Integrated Math III **Name:** ____________________

Per: ________ **Date:** ______________

Unit 4 Test Study Guide

Show all evidence (drawings, calculations, etc.) of how you arrived at your answers. All answers should be exact, simplified, and rationalized – no decimals unless the individual question specifies otherwise.

1. Identify a coterminal angle that is between 0° and 360°, and state in which quadrant it lays.

a. $1670° - 360° = 1310°$
$1310° - 360° = 950°$
$950° - 360° = 590°$
$590° - 360° = \boxed{230°\ \text{QIII}}$

b. $-326° + 360° = \boxed{34°\ \text{QI}}$

2. Convert 146° to radian measure.

$$146° \times \frac{\pi}{180°} = \boxed{\frac{73\pi}{90}}$$

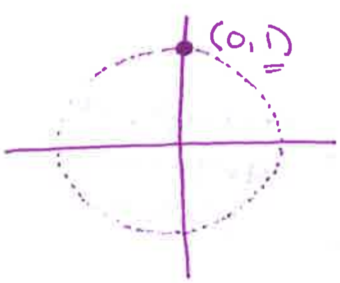
3. Convert $\frac{9\pi}{4}$ to degree measure.

$$\frac{9\pi}{4} \times \frac{180°}{\pi} = \boxed{405°}$$

4. Evaluate the following by drawing the appropriate reference triangle:

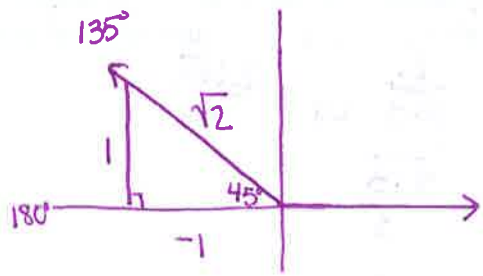
a. $\sin\left(\frac{\pi}{2}\right) = \boxed{1}$

$\frac{\pi}{2} \times \frac{180°}{\pi} = 90°$

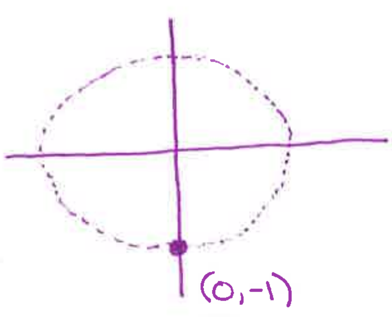


b. $\cos 495° = \boxed{\frac{-1}{\sqrt{2}} \text{ or } \frac{-\sqrt{2}}{2}}$

$495° - 360° = 135°$

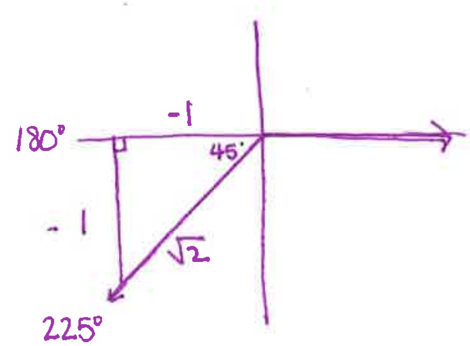


c. $\sec 270° = \frac{1}{0} = \boxed{\text{undefined}}$
(reciprocal of cosine)



d. $\cot -135° = \frac{-1}{-1} = \boxed{1}$
(reciprocal of tangent)

$-135° + 360° = 225°$



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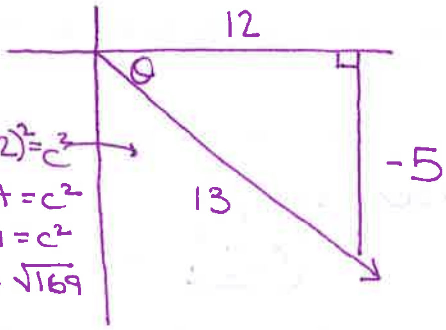
5. If θ is in Quadrant IV and tan θ = $-\frac{5}{12}$ (opp / adj), find the exact value for sin θ.



