

6.01: Review of Trigonometry at Any Angle

Date: _____

* Degree Mode

Helpful Formulas:

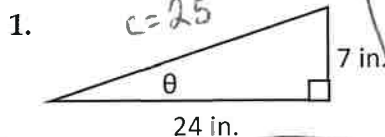
Pythagorean Theorem: $a^2 + b^2 = c^2$

$$\sin \theta = \frac{\text{opp}}{\text{hyp}}$$

$$\cos \theta = \frac{\text{adj}}{\text{hyp}}$$

$$\tan \theta = \frac{\text{opp}}{\text{adj}}$$

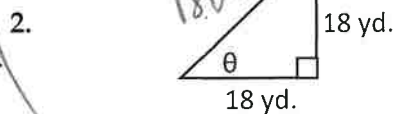
Find the length of the hypotenuse and the measure of the angle of elevation for the given right triangle.



$$7^2 + 24^2 = c^2 \quad \boxed{c=25}$$

$$\tan \theta = \frac{7}{24} \quad \boxed{\theta = \tan^{-1}\left(\frac{7}{24}\right)}$$

$$\boxed{\theta = 16.26^\circ}$$

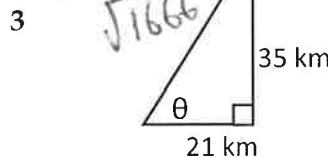


$$18^2 + 18^2 = c^2$$

$$c = 18\sqrt{2}$$

$$\tan \theta = \frac{18}{18} \quad \boxed{\theta = \tan^{-1}(1)}$$

$$\boxed{\theta = 45^\circ}$$

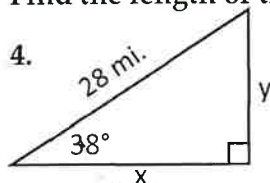


$$21^2 + 35^2 = c^2 \quad \boxed{c = \sqrt{1666}}$$

$$\tan \theta = \frac{35}{21} \quad \boxed{\theta = 59.04^\circ}$$

$$\theta = \tan^{-1}\left(\frac{35}{21}\right)$$

Find the length of the two legs for the given right triangle.

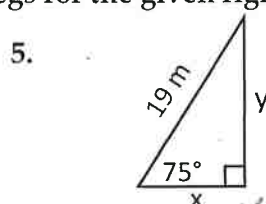


$$\cos \theta = \frac{\text{adj}}{\text{hyp}} \quad \left| \quad \frac{\cos 38}{1} = \frac{x}{28} \right.$$

$$\boxed{x = 28 \cos 38 = 22.06 \text{ mi}}$$

$$\sin \theta = \frac{\text{opp}}{\text{hyp}} \quad \left| \quad \frac{\sin 38}{1} = \frac{y}{28} \right. \quad \left| \quad y = 28 \sin 38 \right.$$

$$\boxed{y = 17.24}$$

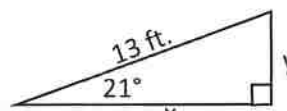


$$\cos 75 = \frac{x}{19} \quad \left| \quad x = 19 \cos 75 \right.$$

$$\boxed{x = 4.92}$$

$$\sin 75 = \frac{y}{19} \quad \left| \quad y = 19 \sin 75 \right.$$

$$\boxed{y = 18.35}$$



$$\cos 21 = \frac{x}{13} \quad \left| \quad x = 13 \cos 21 \right.$$

$$\boxed{x = 12.14}$$

$$\sin 21 = \frac{y}{13} \quad \left| \quad y = 13 \sin 21 \right.$$

$$\boxed{y = 4.66}$$

Sketch each angle in standard position and then state the quadrant where each angle has its terminal side.

