ADJACENT ANGLES

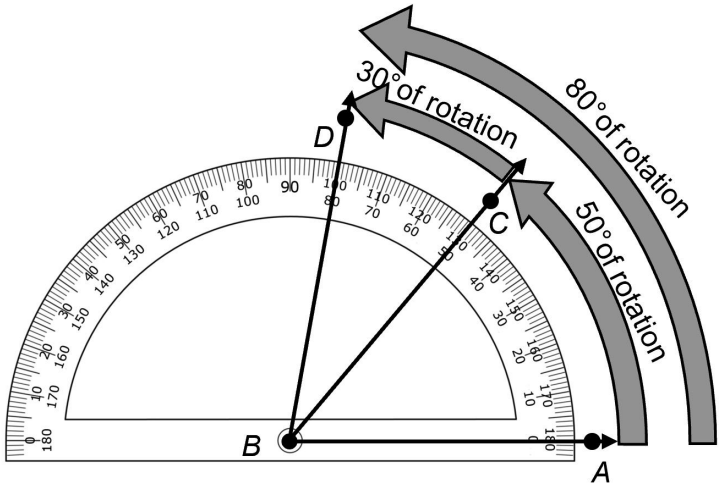
4.7E

The student is expected to determine the measure of an unknown angle formed by two non-overlapping adjacent angles given one or both angle measures.

TELL ME MORE...

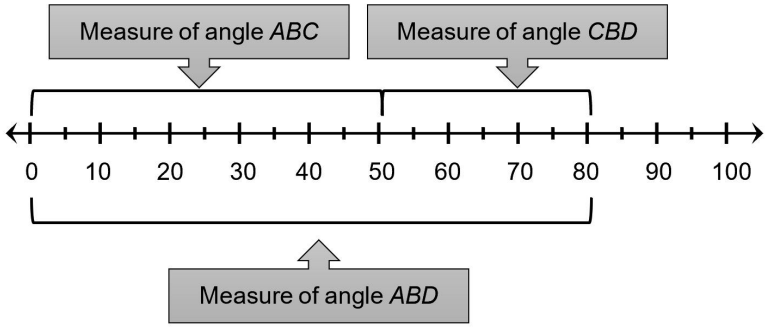
An **angle** is the amount of rotation around a point, called the **vertex**, from one **ray** to another. Angles also describe a rotation between lines or line segments.

Two angles are **adjacent angles** if they share a common ray and have the same vertex. In the diagram, angle *ABC* and angle *CBD* are adjacent angles because they share ray *BC* and vertex *B*.

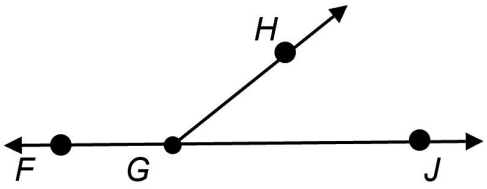


The measure of angle *ABC* is 50°, meaning that there is 50° of rotation about point *B* from ray *BA* to ray *BC*. The measure of angle *CBD* is 30°, meaning that there is 30° of rotation about point *B* from ray *BC* to ray *BD*.

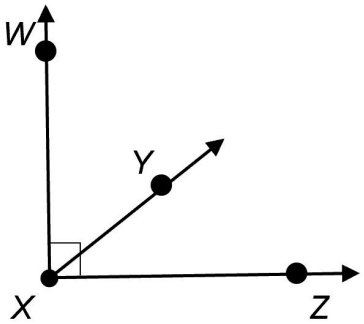
The measure of the largest angle, *ABD*, is the sum of the two non-overlapping adjacent angles: angle *ABC* and angle *CBD*. You can illustrate this relationship on a number line.



Supplementary angles are two angles whose measures add up to 180°. If two adjacent angles form a straight line, then they are supplementary.

