Name_____ Date_____

1.6 Enrichment and Extension

Radian Measures of Complementary and Supplementary Angles

A *radian* is a standard unit of measure used to measure angles. The conversion from degrees to radians is $180° = \pi$ radians.

Example 1: Convert the sum of complementary and supplementary angles into radians.

Solution: $90° \bullet \frac{\pi \text{ radians}}{180°} = \frac{\pi}{2} \text{ radians}$ Complementary angles sum to $\frac{\pi}{2}$ radians.

$180° \bullet \frac{\pi \text{ radians}}{180°} = \pi \text{ radians}$ Supplementary angles sum to π radians.

Example 2: Determine whether $\frac{3\pi}{8}$ and $\frac{\pi}{4}$ are *complementary*, *supplementary*, or *neither*.

Solution: $\frac{\pi}{4} \bullet \left(\frac{2}{2}\right) = \frac{2\pi}{8}$ Multiply by an identity to get the LCD.

$\frac{2\pi}{8} + \frac{3\pi}{8} = \frac{5\pi}{8}$ Add the two measurements.

The sum of $\frac{5\pi}{8}$ does not equal $\frac{\pi}{2}$ or π, so the final answer is *neither*.

In Exercises 1–6, determine whether the two angles are *complementary, supplementary*, or *neither.*

1. $\frac{3\pi}{7}, \frac{4\pi}{7}$

2. $\frac{\pi}{4}, \frac{\pi}{4}$

3. $\frac{5\pi}{18}, \frac{5\pi}{9}$

4. $\frac{\pi}{8}, \frac{7\pi}{8}$

5. $\frac{\pi}{3}, \frac{\pi}{4}$

6. $\frac{6\pi}{15}, \frac{\pi}{10}$

In Exercises 7–12, find the angle complementary and supplementary to the given angle, if possible.

7. $\frac{12\pi}{15}$

8. $\frac{23\pi}{42}$

9. $\frac{3\pi}{17}$

10. $\frac{2\pi}{5}$

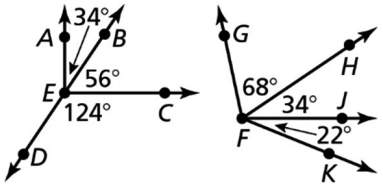
11. $\frac{17\pi}{42}$

12. $\frac{7\pi}{8}$

Name _____ Date _____

1.6 Extra Practice

In Exercises 1–3, use the diagrams.



1. Name a pair of adjacent complementary angles.
2. Name a pair of nonadjacent complementary angles.
3. Name a pair of nonadjacent supplementary angles.

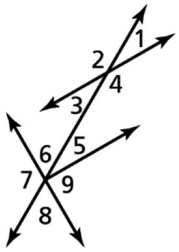
In Exercises 4 and 5, find the angle measure.

4. $\angle 1$ is a complement of $\angle 2$, and $m\angle 2 = 71°$. Find $m\angle 1$.
5. $\angle 3$ is a supplement of $\angle 4$, and $m\angle 4 = 26.7°$. Find $m\angle 3$.

In Exercises 6 and 7, find the measure of each angle.

6. $\angle ABC$ and $\angle CBD$ are supplementary angles, $m\angle ABC = 7x°$ and $m\angle CBD = 8x°$.
7. $\angle WXY$ and $\angle YXZ$ are complementary angles, $m\angle WXY = (2x + 5)°$, and $m\angle YXZ = (8x - 5)°$.

In Exercises 8–11, use the diagram.



8. Identify the linear pair(s) that include $\angle 2$.
9. Identify the linear pair(s) that include $\angle 8$.
10. Are $\angle 6$ and $\angle 8$ vertical angles? Explain your reasoning.
11. Are $\angle 7$ and $\angle 9$ vertical angles? Explain your reasoning.

In Exercises 12–14, write and solve an algebraic equation to find the measure of each angle described.

12. The measure of an angle is 9° more than twice its complement.
13. Two angles form a linear pair. The measure of one angle is four times the measure of the other angle.
14. Two angles form a linear pair. The measure of one angle is $51°$ more than $\frac{1}{2}$ the measure of the other angle.

In Exercises 15 and 16, tell whether the statement is *always*, *sometimes*, or *never* true. Explain your reasoning.

15. The sum of the measures of a linear pair of angles is $90°$.
16. The sum of the measures of a pair of vertical angles is $180°$.