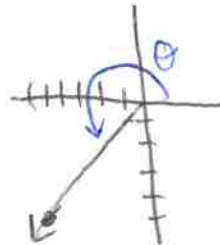
9. $\theta = 140^\circ$



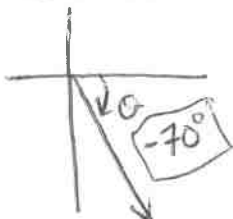
10. $\theta = 285^\circ$



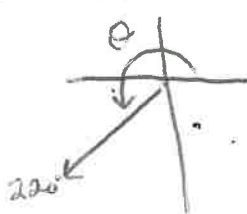
11. The terminal side of θ passes through $(-6, -5)$



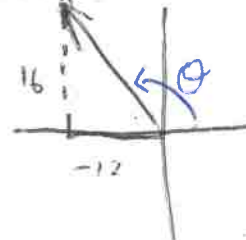
12. $\theta = -70^\circ$



13. $\theta = 220^\circ$ Q3



14. The terminal side of θ passes through $(-12, 16)$



More formulas: Pythagorean Theorem: $a^2 + b^2 = c^2$

$\sin \theta = \frac{y}{r}$ $\cos \theta = \frac{x}{r}$ $\tan \theta = \frac{y}{x}$

Sketch each angle described in standard position, where $0 \leq \theta < 360^\circ$. Find the distance the point is from the origin and the measure of the angle. (use $\tan \theta$) (hypotenuse)

15. The terminal side of θ passes through (2, 9)

$c^2 = a^2 + b^2$ | $c = \sqrt{85}$
 $c^2 = 2^2 + 9^2$
 $\tan \theta = \frac{9}{2}$ (Reference Angle)
 $\theta = \tan^{-1}(9/2) \rightarrow \theta = 77.47^\circ$

16. The terminal side of θ passes through (-8, 6)

$c^2 = 6^2 + 8^2 \rightarrow c = 10$
 $\tan \theta' = \frac{6}{-8}$ $\theta' = -36.87^\circ$
 $\theta = 180 - 36.87^\circ$
 $\theta = 143.13^\circ$

17. The terminal side of θ passes through (-10, -10)

$c^2 = a^2 + b^2$
 $c^2 = 10^2 + 10^2$
 $c = 10\sqrt{2}$
 $\tan \theta' = \frac{-10}{-10}$
 $\theta' = \tan^{-1}(1)$
 $\theta' = 45^\circ$
 $\theta = 180 + 45 = 225^\circ$

18. The terminal side of θ passes through (13, -22)

$c^2 = a^2 + b^2$
 $c^2 = 13^2 + 22^2$
 $c = \sqrt{653}$
 $\tan \theta' = \frac{-22}{13}$ $\theta' = \tan^{-1}(\frac{-22}{13})$
 $\theta' = -59.42^\circ$
 $\theta = 360 - 59.42^\circ$
 $\theta = 300.58^\circ$

Self Check: Did your measures for the angles in #15 - 18 get larger each time? If not, you did something wrong.

Sketch each point described with its given distance from the origin and angle measure in standard position. Determine the ordered pair coordinates described.

19. The point lies 15 inches from the origin on the terminal side of $\theta = 320^\circ$.

(hypotenuse given)
 $\cos 40 = \frac{x}{15}$ | $x = 15 \cos 40$
 $x = 11.49$
 $\sin 40 = \frac{y}{15}$ | $y = 15 \sin 40$
 $y = 9.64$
 $(11.49, -9.64)$

20. The point lies 29 mm from the origin on the terminal side of $\theta = 251^\circ$.

$\cos 71 = \frac{x}{29}$ | $x = 29 \cos 71$
 $x = 9.44$
 $\sin 71 = \frac{y}{29}$ | $y = 29 \sin 71$
 $y = 27.42$
 $(-9.44, -27.42)$

21. The point lies 7 yds. from the origin on the terminal side of $\theta = 120^\circ$.

$\cos 60 = \frac{x}{7}$ | $\sin 60 = \frac{y}{7}$
 $x = 7 \cos 60$ | $y = 7 \sin 60$
 $x = 3.5$ | $y = 6.06$
 $(-3.5, 6.06)$

22. The point lies 32 dm from the origin on the terminal side of $\theta = 38^\circ$.

$\cos 38 = \frac{x}{32}$ | $\sin 38 = \frac{y}{32}$
 $x = 32 \cos 38$ | $y = 32 \sin 38$
 $x = 25.22$ | $y = 19.7$
 $(25.22, 19.7)$