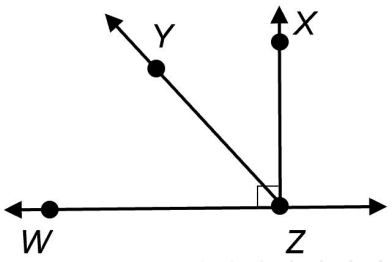


Complementary angles are two angles whose measures add up to 90°. If two adjacent angles form a right angle, then they are complementary.



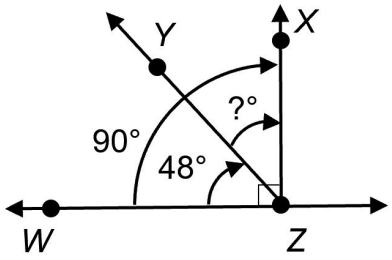
EXAMPLES

EXAMPLE 1: Angle *WZY* and angle *YZX* have a combined measure of 90°. The measure of angle *WZY* is 48 degrees. What is the measure of angle *YZX* in degrees? Record your answer and fill in the bubbles. Be sure to use the correct place value.



STEP 1 Label the figure with the known angle measures.

- The measure of angle *WZY* is 48°.
- The measure of angle *WZX*, the combined angle from the two adjacent angles, is 90°.



STEP 2 Use a strip diagram to relate the angle measures.

measure of angle *WZY* = 48°	measure of angle *YZX* = ?°
measure of angle *WZX* = 90°	

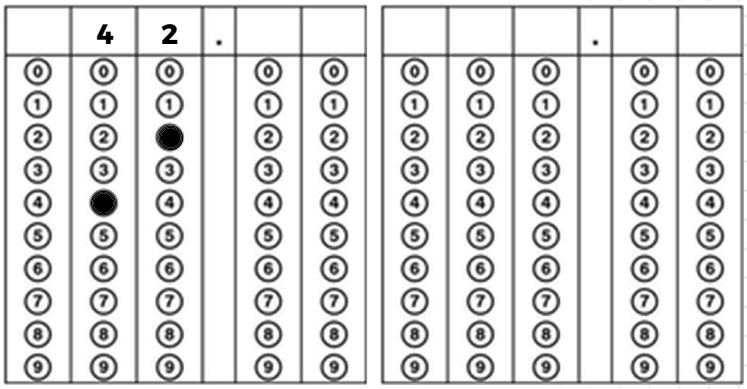
STEP 3 Use the strip diagram to solve for the missing value.

- 48°+ ?° = 90°, so the missing value is 90 – 48 = 42.

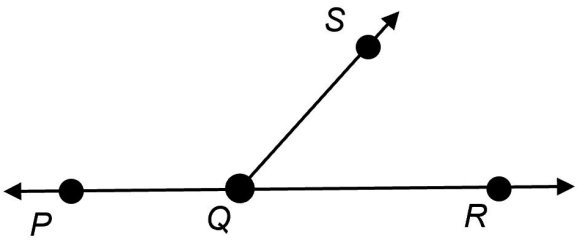
The measure of angle *YZX* = 42˚.

STEP 4 Since the question is a gridded response question, enter your response on the grid provided. Practice using the grid with the instructions.

1. Record a 4 in the tens column.
   Record a 2 in the ones column.
2. Bubble **4** beneath the numeral 4.
   Bubble **2** beneath the numeral 2

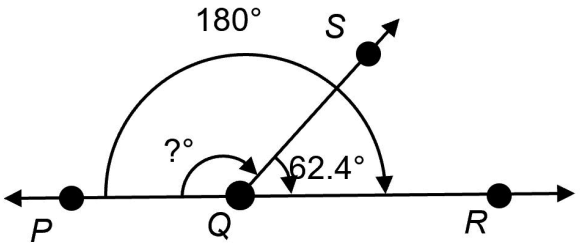


EXAMPLE 2: In the diagram, angle *PQS* and angle *SQR* are supplementary. If the measure of angle *SQR* is 62.4°, what is the measure of angle *PQS*?



STEP 1 Label the figure with the known angle measures.

- The measure of angle *SQR* is 62.4°.
- The measure of angle *PQR*, the combined angle from the two adjacent angles, is 180°.



