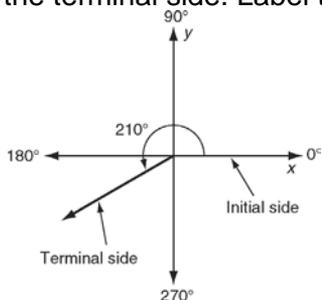Name _____ Date _____ Class _____

Reteach

Angles of Rotation

To draw an angle with a given measure, start with the initial side on the
*x*-axis and rotate the terminal side to show the angle measure.

> Label the angle measures on the axes to help locate the correct quadrant.

- Rotate *counterclockwise* for a positive angle measure.
- Rotate *clockwise* for a negative angle measure.

Draw a 210° angle. Start at the *x*-axis and rotate counterclockwise past 180° to 210°. Draw the terminal side. Label the angle.	Draw a −145° angle. Start at the *x*-axis and rotate clockwise past −90° to −145°. Draw the terminal side. Label the angle.
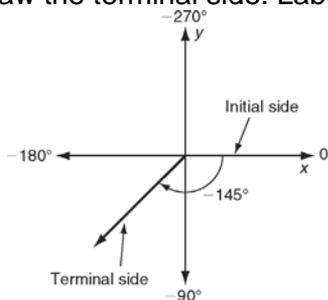
Coterminal angles are angles with the same initial and terminal sides.
You can find the measure of an angle that is coterminal with another angle
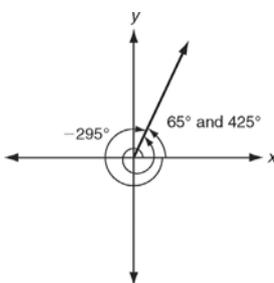by adding 360° to or subtracting 360° from the angle.

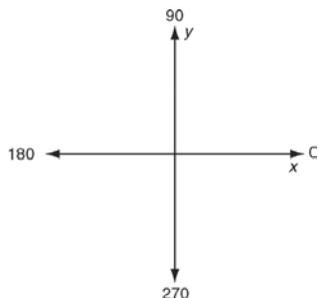> 360° is a complete rotation.

For $\theta = 65°$:

$65° + 360° = 425°$

$65° - 360° = -295°$
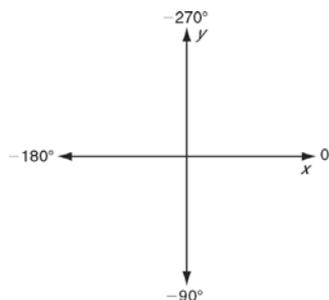
425° and −295° are coterminal with 65°.

Draw an angle with the given measure in standard position.

1. 150°

2. −330°

Find the measures of two angles that are coterminal with each angle.

3. 145°

$145° + 360° =$ _____

$145° - 360° =$ _____

4. −130°

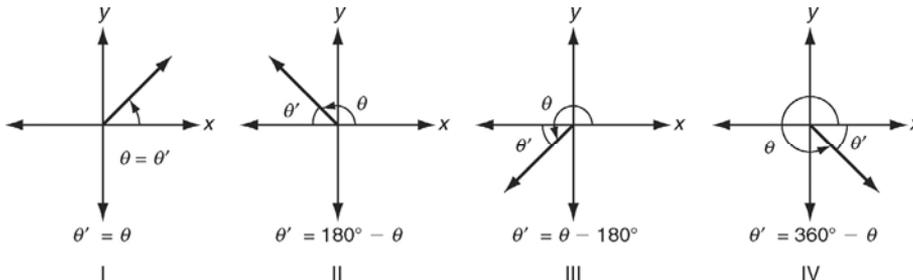_____

_____

5. 210°

_____

_____

LESSON **Reteach**
10-2
Angles of Rotation (continued)

The **reference angle** for an angle θ in standard position is the positive acute angle formed by the terminal side of θ and the *x*-axis.

Denote the reference angle for θ as θ'. The diagram shows the location of the reference angle in each quadrant.

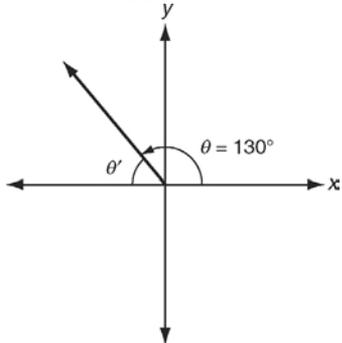| $\theta' = \theta$	$\theta' = 180° - \theta$	$\theta' = \theta - 180°$	$\theta' = 360° - \theta$
I	II	III	IV

To find the reference angle for an angle θ:
   • draw the angle in standard position,
   • find the reference angle formed by the terminal side of θ and the
     x-axis,
   • find the measure of θ'. $\qquad$ θ' is an acute angle so it is always less than 90°.

For $\theta = 130°$.

$\theta' = 180° - 130° = 50°$
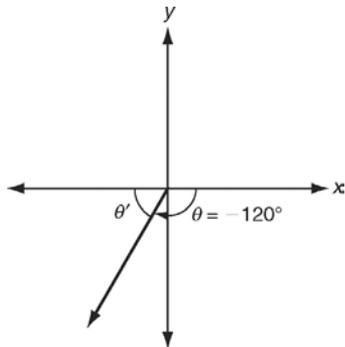The reference angle for 130° is 50°.

For $\theta = 225°$.

