Diagnostic Review – Trigonometry

The Math Diagnostic Sequence at the College of Western Idaho involves testing out of Trigonometry. The diagnostic tests have between 10 and 20 questions.

Trigonometry: Simplify all answers. Write the correct response, using radicals as needed. Rationalize all denominators.

Topics and Examples

1. Topic: Classify angles
   - Example: Classify the angle 54^o as acute, right, obtuse, or straight.

2. Topic: Find the reference angle
   - Find the reference angle of 410^o.

3. Topic: Find the reference angle
   - Find the reference angle of $-\frac{\pi}{4}$.

4. Topic: Convert between degrees and radians
   - Convert - 45^o to radians.

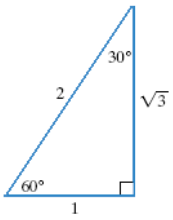
5. Topic: Convert between radians and degrees
   - Convert $\frac{\pi}{12}$ radians to degrees.

6. Topic: Find a coterminal angle expressed in degrees
   - Find a positive angle less than 360^o that is coterminal with -45^o.

7. Topic: Find a coterminal angle expressed in radians
   - Find a positive angle less than 2π that is coterminal with $\frac{3\pi}{4}$.

8. Topic: Using identities, find the exact value of a trigonometric function
   - Given that $\cos\theta = \frac{1}{3}$, find the exact value of the remaining trigonometric functions of the acute angle θ .

9. Topic: Using triangles, find the exact value of a trigonometric function
   - Use the 30-60-90 triangle to evaluate the $\cot 60^o$ and $\cos 30^o$.



10. Topic: Using reference angles, find the exact value of a trigonometric function
    - Find the exact value of $\cos 135^o$. Do not use a calculator.

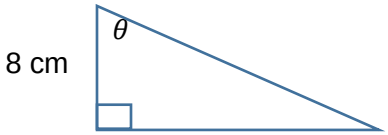
11. Topic: Using reference angles, find the exact value of a trigonometric function
- Find the exact value of $\sec\frac{7\pi}{4}$. Do not use a calculator.

12. Topic: Using reference angles, find the exact value of a trigonometric function
- Find the exact value of $\cot 390°$. Do not use a calculator.

13. Topic: Identify the cofunction of a given function
- Given the expression cot 25º, identify the equivalent cofunction.

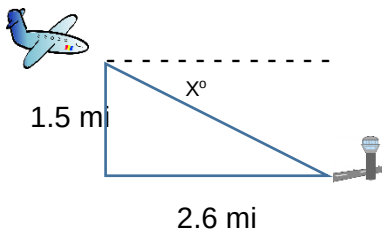
14. Topic: Given a point on the terminal side of angle θ, find the exact value of each of the six trigonometric functions of θ
- (3, - 6) is a point on the terminal side of angle θ. Find the exact value of each of the six trigonometric functions of θ.

15. Topic: Find the angle using inverse trigonometric functions
- Use the diagram to find the value of the angle θ. Round to the nearest degree.

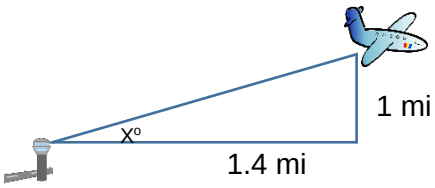


16. Topic: Given a trigonometric function and a quadrant, find the exact value of each of the six trigonometric functions of θ
- Find the exact value of each of the remaining trigonometric functions of θ, given $\cos\theta = -\frac{2}{5}$ and θ is in Quadrant III.

17. Topic: Find the angle of depression
- An airplane is flying 1.5 miles above the ground. The distance along the ground from the airplane to the airport is 2.6 miles. What is the angle of depression from the airplane to the airport? Round to the nearest degree.



18. Topic: Find the angle of elevation
- A plane is flying 1 mile above the tower and is 1.4 miles along the ground from the tower. What is the angle of elevation? Round to the nearest degree.



19. Topic: Rewrite a trig function in terms of a different trigonometric function
    - Rewrite $\frac{\sec x}{\csc x} + \frac{\sin x}{\cos x}$ in terms of tan x.

20. Topic: Rewrite a trig function in terms of a different trigonometric function
    - Rewrite $\sin\theta(\cot\theta + \tan\theta)$ in terms of $\cos\theta$.

21. Topic: Verify an identity
    - Establish the identity and show $(1 - cos^2\theta)(1 + cot^2\theta) = 1$.

22. Topic: Verify an identity
    - Establish the identity and show $\frac{1-\sin x}{1+\sin x} = (\sec x - \tan x)^2$.

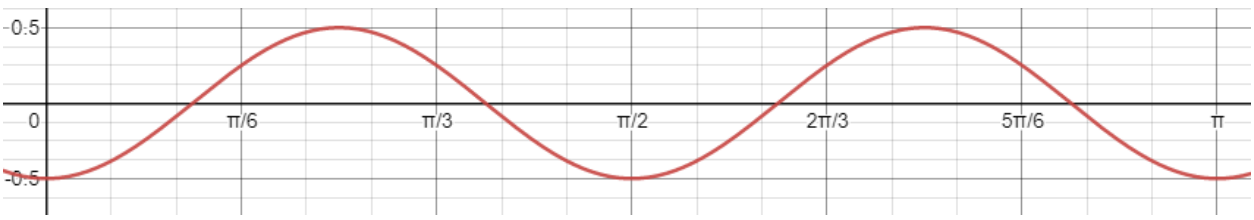
23. Topic: Determine the period amplitude of a function
    - Determine the period and amplitude of the function, $= -\frac{1}{2}cos\ \frac{3}{2}x$.

