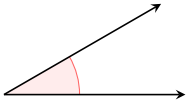
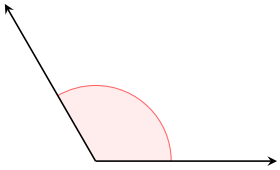
ANGLES

A DEFINITION

A.1 COMPARING ANGLES

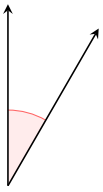
MCQ 1: Which angle has the greater measure?

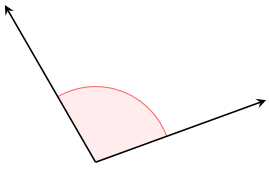
☐ Angle A: 

☒ 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.

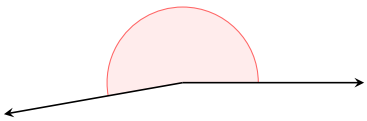
MCQ 2: Which angle has the greater measure?

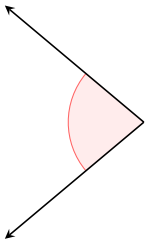
☐ Angle A: 

☒ 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.

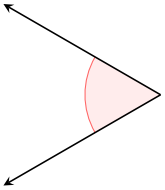
MCQ 3: Which angle has the greater measure?

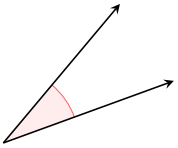
☒ Angle A: 

☐ 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.

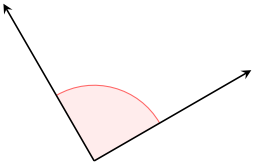
MCQ 4: Which angle has the greater measure?

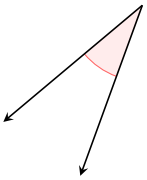
☒ Angle A: 

☐ 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: 

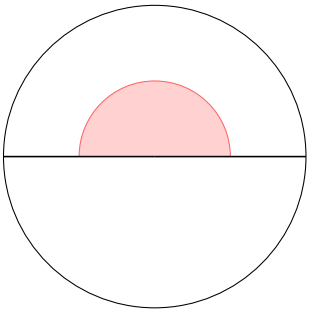
☐ Angle B: 

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:

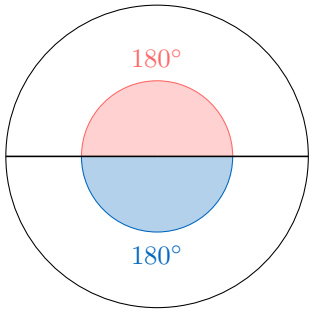


One-half of a full turn measures $\boxed{180}$°.

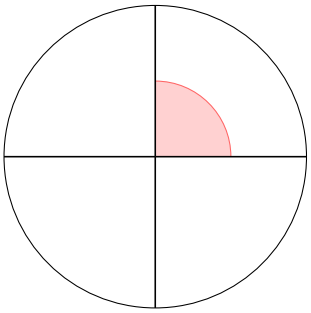
Answer:

$$\begin{aligned}\text{One-half of a full turn} &= \frac{1}{2} \times 360^\circ \\ &= 360^\circ \div 2 \\ &= 180^\circ\end{aligned}$$

$$\begin{array}{r|l} & 180 \\ \hline 2 & 360 \\ & 2 \\ \hline & 16 \\ & 16 \\ \hline & 00 \end{array}$$



Ex 7:

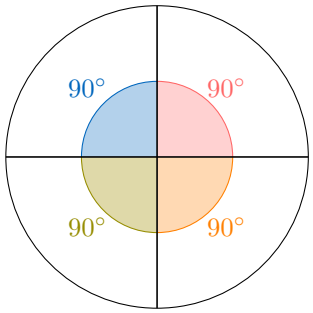


One-quarter of a full turn measures $\boxed{90}$°.

