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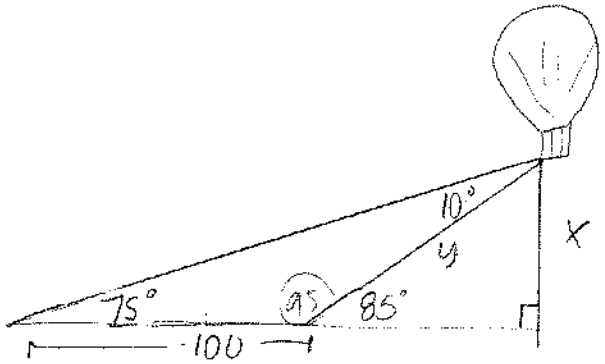
11, Two wires are tethering an air balloon to the ground. One wire is tethered with an angle of elevation of 75°. A wire 100 feet closer to the balloon than the first is tethered at an angle of elevation of 85°. How high is the balloon flying?



$\frac{\sin 10}{100} = \frac{\sin 75}{y}$

$y = 556.25$

$\sin 85 = \frac{x}{556.25}$

$x = 554.14$ ft

12. A bike has traveled 9.5 miles and the tire has a diameter of 26 inches. How many revolutions has the tire made?

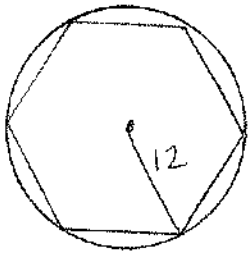
$C = 2\pi(13)$

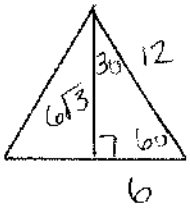
$C = 81.68$ inch in 1 r.

$(9.5\text{mi})(5280\text{ft})(12\text{in}) = \frac{601920\text{in}}{26\pi}$

$= 7,369$ rev.

13. Find the area and perimeter of a regular hexagon that is inscribed in a circle with a radius of 12 cm. Exact answers only.





Area $1\Delta = \left[\frac{1}{2}(12)(6\sqrt{3})\right]6$ $A = 216\sqrt{3}\,u^2$

$P = 12(6) = 72u$

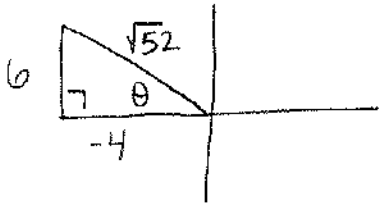
14. An arc length of 18.4 meters has been cut off in a circle with a radius of 6.2 meters. What is the central angle in radians and degrees to the nearest hundredth?

$S = r\theta$

$18.4 = (6.2)\theta$

$2.97 = \theta$ → 170.04°

15. Find the value of the 6 trigonometric ratios of the angle in standard position if the point (-4, 6) lies on the terminal side of theta.



$\sin\theta = \frac{3\sqrt{13}}{13}$ $\csc\theta = \sqrt{13}/3$

$\cos\theta = -\frac{2\sqrt{13}}{13}$ $\sec\theta = -\sqrt{13}/2$

$\tan\theta = -3/2$ $\cot\theta = -2/3$

16. Find one positive and one negative coterminal angle of the following:

a) $-\frac{37\pi}{4}$ $-5\pi/4, 3\pi/4$

b) 1560° $120°, -240°$

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17. Solve the triangles with the given information.

a) A = 48°, a = 14.3 feet, b =15.1 feet.

$\frac{\sin 48}{14.3} = \frac{\sin B}{15.1} = \frac{\sin C}{c}$

$A = 48°$ $a = 14.3$
$B = 51.69$ $b = 15.1$
$C = 80.31°$ $C = 18.97$

$A = 48$ $a = 14.3$
$B = 128.31$, $b = 15.1$
$C = 3.69°$, $C = 1.24$

b) A = 34°, b = 12 in, c = 17in

$a^2 = 12^2 + 17^2 - 2(12)(17)\cos 34$

$a = 9.73$

$A = 34$ $a = 9.73$
$B = 43.6°$ $b = 12$
$C = 102.4°$ $C = 17$

c) A = 81°, B = 29°, c = 8.6 cm

$A = 81°$ $a = 9.04$
$B = 29°$ $b = 4.44$
$C = 70°$ $c = 8.6$

d) A = 63°, a = 12 m, b = 29m

NO △

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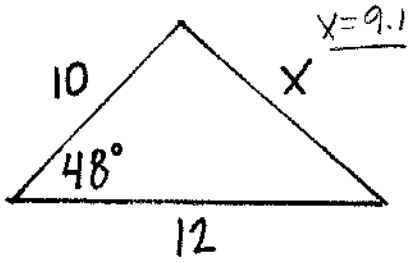
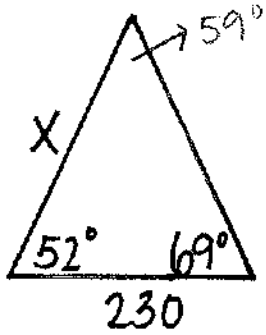
8. Solve for the missing side length x in the triangles provided.

a) $x^2 = 10^2 + 12^2 - 2(10)(12)\cos 48$

$x = 9.13$



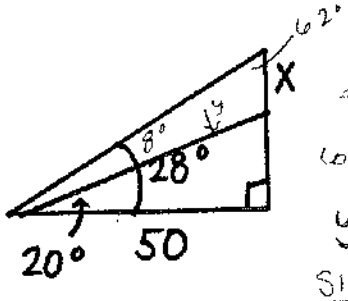
b)



$\frac{\sin 59}{230} = \frac{\sin 69}{x}$

$x = 250.50$

c)



