Unit 4A Exam – Trigonometric Functions

Multiple Choice: Solve each problem using your own paper for scrap work. Decide which choice is the best answer and mark your answer on the scantron answer sheet.

1. A angle of $11\pi/5$ is placed in standard position on a Cartesian coordinate system. The terminal side of the angle lies in which quadrant?

   A. I

   B. II

   C. III

   D. IV

   E. The terminal side lies on an axis.

2. Which of the following angles is coterminal to $-5\pi/6$?

   A. $5\pi/6$

   B. $7\pi/6$

   C. $\pi/6$

   D. $11\pi/6$

   E. $-7\pi/6$

3. Convert $5\pi/12$ into degrees.

   A. 82°

   B. 150°

   C. 36°

   D. 60°

   E. 75°

4. Convert 13° 42′ 15″ into decimal degrees.

   A. 13.95°

   B. 13.422°

   C. 13.296°

   D. 13.704°

   E. 13.05°

5. Convert 2.5 radians into degrees.

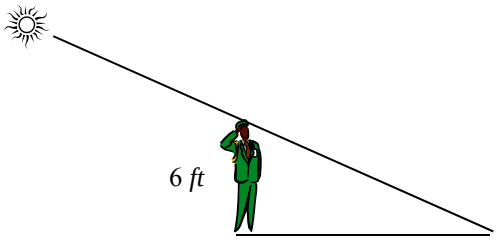
   A. 143.24°

   B. 0.04°

   C. 286.48°

   D. 450.00°

   E. 71.62°



6. The sun is 30° above the horizon. Find the length of a shadow cast by a person 6 feet tall.

   A. 3.5 *feet*

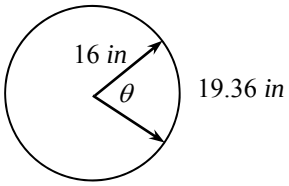
   B. 7.9 *feet*

   C. 9.6 *feet*

   D. 10.4 *feet*

   E. 5.8 *feet*

7. A central angle θ of a circle with radius 16 inches subtends an arc 19.36 inches long. Find the measure of angle θ in degrees.



A. 47.3519°
B. 1.21°
C. 69.3279°
D. 0.8264°
E. 34.6639°

8. Let $C(s) = (x,y)$ represent the wrapping function. Evaluate $C(5\pi/6)$.

A. $\left(\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$
B. $\left(-\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$
C. $\left(-\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$
D. $\left(\frac{\sqrt{3}}{2}, -\frac{1}{2}\right)$
E. $\left(\frac{1}{2}, -\frac{\sqrt{3}}{2}\right)$

9. $\tan(4\pi/3) =$

A. $-\sqrt{3}$
B. $\frac{\sqrt{3}}{3}$
C. $-\frac{\sqrt{3}}{3}$
D. $\sqrt{3}$
E. $-\frac{\sqrt{2}}{2}$

10. $\sin(-4.1) \approx$

A. 0.8183
B. −0.0715
C. 0.9974
D. −0.5748
E. −0.0644

11. $\sec(1.42) \approx$

A. 40.3533
B. 0.7612
C. 0.9997
D. 6.6567
E. −1.0115

12. $\cot(15°) =$

A. $\tan(15°)$
B. $\csc(15°)$
C. $\tan(75°)$
D. $\csc(75°)$
E. $\frac{\sin(15°)}{\cos(15°)}$

13. $\tan x = 1.2617$. $x \approx$

A. 0.0220
B. 0.9006
C. 1.0145
D. 0.3193
E. 1.1104

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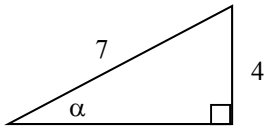
14. cot $\alpha =$



A. $\frac{4}{7}$

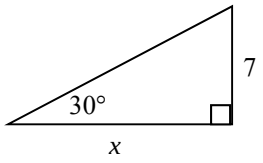
B. $\frac{7}{4}$

C. $\frac{\sqrt{33}}{4}$

D. $\frac{4\sqrt{33}}{33}$

E. $\frac{\sqrt{33}}{7}$

15. Find x.



A. $x = 7\sqrt{3}$

B. $x = \frac{7\sqrt{3}}{3}$

C. $x = 14$

D. $x = \frac{7}{2}$

E. $x = \frac{7\sqrt{3}}{2}$

16. Find the reference angle for $\theta = 305°$.

A. $\phi = 35°$

B. $\phi = -55°$

C. $\phi = -45°$

D. $\phi = 125°$

E. $\phi = 55°$

17. Let $C(s) = (x,y)$ represent the wrapping function. $C(-6)$ is in which quadrant?

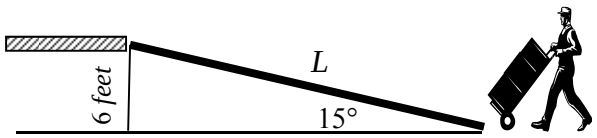
A. I

B. II

C. III

D. IV

E. $C(-6)$ lies on the x-axis.



18. A ramp approaching a loading platform that is 6 feet off the ground rises at an angle of 15°. Find the length of the ramp, L.