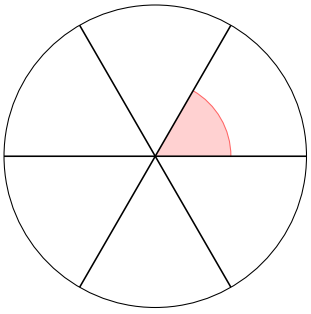
Answer:

$$\begin{aligned} \text{One-quarter of a full turn} &= \frac{1}{4} \times 360^\circ \\ &= 360^\circ \div 4 \\ &= 90^\circ \end{aligned}$$

$$\begin{array}{r|l} & 90 \\ \hline 4 & 360 \\ & 36 \\ \hline & 00 \end{array}$$



Ex 8:

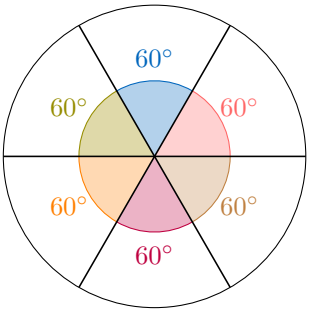


One-sixth of a full turn measures $\boxed{60}$°.

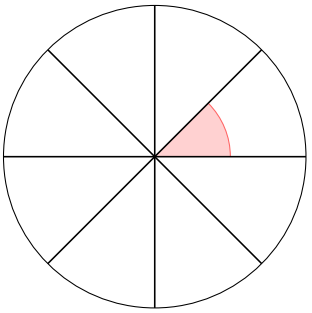
Answer:

$$\begin{aligned} \text{One-sixth of a full turn} &= \frac{1}{6} \times 360^\circ \\ &= 360^\circ \div 6 \\ &= 60^\circ \end{aligned}$$

$$\begin{array}{r|l} & 60 \\ \hline 6 & 360 \\ & 36 \\ \hline & 00 \end{array}$$



Ex 9:

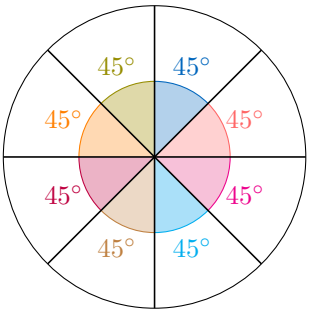


One-eighth of a full turn measures $\boxed{45}$°.

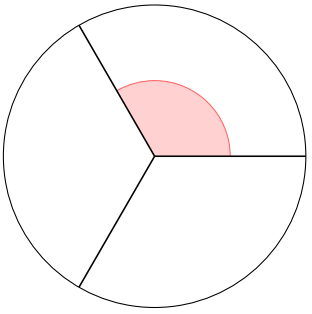
Answer:

$$\begin{aligned} \text{One-eighth of a full turn} &= \frac{1}{8} \times 360^\circ \\ &= 360^\circ \div 8 \\ &= 45^\circ \end{aligned}$$

$$\begin{array}{r|l} & 45 \\ \hline 8 & 360 \\ & 32 \\ \hline & 40 \\ & 40 \\ \hline & 0 \end{array}$$



Ex 10:

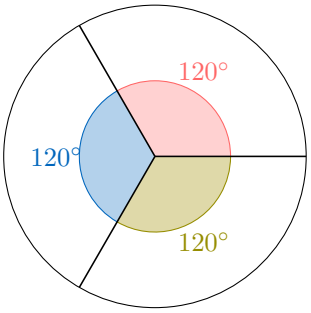


One-third of a full turn measures $\boxed{120}$°.

Answer:

$$\begin{aligned} \text{One-third of a full turn} &= \frac{1}{3} \times 360^\circ \\ &= 360^\circ \div 3 \\ &= 120^\circ \end{aligned}$$

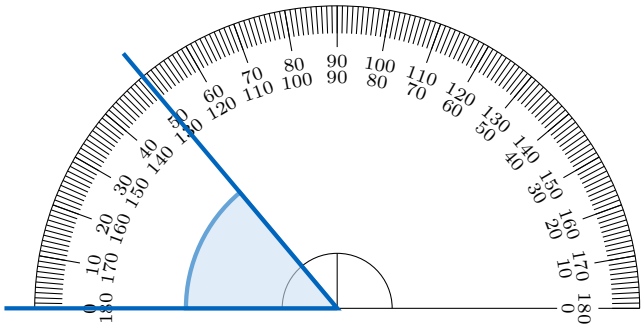
$$\begin{array}{r} 120 \\ 3\overline{)360} \\ \underline{3} \\ 06 \\ \underline{6} \\ 00 \end{array}$$



C MEASURING AND DRAWING ANGLES WITH A PROTRACTOR

C.1 MEASURING ANGLES

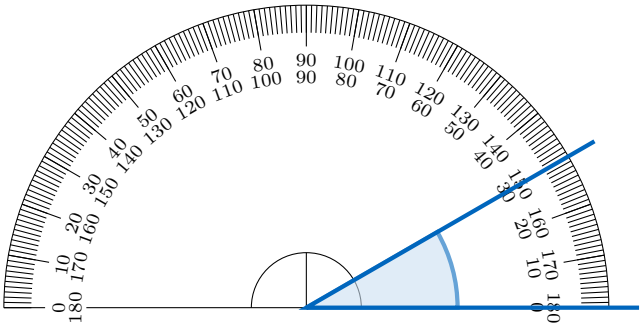
Ex 11:



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°.

