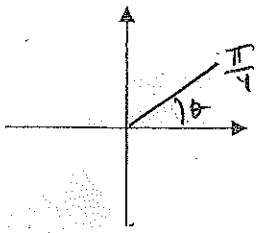
Name Key # Score

4.1-4.4 Review | Worksheet

Note: You must show all work for credit, including calculator problems!!

1. Given $\theta = -\frac{23\pi}{4}$, make a sketch and list (a) a positive and (b) a negative coterminal angle.

Answers must be in radians!



$\frac{\pi}{4}, -\frac{7\pi}{4}$ $\quad -\frac{23\pi}{4} + \frac{8\pi}{4}$

$-\frac{23\pi}{4} + \frac{24\pi}{4} = \frac{\pi}{4}$

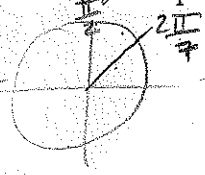
$-\frac{8\pi}{4}$

$-\frac{7\pi}{4}$

a. $\frac{\pi}{4}$

b. $-\frac{7\pi}{4}$

2. Find the (a) complement and (b) supplement for: $\theta = \frac{2\pi}{7}$



C: $\frac{\pi}{2} - \frac{2\pi}{7}$ $\quad$ S: $\pi - \frac{2\pi}{7}$

$\frac{7\pi}{14} - \frac{4\pi}{14} = \frac{3\pi}{14}$ $\quad \frac{7\pi}{7} - \frac{2\pi}{7} = \frac{5\pi}{7}$

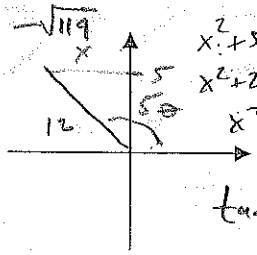
a. $\frac{3\pi}{14}$

b. $\frac{5\pi}{7}$

3. Convert to radians: $115^\circ \left(\frac{\pi}{180}\right)$ $\frac{115\pi}{180} = \frac{23\pi}{36}$ ≈ 2.007

4. Convert to degrees: $\frac{11\pi}{9} \cdot \frac{180^\circ}{\pi} = 220^\circ$ $\quad 220^\circ$

5. Given $\sin\theta = \frac{5}{12}$ and $\cos\theta < 0$, find the ***exact values*** of the other 5 trig functions. You must draw a sketch in the correct quadrant!!



$x^2 + 5^2 = 12^2$

$x^2 + 25 = 144$

$x^2 = 119$

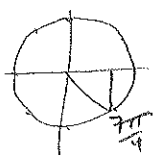
$\tan\theta = \frac{\sin}{\cos} = \frac{5/12}{-\sqrt{119}/12} = \frac{-5}{\sqrt{119}}$

$\csc\theta = \frac{12}{5}$

$\cos\theta = \frac{-\sqrt{119}}{12}$ $\quad \sec\theta = \frac{-12\sqrt{119}}{119}$

$\tan\theta = \frac{-5\sqrt{119}}{119}$ $\quad \cot\theta = \frac{-\sqrt{119}}{5}$

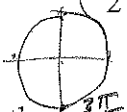
6. Find the ***exact value*** (do not use calculator!) of the following trig functions:



a. $\csc\left(\frac{7\pi}{4}\right) = -\sqrt{2}$

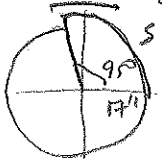
$\frac{1}{\sin\frac{7\pi}{4}} = \frac{1}{-\frac{\sqrt{2}}{2}} = -\frac{2}{\sqrt{2}} = -\frac{2\sqrt{2}}{2} = -\sqrt{2}$

b. $\cot\left(\frac{3\pi}{2}\right) = 0$



$\frac{\cos\frac{3\pi}{2}}{\sin\frac{3\pi}{2}} = \frac{0}{-1} = 0$

7. Find the exact length of the arc intercepted by the central angle 95° on a circle with radius = 17 in.

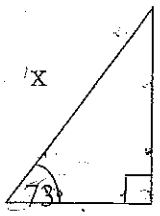


$s = r\theta$ $\quad 95^\circ \left(\frac{\pi}{180^\circ}\right)$

$s = 17 \cdot \frac{95\pi}{180} = \frac{1615\pi}{180} = \frac{323\pi}{36}$

$\frac{323\pi}{36}$

8. Solve for x to two decimal places.



$\cos 73° = \frac{52}{x}$

$x = \frac{52}{\cos 73°} = 179.86$

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

179.86

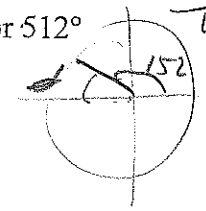
9. If $\sec\theta < 0$ and $\csc\theta < 0$, in which quadrant does θ lie?

