

Name _____

Secondary 3 Honors SAGE Review Teacher _____ Date _____ Period _____

F.TF.1, 2, 3

Multiple Choice

Identify the choice that best completes the statement or answers the question.

- _____ 1. Convert $\frac{13\pi}{6}$ radians to degrees.
- a. 195°
 - b. 390°
 - c. 450°
 - d. 900°
- _____ 2. An arc on the unit circle is $\frac{3\pi}{4}$ units long. What is the radian measure of the arc's central angle?
- a. $\frac{\pi}{4}$ radian
 - b. $\frac{3\pi}{4}$ radians
 - c. 3π radians
 - d. $\frac{3}{4}$ radian
- _____ 3. Which expression has the same value as $\sin\left(-\frac{\pi}{4}\right)$?
- a. $-\cos\left(\frac{\pi}{4}\right)$
 - b. $\sin\left(\frac{\pi}{4}\right)$
 - c. $\cos\left(\frac{\pi}{4}\right)$
 - d. $\tan\left(\frac{\pi}{4}\right)$
- _____ 4. Which expression has the same value as $\tan\left(-\frac{\pi}{3}\right)$?
- a. $-\tan\left(\frac{\pi}{3}\right)$
 - b. $\tan\left(\frac{\pi}{3}\right)$
 - c. $-\cos\left(\frac{\pi}{3}\right)$
 - d. $-\sin\left(\frac{\pi}{3}\right)$
- _____ 5. A square is inscribed in the unit circle. Each vertex lies in a different quadrant. One vertex of the square is at the point $\left(-\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$. What are the coordinates of the vertex in Quadrant III?
- a. $\left(-\frac{\sqrt{3}}{2}, -\frac{1}{2}\right)$
 - b. $\left(-\frac{1}{2}, -\frac{\sqrt{3}}{2}\right)$
 - c. $\left(\frac{\sqrt{3}}{2}, -\frac{1}{2}\right)$
 - d. $\left(-\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$

6. What is the exact value of $\sin \frac{\pi}{3}$?

- a. $\frac{2\sqrt{3}}{3}$
- b. $\frac{\sqrt{3}}{2}$
- c. $\sqrt{3}$
- d. $\frac{1}{2}$

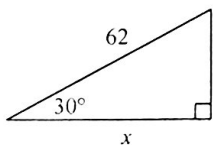
7. Which has the same value as $\sin \frac{\pi}{6}$?

- a. $\cos \frac{\pi}{6}$
- b. $\cos \frac{\pi}{3}$
- c. $\sin \frac{\pi}{3}$
- d. $-\sin \frac{\pi}{6}$

8. Which has the same value as $\tan \frac{\pi}{4}$?

- a. $\tan \frac{3\pi}{4}$
- b. $\tan \frac{5\pi}{4}$
- c. $\tan \frac{7\pi}{4}$
- d. $-\tan \frac{\pi}{4}$

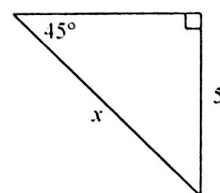
9. Which is equivalent to x ?



- a. $31\sqrt{3}$
- b. $62\sqrt{3}$
- c. $\frac{124}{\sqrt{3}}$
- d. $\frac{62}{\sqrt{3}}$

10. Which is equivalent to x ? In the figure to the right.

- a. $\frac{5}{\sqrt{2}}$
- b. $5\sqrt{2}$
- c. $\frac{\sqrt{2}}{5}$
- d. $\frac{1}{5\sqrt{2}}$



Multiple Response

Identify one or more choices that best complete the statement or answer the question.

11. Which arc lengths on the unit circle have central angles with measures less than 180° ?

- a. $\frac{\pi}{2}$
- b. $\frac{11\pi}{6}$
- c. $\frac{3\pi}{4}$
- d. $\frac{5\pi}{3}$
- e. $\frac{3\pi}{2}$
- f. $\frac{5\pi}{6}$
- g. $\frac{\pi}{6}$
- h. 2π

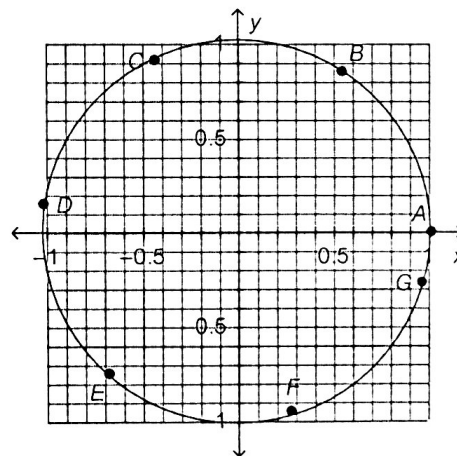
12. Which angles have the same trigonometric values as $\theta = \frac{3\pi}{4}$?

