

# Precalculus – Math 1113

**Dr. Bob Brown, Jr.**  
**Dean Emeritus**  
**Professor Emeritus**  
**East Georgia State College**  
**Test 3 Review Video**



Student: \_\_\_\_\_  
Date: \_\_\_\_\_

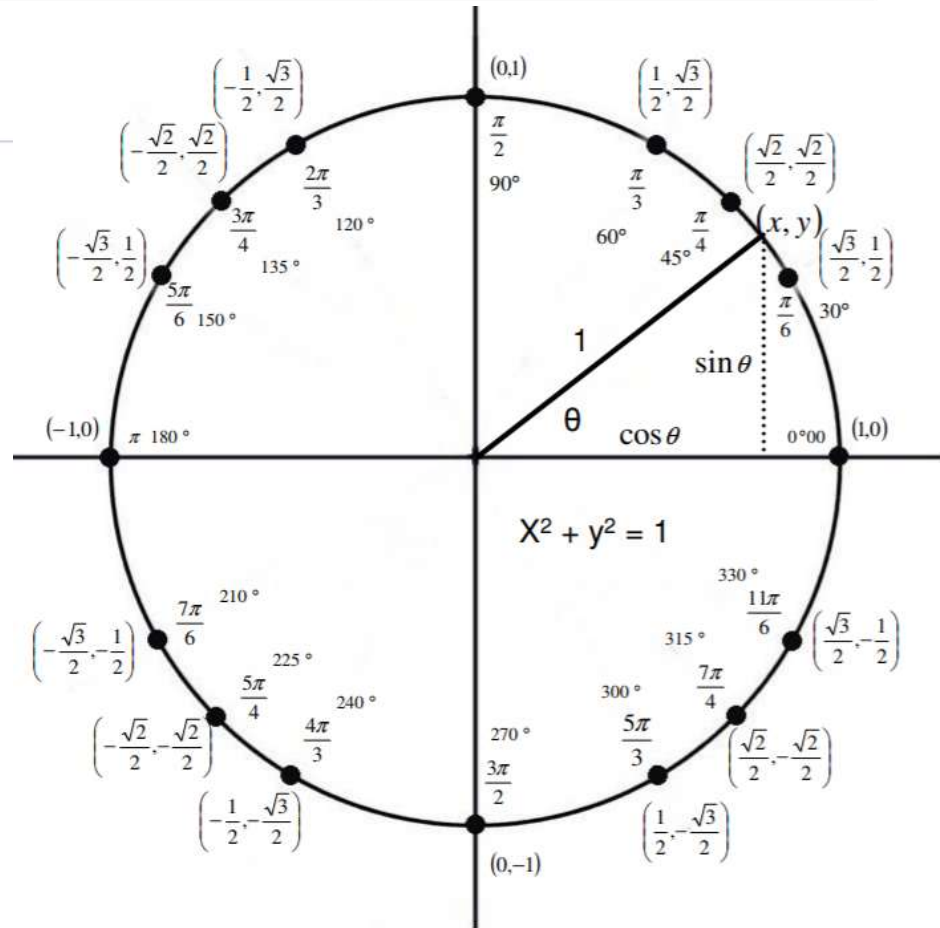
Instructor: Robert Brown  
Course: Math 1113 Spring 2018 Dr. Bob  
Brown, Jr.

