ANGLES

A DEFINITION

A.1 COMPARING ANGLES

MCQ 1: Which angle has the greater measure?
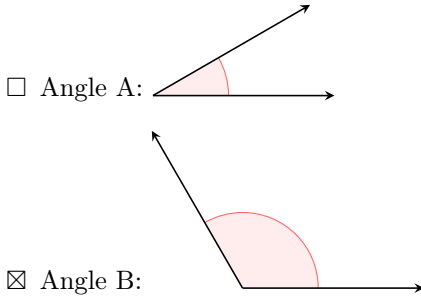
☐ Angle A:

☒ Angle B:

Answer: The measure of an angle depends on the opening between its rays. A wider opening means a greater angle measure. Angle B has a wider opening (120°) compared to Angle A (30°). Therefore, Angle B is greater.

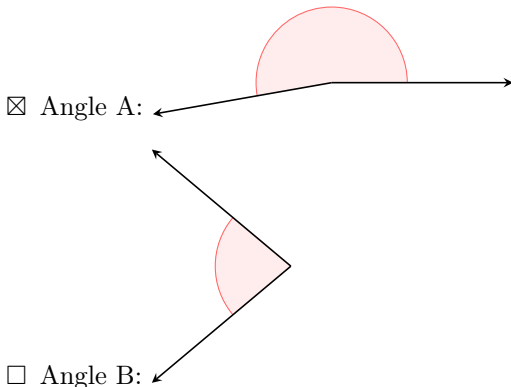**MCQ 2:** Which angle has the greater measure?
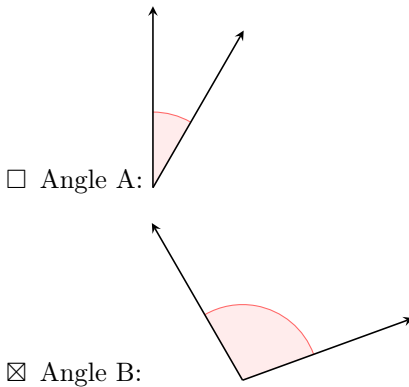
☐ Angle A:

☒ Angle B:

Answer: The measure of an angle depends on the opening between its rays. A wider opening means a greater angle measure. Angle B has a wider opening (100°) compared to Angle A (30°). Therefore, Angle B is greater.

MCQ 3: Which angle has the greater measure?
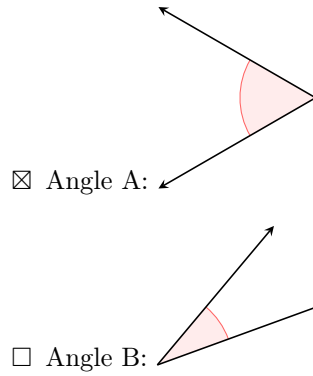
☒ Angle A:

☐ Angle B:

Answer: The measure of an angle depends on the opening between its rays. A wider opening means a greater angle measure. Angle A has a wider opening (170°) compared to Angle B (80°). Therefore, Angle A is greater.

MCQ 4: Which angle has the greater measure?
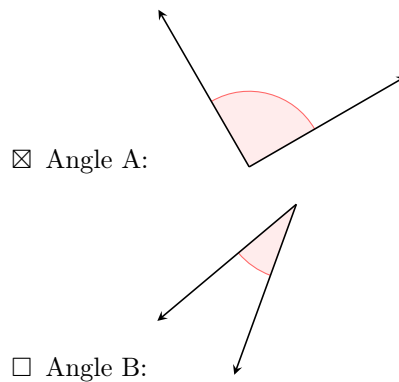
☒ Angle A:

☐ Angle B:

Answer: The measure of an angle depends on the opening between its rays. A wider opening means a greater angle measure. Angle A has a wider opening (60°) compared to Angle B (30°). Therefore, Angle A is greater.

MCQ 5: Which angle has the greater measure?

☒ Angle A:

☐ Angle B:

Answer: The measure of an angle depends on the opening between its rays. A wider opening means a greater angle measure. Angle A has a wider opening (90°) compared to Angle B (30°). Therefore, Angle A is greater.
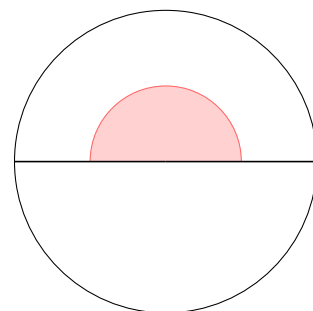
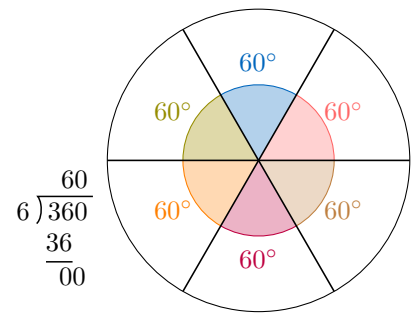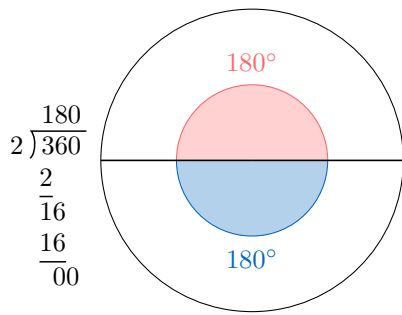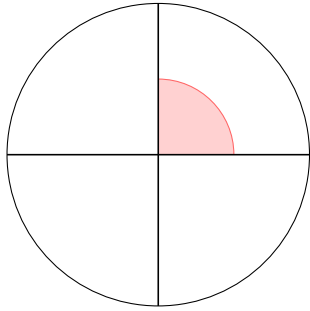## B DEGREES

B.1 DIVIDING THE FULL TURN

Ex 6:

One-half of a full turn measures $\boxed{180}$°.

Answer:

$$\text{One-half of a full turn} = \frac{1}{2} \times 360°$$
$$= 360° \div 2$$
$$= 180°$$

$$2\overline{)\begin{array}{l}180 \\ 360\end{array}}$$
$$\begin{array}{l}2 \\ \overline{16} \\ 16 \\ \overline{00}\end{array}$$

180°
180°

$$6\overline{)\begin{array}{l}60 \\ 360\end{array}}$$
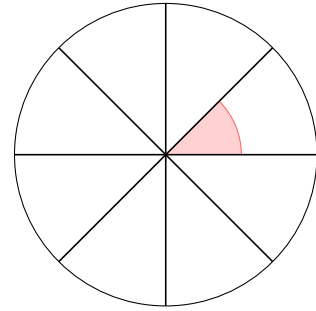$$\begin{array}{l}36 \\ \overline{00}\end{array}$$

60° 60° 60° 60° 60° 60°

Ex 7:

One-quarter of a full turn measures $\boxed{90}$°.

Answer:

$$\text{One-quarter of a full turn} = \frac{1}{4} \times 360°$$
$$= 360° \div 4$$
$$= 90°$$

90° 90° 90° 90°

$$4\overline{)\begin{array}{l}90 \\ 360\end{array}}$$
$$\begin{array}{l}36 \\ \overline{00}\end{array}$$

Ex 8:

One-sixth of a full turn measures $\boxed{60}$°.

Answer:

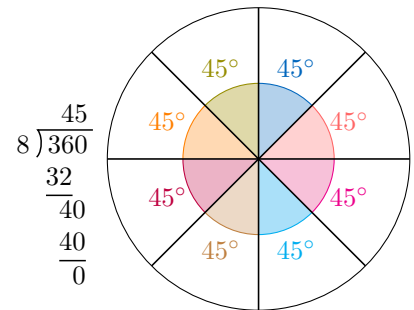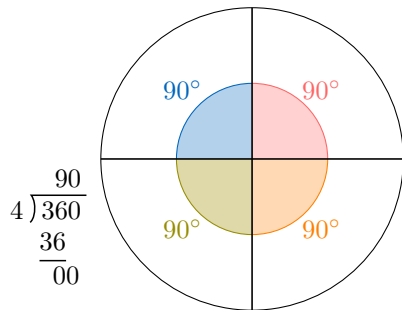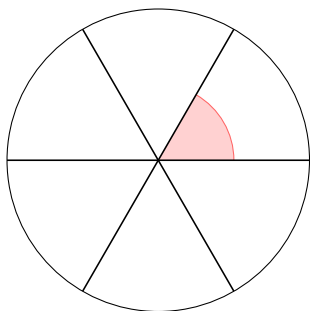$$\text{One-sixth of a full turn} = \frac{1}{6} \times 360°$$
$$= 360° \div 6$$
$$= 60°$$

Ex 9:

One-eighth of a full turn measures $\boxed{45}$°.

