Honors Advanced Algebra 2 with Trig

# Chapter 7.4-7.6 Pretest

Name: Key Date: _____ Period: _____

**Show all of your work.** Read the directions carefully. **No calculator unless otherwise stated.**

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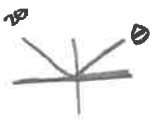
1. Given $\cos 2\theta = -\frac{3}{8}$ and $2\theta$ terminates in quadrant II, use trigonometric identities to find $\cot\theta$.



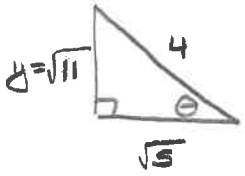
$\cos 2\theta = -\frac{3}{8} = 2\cos^2\theta - 1$

$\frac{5}{8} = 2\cos^2\theta$

$\frac{5}{16} = \cos^2\theta$

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

$\sqrt{5}/4 = \cos\theta$




$y^2 = 4^2 - \sqrt{5}^2$

$y = \sqrt{16-5}$

$= \sqrt{11}$

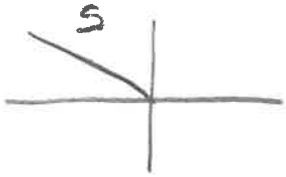
$\cot\theta = \frac{\sqrt{5}}{\sqrt{11}}$

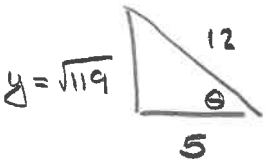
$= \frac{\sqrt{55}}{11}$

1

2. Find ~~the values of the six trigonometric functions of θ~~ given $\cos 2\theta = -\frac{5}{12}$ and $90° < \theta < 180°$.

$\cos 2\theta$, $\sin 2\theta$




$5^2 + y^2 = 12^2$

$y = \sqrt{119}$

$\cos 2\theta = 2\cos^2\theta - 1$

$= 2(-5/12)^2 - 1$

$= 2\left(\frac{25}{144}\right) - 1$

$= \frac{50}{144} - 1$

$\cos 2\theta = \frac{-94}{144}$

$\sin 2\theta = 2\sin\theta\cos\theta$

$= 2\left(\frac{\sqrt{119}}{12}\right)\left(\frac{-5}{12}\right)$

$= \frac{-10\sqrt{119}}{144}$

$\sin 2\theta = \frac{-5\sqrt{119}}{72}$

3. Simplify $2\cos^2 5x - 1$

$= \cos 2(5x)$

$= \cos 10x$

$\alpha = 40°$ $\beta = 15$

4. Write $6 \sin 40° \sin 15°$ as the sum or difference of two functions.

$$= 6 \frac{\cos(25) - \cos(55)}{2}$$

$$= \boxed{3\cos 25° - 3\cos 55°}$$

5. Write $\cos 3\theta + \cos 7\theta$ as a product of two functions.

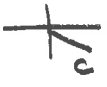
$$= 2\cos\left(\frac{3\theta + 7\theta}{2}\right)\cos\left(\frac{3\theta - 7\theta}{2}\right)$$

* $\cos\theta$ even

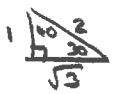
$$= 2\cos 5\theta \cos(-2\theta)$$
$$= 2\cos 5\theta \cos 2\theta$$

6. Use a half-angle identity to find $\sin 165°$


$$\sin 165 = \pm\sqrt{\frac{1-\cos 330}{2}}$$




$\cos 330$
$\theta' = 30°$

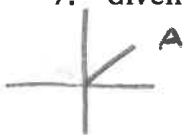



$\cos 330 = \frac{\sqrt{3}}{2}$

$$= +\sqrt{\frac{1 - \sqrt{3}/2}{2}} \quad = \sqrt{\frac{2-\sqrt{3}}{4}}$$

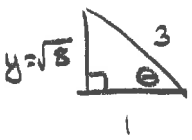
$$= \sqrt{\frac{2-\sqrt{3}}{2} \cdot \frac{1}{2}} \quad = \boxed{\frac{\sqrt{2-\sqrt{3}}}{2}}$$

