

Chapter 13 Test

1. Find three coterminal angles (in radians) including one positive and one negative for  $-\frac{2\pi}{7}$

$$-\frac{2\pi}{7} + \frac{14\pi}{7}$$

$$\boxed{\frac{12\pi}{7} \text{ and } \frac{-16\pi}{7}}$$

2. Find three coterminal angles (in degrees) including one positive and one negative for  $224^\circ$

$$584, 944, -136$$

3. Evaluate the 6 trig functions at the angle  $\frac{\pi}{6}$ .

$$\sin \theta = \frac{1}{2}$$

$$\csc \theta = 2$$

$$\cos \theta = \frac{\sqrt{3}}{2}$$

$$\sec \theta = \frac{2\sqrt{3}}{3}$$

$$\tan \theta = \frac{\sqrt{3}}{3}$$

$$\cot \theta = \sqrt{3}$$

4. Convert following angles from degrees to radians.

a)  $82^\circ \approx 1.43 \text{ rad}$

b)  $-470^\circ \approx -8.2 \text{ rad}$

$$\frac{41\pi}{90} \text{ rad}$$

$$\frac{-47\pi}{18} \text{ rad}$$

5. Convert following angles from radians to degrees (to nearest whole degree).

a)  $\frac{5\pi}{11} \approx 82^\circ$

b)  $-\frac{2\pi}{7} \approx -51^\circ$

6. An amusement park ride has swings connected by metal chains. The metal chains are connected to a metal pole in the middle that spins in circles. The pole spins so fast that the chains get stretched out to their maximum length and the riders are swung very quickly around the outside. The metal chains are 20 feet long and each time the ride goes the pole spins in 30 complete circles.

- a) What is the angle that the swings travel in degrees and radians?

$$10,800^\circ$$

$$60\pi \text{ rad}$$

- b) How far does someone riding this particular ride travel through the air?

$$60\pi \cdot 20 \approx 3770 \text{ feet}$$

7. The point  $(-5, -6)$  is on the terminal side of an angle in standard position. Use this fact to evaluate the six trigonometry functions. (Find the exact value, no decimal answers)

$$\sin \theta = \frac{-6\sqrt{61}}{61}$$

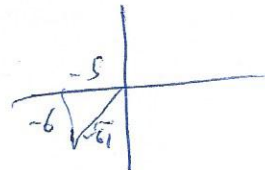
$$\csc \theta = -\frac{\sqrt{61}}{6}$$

$$\cos \theta = \frac{-5\sqrt{61}}{61}$$

$$\sec \theta = -\frac{\sqrt{61}}{5}$$

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

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



8. Solve for the following angles in terms of degrees (rounded to the nearest angle).

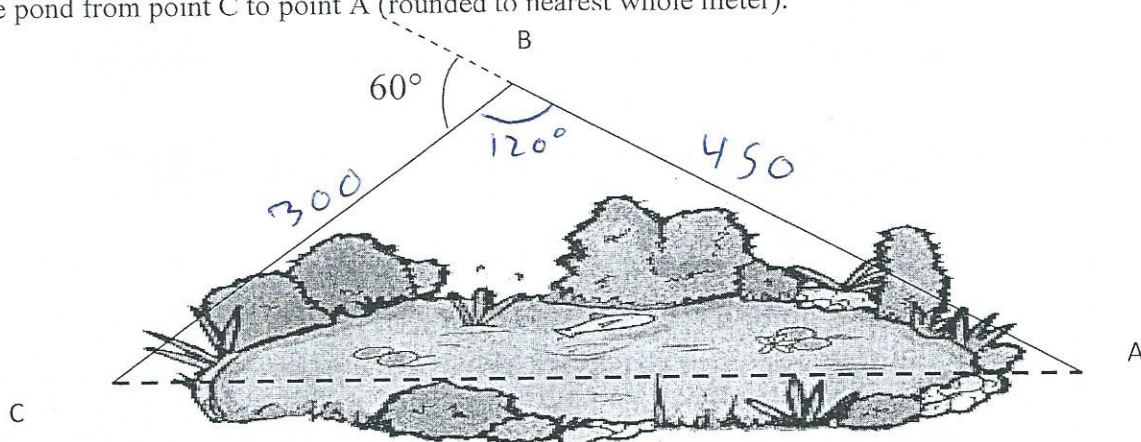
a)  $\cos \theta = .25$

b)  $\cot \theta = .4$

$$76^\circ$$

$$68^\circ$$

9. To approximate the length across a pond a surveyor walks from point A to point B. He then turns 60 degrees (look at picture) and walks towards point C. The surveyor was walking at a constant speed of 75 meters per minute, and it took him 6 minutes to walk from point A to point B, and 4 minutes to walk from point B to point C. Use this information to approximate the distance across the pond from point C to point A (rounded to nearest whole meter).