Assignment: Pre-Calculus Test 3 Video  
Script Dr. Bob Brown

1. Find the exact value of the expression.

$\tan^{-1} 0$

- A. 0
- B.  $2\pi$
- C.  $\pi$
- D.  $\frac{\pi}{2}$

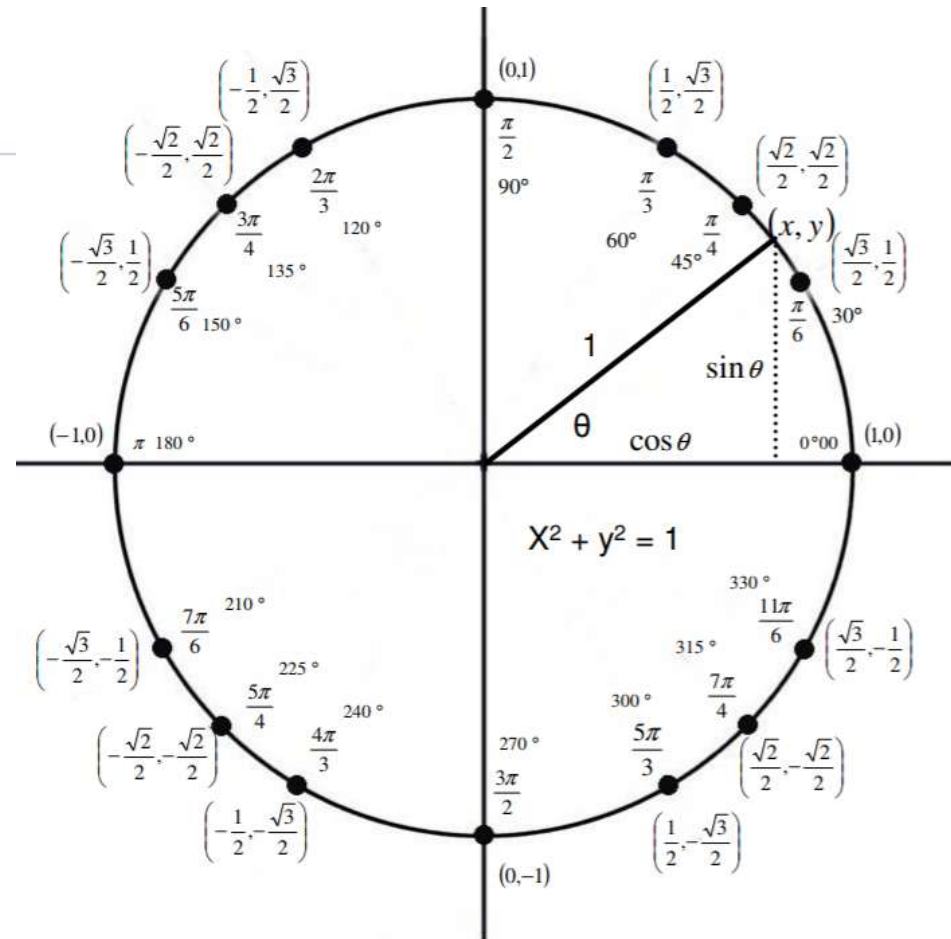


**The Unit Circle**

2. Find the exact value of the expression.

$$\cos^{-1}(1)$$

- A.  $-\pi$
- B.  $\pi$
- C.  $0$
- D.  $\frac{\pi}{2}$



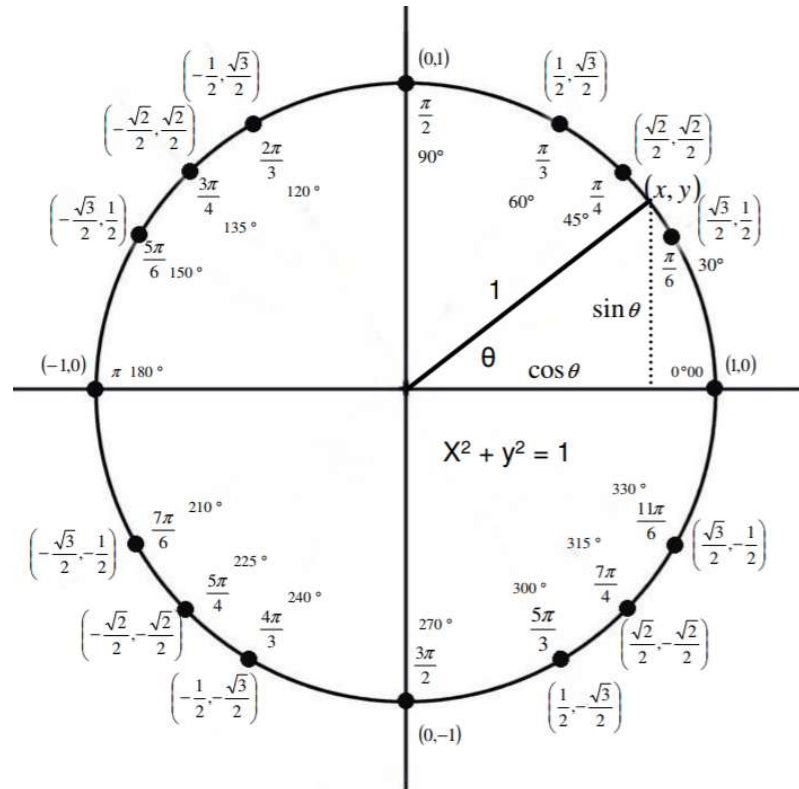
**The Unit Circle**

3. Find the exact value of the following expression.

$$\tan^{-1}(\sqrt{3})$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- A.  $\tan^{-1}(\sqrt{3}) =$  \_\_\_\_\_  
 (Simplify your answer. Type an exact answer, using  $\pi$  as needed. Use integers or fractions for any numbers in the expression.)
- B. The function is not defined.