7. Given $\cos\theta = \frac{1}{3}$ and $0° < \theta < 90°$. Find $\sin 2\theta$.




$$\sin 2\theta = 2\left(\sqrt{8}/3\right)\left(\frac{1}{3}\right)$$

$$= \boxed{\frac{2\sqrt{8}}{9}}$$




$1^2 + y^2 = 3^2$
$y = \sqrt{9-1} = \sqrt{8}$

8. Simplify $\sqrt{\frac{1+\cos 100°}{1-\cos 100°}}$

$$= \boxed{\tan(50°)}$$

9. Verify the following identity:

$$\frac{2\cot\beta}{\sin 2\beta} = \csc^2\beta$$

$$\frac{2\cot\beta}{2\sin\beta\cos\beta} =$$

$$\frac{\frac{\cos\beta}{\sin\beta}}{\sin\beta\cos\beta} =$$

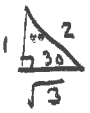
$$\frac{\cos\beta}{\sin\beta\sin\beta\cos\beta} =$$

$$\frac{1}{\sin^2\beta} =$$

$$\csc^2\beta = \checkmark$$

10. Find the exact value of $y = \sin^{-1}(\frac{\sqrt{3}}{2})$


$\theta' = 60°$




$y = 60° = \frac{\pi}{3}$

11. Find the exact value of $\theta = \arccos(-1/\sqrt{2})$


$\theta' = 45°$


$\theta = 135° = \frac{3\pi}{4}$

12. Find the exact value of $y = \arctan(-\sqrt{3})$

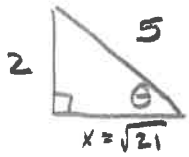

$\theta' = 60°$

$\theta = -60° = -\frac{\pi}{3}$

13. With a calculator, solve $\arccos 0.7619413$.

$= 40.364° = 0.70449$ radians

14. Use a right triangle to solve $\cos(\sin^{-1}\frac{2}{5})$




$= \cos(\theta)$

$= \frac{\sqrt{21}}{5}$

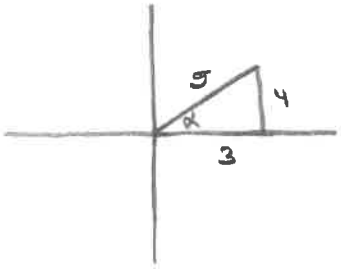
$2^2 + x^2 = 5^2$

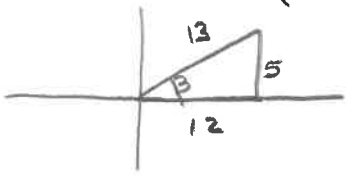
$x = \sqrt{25-4}$

$= \sqrt{21}$

$\cos(\sin^{-1}(2/5)) = \sqrt{21}/5$

15. Using identities, evaluate $\sin\left(\underset{\alpha}{\arctan}\frac{4}{3} - \underset{\beta}{\arccos}\frac{12}{13}\right)$




$$\sin(\alpha-\beta) = \sin\alpha\cos\beta - \cos\alpha\sin\beta$$

$$= \left(\frac{4}{5}\right)\left(\frac{12}{13}\right) - \left(\frac{3}{5}\right)\left(\frac{5}{13}\right)$$

$$= \frac{48}{65} - \frac{15}{65}$$

$$= \boxed{\frac{33}{65}}$$

16. Solve:

a. $\sqrt{3}\tan x - 1 = 0$


$\tan x = \frac{1}{\sqrt{3}}$

$\theta' = 30°$

$\boxed{x = \frac{\pi}{6}, \frac{7\pi}{6}}$

b. $2\cos x = \sqrt{3}$

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


$x' = 30°$

$\boxed{x = \frac{\pi}{6}, \frac{11\pi}{6}}$

17. Solve $2\sin^2 x + \sin x - 1 = 0$

$(2\sin x - 1)(\sin x + 1) = 0$


$\sin x = \frac{1}{2}$ $\quad \sin x = -1$

$x' = 30°$

$x = \frac{\pi}{6}, \frac{5\pi}{6}$ $\quad x = \frac{3\pi}{2}$

$\boxed{x = \pi/6,\ 5\pi/6,\ 3\pi/2}$

18. Solve $\tan\frac{x}{2} = \frac{\sqrt{3}}{3}$


$\theta' = 30°$

$\theta = \frac{\pi}{6}, \frac{7\pi}{6},$

$\frac{x}{2} = \frac{\pi}{6} + 2\pi k$ $\quad \frac{x}{2} = \frac{7\pi}{6} + 2\pi k$

$x = \frac{\pi}{3} + 4\pi k$ $\quad x = \frac{7\pi}{3} + 4\pi k$

$\boxed{x = \frac{\pi}{3}}$

19. Solve $\cos 2x = \frac{\sqrt{2}}{2}$

A
C

$\theta' = 45^\circ$

$\theta = \frac{\pi}{4} + 2\pi k$ $\qquad$ $\theta = \frac{7\pi}{4} + 2\pi k$

$2x = \frac{\pi}{4} + 2\pi k$ $\qquad$ $2x = \frac{7\pi}{4} + 2\pi k$

$x = \frac{\pi}{8} + \pi k$ $\qquad$ $x = \frac{7\pi}{8} + 2\pi k$

$$x = \frac{\pi}{8}, \frac{7\pi}{8}, \frac{9\pi}{8}, \frac{15\pi}{8}$$