Name: _____ Period: _____ Date: _____

PreCalculus CH 6 Practice Test

Answer the following questions.

1. With regards to trigonometry, angles can be viewed as a circular rotation.

2. To covert from **radians** to **degrees**, we multiply by $\frac{180}{\pi}$. To convert from **degrees** to **radians**, we multiply by $\frac{\pi}{180}$.

3. Convert the following degree measures into radians.

a. $62°$ $62 \cdot \frac{\pi}{180} = \frac{31\pi}{90}$

b. $30°$ $\frac{\pi}{6}$

c. $1290°$ $1290 \cdot \frac{\pi}{180} = \frac{43\pi}{6}$

d. $-75°$ $-75 \cdot \frac{\pi}{180} = \frac{-15\pi}{36} = \frac{-5\pi}{12}$

e. $7.5°$ $\frac{7.5\pi}{180} = \frac{\frac{15}{2}\pi}{180} = \frac{15\pi}{360} = \frac{\pi}{24}$

4. Convert the following radians into degrees.

a. $\frac{7\pi}{6}$ $\frac{7\pi}{6} \cdot \frac{180}{\pi} = 210°$

b. $\frac{11\pi}{3}$ $\frac{11\pi}{3} \cdot \frac{180}{\pi} = 660°$

c. -1.2 $-1.2 \cdot \frac{180}{\pi} = -68.75°$

d. $-\frac{13\pi}{12}$ $-\frac{13\pi}{12} \cdot \frac{180}{\pi} = -195°$

e. 3.4 $3.4 \cdot \frac{180}{\pi} = 194.8°$

5. Find a positive and a negative **coterminal** angle for the given angle measure.

a. $50°$ $50 + 360 = 410°$, $50 - 360 = -310°$

b. $\frac{3\pi}{4}$ $\frac{3\pi}{4} + \frac{2\pi}{1} = \frac{11\pi}{4}$, $\frac{3\pi}{4} - \frac{2\pi}{1} = -\frac{5\pi}{4}$

c. $-\frac{\pi}{4}$ $-\frac{\pi}{4} + \frac{2\pi}{1} = \frac{7\pi}{4}$, $-\frac{\pi}{4} - \frac{2\pi}{1} = -\frac{9\pi}{4}$

d. $-45°$ $-45 + 360 = 315°$, $-45 - 360 = -405°$

e. $\frac{11\pi}{6}$ $\frac{11\pi}{6} + \frac{2\pi}{1} = \frac{23\pi}{6}$, $\frac{11\pi}{6} - \frac{12\pi}{6} = -\frac{\pi}{6}$

6. Find an angle between $0°$ and $360°$ that is coterminal with the given angle.

a. $733°$ $733 - 2(360) = 13°$

b. $1110°$ $1110 - 3(360) = 30°$

c. $-800°$ $-800 + 3(360) = 280°$

7. Find an angle between 0 and 2π that is coterminal with the given angle.

a. $\frac{5\pi}{3}$ $\frac{5\pi}{3}$

b. $-\frac{7\pi}{3}$ $-\frac{7\pi}{3} + 2(2\pi) = -\frac{7\pi}{3} + \frac{4\pi}{1} \cdot \frac{12\pi}{3} = \frac{5\pi}{3}$

c. $\frac{51\pi}{2}$ $\frac{51}{2} = 25\frac{1}{2}$ (24) $\frac{51\pi}{2} - \frac{12(2\pi)}{1} = \frac{51\pi}{2} - \frac{24\pi}{1} \cdot \frac{48\pi}{2} = \frac{3\pi}{2}$

8. Find the length of an arc that subtends a central angle of 45° in a circle of radius 10m.

$s = r\theta$ need to change to radians $\frac{\pi}{4}$

$s = 10(\pi/4) = \frac{10\pi}{4} = \boxed{\frac{5\pi}{2}}$

9. A central angle θ in a circle of radius 5m is subtended by an arc of length 6m. Find the measure of θ in **degrees** and in **radians**.