A. $L \approx 5.8$ *feet*

B. $L \approx 6.2$ *feet*

C. $L \approx 9.2$ *feet*

D. $L \approx 22.3$ *feet*

E. $L \approx 23.2$ *feet*

19. Let $C(s) = \left(-\frac{12}{13}, \frac{5}{13}\right)$. Find csc(s).

A. $\frac{12}{13}$

B. $-\frac{5}{13}$

C. $\frac{13}{5}$

D. $-\frac{13}{5}$

E. $-\frac{13}{12}$

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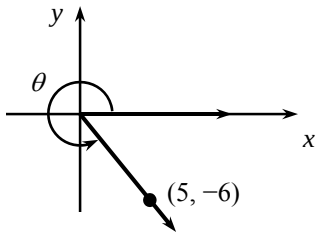
Problems 20 and 21 refer to the diagram below.



20. Find tan θ.

A. $\tan\theta = -\frac{5\sqrt{61}}{61}$

B. $\tan\theta = \frac{\sqrt{61}}{5}$

C. $\tan\theta = \frac{6\sqrt{61}}{61}$

D. $\tan\theta = -\frac{5}{6}$

E. $\tan\theta = -\frac{6}{5}$

21. Find sin θ.

A. $\sin\theta = -\frac{9\sqrt{130}}{130}$

B. $\sin\theta = \frac{\sqrt{130}}{7}$

C. $\sin\theta = \frac{\sqrt{130}}{130}$

D. $\sin\theta = -\frac{7}{9}$

E. $\sin\theta = -\frac{9}{7}$

22. Given $\sin\theta = -\frac{1}{5}$ and $\tan\theta < 0$, find $\cos\theta$.

A. $\cos\theta = -\frac{\sqrt{26}}{5}$

B. $\cos\theta = \frac{\sqrt{26}}{5}$

C. $\cos\theta = -\frac{2\sqrt{6}}{5}$

D. $\cos\theta = \frac{2\sqrt{6}}{5}$

E. $\cos\theta = -5$

23. Find two values of θ where $0 \le \theta \le 2\pi$, such that $\tan\theta = -1$.

A. $\frac{\pi}{4}$ *and* $\frac{3\pi}{4}$

B. $\frac{\pi}{2}$ *and* $\frac{3\pi}{2}$

C. $\frac{3\pi}{4}$ *and* $\frac{5\pi}{4}$

D. π *and* $\frac{3\pi}{2}$

E. $\frac{3\pi}{4}$ *and* $\frac{7\pi}{4}$

24. Let (x,y) be a point in Quadrant IV on the *unit circle* such that $C(s) = (x, y)$. If $x = 0.8$, then $y =$

A. 0.6

B. −0.7134

C. −0.8

D. 0.2

E. −0.6

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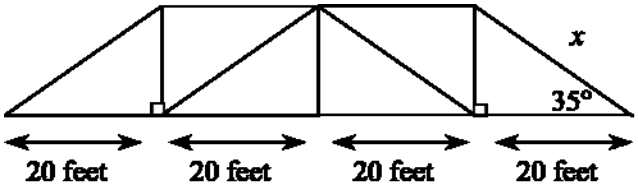

25. The length of the diagonal section *x* in the roof truss shown above is approximately…

    A. 11 *feet* 5 *inches*

    B. 16 *feet* 5 *inches*

    C. 24 *feet* 5 *inches*

    D. 28 *feet* 7 *inches*

    E. 34 *feet* 10 *inches*

26. Which of the following has a value of $\frac{2\sqrt{3}}{3}$?

    A. sec(60°)

    B. cot(45°)

    C. sin(60°)

    D. csc(60°)

    E. cos(45°)

27. The second hand of a clock is 6 *in* long. What is the *linear speed* of a point on the end of the second hand as it moves from the 12 to the 6?

    A. 6π rad/sec

    B. $^{\pi}/_{5}$ in/sec

    C. 0.10 rad/sec

    D. 6 degrees/sec

    E. 30π in/sec

28. Which of the following is true for all values of *x*?

    A. $\sin^2 x + \cos^2 x = 1$

    B. $\sin^2 x - \cos^2 x = 1$

    C. $\cos^2 x - \sin^2 x = 1$

    D. All of the above are true for all *x*.

    E. None of the above are true for all *x*.

29. Find the supplement of $\frac{3\pi}{10}$.

    A. $\frac{\pi}{5}$

    B. $\frac{10\pi}{3}$

    C. $\frac{13\pi}{10}$

    D. 179.05

    E. $\frac{7\pi}{10}$

30. The latitude of Memphis, TN is 35° 9’ and the latitude of New Orleans, LA is 29° 57’. If Memphis is due north of New Orleans, and the radius of the earth is about 4000 miles, find the approx. distance between the two cities.