- a. $\alpha = \frac{11\pi}{4}$
- b. $\alpha = \frac{63\pi}{4}$
- c. $\alpha = -\frac{25\pi}{4}$
- d. $\alpha = -\frac{5\pi}{4}$
- e. $\alpha = \frac{35\pi}{4}$
- f. $\alpha = -\frac{9\pi}{4}$

Short Answer

13. On the graph shown, the points A , B , C , D , E , F , and G mark off arc lengths of 1 unit counterclockwise from A to G along the unit circle. Use the graph to estimate the following trigonometric function values to the nearest tenth.

- a. $\sin 1$
- b. $\cos 6$
- c. $\tan 2$
- d. $\tan 5.5$



14. A student evaluates $\cos \frac{19\pi}{6}$ by repeatedly subtracting π from the angle until the result is between 0 and π , as shown. Explain why this is incorrect and find the correct value.

$$\cos \frac{19\pi}{6} = \cos \frac{13\pi}{6} = \cos \frac{7\pi}{6} = \cos \frac{\pi}{6} = \frac{\sqrt{3}}{2}$$

Essay

15. Two friends counted 24 evenly spaced seats on a Ferris wheel. As they boarded one of the seats, they noticed the edge of the wheel was 1 meter off the ground. They learned from the operator that the diameter of the wheel was 26 meters. After they got seated and started moving, in a counter-clockwise direction, they counted 13 chairs pass the operator, and then the Ferris wheel was stopped on the fourteenth chair to load another passenger.

Part A: Design a representation of the Ferris wheel and locate where the friends were when the wheel stopped to load the next passenger.

Part B: How many radians had they rotated through in the time before they stopped?

Part C: To the nearest tenth of a meter, how far above the ground were they? Show your work.

16. Use your knowledge of special right triangles to explain why $\sin\left(\frac{\pi}{3}\right) = \frac{\sqrt{3}}{2}$, $\cos\left(\frac{\pi}{3}\right) = \frac{1}{2}$, and $\tan\left(\frac{\pi}{3}\right) = \sqrt{3}$. Include a diagram in your explanation.

17. **Part A:** How does an understanding of $30^\circ - 60^\circ - 90^\circ$ and $45^\circ - 45^\circ - 90^\circ$ triangles assist in understanding the relationships of sine, cosine, and tangent?

Part B: Explain how to find the sine of other angles from the knowledge in **Part A**. Consider several cases such as 225° , $\frac{11\pi}{4}$, and $-\frac{3\pi}{2}$.

Name _____

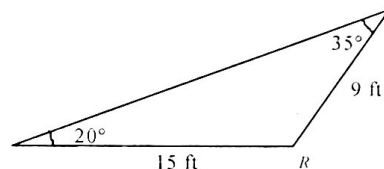
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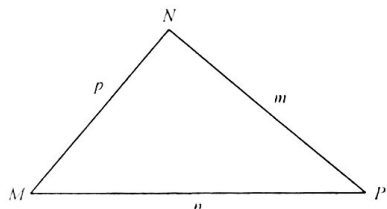
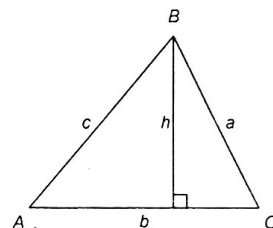
Multiple Choice

Identify the choice that best completes the statement or answers the question.

- _____ 1. A triangle has a side with length 6 feet and another side with length 8 feet. The angle between the sides measures 73° . Find the area of the triangle. Round your answer to the nearest tenth.
- a. 1752.0 ft^2 c. 45.9 ft^2
 b. 7.0 ft^2 d. 23.0 ft^2
- _____ 2. Jason and Melissa have a triangular patio they want to cover with indoor-outdoor carpeting. The dimensions of the patio are shown. If the carpeting sells for $\$12.50$ per square yard, and the carpeting is only sold in full square yards, how much will it cost them to cover their patio?



