

## Trigonometry Review Problems

The following problems are provided as examples of some of the trigonometry concepts and topics that are tested on the mathematics placement test used at UNCW. They are not intended to be a complete summary of all topics covered on the test or representative of prerequisite material for any UNCW mathematics course. See our website ([www.uncw.edu/math](http://www.uncw.edu/math)) for more information about the placement test.

1. State the value of each of the following:

a.)  $\sin(30^\circ)$       b.)  $\cos\left(\frac{\pi}{6}\right)$       c.)  $\tan(135^\circ)$       d.)  $\sec(\pi)$   
e.)  $\sin(-225^\circ)$       f.)  $\csc\left(\frac{2\pi}{3}\right)$       g.)  $\cot(0)$       h.)  $\cos\left(\frac{17\pi}{6}\right)$

2. If  $\theta$  is an acute angle and  $\sin(\theta) = \frac{2}{3}$ , find the value of each of the following:

a.)  $\cos(\theta)$       b.)  $\tan(\theta)$       c.)  $\sec(\theta)$       d.)  $\csc(\theta)$

3. If  $\sin(\theta) = \frac{1}{2}$  and  $\cos(\theta) = \frac{-\sqrt{3}}{2}$ , find the value of each of the following:

a.)  $\sin(2\theta)$       b.)  $\cos(2\theta)$       c.)  $\tan(\theta)$

4. In triangle  $ABC$ , the measures of angles  $A$ ,  $B$ , and  $C$  are  $20^\circ$ ,  $70^\circ$ , and  $90^\circ$ , respectively. If  $\overline{BC}$  is 8 units long, how long is  $\overline{AC}$ ?

5. In triangle  $ABC$ , angle  $C$  is a right angle. Let the measure of angle  $A$  be  $\alpha$  and the measure of angle  $B$  be  $\beta$ . Let the side opposite angle  $A$  have length  $a$ , the side opposite angle  $B$  have length  $b$ , and the hypotenuse have length  $c$ . Find each of the following:

a.)  $\cos(\alpha)$       b.)  $\tan(\alpha)\tan(\beta)$       c.)  $\sin(\alpha + \beta)$       d.)  $\sin(2\alpha)$

6.  $\frac{1}{1 - \sin(x)} - \frac{1}{1 + \sin(x)}$  equals

7. In triangle  $ABC$ , angle at  $C$  is a right angle. The measure of angle  $A$  is  $\alpha$ , and the length of side  $\overline{AC}$  is 1. If  $45^\circ \leq \alpha \leq 60^\circ$ , then what are the possible lengths of side  $\overline{BC}$ ?

8. If  $\tan(\theta) = \frac{3}{4}$  and  $\pi \leq \theta \leq 2\pi$ , then what is the value of  $\cos(\theta)$ ?

9. If  $2\sin^2(\theta) + 3\sin(\theta) + 1 = 0$  and  $0 \leq \theta < 2\pi$ , then what are the possible values of  $\theta$ ?

10. If  $\sqrt{\sin(\theta)} = 1$  and  $0 \leq \theta < 2\pi$ , then what are the possible values of  $\theta$ ?

11. In right triangle  $ABC$  (with right angle at  $C$ ), the hypotenuse has length 5. The side opposite angle  $A$  has length 2. If the measure of angle  $A$  is  $\alpha$ , what is  $\sec(\alpha)$ ?
12. What is the period of the graph of the function  $f(x) = \frac{1}{3} \sin(2x)$ ?
13. The lengths of the two legs of a right triangle are  $3 \cos(\theta)$  and  $3 \sin(\theta)$ . How long is the hypotenuse?
14. What is the angle of elevation to the top of a building 200 feet tall from a point 12 feet from the base of the building?
15. What is the exact value of  $3 \sin\left(\frac{\pi}{12}\right)$ ?

### ANSWERS

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|------------------------------|--|
| 1. a.) $\frac{1}{2}$         | c.) $(a^2 + b^2)/c^2$  |
| b.) $\frac{\sqrt{3}}{2}$     | d.) $2ab/c^2$  |
| c.) $-1$                     |  |
| d.) $-1$                     | 6. $\frac{2 \sin(x)}{\cos^2(x)}$                                 |
| e.) $\frac{\sqrt{2}}{2}$     |  |
| f.) $\frac{2}{\sqrt{3}}$     | 7. $1 \leq \overline{BC} \leq \sqrt{3}$                          |
| g.) undefined                |  |
| h.) $-\frac{\sqrt{3}}{2}$    | 8. $-\frac{4}{5}$  |
| 2. a.) $\frac{\sqrt{5}}{3}$  | 9. $\frac{7\pi}{6}, \frac{11\pi}{6}, \text{ or } \frac{3\pi}{2}$ |
| b.) $\frac{2\sqrt{5}}{5}$    |  |
| c.) $\frac{3\sqrt{5}}{5}$    | 10. $\frac{\pi}{2}$  |
| d.) $\frac{3}{2}$            | 11. $\frac{5\sqrt{21}}{21}$                                      |
| 3. a.) $-\frac{\sqrt{3}}{2}$ | 12. $\pi$  |
| b.) $\frac{1}{2}$            |  |
| c.) $-\frac{\sqrt{3}}{3}$    | 13. 3  |
| 4. $8 \tan(70^\circ)$ or     | 14. $\theta = \arctan\left(\frac{50}{3}\right)$                  |
| $8 / \tan(20^\circ)$         |  |
| 5. a.) $\frac{b}{c}$         | 15. $\frac{3}{2} \sqrt{2 - \sqrt{3}}$                            |
| b.) 1                        |  |