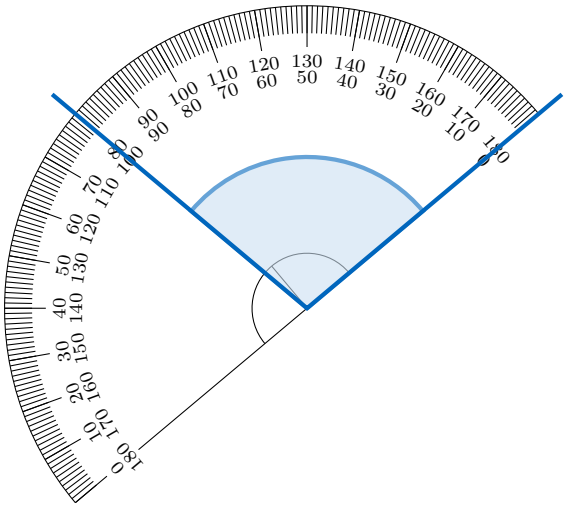
Ex 12:



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°.

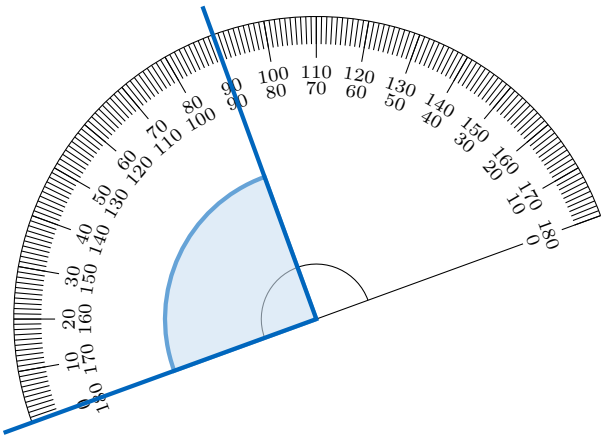
Ex 13:



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°.

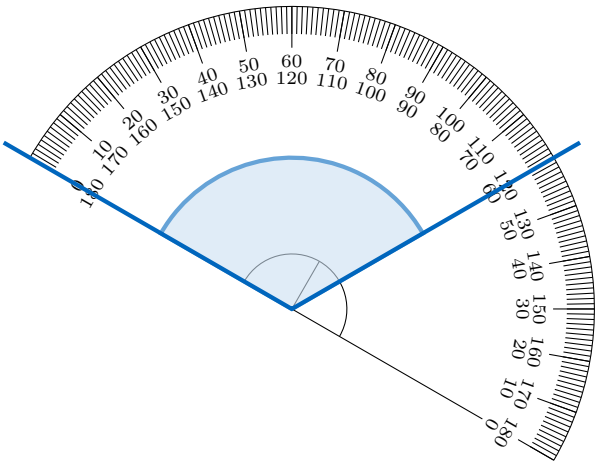
Ex 14:



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°.

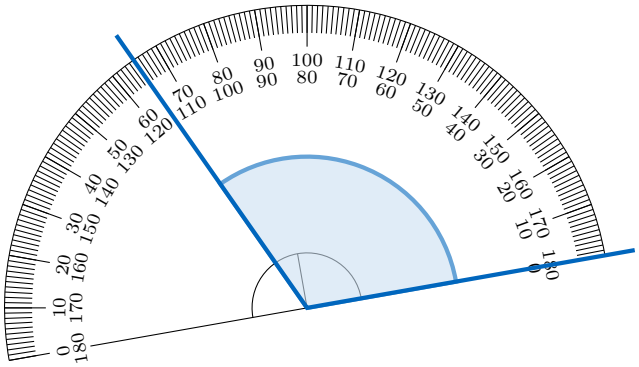
Ex 15:



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°.