**The Unit Circle**

4. Use a calculator to find the value of the following expression rounded to two decimal places.

$$\tan^{-1}(-2.1)$$

---

$$\tan^{-1}(-2.1) = \underline{\hspace{2cm}} \text{radian(s)}$$

(Type your answer in radians. Round to the nearest hundredth as needed.)

5. Use a calculator to find the value of the expression rounded to three decimal places.

$$\sin^{-1}\left(\frac{1}{6}\right)$$

---

- A. 1.403
- B. 9.613
- C. 80.387
- D. 0.168

6. Find the exact value, if any, of the composite function. Do not use a calculator.

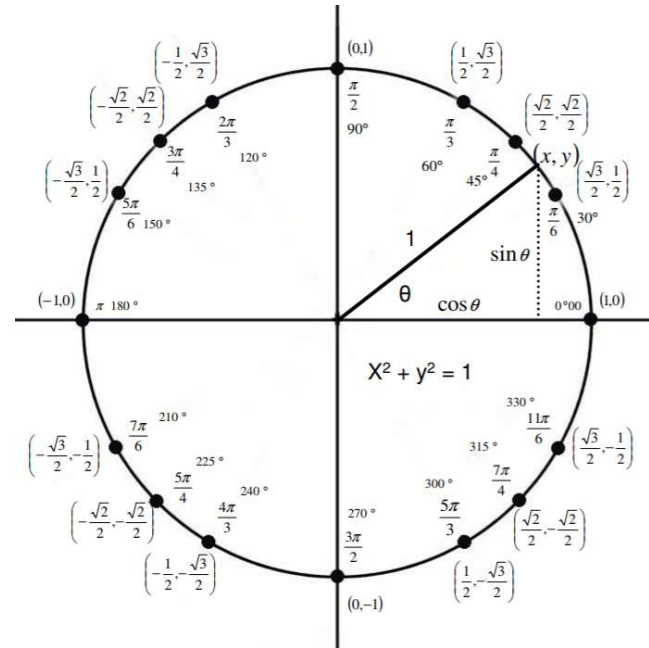
$$\cos \left( \cos^{-1} 2.1 \right)$$

Select the correct choice below and fill in any answer boxes in your choice.

A.  $\cos \left( \cos^{-1} 2.1 \right) =$  \_\_\_\_\_

(Simplify your answer. Type an exact answer, using  $\pi$  as needed. Use integers or fractions for any numbers in the expression.)

B. There is no solution.



**The Unit Circle**

7. Multiply and simplify  $\frac{\sin \theta \cos \theta}{(\sin \theta - \cos \theta)(\sin \theta - \cos \theta) - 1}$ .

---

$$\frac{\sin \theta \cos \theta}{(\sin \theta - \cos \theta)(\sin \theta - \cos \theta) - 1} = \underline{\hspace{2cm}}$$

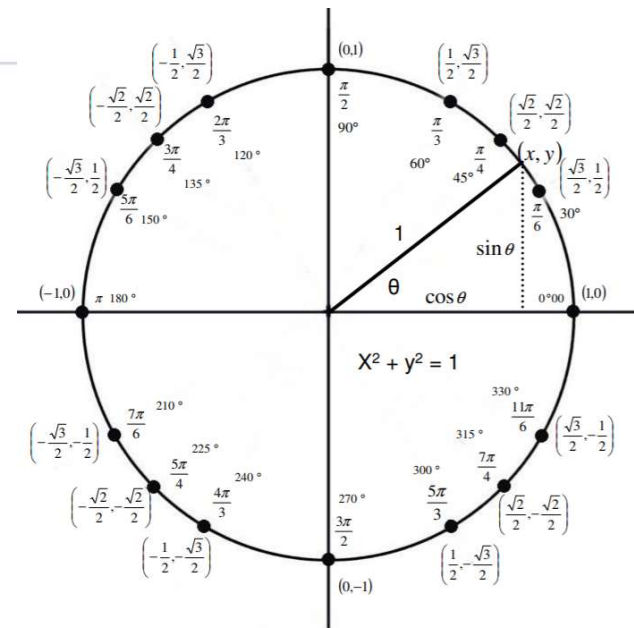
(Use integers or fractions for any numbers in the expression.)