$\cos\theta < 0$ $\sin\theta < 0$

III

10. Find the reference angle for 512°

512 − 360 = 152



28°

11. Find the point (x, y) on the unit circle that corresponds to the angle θ.

$(\cos\theta, \sin\theta)$

a. $\theta = -\frac{3\pi}{2}$

b. $\theta = \frac{7\pi}{3}$

a. (0, 1)

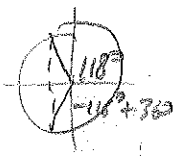
b. $\left(\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$

12. Use a calculator to evaluate sec 21°49': (round your result to four decimal places) 1.0771

$21°49' = 21.8166\ldots$ $\cos 21.816$

13. Find two values of θ to the nearest degree, $0° \le \theta < 360°$, that satisfy $\cos\theta = -.4695$

$\theta = \cos^{-1}(-.4695) = 118°$



118° and 242°

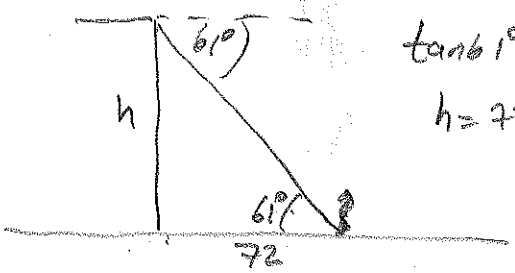
14. A ramp 30 feet in length rises to a loading platform that is 2.25 feet off the ground. Find the angle of elevation of the ramp to the nearest degree.

$\sin\theta = \frac{2.25}{30}$

$\theta = \sin^{-1}\left(\frac{2.25}{30}\right)$

4°

15. An angle of depression from the top of a building to the base of a statue 72 feet from the base of the building is 61°. Determine the height of the building to the nearest foot. Make a sketch, label all parts, and show your equations.



$\tan 61° = \frac{h}{72}$

$h = 72\tan 61° = 129.89$

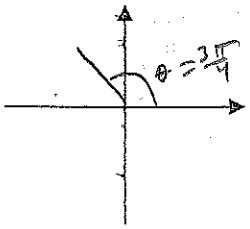
130 ft

Name Key #

Review 4.1-4.4 # 2. You must show all work for credit, including calculator problems!!

1. Given $\theta = \frac{3\pi}{4}$ make a sketch and list a) a positive and b) a negative coterminal angle.

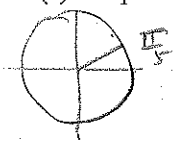
Answers must be in radians!



$\frac{3\pi}{4} + \frac{8\pi}{4} = \boxed{\frac{11\pi}{4}}$

$\frac{3\pi}{4} - \frac{8\pi}{4} = \boxed{\frac{-5\pi}{4}}$

2. Find the (a) complement and (b) supplement for: $\theta = \frac{\pi}{5}$



C: $\frac{\pi}{2} - \frac{\pi}{5} = \frac{5\pi}{10} - \frac{2\pi}{10} = \boxed{\frac{3\pi}{10}}$

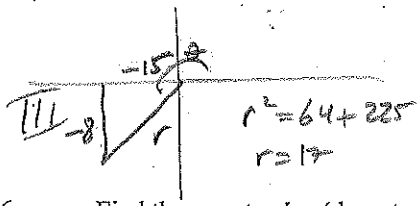
S: $\pi - \frac{\pi}{5} = \frac{5\pi}{5} - \frac{\pi}{5} = \boxed{\frac{4\pi}{5}}$