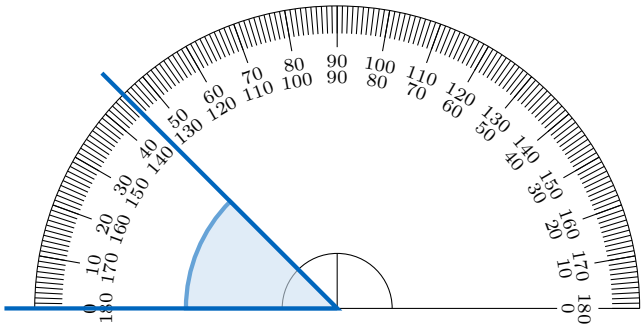
Ex 16:



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:

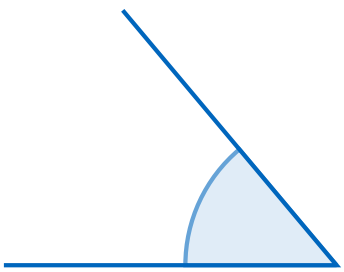


The angle shown measures $\boxed{45}$°.

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.



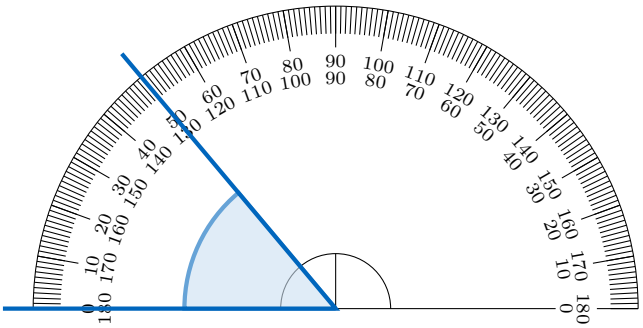
☐ 30°

☒ 50°

☐ 90°

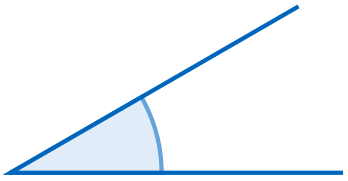
☐ 130°

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.



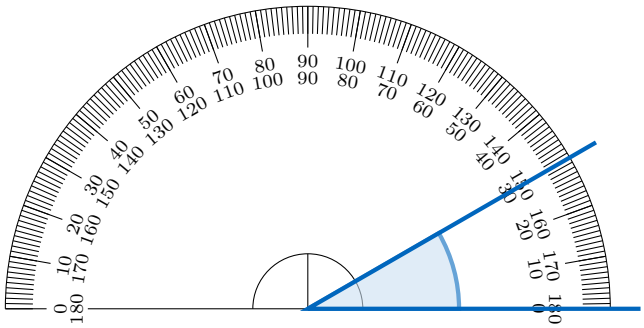
☒ 30°

☐ 50°

☐ 90°

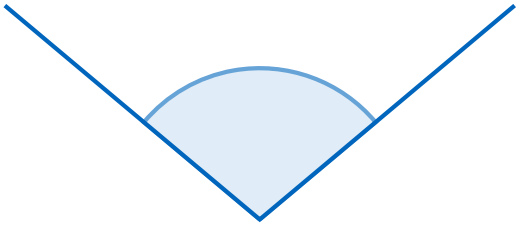
☐ 130°

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.