8. Solve the equation on the interval  $0 \leq \theta < 2\pi$ .

$$2 \cos (2\theta) = \sqrt{3}$$

- A.  $\left\{ \frac{\pi}{6}, \frac{11\pi}{6} \right\}$
- B.  $\left\{ \frac{\pi}{2} \right\}$
- C.  $\left\{ \frac{3\pi}{2} \right\}$
- D.  $\left\{ \frac{\pi}{12}, \frac{11\pi}{12}, \frac{13\pi}{12}, \frac{23\pi}{12} \right\}$

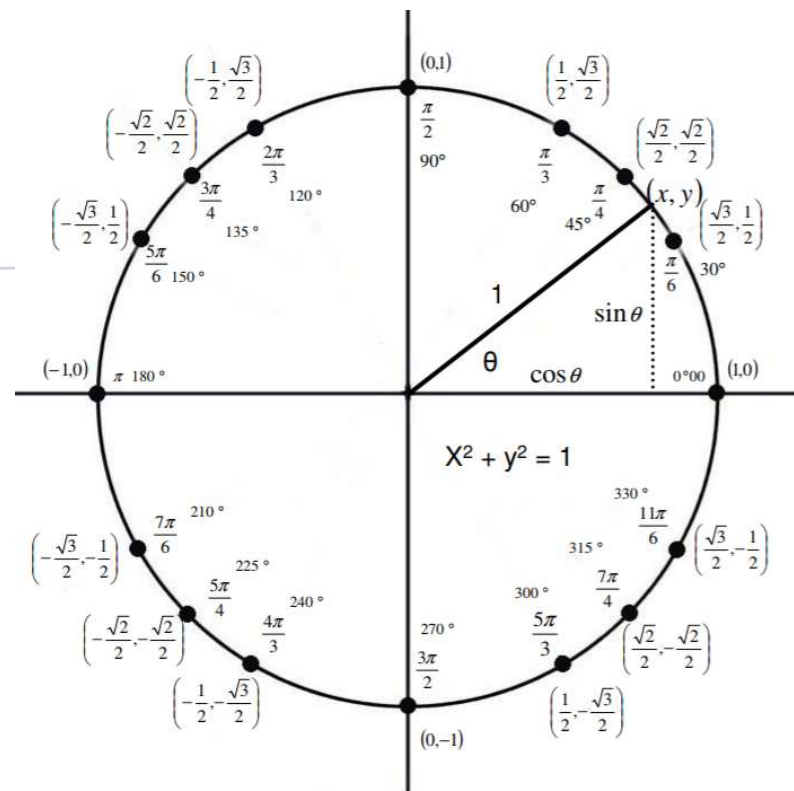


The Unit Circle

9. Solve the equation on the interval  $0 \leq \theta < 2\pi$ .

$$4\sin^2\theta - 3 = 0$$

- A.  $\left\{ \frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6} \right\}$
- B.  $\left\{ \frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3} \right\}$
- C.  $\left\{ \frac{\pi}{6}, \frac{5\pi}{6} \right\}$
- D.  $\left\{ \frac{\pi}{3}, \frac{2\pi}{3} \right\}$



**The Unit Circle**

10. Use a calculator to solve the equation on the interval  $0 \leq \theta < 2\pi$ .

$$\cos \theta = -0.48$$

---

What are the solutions in the interval  $0 \leq \theta < 2\pi$ ? Select the correct choice and fill in any answer boxes in your choice below.

- A.** The solution set is  $\{ \underline{\hspace{2cm}} \}$ .  
(Type your answer in radians. Round to two decimal places as needed. Use a comma to separate answers as needed.)
- B.** There is no solution.

11. Use a calculator to solve the following equation on the interval  $0 \leq \theta < 2\pi$ .

$$\tan \theta = 18$$

---

Select the correct choice below, and if necessary, fill in the answer box to complete your choice.

- A.** The solution set is  $\{\underline{\hspace{2cm}}\}$ .  
(Type your answer in radians. Round to two decimal places as needed. Use a comma to separate answers as needed.)
- B.** There is no solution.

12. Establish the identity.

$$(\tan \theta + \cot \theta) \sin \theta = \sec \theta$$

---

Write the left side in terms of sine and cosine.

$$(\underline{\hspace{2cm}}) \sin \theta$$

Simplify the expression inside the parentheses from the previous step and write the result in terms of sine and cosine.

$$(\underline{\hspace{2cm}}) \sin \theta$$

Simplify the expression from the previous step and write the result in terms of **cos**  $\theta$ .

\_\_\_\_\_

13. Establish the identity.

$$\sec u \cos u - \sin^2 u = \cos^2 u$$

---

Write the left side term  $\sec u$  in term of  $\cos u$ .

$$\underline{\hspace{2cm}} \cdot \cos u - \sin^2 u$$

Simplify the expression from the previous step by canceling the common factor.

$$\underline{\hspace{2cm}} - \sin^2 u$$

The expression from the previous step is equivalent to  $\cos^2 u$  using what?