3. Convert to radians: $75°\left(\frac{\pi}{180°}\right) = \frac{15\pi}{36} = \boxed{\frac{5\pi}{12}}$

4. Convert to degrees: $\frac{11\pi}{6}\left(\frac{180}{\pi}\right) = \boxed{330°}$

5. Given $\tan\theta = \frac{8}{15}$ and $\cos\theta < 0$, find the ***exact values*** of the five other trig functions.

tan > 1



$r^2 = 64 + 225$

$r = 17$

$\sin\theta = \frac{-8}{17}$

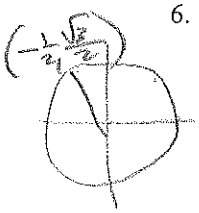
$\cos\theta = \frac{-15}{17}$

$\csc\theta = \frac{-17}{8}$

$\sec\theta = \frac{-17}{15}$

$\cot\theta = \frac{15}{8}$

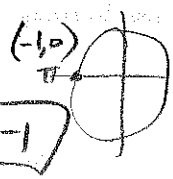
6. Find the ***exact value*** (do not use calculator!) of the following trig functions:



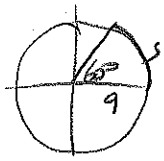
(a) $\sin\left(\frac{2\pi}{3}\right) = \boxed{\frac{\sqrt{3}}{2}}$

(b) $\cos\left(\frac{3\pi}{2}\right) = \boxed{0}$

(c) $\sec\pi = \frac{1}{\cos\pi} = \frac{1}{-1} = \boxed{-1}$



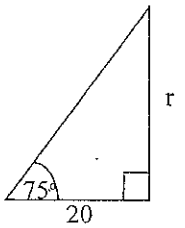
7. Find the exact length of the arc with $\theta = 60°$ and the radius of the circle 9 feet.



$s = r\theta$

$s = 9\left(\frac{60\pi}{180}\right) = \boxed{3\pi \text{ ft}}$

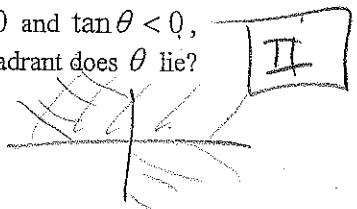
8. Solve for r to two decimal places.



$\tan 75° = \frac{r}{20}$

$r = 20\tan 75° = \boxed{74.64}$

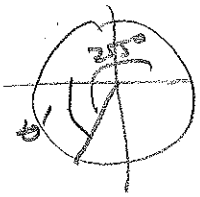
9. If $\sin\theta > 0$ and $\tan\theta < 0$, in which quadrant does θ lie?



II

10. Find the reference angle for 255°

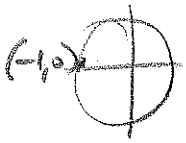
$\theta' = 255 - 180 = 75°$



11. Find the point (x, y) on the unit circle that corresponds to the angle θ.

(a) $\theta = \frac{\pi}{3}$ $\left(\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$

(b) $\theta = \pi$



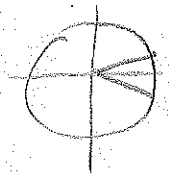
(-1,0)

12. Use a calculator to evaluate a) sin (-.65) b) cot 16°18' (round your result to four decimal places)

-0.6052

$\frac{1}{\tan 16°18'} = 3.4197$

13. Find two values of θ to the nearest degree, $0° \le \theta < 360°$, that satisfy $\cos\theta = .9848$

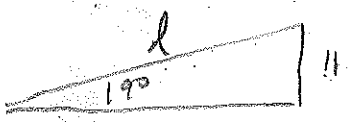


$\theta = \cos^{-1}(.9848)$

$\theta = 10°$

10° and 350°

14. The ramp approaching a loading platform that is 11 feet off the ground is to have an angle of 19° with the ground. Find the length *l* of the ramp to the nearest tenth. Make a sketch, label all parts, and show your equations.

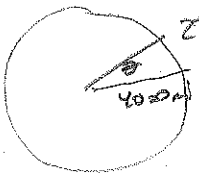


$\sin 19° = \frac{11}{l}$

$l = \frac{11}{\sin 19°} = 33.8 \text{ ft}$

15. *Distance between two cities.* Find the distance between the two cities. Assume that the earth is a sphere of radius 4000 miles and that the cities are on the same meridian (one city is due north of the other).