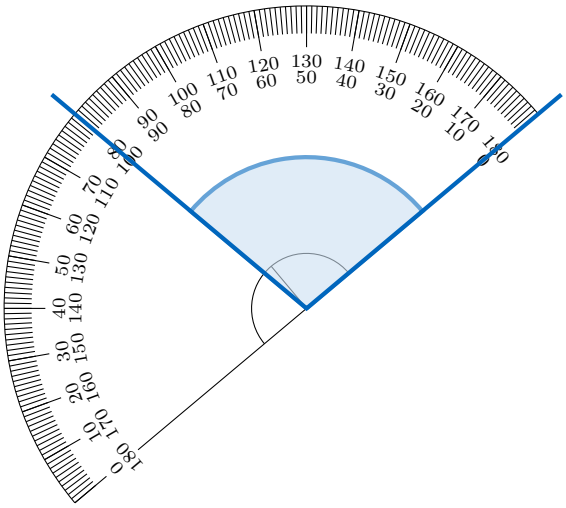
☐ 30°

☐ 50°

☒ 100°

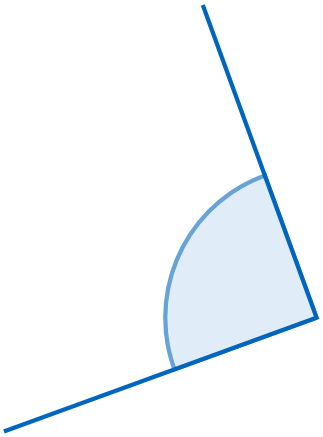
☐ 130°

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.



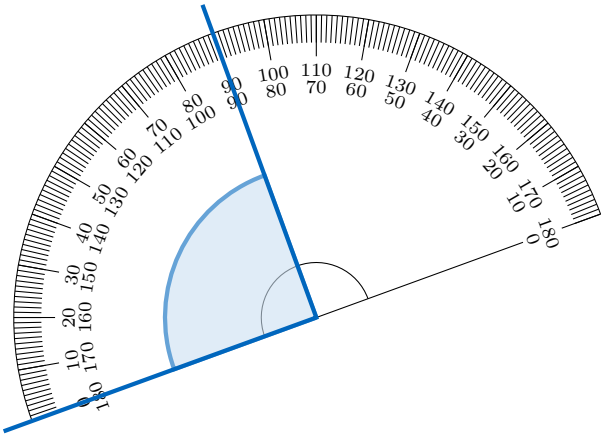
☐ 30°

☐ 50°

☒ 90°

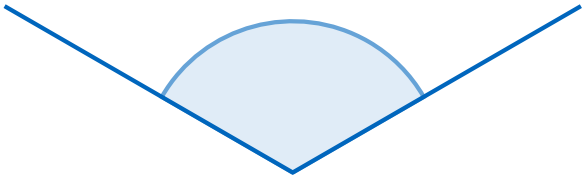
☐ 130°

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.



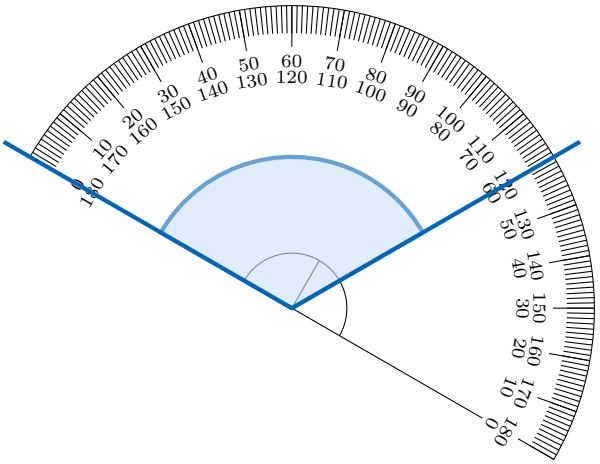
☐ 30°

☐ 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

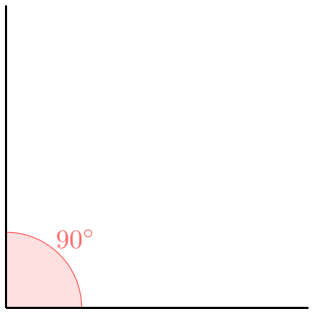
Ex 23: Using a pencil, a ruler, and a protractor, draw an angle that measures 90°.

Students should draw two rays forming 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.



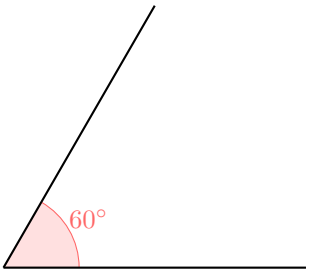
Ex 24: Using a pencil, a ruler, and a protractor, draw an angle that measures 60°.

Students should draw two rays forming 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.



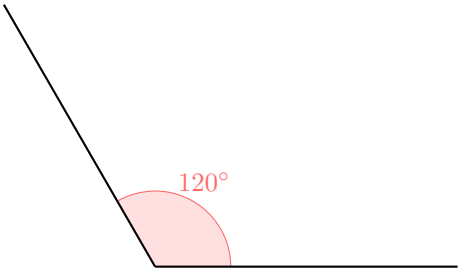
Ex 25: Using a pencil, a ruler, and a protractor, draw an angle that measures 120°.