- A. Reciprocal Identity
- B. Cancellation Property
- C. Quotient Identity
- D. Pythagorean Identity
- E. Even-Odd Identity

14. Use a calculator to solve the equation on the interval  $0 \leq \theta < 2\pi$ . Round the answer to two decimal places.

$$2 \tan \theta - 5 = 0$$

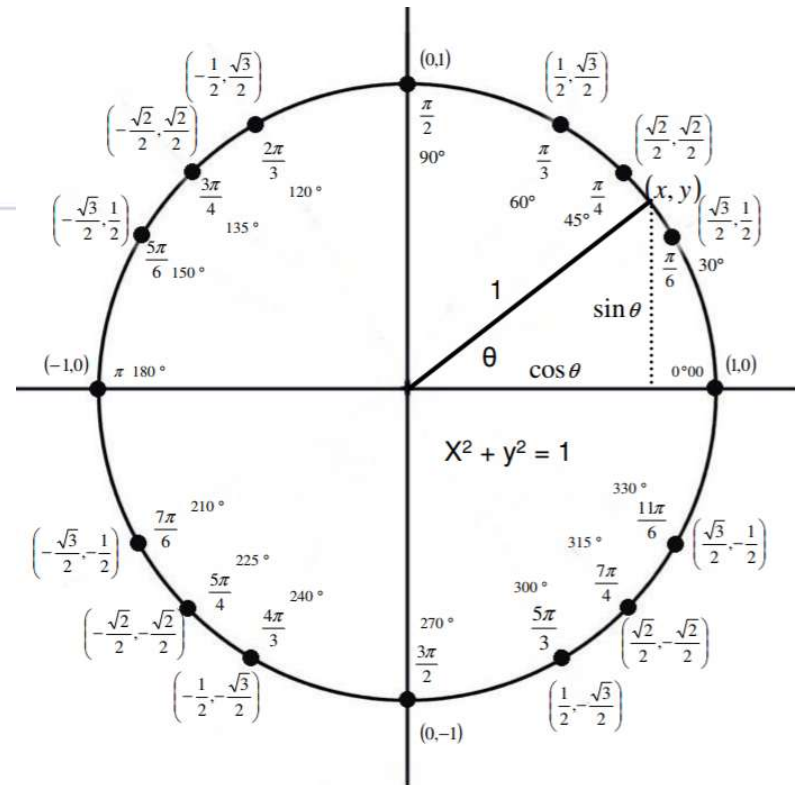
---

- A. 0.38,3.52
- B. 1.19,5.09
- C. 1.19,4.33
- D. 1.19,1.95

15  $2 \sin^2 \theta - 3 \sin \theta - 2 = 0$

- A.  $\left\{ \frac{\pi}{2}, \frac{5\pi}{6}, \frac{7\pi}{6} \right\}$
- B.  $\left\{ \frac{7\pi}{6}, \frac{11\pi}{6} \right\}$
- C.  $\left\{ \frac{4\pi}{3}, \frac{5\pi}{3} \right\}$
- D.  $\left\{ \frac{\pi}{2}, \frac{7\pi}{6}, \frac{11\pi}{6} \right\}$