Answer:

$$\text{One-eighth of a full turn} = \frac{1}{8} \times 360°$$
$$= 360° \div 8$$
$$= 45°$$

$$8\overline{)\begin{array}{l}45 \\ 360\end{array}}$$
$$\begin{array}{l}32 \\ \overline{40} \\ 40 \\ \overline{0}\end{array}$$

45° 45° 45° 45° 45° 45° 45° 45°

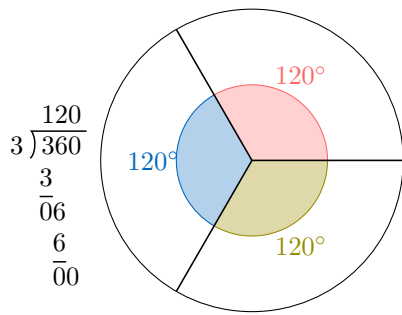**Ex 10:**
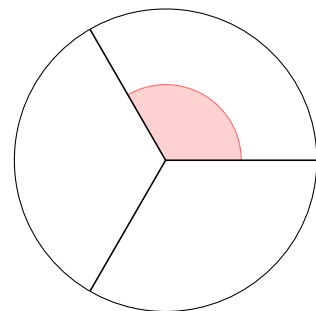
One-third of a full turn measures $\boxed{120}$°.

Answer:

$$\text{One-third of a full turn} = \frac{1}{3} \times 360°$$
$$= 360° \div 3$$
$$= 120°$$

$$3 \overline{)360} \atop \begin{array}{r} 120 \\ \underline{3} \\ 06 \\ \underline{6} \\ 00 \end{array}$$

C MEASURING AND DRAWING ANGLES WITH A PROTRACTOR

C.1 MEASURING ANGLES

Ex 11:
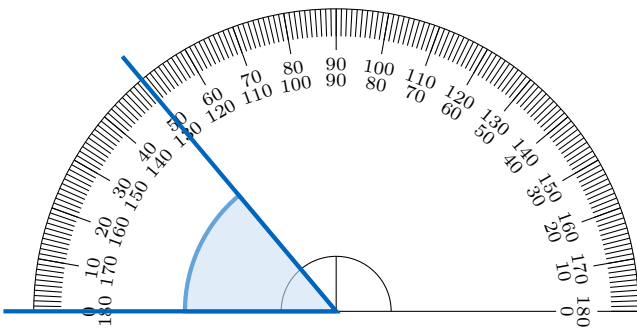
The angle shown measures $\boxed{50}$°.

Answer: To measure an angle with a protractor, place its center on the vertex and align one ray with the 0° mark. The other ray points to the angle's measure on the protractor's scale. Here, one ray aligns with 0°, and the other points to 50°, so the angle measures 50°.
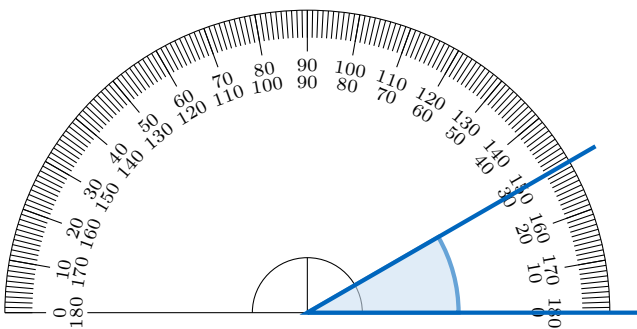
Ex 12:

The angle shown measures $\boxed{30}$°.

Answer: To measure an angle with a protractor, place its center on the vertex and align one ray with the 0° mark. The other ray points to the angle's measure on the protractor's scale. Here, one ray aligns with 0°, and the other points to 30°, so the angle measures 30°.

Ex 13:

The angle shown measures $\boxed{100}$°.

Answer: To measure an angle with a protractor, place its center on the vertex and align one ray with the 0° mark. The other ray points to the angle's measure on the protractor's scale. Here, one ray aligns with 0°, and the other points to 100°, so the angle measures 100°.
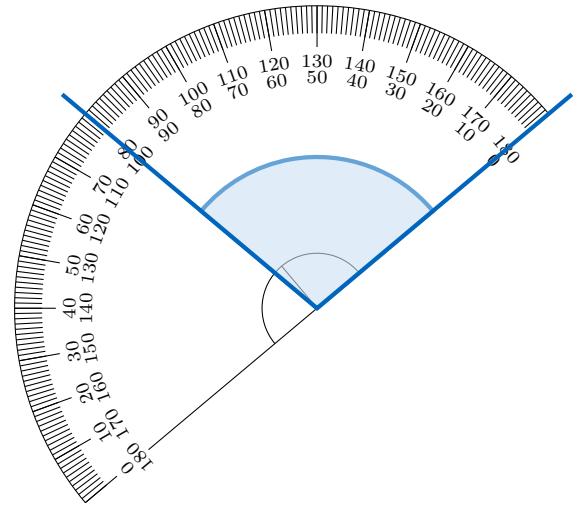
Ex 14:

The angle shown measures $\boxed{90}$°.