Draw θ.
Then use the axis to find the measure of θ'.
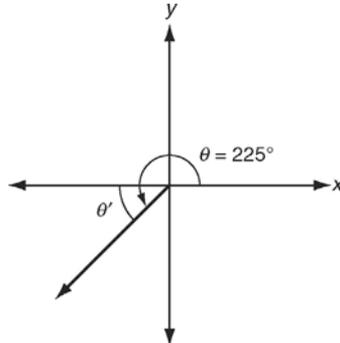
$\theta' = 225° - 180° = 45°$
The reference angle for 225° is 45°.

Find the measure of the reference angle for each angle.

6. $\theta = -120°$

7. $\theta = 315°$

8. $\theta = 110°$

$\theta' = 180° - 120° = $ _____   _____   _____

Holt McDougal Algebra 2
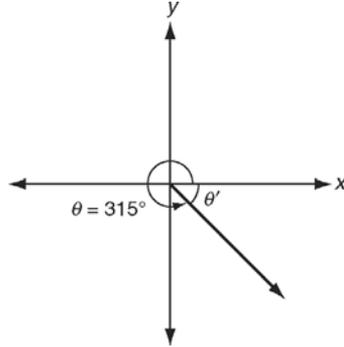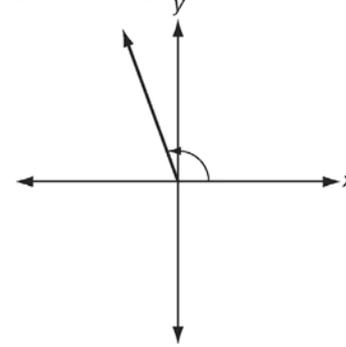
$\csc\theta = \dfrac{\sqrt{85}}{9}; \sec\theta = \dfrac{\sqrt{85}}{2}$

18. $\sin\theta = -\dfrac{5\sqrt{74}}{74}; \cos\theta = -\dfrac{7\sqrt{74}}{74}$

$\tan\theta = \dfrac{5}{7}; \cot\theta = \dfrac{7}{5};$

$\csc\theta = -\dfrac{\sqrt{74}}{5}; \sec\theta = -\dfrac{\sqrt{74}}{7}$

19. 8100°

Practice C

1. 40°, −320°   2. 360°, −720°

3. 70°, −290°   4. 207°, −153°

5. 196°, −524°   6. 718°, −2°

7. 36°   8. 28°

9. 91°   10. 54°

11. 20°   12. 13°

13. $\sin\theta = \dfrac{14\sqrt{197}}{197}; \cos\theta = -\dfrac{\sqrt{197}}{197};$

$\tan\theta = -14; \cot\theta = -\dfrac{1}{14};$

$\csc\theta = \dfrac{\sqrt{197}}{14}; \sec\theta = -\sqrt{197}$

14. $\sin\theta = -\dfrac{\sqrt{2}}{2}; \cos\theta = -\dfrac{\sqrt{2}}{2};$

$\tan\theta = 1; \cot\theta = 1;$

$\csc\theta = -\sqrt{2}; \sec\theta = -\sqrt{2}$

15. $\sin\theta = -\dfrac{2\sqrt{13}}{13}; \cos\theta = \dfrac{3\sqrt{13}}{13};$

$\tan\theta = -\dfrac{2}{3}; \cot\theta = -\dfrac{3}{2};$

$\csc\theta = -\dfrac{\sqrt{13}}{2}; \sec\theta = \dfrac{\sqrt{13}}{3}$

16. $\sin\theta = \dfrac{3\sqrt{13}}{13}; \cos\theta = \dfrac{2\sqrt{13}}{13};$

$\tan\theta = \dfrac{3}{2}; \cot\theta = \dfrac{2}{3};$

$\csc\theta = \dfrac{\sqrt{13}}{3}; \sec\theta = \dfrac{\sqrt{13}}{2}$

17. $\sin\theta = -\dfrac{\sqrt{5}}{5}; \cos\theta = -\dfrac{2\sqrt{5}}{5};$

$\tan\theta = \dfrac{1}{2}; \cot\theta = 2;$

$\csc\theta = -\sqrt{5}; \sec\theta = -\dfrac{\sqrt{5}}{2}$

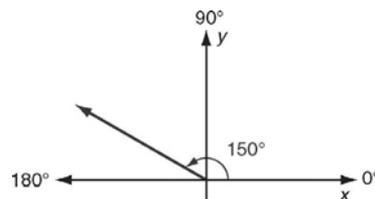18. $\sin\theta = \dfrac{5}{13}; \cos\theta = -\dfrac{12}{13};$

$\tan\theta = -\dfrac{5}{12}; \cot\theta = -\dfrac{12}{5};$
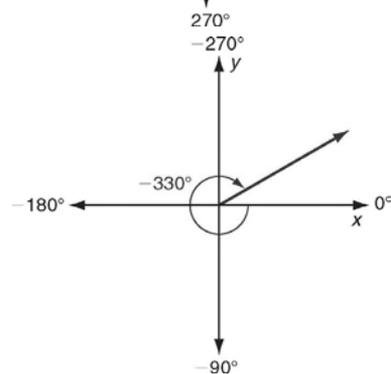
$\csc\theta = \dfrac{13}{5}; \sec\theta = -\dfrac{13}{12}$

19. 1598.4°

Reteach

1.

2.

3. 505°   −215°

4. 230°   −490°

5. 570°   −150°

6. 60°   7. 45°

8. 70°

Challenge

1. About 1.52   2. 1.0

3. 1.97×10^{8} m per s   4. 2.42

Holt McDougal Algebra 2