$$b^2 = 300^2 + 450^2 - 2 \cdot 300 \cdot 450 \cdot \cos B$$

$$b \approx 653.83 \text{ meters}$$

$$b \approx 654$$

10. For each problem below solve for the remaining sides and angles. If more than one triangle can be formed solve both. If no solution exists, be sure and state how you know. Round all answers to the tenths place.

a)  $\angle A = 25^\circ, b = 6.2, a = 4$

$$\frac{\sin B}{6.2} = \frac{\sin 25}{4}$$

#1	}	#2
$B_1 = 41^\circ$		$B_2 = 139^\circ$
$C_1 = 114^\circ$		$C_2 = 16^\circ$
$c = 8.65$		$c = 2.6$

b)  $\angle B = 76^\circ, a = 20, b = 18$

Not possible

c)  $A = 25^\circ, B = 35^\circ, c = 21$

$$C = 120^\circ$$

$$b = 13.9$$

$$a = 16.25$$

$$\frac{b}{\sin 35} = \frac{21}{\sin 120}$$

$$\frac{a}{\sin 25} = \frac{21}{\sin 120}$$

d)  $B = 135^\circ, a = 19, c = 7$

$$b^2 = 19^2 + 7^2 - 2 \cdot 19 \cdot 7 \cdot \cos 135$$

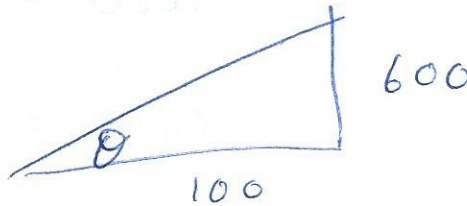
$$b = 24.5$$

$$A = 37.3^\circ$$

$$C = 11.7^\circ$$

$$\frac{\sin A}{19} = \frac{\sin 135}{24.5}$$

11. Spiderman hears a call for help in the distance. He looks up and sees a woman on top of a building being attacked. The woman is 100 feet away horizontally and the building is 600 feet high. At what angle does Spiderman need to shoot his web to hit the bad guy and save the woman?

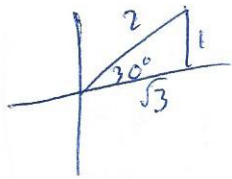


$$\tan \theta = 6$$

$$\theta = 80.5^\circ$$

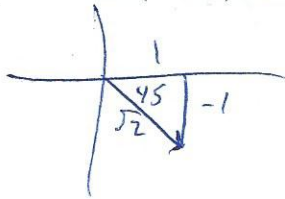
12) Evaluate the following trig functions without a calculator. Give exact answers with not decimal answers.

a)  $\sin(30^\circ) = \frac{1}{2}$

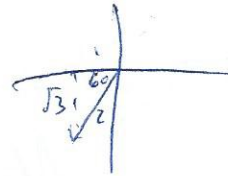


b)  $\sec(30^\circ) = \frac{2}{\frac{1}{\sqrt{3}}} = \frac{2\sqrt{3}}{1}$

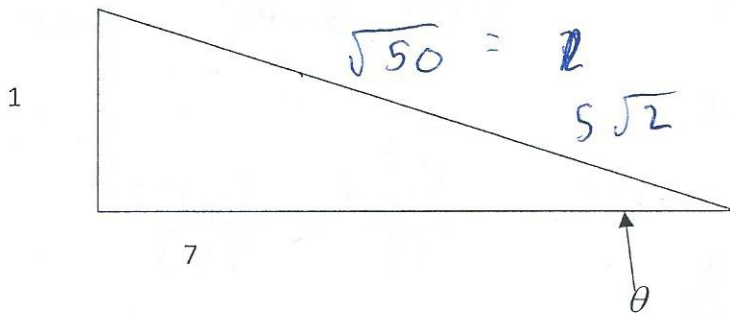
c)  $\tan(-45^\circ) = -1$



d)  $\cos(240^\circ) = -\frac{1}{2}$



14) Evaluate the six trig functions based on the drawing below.



$\sin \theta = \frac{1}{5\sqrt{2}} = \frac{\sqrt{2}}{10}$

$\csc \theta = 5\sqrt{2}$

$\cos \theta = \frac{7}{5\sqrt{2}} = \frac{7\sqrt{2}}{10}$

$\sec \theta = \frac{5\sqrt{2}}{7}$

$\tan \theta = \frac{1}{7}$

$\cot \theta = 7$