Answer: To measure an angle with a protractor, place its center on the vertex and align one ray with the 0° mark. The other ray points to the angle's measure on the protractor's scale. Here, one ray aligns with 0°, and the other points to 90°, so the angle measures 90°.
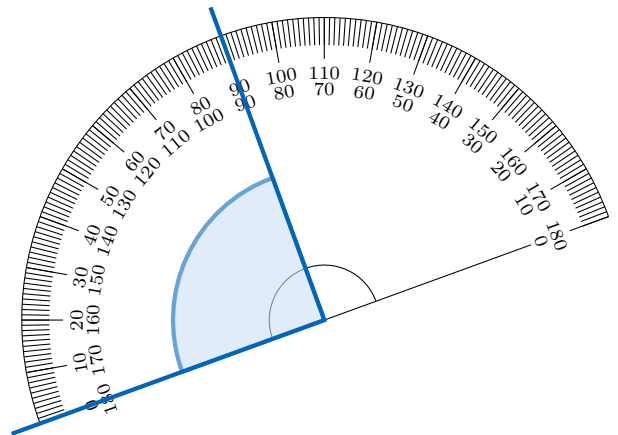
Ex 15:

The angle shown measures $\boxed{120}$°.

Answer: To measure an angle with a protractor, place its center on the vertex and align one ray with the 0° mark. The other ray points to the angle's measure on the protractor's scale. Here, one ray aligns with 0°, and the other points to 120°, so the angle measures 120°.
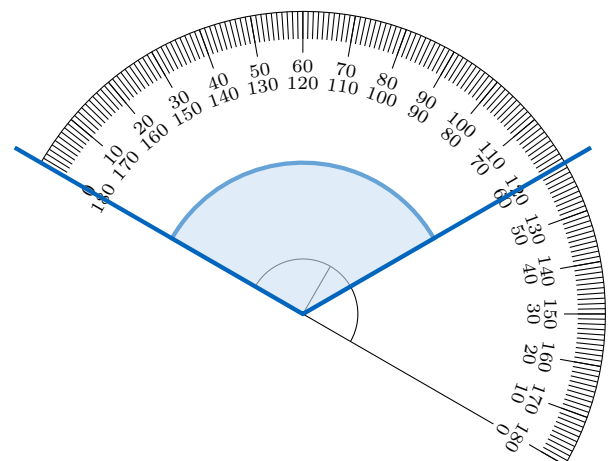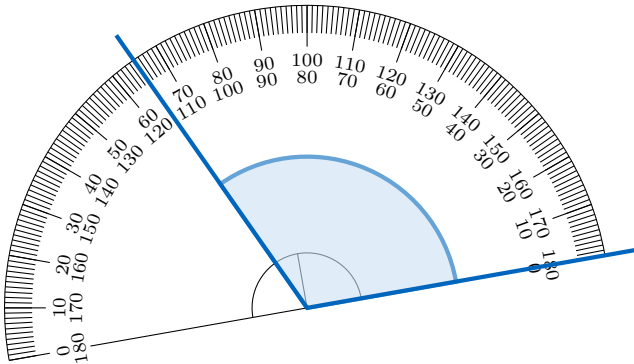
Ex 16:

The angle shown measures $\boxed{115}$°.

Answer: To measure an angle with a protractor, place its center on the vertex and align one ray with the 0° mark. The other ray points to the angle's measure on the protractor's scale. Here, one ray aligns with 0°, and the other points to 115°, so the angle measures 115°.

Ex 17:

The angle shown measures $\boxed{45}$°.

Answer: To measure an angle with a protractor, place its center on the vertex and align one ray with the 0° mark. The other ray points to the angle's measure on the protractor's scale. Here, one ray aligns with 0°, and the other points to 45°, so the angle measures 45°.
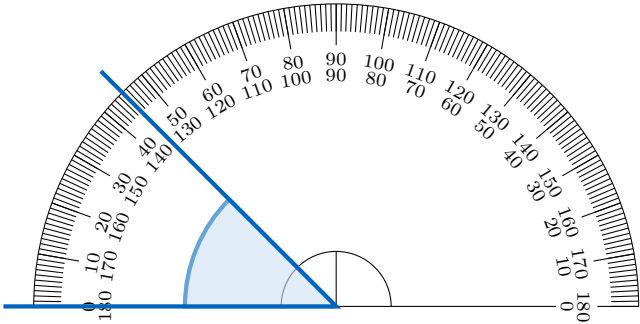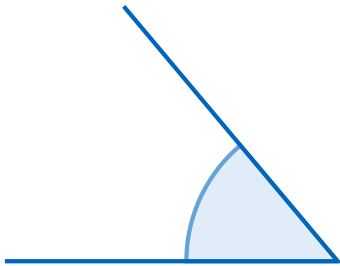
C.2 MEASURING ANGLES

MCQ 18: Using a protractor, find the measure of the angle shown.

