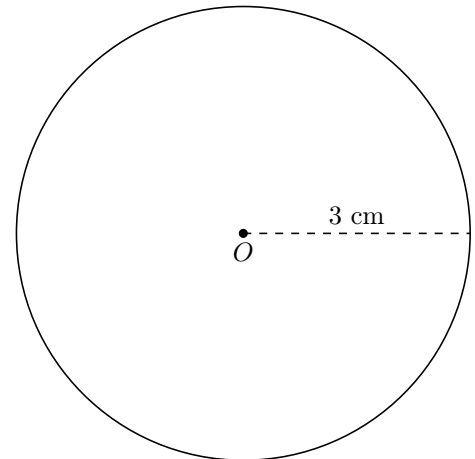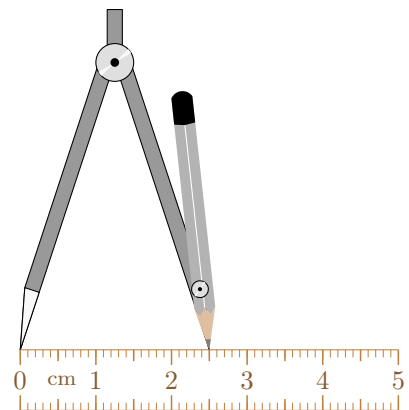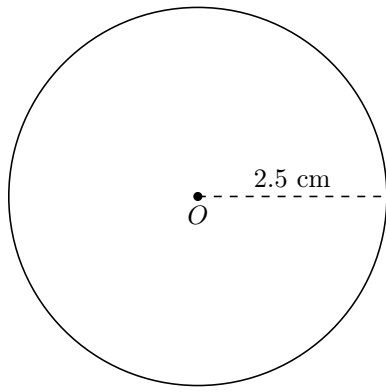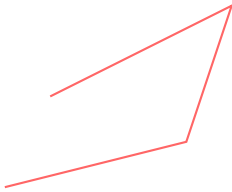
2.5 cm

O

C POLYGONS

C.1 IDENTIFYING POLYGONS

MCQ 24: Is this figure a polygon?

Pick the correct answer:

☐ Yes

☒ No

Answer: A polygon is a closed shape with straight sides. This figure is not a polygon because the lines do not connect at any point, so the shape is not closed.

MCQ 25: Is this figure a polygon?

Pick the correct answer:

☒ Yes

☐ No

Answer: A polygon is a closed shape with only straight sides that do not cross. This figure is a polygon because it is closed, has straight lines, and its lines do not cross.

MCQ 26: Is this figure a polygon?

Pick the correct answer:

☐ Yes

☒ No

Answer: A polygon is a closed shape with straight sides that do not cross. This figure is not a polygon because its lines cross each other.

MCQ 27: Is this figure a polygon?

Pick the correct answer:

☐ Yes

☒ No

Answer: A polygon is a closed shape with only straight sides. This figure is not a polygon because it has a curved line.

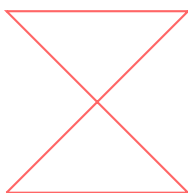**MCQ 28:** Is this figure a polygon?

Pick the correct answer:

☒ Yes

☐ No

Answer: A polygon is a closed shape with only straight sides that do not cross. This figure is a polygon because it is closed, has straight lines, and its lines do not cross.
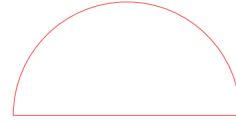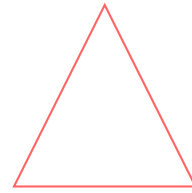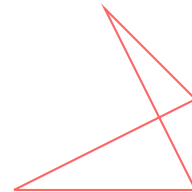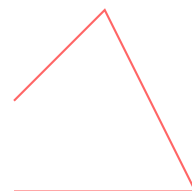
MCQ 29: Is this figure a polygon?

Pick the correct answer:

☐ Yes

☒ No

Answer: A polygon is a closed shape with only straight sides that do not cross. This figure is not a polygon because its lines cross each other.

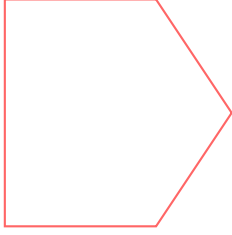**MCQ 30:** Is this figure a polygon?

Pick the correct answer:

☐ Yes

☒ No

Answer: A polygon is a closed shape with only straight sides. This figure is not a polygon because the lines do not connect at any point, so the shape is not closed.

C.2 NAMING POLYGONS
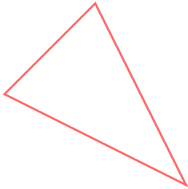
MCQ 31: What is the name of this polygon?