$(-5)^2+(12)^2=c^2$
$25+144=c^2$
$169=c^2$
$c=\sqrt{169}$

$\sin\theta = \frac{-5}{13}$

6. If θ is an angle in standard position whose terminal side lies in Quadrant II, and sec $\theta = -\frac{7}{5}$ (hyp / adj), find the values of the trigonometric functions for θ.

sin θ = $\frac{\sqrt{24}}{7}$

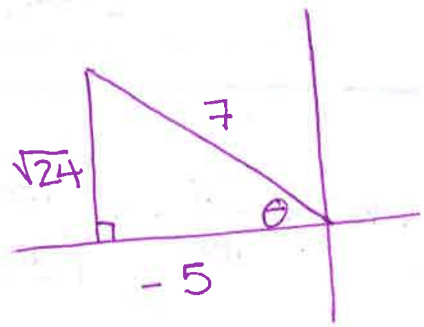
cos θ = $-\frac{5}{7}$

tan θ = $-\frac{\sqrt{24}}{5}$

csc θ = $\frac{7}{\sqrt{24}}$ or $\frac{7\sqrt{24}}{24}$

sec $\theta = -\frac{7}{5}$

cot θ = $\frac{-5}{\sqrt{24}}$ or $-\frac{5\sqrt{24}}{24}$



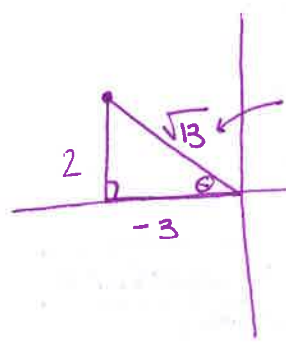
$(-5)^2+b^2=7^2$
$25+b^2=49$
$b^2=24$

7. Find the exact values for the following trigonometric functions for an angle θ in standard position if a point with coordinates (−3, 2) lies on the terminal side.

a. sin θ = $\frac{2}{\sqrt{13}}$ or $\frac{2\sqrt{13}}{13}$

b. sec θ = $-\frac{\sqrt{13}}{3}$
(cosθ)

c. tan θ = $-\frac{2}{3}$



$2^2+(-3)^2=c^2$
$4+9=c^2$
$13=c^2$

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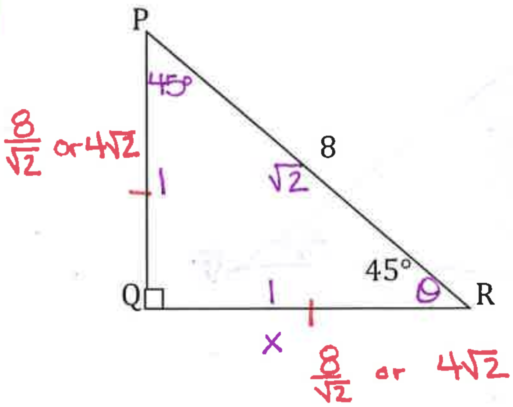
8. Find the **exact** values of the trigonometric functions for $\angle R$ in the triangle below.

a. $\sin R = \dfrac{8/\sqrt{2}}{8} = \dfrac{\cancel{8}}{\sqrt{2}} \cdot \dfrac{1}{\cancel{8}} = \boxed{\dfrac{1}{\sqrt{2}} \text{ or } \dfrac{\sqrt{2}}{2}}$

b. $\cos R = \dfrac{8/\sqrt{2}}{8} = \dfrac{\cancel{8}}{\sqrt{2}} \cdot \dfrac{1}{\cancel{8}} = \boxed{\dfrac{1}{\sqrt{2}} \text{ or } \dfrac{\sqrt{2}}{2}}$

c. $\cot R = \dfrac{8/\sqrt{2}}{8/\sqrt{2}} = \boxed{1}$



$\dfrac{8}{\sqrt{2}} = \dfrac{x}{1}$ $\qquad \dfrac{x\cancel{\sqrt{2}}}{\cancel{\sqrt{2}}} = \dfrac{8}{\sqrt{2}}$

$x = \dfrac{8}{\sqrt{2}}$ or $4\sqrt{2}$

9. *Solve* the triangle if $Q = 42°$ and $r = 13$. Round your answers to the nearest tenth.