$s = r\theta$

$6 = 5\theta$

$\frac{6}{5} = \theta$

rad = 6/5

deg = 678.6

$\frac{6}{5} \cdot \frac{180}{\pi} =$ 68.8

10. Find the radius of the circle if an arc of length 6m on the circle subtends a central angle of $\frac{\pi}{6}$ rad.

$\theta = \frac{\pi}{6}$ $s = r\theta$ $\left(\frac{6}{\pi}\right) 6 = r\left(\frac{\pi}{6}\right)\left(\frac{6}{\pi}\right)$

$\Rightarrow r = \frac{36}{\pi} = \boxed{11.5}$

11. Find the area of a sector with central angle 1 rad in a circle of radius 10m.

$A = \frac{1}{2} r^2\theta \Rightarrow A = \frac{1}{2}(10^2)(1) = \boxed{50}$

12. Find the area of a sector with central angle of 60° in a circle of radius 3m.

need to change to rad. first

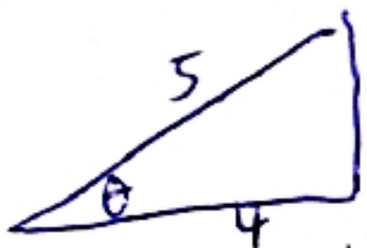
$1 \cdot \frac{\pi}{180} = \frac{\pi}{3} = \theta$

$A = \frac{1}{2} r^2\theta$

$= \frac{1}{2}(3^2)\left(\frac{\pi}{3}\right) = \boxed{4.71}$

13. Sketch a triangle that has acute angle θ, and find the other five trig ratios of θ.

a. $\sin\theta = \frac{3}{5}$ opp/hyp



$3^2 + b^2 = 5^2$

$9 + b^2 = 25$

$b^2 = 16$

$b = 4$

$\cos\theta = \frac{4}{5}$

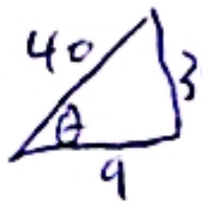
$\tan\theta = 3/4$

$\cot\theta = 4/3$

$\csc\theta = 5/3$

$\sec\theta = 5/4$

b. $\cos\theta = \frac{9}{40}$



$9^2 + b^2 = 40^2$

$81 + b^2 = 1600$

$b^2 = 1519$

$b \approx 39.$

$\sin\theta = \frac{39}{40}$ $\sec\theta = \frac{40}{9}$

$\tan\theta = 39/9$ $\cot\theta = 9/39$

$\csc\theta = 40/39$

c. $\csc\theta = \frac{13}{12}$

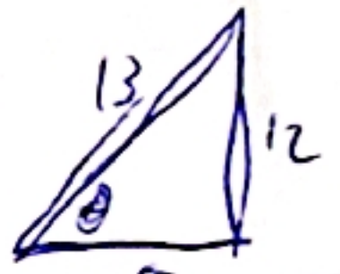
$\sin\theta = 12/13$

$a^2 + 12^2 = 13^2$

$a^2 + 144 = 169$

$a^2 = 25$

$a = 5$



$\sin\theta = 12/13$

$\cos\theta = 5/13$

$\tan\theta = 12/5$

$\cot\theta = 5/12$

$\sec\theta = 13/5$

14. Solve ΔABC, where $\angle A = 20°$, $\angle C = 25°$, and $c = 80.4$

$\frac{\sin C}{C} = \frac{\sin A}{a}$ $\frac{\sin 25}{80.4} = \frac{\sin 20}{a}$

$a = 65.1$, $B = 135°$, $b = 134.5$

$\frac{\sin C}{c} = \frac{\sin B}{b}$

$\frac{\sin 25}{80.4} = \frac{\sin 135}{b}$ $b = 134.5$

15. Solve ΔABC if $\angle A = 45.3°$, $a = 167.1$, and $b = 185.2°$

① $\frac{\sin A}{a} = \frac{\sin B}{b}$

$\frac{\sin 45.3}{167.1} = \frac{\sin B}{185.2}$

$\sin B = 0.7878$

$B = \boxed{52°}$

$C = 82.7$

$\frac{\sin 82.7}{c} = \frac{\sin 52}{185.2}$

$c = 233.1$

② $180 - 52 = 128 = B$

$C = 6.7°$

$C = 27.4$

$\frac{\sin 6.7}{c} = \frac{\sin 128}{185.2}$

16. Solve ΔABC if $\angle A = 42°$, $a = 70$, and $b = 122$

$\frac{\sin 42}{70} = \frac{\sin B}{122}$ (122) $\sin B = 1.17 > 1$ impossible. No Sol.