☐ 30°

☒ 50°

☐ 90°

☐ 130°

Answer: To measure an angle with a protractor, place its center on the vertex and align one ray with the 0° mark. The other ray points to the angle's measure on the protractor's scale.

Here, one ray aligns with 0°, and the other points to 50°, so the angle measures 50°.

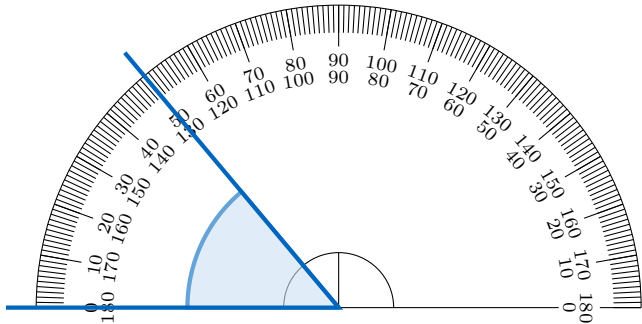**MCQ 19:** Using a protractor, find the measure of the angle shown.
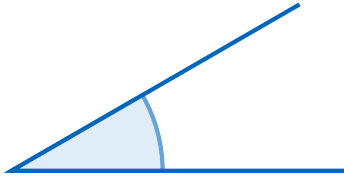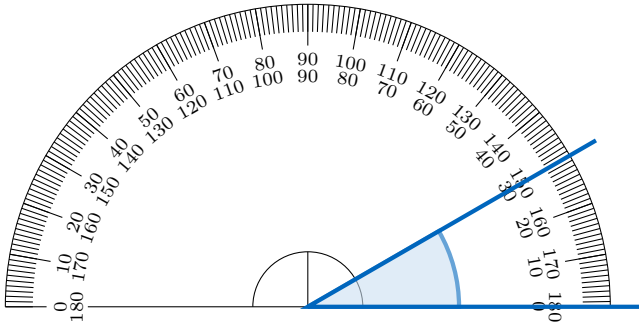

☒ 30°

☐ 50°

☐ 90°

☐ 130°

Answer: To measure an angle with a protractor, place its center on the vertex and align one ray with the 0° mark. The other ray points to the angle's measure on the protractor's scale.

Here, one ray aligns with 0°, and the other points to 30°, so the angle measures 30°.

MCQ 20: Using a protractor, find the measure of the angle shown.
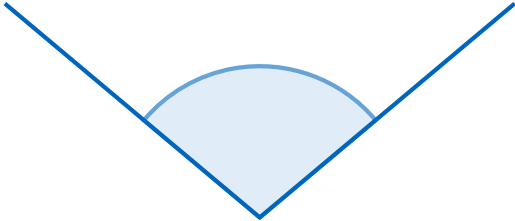
- ☐ 30°
- ☐ 50°
- ☒ 100°
- ☐ 130°

Answer: To measure an angle with a protractor, place its center on the vertex and align one ray with the 0° mark. The other ray points to the angle's measure on the protractor's scale.

Here, one ray aligns with 0°, and the other points to 100°, so the angle measures 100°.

MCQ 21: Using a protractor, find the measure of the angle shown.

- ☐ 30°
- ☐ 50°
- ☒ 90°
- ☐ 130°

Answer: To measure an angle with a protractor, place its center on the vertex and align one ray with the 0° mark. The other ray points to the angle's measure on the protractor's scale.
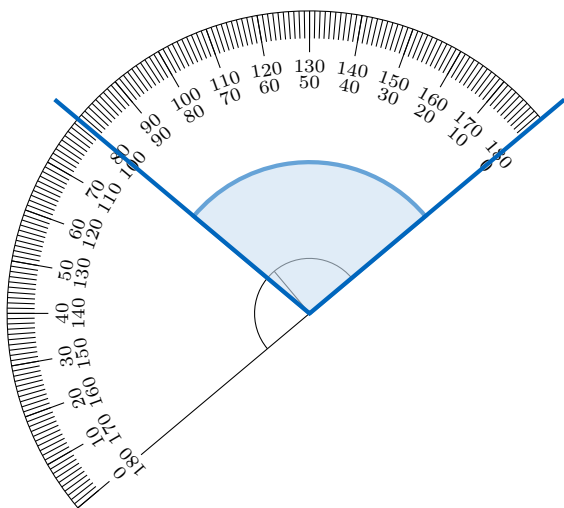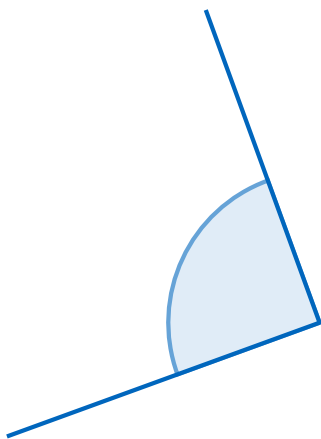
Here, one ray aligns with 0°, and the other points to 90°, so the angle measures 90°.