STEP 2 Use a strip diagram to write an equation relating the angle measures.

measure of angle *PQS* = ?°	measure of angle *SQR* = 62.4°
measure of angle *PQR* = 180°	

? + 62.4 = 180

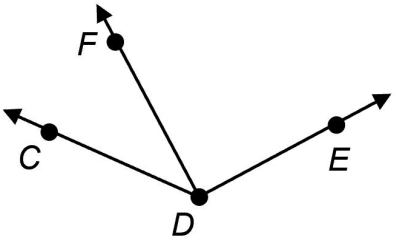
STEP 3 Use the equation to solve for the missing value.

- ?° + 62.4° = 180°, so the missing value is 180 – 62.4 = 117.6.

$$\begin{array}{r} {}^{7}1{}^{9}8{}^{10}0.0 \\ -\ 62.4 \\ \hline 117.6 \end{array}$$

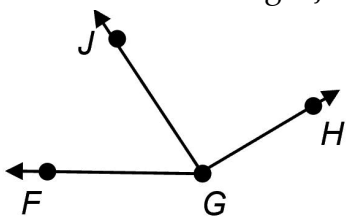
The measure of angle *PQS* = 117.6°.

EXAMPLE 3: Angle *CDF* has a measure of 28° and angle *FDE* is a right angle. What is the measure of angle *CDE*?



YOU TRY IT!

Angle *FGJ* has a measure of 67° and angle *FGH* has a measure of 162°. What is the measure of angle *JGH*?

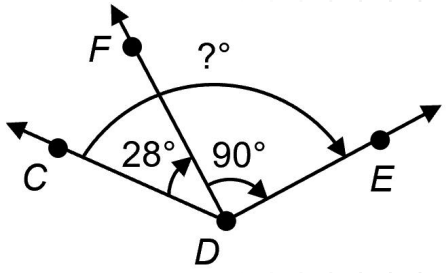


Fill in the blanks with the appropriate angle measures or a ? for the missing value.

_____ + _____ = _____

2. Use addition or subtraction to determine the missing value.

STEP 1 Label the figure with the known angle measures.



- The measure of angle *CDF* is 28°.
- Angle *FDE* is a right angle, so the measure of angle *FDE* is 90°.

STEP 2 Write an equation relating the angle measures.

- Angle *CDF* and angle *FDE* are adjacent, non-overlapping angles.
- The sum of their measures is equal to the measure of the combined angle, *CDE*.

28 + 90 = ?

STEP 3 Use the equation to solve for the missing value.

- 28 + 90 = ?, so the missing value is 28 + 90 = 118.

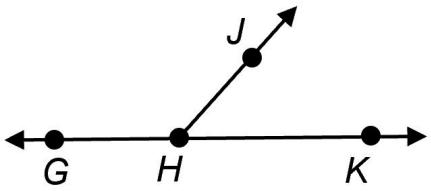
$$\begin{array}{r} 28 \\ +\ 90 \\ \hline 118 \end{array}$$

The measure of angle *CDE* = 118˚.

PRACTICE

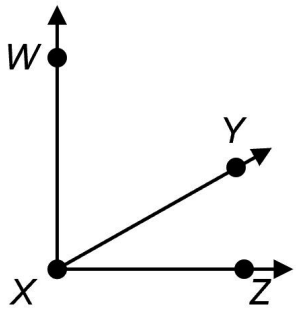
For questions 1-6, determine the measure of the missing angle.

1. Angle *GHJ* and angle *JHK* are supplementary. The measure of angle *GHJ* is 122°.



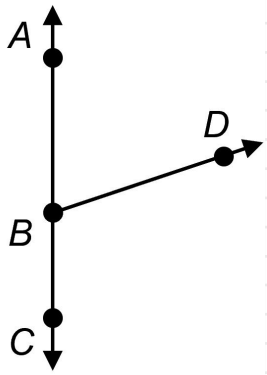
The measure of angle *JHK* is _____°.