$\boxed{\angle R = 48° \quad t = 17.5 \quad q = 11.7}$

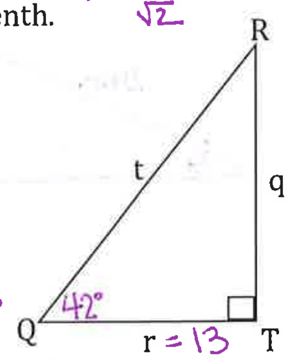
$180° - 90° - 42° = \boxed{48°}$

$\dfrac{\tan 42°}{1} = \dfrac{q}{13}$ $\qquad \dfrac{\cos 42°}{1} = \dfrac{13}{t}$

$q = 13 \cdot \tan 42°$ $\qquad \dfrac{13}{\cos 42°} = \dfrac{t \cdot \cancel{\cos 42°}}{\cancel{\cos 42°}}$

$\boxed{q \approx 11.7}$ $\qquad t = \dfrac{13}{\cos 42°}$

$\boxed{t \approx 17.5}$



10. *Solve* the triangle if $q = 14$ and $r = 7.7$. Round your answers to the nearest tenth.

$\boxed{t = 16.0 \quad \angle R = 28.8° \quad \angle Q = 61.2°}$

$(7.7)^2 + 14^2 = c^2$

$255.29 = c^2$

$c = \sqrt{255.29}$

$\boxed{c \approx 16.0}$

$\tan^{-1}(\tan Q) = \tan^{-1}\left(\dfrac{14}{7.7}\right)$

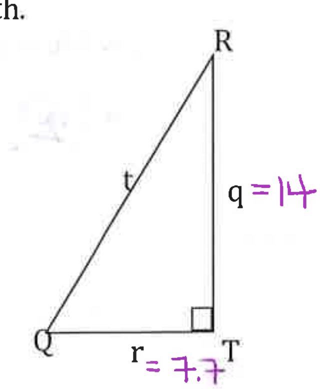
$Q = \tan^{-1}\left(\dfrac{14}{7.7}\right)$

$\boxed{Q \approx 61.2°}$

$\tan^{-1}(\tan R) = \tan^{-1}\left(\dfrac{7.7}{14}\right)$

$R = \tan^{-1}\left(\dfrac{7.7}{14}\right)$

$\boxed{R \approx 28.8°}$



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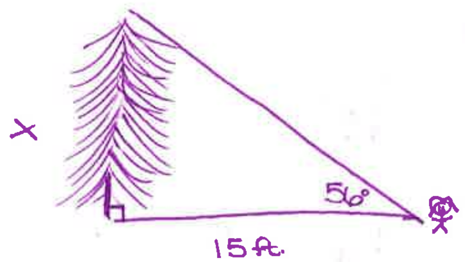
11. Frida is attempting to measure the height of a tree. If she walks 15 feet away from the tree, the angle of elevation to the top of the tree is 56°. How tall is the tree?

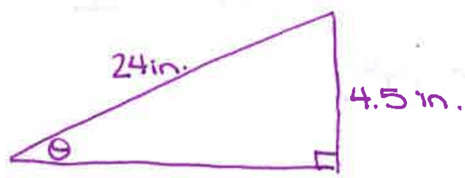


$$\frac{\tan 56^\circ}{1} = \frac{x}{15\text{ft}}$$

$$x = 15 \cdot \tan 56^\circ$$

$$\boxed{x \approx 22.2 \text{ ft.}}$$

12. Ron is building a ramp to make a building wheelchair accessible. The ramp needs to be 24 inches in length with a rise of 4.5 inches. Find the angle of elevation.



$$\cancel{\sin^{-1}}(\cancel{\sin}\theta) = \sin^{-1}\left(\frac{4.5}{24}\right)$$

$$\theta = \sin^{-1}\left(\frac{4.5}{24}\right)$$

$$\boxed{\theta \approx 10.8^\circ}$$

13. Simplify: $4(\underbrace{\sin^2\theta + \cos^2\theta}_{=1}) - 2$

$4(1) - 2$

$= 4 - 2$

$= \boxed{2}$

14. Verify: $\cos\theta \cdot \csc\theta + \tan\theta \cdot \cot\theta = \cot\theta + 1$

$$\frac{\cos\theta}{1} \cdot \frac{1}{\sin\theta} + \frac{\cancel{\sin}\theta}{\cancel{\cos}\theta} \cdot \frac{\cancel{\cos}\theta}{\cancel{\sin}\theta} = \cot\theta + 1$$

$$\frac{\cos\theta}{\sin\theta} + 1 = \cot\theta + 1$$

$$\boxed{\cot\theta + 1 = \cot\theta + 1} \checkmark$$