MCQ 22: Using a protractor, find the measure of the angle shown.

- ☐ 30°
- ☐ 50°
- ☐ 90°
- ☒ 120°

Answer: To measure an angle with a protractor, place its center on the vertex and align one ray with the 0° mark. The other ray points to the angle's measure on the protractor's scale.
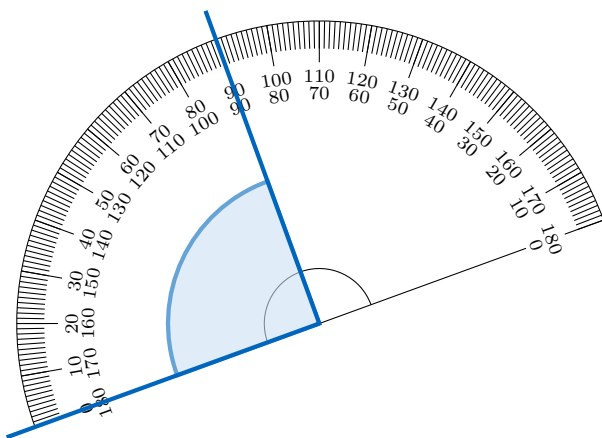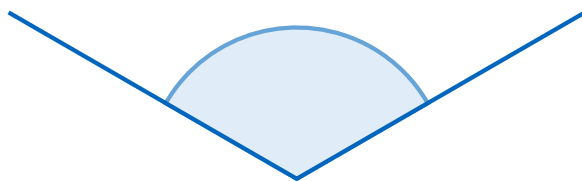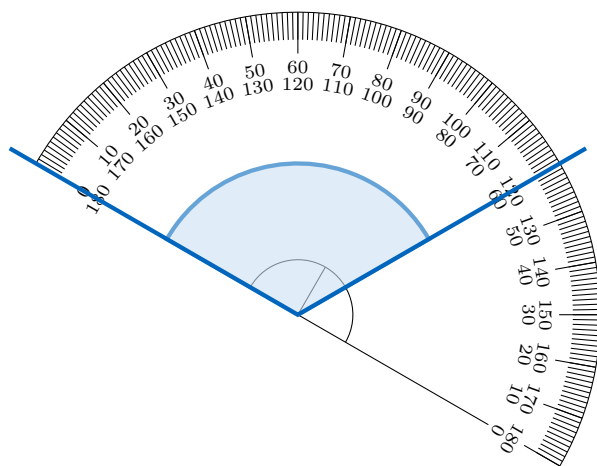
Here, one ray aligns with 0°, and the other points to 120°, so the angle measures 120°.
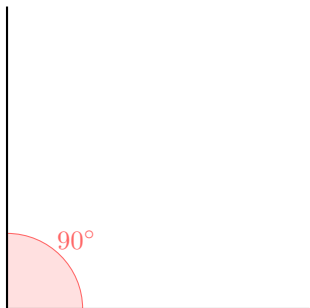
C.3 CONSTRUCTING ANGLES

Ex 23: Using a pencil, a ruler, and a protractor, draw an angle that measures 90°.

Answer: To draw a 90° angle:

1. Draw a ray using a ruler to create the first side of the angle.

2. Place the protractor's center on the endpoint of the ray (the vertex) and align the baseline with the ray at 0°.

3. Mark a point at 90° on the protractor's scale.

4. Remove the protractor and use the ruler to draw a second ray from the vertex through the marked point.

The resulting angle measures 90°, as shown below.

Ex 24: Using a pencil, a ruler, and a protractor, draw an angle that measures 60°.