ID: 8.3-50



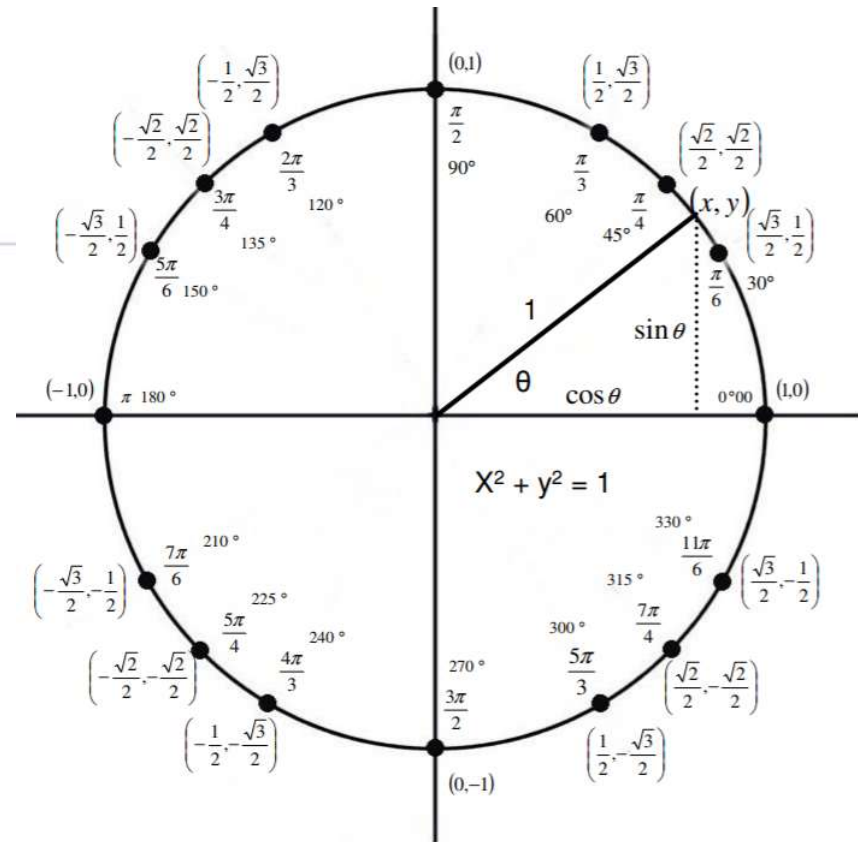
**The Unit Circle**



16. Solve the equation on the interval  $0 \leq \theta < 2\pi$ .

$$\cos^2 \theta + 2 \cos \theta + 1 = 0$$

- A.  $\left\{ \frac{\pi}{4}, \frac{7\pi}{4} \right\}$   
 B.  $\{\pi\}$   
 C.  $\{2\pi\}$   
 D.  $\left\{ \frac{\pi}{2}, \frac{3\pi}{2} \right\}$



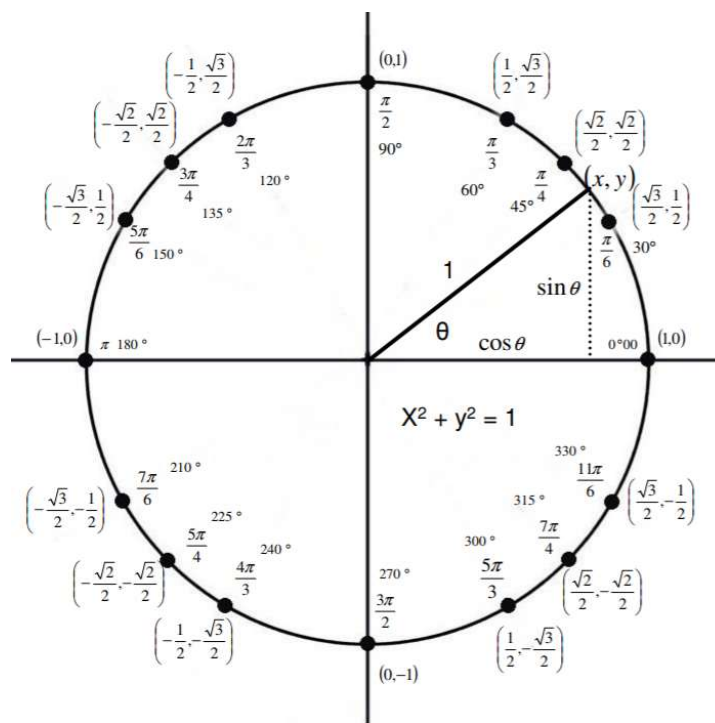
**The Unit Circle**

17. Solve the equation on the interval  $0 \leq \theta < 2\pi$ .

$$2 \sin^2 \theta + \sin \theta = 0$$

Select the correct choice and fill in any answer boxes in your choice below.

- A. The solution set is  $\{ \quad \quad \quad \}$ .  
 (Simplify your answer. Type an exact answer, using  $\pi$  as needed. Type your answer in radians. Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)
- B. There is no solution.