Pick the correct answer:

☐ Triangle

☐ Quadrilateral

☒ Pentagon

☐ Hexagon

Answer: A polygon is named by the number of its sides. This figure has 5 sides, so it is a pentagon.

MCQ 32: What is the name of this polygon?

Pick the correct answer:

☒ Triangle

☐ Quadrilateral

☐ Pentagon

☐ Hexagon

Answer: A polygon is named by the number of its sides. This figure has 3 sides, so it is a triangle.

MCQ 33: What is the name of this polygon?

Pick the correct answer:

☐ Triangle

☒ Quadrilateral

☐ Pentagon

☐ Hexagon

Answer: A polygon is named by the number of its sides. This figure has 4 sides, so it is a quadrilateral.
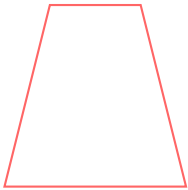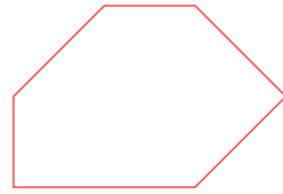
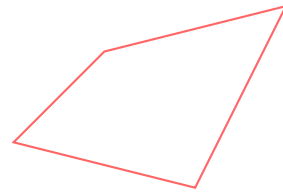**MCQ 34:** What is the name of this polygon?

Pick the correct answer:

☐ Triangle

☐ Quadrilateral

☐ Pentagon

☒ Hexagon

Answer: A polygon is named by the number of its sides. This figure has 6 sides, so it is a hexagon.

MCQ 35: What is the name of this polygon?

Pick the correct answer:
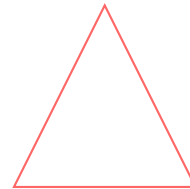
☐ Triangle

☒ Quadrilateral

☐ Pentagon

☐ Hexagon

Answer: A polygon is named by the number of its sides. This figure has 4 sides, so it is a quadrilateral.

C.3 DRAWING POLYGONS

Ex 36: Draw a triangle.

Answer: A triangle is a polygon with 3 sides. To draw a triangle, connect three straight lines to form a closed shape with no crossing lines. For example:
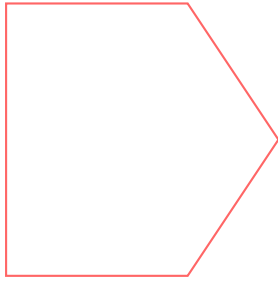
Ex 37: Draw a quadrilateral.

Answer: A quadrilateral is a polygon with 4 sides. To draw a quadrilateral, connect four straight lines to form a closed shape with no crossing lines. For example:
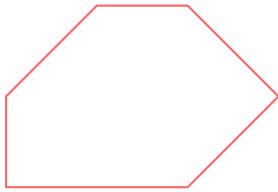
Ex 38: Draw a pentagon.

Answer: A pentagon is a polygon with 5 sides. To draw a pentagon, connect five straight lines to form a closed shape with no crossing lines. For example:
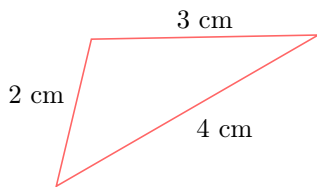
Ex 39: Draw a hexagon.

Answer: A hexagon is a polygon with 6 sides. To draw a hexagon, connect six straight lines to form a closed shape with no crossing lines. For example:

D TRIANGLES

D.1 CLASSIFYING TRIANGLES BY SIDE LENGTHS
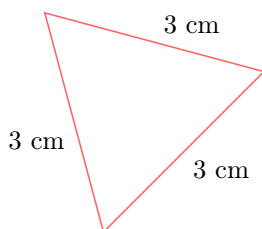
MCQ 40: Classify the triangle:

3 cm

2 cm

4 cm

Choose one answer:

☒ Scalene

☐ Isosceles

☐ Equilateral

☐ Right-angle

Answer: The triangle is scalene because its sides are 4 cm, 3 cm, and 2 cm, which are all different lengths.
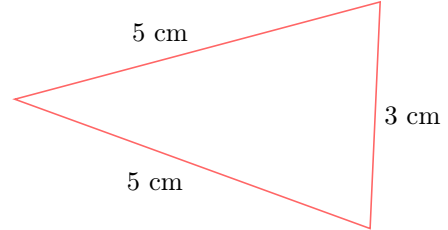
MCQ 41: Classify the triangle:

3 cm

3 cm

3 cm

Choose two answers:

☐ Scalene

☒ Isosceles

☒ Equilateral

☐ Right-angle

Answer: The triangle is equilateral because all three sides are 3 cm long. It is also isosceles because an equilateral triangle has at least two equal sides.
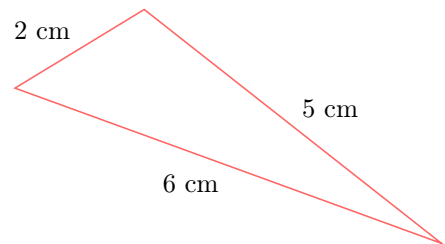
MCQ 42: Classify the triangle:

5 cm

3 cm

5 cm

Choose one answer:

☐ Scalene

☒ Isosceles

☐ Equilateral

☐ Right-angle

Answer: The triangle is isosceles because two sides are 5 cm and one side is 3 cm, so exactly two sides have the same length.
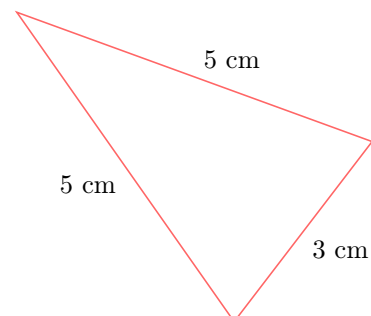
MCQ 43: Classify the triangle:

2 cm

5 cm

6 cm

Choose one answer:

☒ Scalene

☐ Isosceles

☐ Equilateral

☐ Right-angle

Answer: The triangle is scalene because its sides are 6 cm, 5 cm, and 2 cm, which are all different lengths.

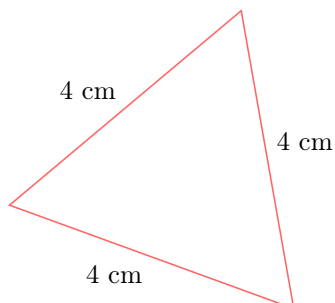**MCQ 44:** Classify the triangle:

5 cm

5 cm

3 cm

Choose one answer:

☐ Scalene

☒ Isosceles

☐ Equilateral

☐ Right-angle

Answer: The triangle is isosceles because two sides are 5 cm and one side is 3 cm, so exactly two sides have the same length.
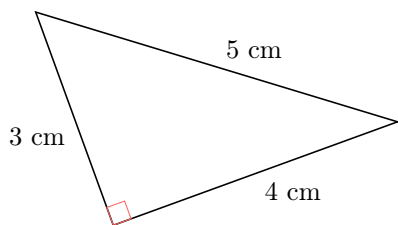
MCQ 45: Classify the triangle:

Choose one answer:

☐ Scalene

☐ Isosceles

☒ Equilateral

☐ Right-angle

Answer: The triangle is equilateral because all three sides are 4 cm long.
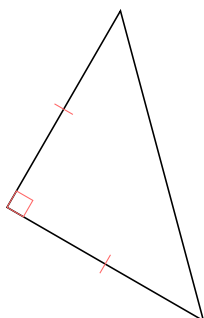
MCQ 46: Classify the triangle:

Choose one answer:

☐ Scalene

☐ Isosceles

☐ Equilateral

☒ Right-angle

Answer: The triangle is right-angle.

MCQ 47: Classify the triangle:

Choose one or two answers:

☐ Scalene

☒ Isosceles
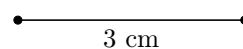
☐ Equilateral

☒ Right-angle

Answer: The triangle is right-angle and isosceles.

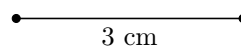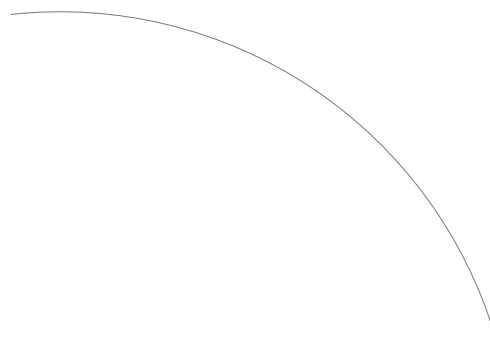## D.2 CONSTRUCTING TRIANGLES WITH A RULER AND COMPASS

Ex 48: Construct a triangle ABC with $AB = 3$ cm, $AC = 6$ cm, and $BC = 5$ cm, leaving the construction marks visible, using a ruler and a compass.