    A. 128 mi

    B. 286 mi

    C. 392 mi

    D. 363 mi

    E. 442 mi

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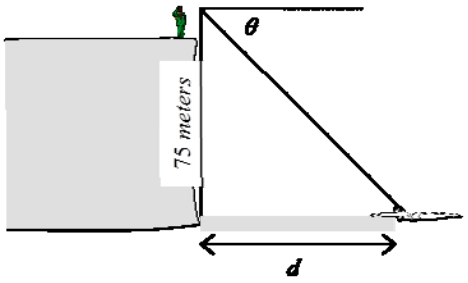
Free Response: Solve these problems in the space provided on the answer sheet. Show all work.



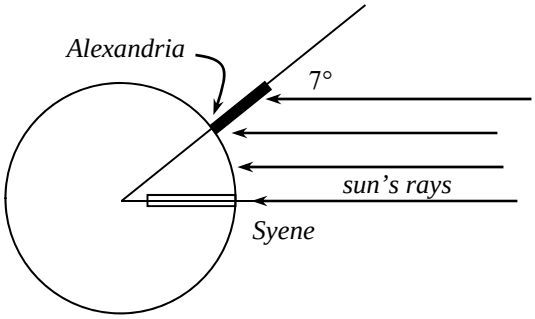
1. A man stands at the edge of a cliff 75 meters above the shore looking straight out to sea. When he lowers his line of site by an angle of $\theta = 36° 48' 12''$ he sees a swimmer struggling in a rip tide.

(*a*) Convert $36° 48' 12''$ into decimal degrees. Show the work leading to your answer. Round your answer to the hundredths place.

(*b*) How far is the swimmer from the ***base of the cliff***? Show the analysis leading to your answer.

(*c*) How far is the swimmer from the man at the ***top of the cliff***? Show the analysis leading to your answer.

(*d*) The swimmer manages to swim within 50 meters of the base of the cliff. Find the new angle of depression (θ) from the man to the swimmer. Express your answer in Degrees-Minutes-Seconds, to the nearest second.



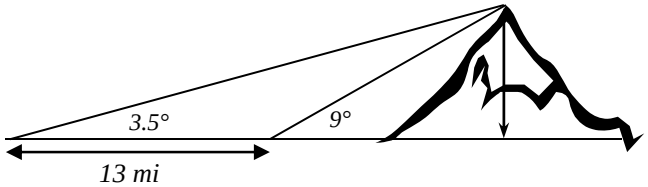
2. About 200 B.C., the Greek mathematician Eratosthenes heard about a very deep well in the city of Syene where sun shined all the way to the bottom at exactly noon on June 21st each year. He noticed that at the exact same time, the sun made an angle of 7° with a tower in his hometown of Alexandria, due north. Eratosthenes realized that if he knew the distance from Alexandria to Syene, he could determine the ***radius of the earth***.

(*a*) Convert 7° into radians. Give an exact answer.

(*b*) Explain how Eratosthenes could determine the radius of the earth if he knew the distance from Alexandria to Syene.

(*c*) To determine the distance, Eratosthenes hired a man to ***walk*** from Alexandria to Syene and count his footsteps. The man reported back that the distance was 500 miles. Use this information to find the radius of the earth. Show the work that leads to your answer. Round to the nearest mile.

CHALLENGE



When driving on a long trip you see a mountain directly in front of you. The angle of elevation to the mountain peak is 3.5°. After driving for 13 more miles you notice the angle of elevation to the peak is only 9°. Determine the height of the mountain in feet (1 mi = 5280 ft).

Precalculus A Name:

Exam 4A – Free Response Answer Sheet

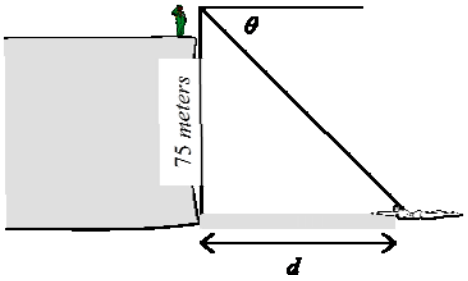
MC	
FR1	
FR2	
XC	
Total Score	
Grade	

Free Response #1

(a)

(b)

(c)



(d)

Free Response #2

(a)

(b)

(c)

CHALLENGE