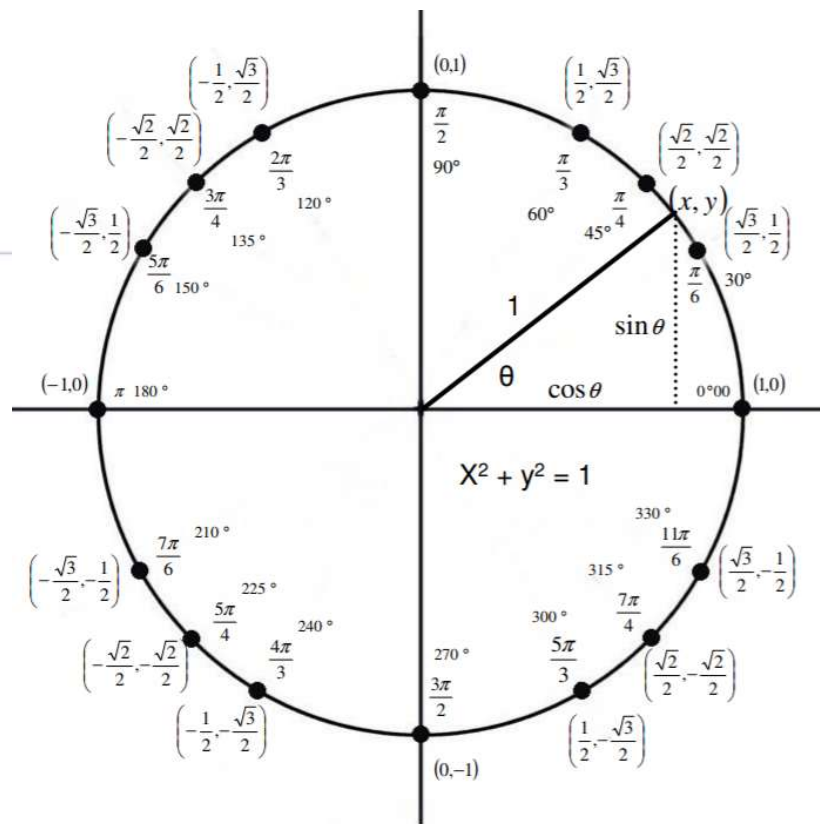


**The Unit Circle**

18. Solve the equation on the interval  $0 \leq \theta < 2\pi$ .

$$\sin^2 \theta - \cos^2 \theta = 0$$

- A.  $\left\{ \frac{\pi}{4} \right\}$
- B.  $\left\{ \frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4} \right\}$
- C.  $\left\{ \frac{\pi}{4}, \frac{\pi}{3} \right\}$
- D.  $\left\{ \frac{\pi}{4}, \frac{\pi}{6} \right\}$

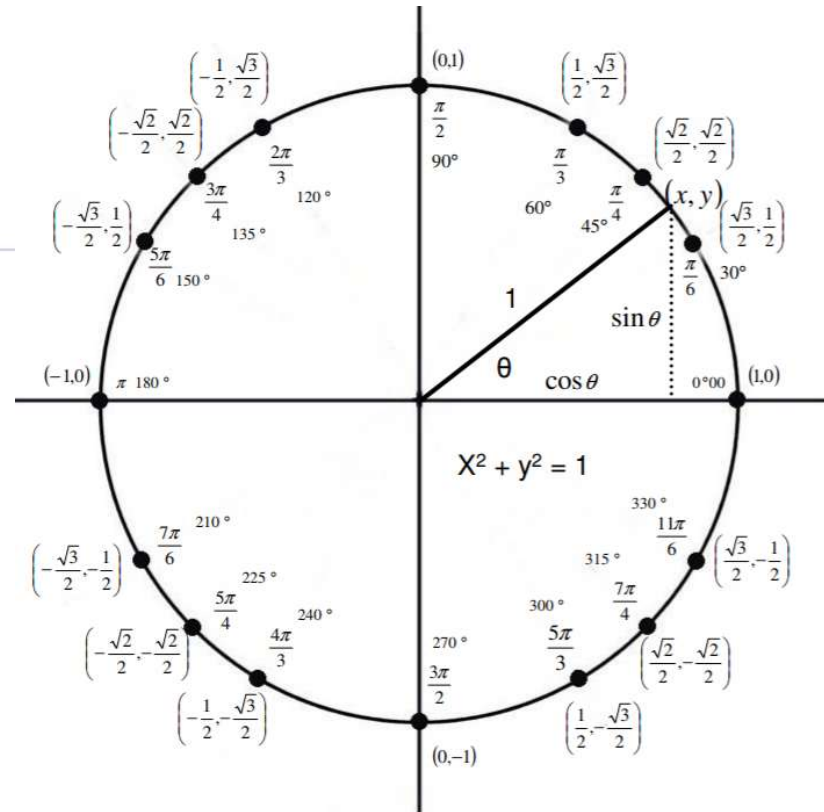


**The Unit Circle**

19. Solve the equation on the interval  $0 \leq \theta < 2\pi$ .

$$\sin^2 \theta = 5(\cos \theta + 1)$$

- A.  $\{0\}$   
 B.  $\left\{\frac{3\pi}{2}\right\}$   
 C.  $\{\pi\}$   
 D. No solution



**The Unit Circle**

20. Use a graphing utility to solve the equation on the interval  $0^\circ \leq x < 360^\circ$ . Express the solution(s) rounded to one decimal place.

$$\tan^2 x + 5 \tan x + 3 = 0$$

---

- A.  $49.8^\circ, 130.2^\circ, 229.8^\circ, 310.2^\circ$
- B.  $70.5^\circ, 109.5^\circ, 180.0^\circ$
- C.  $103.1^\circ, 145.1^\circ, 283.1^\circ, 325.1^\circ$
- D.  $51.8^\circ, 128.2^\circ$