Students should draw two rays forming 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°.

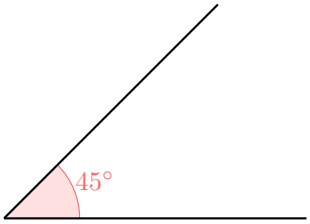
Students should draw two rays forming an angle that measures 45°.

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.

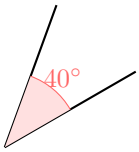
The resulting angle measures 45°, as shown below.



D CLASSIFICATION OF ANGLES

D.1 IDENTIFYING ANGLE TYPES BY MEASURE

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



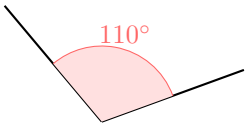
Choose one answer:

- ☒ 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?



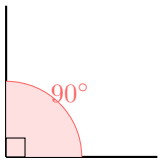
Choose one answer:

- ☐ 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?



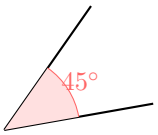
Choose one answer:

- ☐ 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?



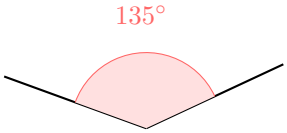
Choose one answer:

- ☒ 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?



Choose one answer:

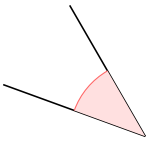
- ☐ Acute angle
- ☐ Right angle
- ☒ Obtuse angle
- ☐ Straight angle

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°.

D.2 IDENTIFYING ANGLE TYPES

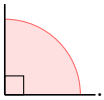
MCQ 32: Identify the type of the highlighted angle.



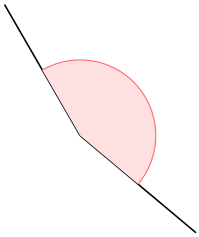
Choose one answer:

- ☒ acute angle
- ☐ right angle
- ☐ obtuse angle
- ☐ straight angle

Answer:

- An acute angle measures less than 90°.
- The highlighted angle (≈ 40°) is less open than a right angle  .
- Hence it is **acute**.

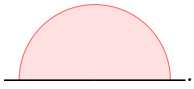
MCQ 33: Identify the type of the highlighted angle.



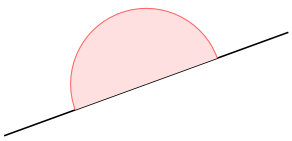
Choose one answer:

- ☐ acute angle
- ☐ right angle
- ☒ obtuse angle
- ☐ straight angle

Answer:

- An obtuse angle measures between 90° and 180°.
- The highlighted angle (≈ 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.



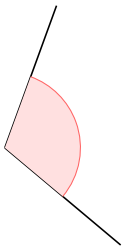
Choose one answer:

- ☐ 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**.

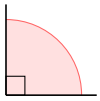
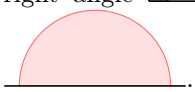
MCQ 35: Identify the type of the highlighted angle.



Choose one answer:

- ☐ acute angle
- ☐ right angle
- ☒ obtuse angle
- ☐ straight angle

Answer:

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

D.3 CONSTRUCTING ANGLE TYPES

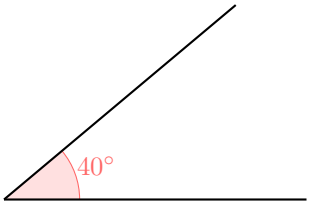
Ex 36: Using a pencil, a ruler, and a protractor, draw an acute angle.

Students should draw two rays forming an angle that measures less than 90°.

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.



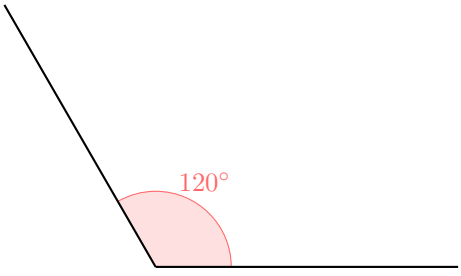
Ex 37: Using a pencil, a ruler, and a protractor, draw an obtuse angle.

Students should draw two rays forming an angle that measures greater than 90° but less than 180°.

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.

Students should draw two rays forming an angle that measures exactly 90°.

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.