Berlin	27°41'19"
Regensburg	17°52'38"



$27°41'19'' = 27.6886111$

$17°52'38'' = 17.8772222$

$\theta = 9.8113889 \left(\frac{\pi}{180}\right) = .171241 \text{ rad}$

$s = 4000(.171241)$

$s = 684.96 \text{ miles}$

Name_____ #_____ Score_____

4.1-4.4 Review ¦ Worksheet

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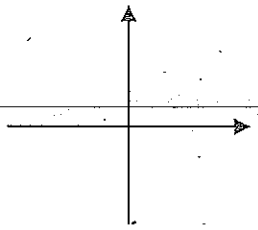


a._____

b._____

2. Find the (a) complement and (b) supplement for: $\theta = \frac{2\pi}{7}$

a._____

b._____

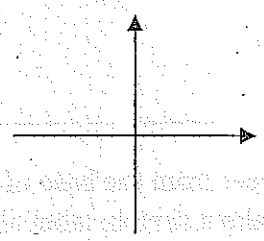
3. Convert to radians: 115°

_____

4. Convert to degrees: $\frac{11\pi}{9}$

_____

5. Given $\sin\theta = \frac{5}{12}$ and $\cos\theta < 0$, find the ***exact values*** of the other 5 trig functions. You must draw a sketch in the correct quadrant!!



$\csc\theta =$ _____

$\cos\theta =$ _____ $\sec\theta =$ _____

$\tan\theta =$ _____ $\cot\theta =$ _____

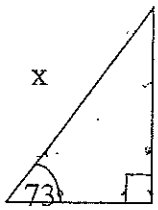
6. Find the ***exact value*** (do not use calculator!) of the following trig functions:

a. $\csc\left(\frac{7\pi}{4}\right) =$ _____ b. $\cot\left(\frac{3\pi}{2}\right) =$ _____

7. Find the exact length of the arc intercepted by the central angle 95° on a circle with radius = 17 in.

_____

8. Solve for x to two decimal places.



52

_____

9. If $\sec\theta < 0$ and $\csc\theta < 0$, in which quadrant does θ lie?

_____

10. Find the reference angle for 512°

_____

11. Find the point (x, y) on the unit circle that corresponds to the angle θ.

a. $\theta = -\frac{3\pi}{2}$ b. $\theta = \frac{7\pi}{3}$

a. _____

b. _____

12. Use a calculator to evaluate $\sec 21°49'$: (round your result to four decimal places) _____

13. Find two values of θ to the nearest degree, $0° \le \theta < 360°$, that satisfy $\cos\theta = -.4695$

_____ and _____

4. A ramp 30 feet in length rises to a loading platform that is 2.25 feet off the ground. Find the angle of elevation of the ramp to the nearest degree.

_____

15. An angle of depression from the top of a building to the base of a statue 72 feet from the base of the building is 61°. Determine the height of the building to the nearest foot. Make a sketch, label all parts, and show your equations.

_____

Name_____ #_____

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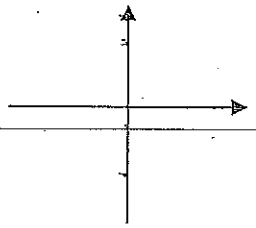


2. Find the (a) complement and (b) supplement for: $\theta = \frac{\pi}{5}$

3. Convert to radians: $75°$

4. Convert to degrees: $\frac{11\pi}{6}$

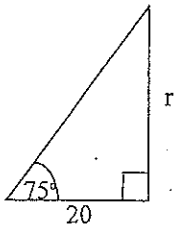
5. Given $\tan\theta = \frac{8}{15}$ and $\cos\theta < 0$, find the ***exact values*** of the five other trig functions.

6. Find the ***exact value*** (do not use calculator!) of the following trig functions:

(a) $\sin\left(\frac{2\pi}{3}\right)$ (b) $\cos\left(\frac{3\pi}{2}\right)$ (c) $\sec\pi$

7. Find the exact length of the arc with $\theta = 60°$ and the radius of the circle 9 feet.

8. Solve for r to two decimal places.



9. If $\sin\theta > 0$ and $\tan\theta < 0$, in which quadrant does θ lie?

10. Find the reference angle for 255°

11. Find the point (x, y) on the unit circle that corresponds to the angle θ.

(a) $\theta = \frac{\pi}{3}$ (b) $\theta = \pi$

---

12. Use a calculator to evaluate a) sin (-.65) b) cot16°18' (round your result to four decimal places)

13. Find two values of θ to the nearest degree, $0° \le \theta < 360°$, that satisfy $\cos\theta = .9848$

_____ and _____

14. The ramp approaching a loading platform that is 11 feet off the ground is to have an angle of 19° with the ground. Find the length *l* of the ramp to the nearest tenth. Make a sketch, label all parts, and show your equations.

15. *Distance between two cities.* Find the distance between the two cities. Assume that the earth is a sphere of radius 4000 miles and that the cities are on the same meridian (one city is due north of the other).

Berlin	27°41'19"
Regensburg	17°52'38"