21. Find the inverse function  $f^{-1}$  of the function  $f$ .  
 $f(x) = 2 \tan(6x)$
- 

A.  $f^{-1}(x) = \frac{1}{6} \tan^{-1}\left(\frac{x}{2}\right)$

B.  $f^{-1}(x) = \frac{1}{2 \tan(6x)}$

C.  $f^{-1}(x) = 2 \tan^{-1}(6x)$

D.  $f^{-1}(x) = \frac{1}{2} \tan^{-1}\left(\frac{x}{6}\right)$

22. Use a graphing utility to solve the equation on the interval  $0^\circ \leq x < 360^\circ$ . Express the solution(s) rounded to one decimal place.

$$\tan^2 x + 5 \tan x + 3 = 0$$

Same As 20

---

- A.  $103.1^\circ, 145.1^\circ, 283.1^\circ, 325.1^\circ$
- B.  $70.5^\circ, 109.5^\circ, 180.0^\circ$
- C.  $49.8^\circ, 130.2^\circ, 229.8^\circ, 310.2^\circ$
- D.  $51.8^\circ, 128.2^\circ$

23. Simplify the expression.

$$(1 + \cot \theta)(1 - \cot \theta) - \csc^2 \theta$$

---

- A. 0
- B. 2
- C.  $-2\cot^2 \theta$
- D.  $2\cot^2 \theta$

ID: 8.4-2



24. When light travels from one medium to another--from air to water, for instance--it changes direction. (This is why a pencil, partially submerged in water, looks as though it is bent.) The angle of incidence  $\theta_i$  is the angle in the first medium; the angle of refraction  $\theta_r$  is the angle in the second medium. Each medium has an index of refraction-- $n_i$  and  $n_r$ , respectively--which can be found in tables. Snell's law relates these quantities in the formula

$$n_i \sin \theta_i = n_r \sin \theta_r$$

Solving for  $\theta_r$ , we obtain

$$\theta_r = \sin^{-1} \left( \frac{n_i}{n_r} \sin \theta_i \right)$$

Find  $\theta_r$  for air ( $n_i = 1.0003$ ), methylene iodide ( $n_r = 1.74$ ), and  $\theta_i = 14.7^\circ$ .

Round your answer to two decimal places.

---

\_\_\_\_\_ degrees

1. A. 0

---

2. C. 0

---

3. A.  $\tan^{-1}(\sqrt{3}) = \frac{\pi}{3}$

(Simplify your answer. Type an exact answer, using  $\pi$  as needed. Use integers or fractions for any numbers in the expression.)

---

4. -1.13

---

5. D. 0.168

---

6. B. There is no solution.

---

7.  $-\frac{1}{2}$

---

8. D.  $\left\{ \frac{\pi}{12}, \frac{11\pi}{12}, \frac{13\pi}{12}, \frac{23\pi}{12} \right\}$

---

9. B.  $\left\{ \frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3} \right\}$

---

10. A. The solution set is  $\{2.07, 4.21\}$ .

(Type your answer in radians. Round to two decimal places as needed. Use a comma to separate answers as needed.)

---

11. A. The solution set is  $\{1.52, 4.66\}$ .

(Type your answer in radians. Round to two decimal places as needed. Use a comma to separate answers as needed.)

---

12.  $\frac{\sin \theta}{\cos \theta} + \frac{\cos \theta}{\sin \theta}$

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

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

D. Reciprocal Identity

---

13.  $\frac{1}{\cos u}$

1

D. Pythagorean Identity

---

14. C. 1, 19, 4, 33

---

15. B.  $\left\{ \frac{7\pi}{6}, \frac{11\pi}{6} \right\}$

---

16. B.  $\{\pi\}$

---

17. A. The solution set is  $\left\{ \frac{7\pi}{6}, \frac{11\pi}{6}, 0, \pi \right\}$ .

(Simplify your answer. Type an exact answer, using  $\pi$  as needed. Type your answer in radians. Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)

---

18. B.  $\left\{ \frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4} \right\}$

---

19. C.  $\{\pi\}$

---

20. C.  $103.1^\circ, 145.1^\circ, 283.1^\circ, 325.1^\circ$

---

21. A.  $f^{-1}(x) = \frac{1}{6} \tan^{-1}\left(\frac{x}{2}\right)$

---

22. A.  $103.1^\circ, 145.1^\circ, 283.1^\circ, 325.1^\circ$

---

23. C.  $-2\cot^2 \theta$

---

24. 8.39

---