24. Topic: Determine the period, amplitude, and phase shift of a function
    - Determine the period, amplitude, and phase shift of the function, $= 3\sin\left(2x + \frac{\pi}{4}\right)$.

25. Topic: Identify the reciprocal function
    - Give the reciprocal or the function $y = -\sin\left(x + \frac{\pi}{2}\right)$

26. Topic: Graph a trigonometric function
    - Graph the function $y = -4sin\frac{1}{2}x$ over one period.

27. Topic: Determine period and amplitude from a graph
    - Find the period and amplitude of the given cosine graph.



28. Topic: Determine an equation from a graph
    - Give the equation for the cosine graph in Question 27.

29. Topic: Determine the reciprocal function from a graph
    - Find the equation of the reciprocal function of the cosine graph in Question 27.

Answers: Simplify all answers. Type an exact answer, using radicals as needed. Rationalize all denominators.

Trigonometry

1. Acute
2. 50^{o}
3. $\frac{\pi}{4}$
4. $-\frac{\pi}{4}$
5. 15^{o}
6. 315^{o}
7. $\frac{5\pi}{4}$
8. $sin\theta = \frac{2\sqrt{2}}{3},\ \ tan\theta = 2\sqrt{2}\ ,\ sec\theta = 3,\ \ csc\vartheta = \frac{3\sqrt{2}}{4},\ \ cot\theta = \frac{\sqrt{2}}{4}$
9. $\frac{\sqrt{3}}{3}\ ,\ \frac{\sqrt{3}}{2}$
10. $-\frac{\sqrt{2}}{2}$
11. $\sqrt{2}$
12. $\sqrt{3}$
13. $\tan 65^{o}$
14. $cos\theta = \frac{\sqrt{5}}{5}, sin\theta = \frac{2\sqrt{5}}{5},\ \ tan\theta = 2,\ \ sec\theta = \sqrt{5},\ \ csc\theta\frac{\sqrt{5}}{2},\ \ cot\theta = \frac{1}{2}$
15. $\theta = 58°$
16. $sin\theta = \frac{-\sqrt{21}}{5},\ \ tan\theta = \frac{\sqrt{21}}{2},\ \ sec\theta = -\frac{5}{2},\ \ csc\theta = \frac{-5\sqrt{21}}{21},\ \ cot\theta = \frac{2\sqrt{21}}{21}$
17. $30°$
18. $36°$

19. $\frac{\sec x}{\csc x} + \frac{\sin x}{\cos x} =$

$\frac{\frac{1}{\cos x}}{\frac{1}{\sin x}} + \frac{\sin x}{\cos x} =$

$\frac{\cos x \cdot \sin x}{\cos x \cdot \sin x}\left(\frac{\frac{1}{\cos x}}{\frac{1}{\sin x}}\right) + \frac{\sin x}{\cos x} =$

$\frac{\sin x}{\cos x} + \frac{\sin x}{\cos x} =$

$\tan x + \tan x =$

$2\tan x$

20. $sin\theta(cot\theta + tan\theta) =$

$sin\theta\left(\frac{cos\theta}{sin\theta} + \frac{sin\theta}{cos\theta}\right) =$

$cos\theta + \frac{sin^2\theta}{cos\theta} =$

$\frac{cos^2\theta}{cos\theta} + \frac{sin^2\theta}{cos\theta} =$

$\frac{cos^2\theta + sin^2\theta}{cos\theta} =$

$\frac{1}{cos\theta}$

21. $(1 - cos^2\theta)(1 + cot^2\theta) = 1$

$\boldsymbol{sin^2}\theta(1 + cot^2\theta) = 1$

$sin^2\theta + sin^2\theta(cot^2\theta) = 1$

$sin^2\theta + sin^2\theta\left(\frac{cos^2\theta}{sin^2\theta}\right) = 1$

$sin^2\theta + cos^2\theta = 1$

$1 = 1$

22. $\frac{1-sinx}{1+sinx} = (\sec x - \tan x)^2$

$$\frac{1-sinx}{1+sinx} = \left(\frac{1}{cosx} - \frac{sinx}{cosx}\right)^2$$

$$\frac{1-sinx}{1+sinx} = \left(\frac{1}{cosx} - \frac{sinx}{cosx}\right)\left(\frac{1}{cosx} - \frac{sinx}{cosx}\right)$$

$$\frac{1-sinx}{1+sinx} = \frac{1}{cos^2x} - \frac{2sinx}{cos^2x} + \frac{sin^2x}{cos^2x}$$

$$\frac{1-sinx}{1+sinx} = \frac{(1-sinx)(1-sinx)}{cos^2x}$$

$$\frac{1-sinx}{1+sinx} = \frac{(1-sinx)(1-sinx)}{1-sin^2x}$$

$$\frac{1-sinx}{1+sinx} = \frac{(1-sinx)(1-sinx)}{(1-sinx)(1+sinx)}$$

$$\frac{1-sinx}{1+sinx} = \frac{(1-sinx)}{(1+sinx)}$$

23. $period = \frac{4\pi}{3}, amplitude = \frac{1}{2}$

24. $period = \pi$, amplitude = 3, phase shift = $-\frac{\pi}{8}$

25. $y = -\csc\left(x + \frac{\pi}{2}\right)$

26.

27. Period = $\frac{\pi}{2}$, amplitude = $\frac{1}{2}$ (or 0.5)

28. $y = -\frac{1}{2}\cos 4x$

29. $y = -\frac{1}{2}\sec 4x$