$\frac{y}{20} = \frac{1}{50}$

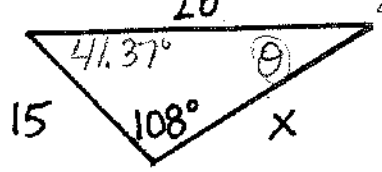
$\cos 20 = \frac{50}{y}$

$y = 53.21$

$\frac{\sin 62}{53.21} = \frac{\sin 8}{x}$

$x = 8.39$

d)



$\frac{\sin 108}{28} = \frac{\sin \theta}{15}$

$\theta = 30.63°$

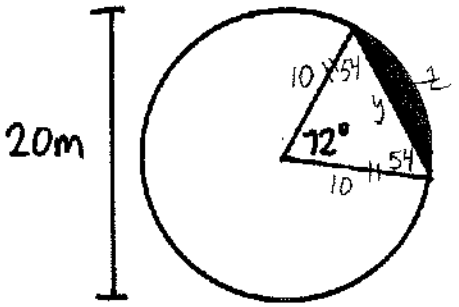
$\frac{\sin 41.37}{x} = \frac{\sin 108}{28}$

$x = 19.46$

9. Refer to the figure below.

a) Find the area of the shaded region

b) Find the perimeter of the shaded region.



a) $\frac{72}{360} \cdot \pi(10)^2 - \frac{1}{2}(10)(10)\sin 72$

$62.83 - 47.55 = 15.28 u^2$

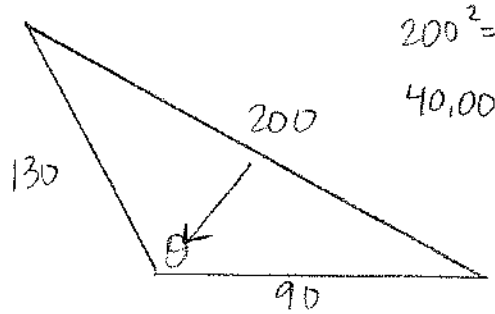
b) $\frac{\sin 72}{y} = \frac{\sin 54}{10}$

$y = 11.756$

$z = 10 \cdot \left(72 \cdot \frac{\pi}{180}\right) = 12.57$

$z + y =$ 24.32 units

10. A triangular lot of land is being sold with side lengths 130 yards, 200 yards and 90 yards. Find the angle across from the longest side of the plot and find the area of the plot.



$200^2 = 130^2 + 90^2 - 2(130)(90)\cos\theta$

$40{,}000 = 25000 - 23400\cos\theta$

$15000 = -23400\cos\theta$

$-.641025 = \cos\theta$

$\theta = 129.87°$

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1. Find the radian measures that correspond to the degree measures 335° and -128°.

$\frac{67\pi}{36}$, $-\frac{32\pi}{45}$

2. Find the degree measure that correspond to the radian measures $\frac{13\pi}{8}$ *and* $-\frac{7\pi}{12}$.

292.5°, $-105°$

3. The blades of a helicopter are 16 feet long and are rotating at 120 rpm.
   a) Find the angular speed of the rotor
   b) Find the linear speed of a point on the tip of the blade.

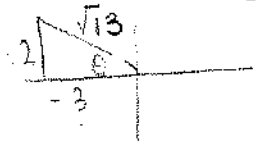
a) $\omega = \frac{120 \cdot 2\pi}{1\text{min}} \rightarrow 240\pi \text{ rad/min}$

b) $v = \frac{(120 \cdot 2\pi)(16\text{ft})}{1\text{min}} \cdot \frac{60\text{min}}{1\text{hr}} \cdot \frac{1\text{mi}}{5280\text{ft}} = 137.09 \text{ mi/h}$

4. Find the exact value of each of the following:

a) $\sin 405°$ $\frac{\sqrt{2}}{2}$ b) $\tan(-150°)$ $\frac{\sqrt{3}}{3}$ c) $\sec(\frac{5\pi}{3})$ 2 d) $\csc(\frac{5\pi}{2})$ 1

5. If $\cot\theta = -\frac{3}{2}$ and θ is in quadrant 2, find $\tan\theta + \sin\theta$.



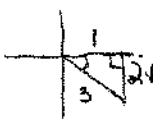
$\sin\theta = \frac{2\sqrt{13}}{13}$

$\cos\theta = -\frac{3\sqrt{13}}{13}$

$\tan\theta = -\frac{2}{3}$

$-\frac{2}{3} + \frac{2\sqrt{13}}{13}$

6. If $\cos\theta = +\frac{1}{3}$ and $\frac{3\pi}{2} < \theta < 2\pi$, find $\cot\theta + \csc\theta$.



$\sin^2\theta + (-\frac{1}{3})^2 = 1$

$\sin^2\theta + \frac{1}{9} = 1$

$\sin^2\theta = \frac{8}{9}$

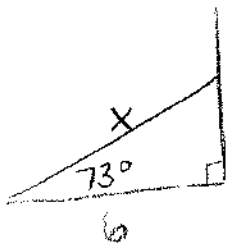
$\sin\theta = -\frac{2\sqrt{2}}{3} \rightarrow \csc\theta = \frac{3}{2\sqrt{2}} \rightarrow -\frac{3\sqrt{2}}{4}$

$\tan\theta = \frac{-2\sqrt{2}/3}{+1/3}$

$\cot\theta = \frac{-1}{2\sqrt{2}} = -\frac{\sqrt{2}}{4}$

$-\frac{\sqrt{2}}{4} - \frac{3\sqrt{2}}{4} = -\frac{4\sqrt{2}}{4} = -\sqrt{2}$

7. The base of a ladder is 6 feet from the base of a building. The angle of elevation from the bottom of the ladder to the spot where the top touches the building is 73°. How long is the ladder?



$\cos 73 = \frac{6}{x}$

$x = 20.52$ feet