17. Solve ΔABC if $\angle A = 45°$, $a = 7\sqrt{2}$, and $b = 7$

$\frac{\sin 45}{7\sqrt{2}} = \frac{\sin B}{7}$ (7) $0.5 = \sin B$ $B = 30°$ $C = 105°$

$\frac{\sin 105}{c} = \frac{\sin 30}{7}$ $c = 13.5$

② $180 - 30 = 150$. But, $150 + 45 > 180$. Impossible

18. Solve ΔABC if $a = 5$, $b = 8$, and $c = 12$

$a^2 = b^2 + c^2 - 2bc \cos A$

$25 = 64 + 144 - 2(8)(12)\cos A$

$-183 = -192 \cos A$

$\cos A = 0.953125$ $A = 17.6°$ $C = 133.4°$

$b^2 = a^2 + c^2 - 2ac \cos B$.

$64 = 25 + 144 - 2(5)(12)\cos B$.

$-105 = -120 \cos B$.

$0.875 = \cos B$ $B = 29°$

19. Solve ΔABC if $\angle A = 46.5°$, $b = 10.5$, and $c = 18$

$a^2 = b^2 + c^2 - 2bc \cos A$.

$a^2 = (10.5)^2 + 18^2 - 2(10.5)(18)\cos 46.5$

$a^2 = 174.1$ $a = 13.2$

$b^2 = a^2 + c^2 - 2ac \cos B$.

$110.25 = 174.24 + 324 - 2(13.2)(18)\cos B$.

$-388 = -475.2 \cos B$ $B = 35.3°$ $C = 98.2°$

$\cos B = 0.82$

20. Find the area of the triangle whose sides have lengths: $a = 9, b = 12, c = 15$

$s = \frac{1}{2}(9 + 12 + 15)$ $= 18$

$A = \sqrt{s(s-a)(s-b)(s-c)}$

$= \sqrt{18(18-9)(18-12)(18-15)}$ $= \sqrt{2916} = 54$.

21. A ceiling fan with 16-in. blade rotates at 45rpm.

a. Find the angular speed of the fan in rad/min.

$\omega = \frac{\theta}{t}$ $45 \cdot 2\pi = 90\pi = \theta$ rad. $\omega = \frac{90\pi}{1} = 90\pi$ rad/min.

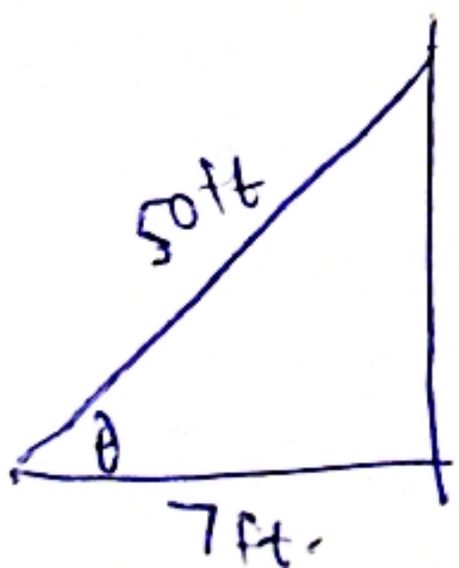
b. Find the linear speed of the blades in in/min.

$V = \omega r$ $V = 90\pi(16) = 1440\pi = 4523.9$ in/min.

22. A giant redwood tree casts a shadow 452ft long. Find the height of the tree if the angle of elevation of the sun is 12.3°. **(Hint: Draw the picture!)**

$\tan 12.3 = \frac{x}{452}$ (452) $x = 98.6$ ft

23. A 50-ft ladder leans against a building. If the base of the ladder is 7ft from the base of the building, what is the angle formed by the ladder and the building? **(Hint: Draw the picture!)**



$\cos \theta = \frac{7}{50}$

$\cos^{-1}(\cos\theta) = 0.14$ $\cos^{-1}$

$\theta \approx 82°$