2. Angle *WXY* and angle *YXZ* are complementary. The measure of angle *YXZ* is 27°.



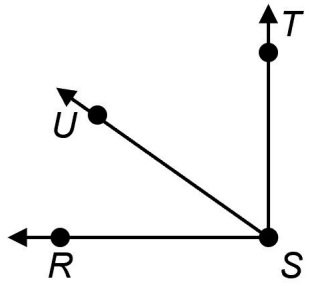
The measure of angle *WXY* is _____°.

3. Angle *ABD* and angle *DBC* have a combined measure of 180°. The measure of angle *ABD* is 82.4°.



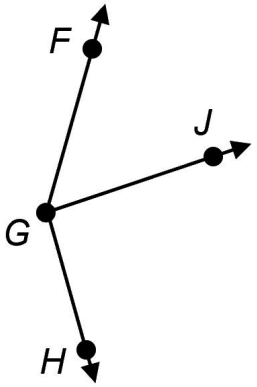
The measure of angle *DBC* is _____°.

4. Angle *RST* is a right angle. The measure of angle *UST* is 51.8°.



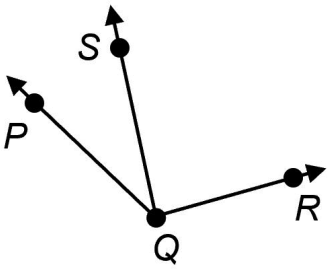
The measure of angle *RSU* is _____°.

5. The measure of angle *FGH* is 162°. The measure of angle *JGH* is 92°.



The measure of angle *FGJ* is _____°.

6. The measure of angle *PQS* is 22.5°. Angle *SQR* is a right angle.



The measure of angle *PQR* is _____°.

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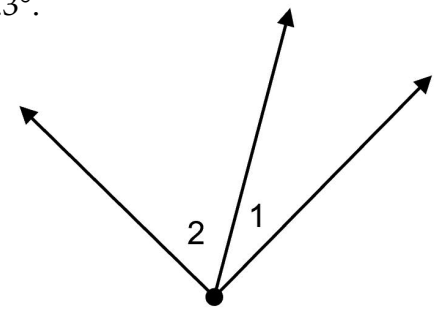
7. Angles 1 and 2 in the diagram form a right angle. The measure of angle 1 is 31.3°.



What is the measure of angle 2 in degrees? Record your answer and fill in the bubbles. Be sure to use the correct place value?

			.		
⓪	⓪	⓪		⓪	⓪
①	①	①		①	①
②	②	②		②	②
③	③	③		③	③
④	④	④		④	④
⑤	⑤	⑤		⑤	⑤
⑥	⑥	⑥		⑥	⑥
⑦	⑦	⑦		⑦	⑦
⑧	⑧	⑧		⑧	⑧
⑨	⑨	⑨		⑨	⑨

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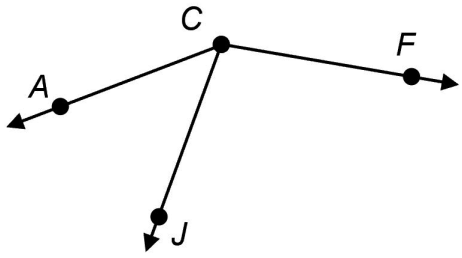
8. Angle *ACJ* has a measure of 51°. Angle *FCJ* has a measure of 118°. What is the measure of angle *ACF*?



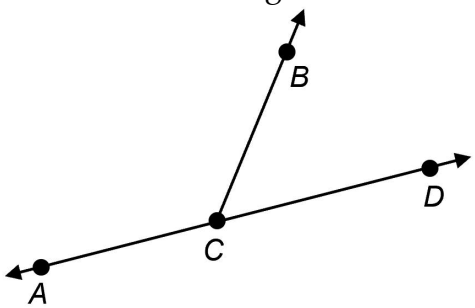
A 169°

B 129°

C 67°

D 39°

9. Angle *ACB* and angle *BCD* have a combined measure of 180°. The measure of angle *ACB* is 115.7°. What is the measure of angle *BCD*?



F 64.3°

G 25.7°

H 64.7°

J Not here