Answer: To draw a 60° angle:

1. Draw a ray using a ruler to create the first side of the angle.

2. Place the protractor's center on the endpoint of the ray (the vertex) and align the baseline with the ray at 0°.

3. Mark a point at 60° on the protractor's scale.

4. Remove the protractor and use the ruler to draw a second ray from the vertex through the marked point.
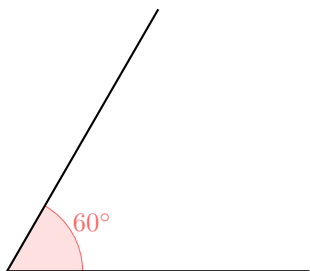
The resulting angle measures 60°, as shown below.

Ex 25: Using a pencil, a ruler, and a protractor, draw an angle that measures 120°.

Answer: To draw a 120° angle:

1. Draw a ray using a ruler to create the first side of the angle.

2. Place the protractor's center on the endpoint of the ray (the vertex) and align the baseline with the ray at 0°.

3. Mark a point at 120° on the protractor's scale.

4. Remove the protractor and use the ruler to draw a second ray from the vertex through the marked point.

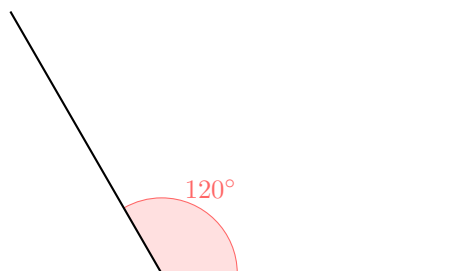The resulting angle measures 120°, as shown below.

Ex 26: Using a pencil, a ruler, and a protractor, draw an angle that measures 45°.

Answer: To draw a 45° angle:

1. Draw a ray using a ruler to create the first side of the angle.

2. Place the protractor's center on the endpoint of the ray (the vertex) and align the baseline with the ray at 0°.

3. Mark a point at 45° on the protractor's scale.

4. Remove the protractor and use the ruler to draw a second ray from the vertex through the marked point.
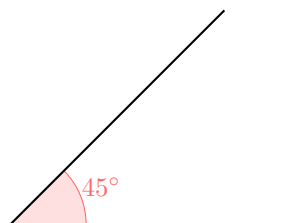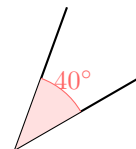
The resulting angle measures 45°, as shown below.

D CLASSIFICATION OF ANGLES

D.1 IDENTIFYING ANGLE TYPES BY MEASURE

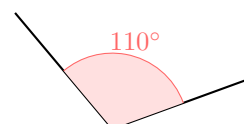**MCQ 27:** What is the nature of the marked angle?

Choose one answer:

☒ Acute angle

☐ Right angle

☐ Obtuse angle

☐ Straight angle

Answer:

- An acute angle measures less than 90 degrees.

- The marked angle, measuring 40°, is acute because it is less than 90°.

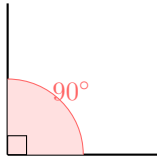**MCQ 28:** What is the nature of the marked angle?

Choose one answer:

☐ Acute angle

☐ Right angle

☒ Obtuse angle

☐ Straight angle

Answer:

- An obtuse angle measures more than 90 degrees but less than 180 degrees.

- The marked angle, measuring 110°, is obtuse because it is between 90° and 180°.

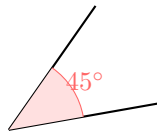**MCQ 29:** What is the nature of the marked angle?

90°

Choose one answer:

☐ Acute angle

☒ Right angle

☐ Obtuse angle

☐ Straight angle

Answer:

- A right angle measures exactly 90 degrees.

- The marked angle, measuring 90°, is a right angle.

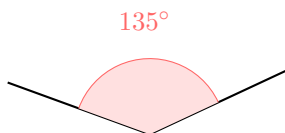**MCQ 30:** What is the nature of the marked angle?

45°

Choose one answer:

☒ Acute angle

☐ Right angle

☐ Obtuse angle

☐ Straight angle

Answer:

- An acute angle measures less than 90 degrees.

- The marked angle, measuring 45°, is acute because it is less than 90°.

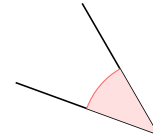**MCQ 31:** What is the nature of the marked angle?

135°

Choose one answer:

☐ Acute angle

☐ Right angle

☒ Obtuse angle

☐ Straight angle

Answer:

- An obtuse angle measures more than 90 degrees but less than 180 degrees.

- The marked angle, measuring 135°, is obtuse because it is between 90° and 180°.

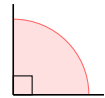**MCQ 32:** Identify the type of the highlighted angle.

Choose one answer:

☒ acute angle
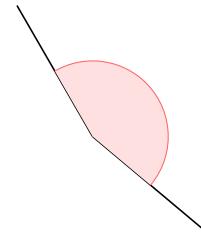
☐ right angle

☐ obtuse angle

☐ straight angle

Answer:

- An acute angle measures less than 90°.