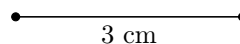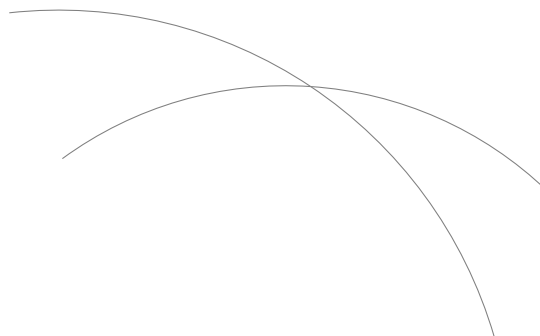*Answer:* To construct a triangle ABC with $AB = 3$ cm, $AC = 6$ cm, and $BC = 5$ cm:

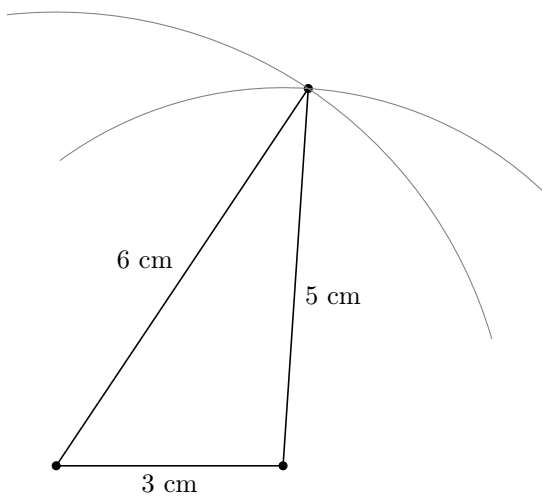1. Draw the segment $\overline{AB}$ of length 3 cm using your ruler.

3 cm

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

3 cm

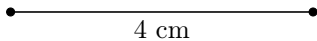3. Draw an arc with center B and radius 5 cm using your compass.

3 cm

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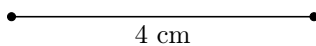
6 cm

5 cm

3 cm

3 cm

5 cm

4 cm

Ex 49: Construct a triangle ABC with $AB = 4$ cm, $AC = 3$ cm, and $BC = 5$ cm, leaving the construction marks visible, using a ruler and a compass.

Answer: To construct a triangle ABC with $AB = 4$ cm, $AC = 3$ cm, and $BC = 5$ cm:

1. Draw the segment $\overline{AB}$ of length 4 cm using your ruler.

4 cm

2. Draw an arc with center A and radius 3 cm using your compass.

4 cm

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

4 cm

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

Ex 50: Construct an equilateral triangle ABC with $AB = 4$ cm, leaving the construction marks visible, using a ruler and a compass.

Answer: To construct an equilateral triangle ABC with $AB = 4$ cm:

1. Draw the segment $\overline{AB}$ of length 4 cm using your ruler.

4 cm

2. Draw an arc with center A and radius 4 cm using your compass.

4 cm

3. Draw an arc with center B and radius 4 cm using your compass.

4 cm

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

Ex 51: Construct an isosceles triangle ABC with $AB = 4$ cm, $AC = 3$ cm, and $BC = 3$ cm, leaving the construction marks visible, using a ruler and a compass.

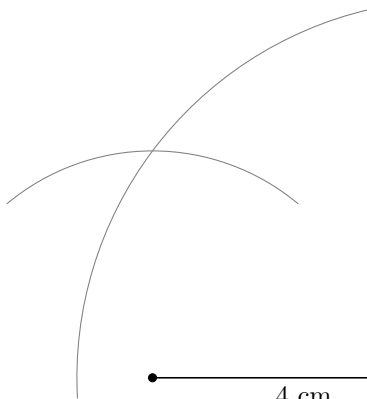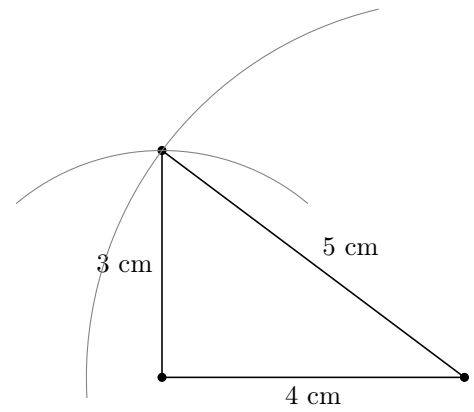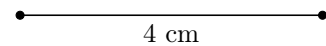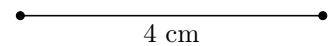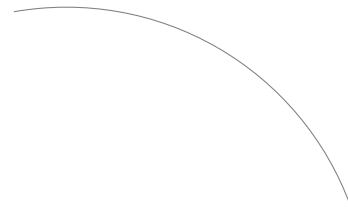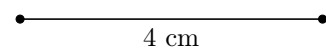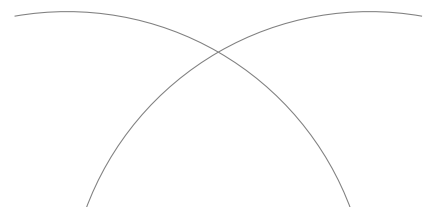*Answer:* To construct an isosceles triangle ABC with $AB = 4$ cm, $AC = 3$ cm, and $BC = 3$ cm:

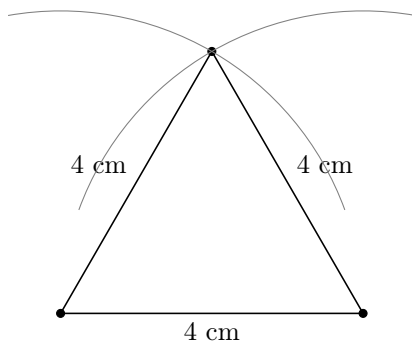1. Draw the segment $\overline{AB}$ of length 4 cm using your ruler.

2. Draw an arc with center A and radius 3 cm using your compass.

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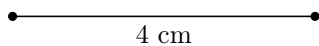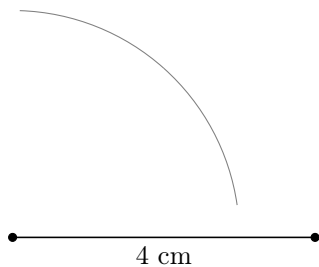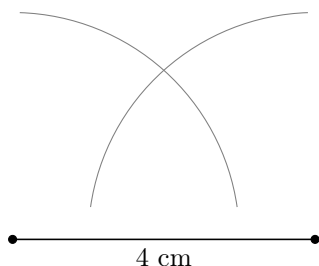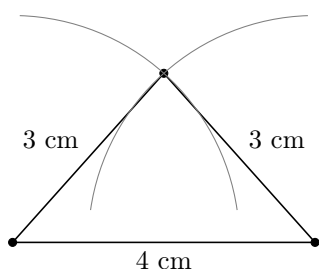

4. Mark the point C at the intersection of the two arcs, then draw the segments $\overline{AC}$ and $\overline{BC}$ using your ruler.

E QUADRILATERALS

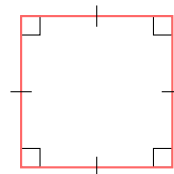## E.1   DETERMINING   PROPERTIES   OF QUADRILATERALS

MCQ 52: A square has four right angles.
Choose one answer:

☒ True

☐ False

Answer: The statement "A square has four right angles" is true. A square has four right angles, which are 90 degrees.
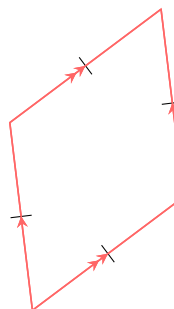

MCQ 53: The opposite sides of a rhombus are parallel.
Choose one answer:

☒ True

☐ False

Answer: The statement "The opposite sides of a rhombus are parallel" is true. A rhombus has opposite sides that are parallel to each other.
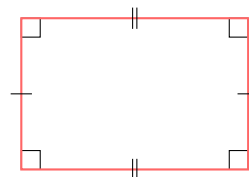

MCQ 54: The adjacent sides of a rectangle are parallel.
Choose one answer:

☐ True

☒ False

Answer: The statement "The adjacent sides of a rectangle are parallel" is false. In a rectangle, adjacent sides are not parallel because they meet at right angles (90 degrees). Only the opposite sides are parallel.
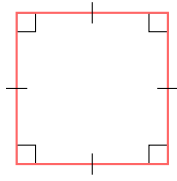

MCQ 55: A square is a special type of rectangle.
Choose one answer:

☒ True

□ False

Answer: The statement "A square is a special type of rectangle" is true. A square is a special type of rectangle because it has four right angles and all sides are the same length.
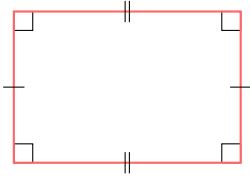
MCQ 56: A rectangle is a special type of square.
Choose one answer:

□ True

☒ False

Answer: The statement "A rectangle is a special type of square" is false. A rectangle is not a special type of square because a rectangle can have sides of different lengths, while a square must have all sides the same length.

MCQ 57: A rectangle is a special type of parallelogram.
Choose one answer:

☒ True

□ False

Answer: The statement "A rectangle is a special type of parallelogram" is true. A rectangle is a special type of parallelogram because its opposite sides are parallel.