- The highlighted angle ($\approx 40°$) is less open than a right angle

.

- Hence it is **acute**.

MCQ 33: Identify the type of the highlighted angle.

Choose one answer:

☐ acute angle

☐ right angle

☒ obtuse angle

☐ straight angle

Answer:

- An obtuse angle measures between 90° and 180°.

- The highlighted angle ($\approx 160°$) is more open than a right

angle but less than a straight angle .

- Therefore it is **obtuse**.

MCQ 34: Identify the type of the highlighted angle.

Choose one answer:

☐ acute angle

☐ right angle

☐ obtuse angle

☒ straight angle

Answer:

- A straight angle measures exactly 180°.
- The highlighted angle forms a line.
- It is therefore **straight**.

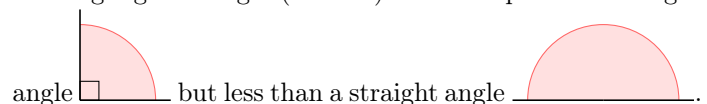**MCQ 35:** Identify the type of the highlighted angle.

Choose one answer:

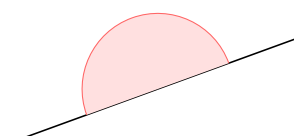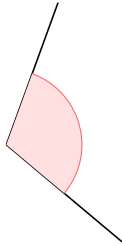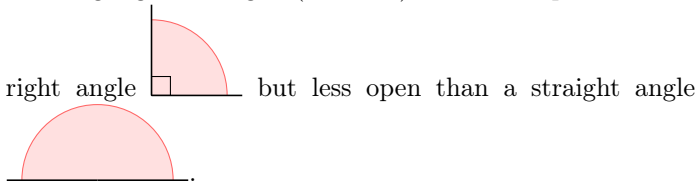☐ acute angle

☐ right angle

☒ obtuse angle

☐ straight angle

Answer:

- An obtuse angle measures between 90° and 180°.
- The highlighted angle ($\approx$ 110°) is more open than a right angle but less open than a straight angle .
- Therefore it is **obtuse**.

D.3 CONSTRUCTING ANGLE TYPES

Ex 36: Using a pencil, a ruler, and a protractor, draw an acute angle.

Answer: To draw an acute angle, such as a 40° angle:

1. Draw a ray using a ruler to create the first side of the angle.
2. Place the protractor's center on the endpoint of the ray (the vertex) and align the baseline with the ray at 0°.
3. Mark a point at 40° on the protractor's scale (any angle less than 90° is acceptable).
4. Remove the protractor and use the ruler to draw a second ray from the vertex through the marked point.

The resulting angle is acute, measuring less than 90°, as shown below.
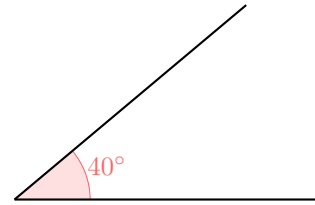
Ex 37: Using a pencil, a ruler, and a protractor, draw an obtuse angle.

Answer: To draw an obtuse angle, such as a 120° angle:

1. Draw a ray using a ruler to create the first side of the angle.
2. Place the protractor's center on the endpoint of the ray (the vertex) and align the baseline with the ray at 0°.
3. Mark a point at 120° on the protractor's scale (any angle greater than 90° but less than 180° is acceptable).
4. Remove the protractor and use the ruler to draw a second ray from the vertex through the marked point.

The resulting angle is obtuse, measuring greater than 90° but less than 180°, as shown below.
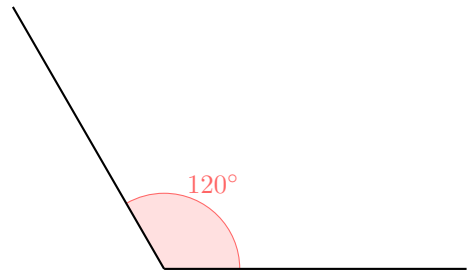
Ex 38: Using a pencil, a ruler, and a protractor, draw a right angle.

Answer: To draw a right angle, which measures 90°:

1. Draw a ray using a ruler to create the first side of the angle.
2. Place the protractor's center on the endpoint of the ray (the vertex) and align the baseline with the ray at 0°.
3. Mark a point at 90° on the protractor's scale.
4. Remove the protractor and use the ruler to draw a second ray from the vertex through the marked point.

The resulting angle is a right angle, measuring exactly 90°, as shown below.