- a. $\$112.50$ c. $\$87.50$
 b. $\$75$ d. $\$100$
- _____ 3. Which of the following expressions is equivalent to h , the height of $\triangle ABC$?
- a. $c \sin B$
 b. $b \sin C$
 c. $a \sin C$
 d. $a \sin B$
- _____ 4. Solve the triangle. $m\angle N = 118^\circ$, $m\angle P = 33^\circ$, and $m = 15$. Round to the nearest tenth.



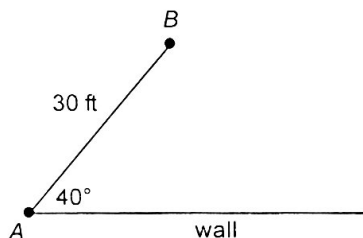
- a. $m\angle M = 29^\circ$, $n \approx 27.3$, $p \approx 13.4$ c. $m\angle M = 29^\circ$, $n \approx 27.3$, $p \approx 16.9$
 b. $m\angle M = 29^\circ$, $n \approx 8.2$, $p \approx 13.4$ d. $m\angle M = 29^\circ$, $n \approx 8.2$, $p \approx 16.9$
- _____ 5. Given triangle ABC with $a = 7$, $C = 37^\circ$, and $B = 18^\circ$, find c . Round the answer to two decimal places.
- a. 3.59 b. 5.14 c. 13.63 d. 18.56
- _____ 6. Given triangle ABC with $a = 12$, $b = 14$, and $A = 19^\circ$, find c . Round your answer to two decimal places.
- a. $c = 4.82$ c. $c = 24.34$ or 3.20
 b. $c = 18.44$ d. $c = 24.34$ or 2.14
- _____ 7. In $\triangle XYZ$, $x = 11.2$, $y = 9.8$, $m\angle Z = 38^\circ$, and $m\angle Y = 60^\circ$. Which expression can be used to find the length of side z ?
- a. $\frac{9.8 \sin 82}{\sin 60}$ c. $\frac{11.2 \sin 60}{\sin 38}$
 b. $\frac{11.2 \sin 82}{\sin 60}$ d. $\frac{9.8 \sin 38}{\sin 60}$

- _____ 8. If the measure of angle A is 40° and the length of side b is 15 inches, which can be the length of side a if it is possible to form two triangles?
- | | |
|----------|-----------|
| a. 8 in. | c. 12 in. |
| b. 9 in. | d. 20 in. |
- _____ 9. Two airplanes leave the airport at the same time. One airplane flies due east at a speed of 300 miles per hour. The other airplane flies east-northeast at a speed of 350 miles per hour (the angle between the two directions is 22.5°). If the planes are at the same altitude, how far apart are they after 2 hours? Round your answer to the nearest mile.
- | | |
|--------------|--------------|
| a. 136 miles | c. 100 miles |
| b. 272 miles | d. 727 miles |

Multiple Response

Identify one or more choices that best complete the statement or answer the question.

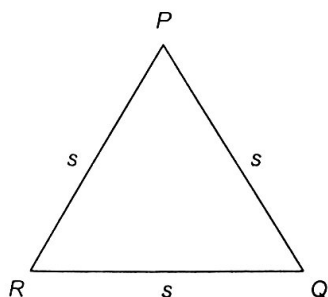
- _____ 10. Rafael wants to enclose a triangular area with a fence. One side of the triangle is formed by the wall of his house. He has already built one side of the enclosure, 30 feet long and forming a 40° angle with the house at point A . Rafael has a maximum of 22 feet of fencing left to use to build a fence from point B to the wall. Which of the following could be the distance between point A and point C , where the fence meets the wall?



- | |
|------------|
| a. 10.5 ft |
| b. 12 ft |
| c. 12.5 ft |
| d. 25 ft |
| e. 30 ft |
| f. 33 ft |
| g. 34.5 ft |
| h. 50 ft |

Short Answer

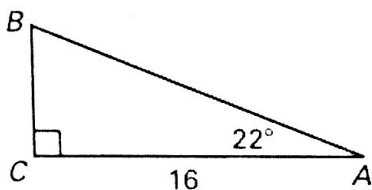
11. The area of $\triangle ABC$ with sides a , b , and c can be found with the formula $\text{Area} = \frac{1}{2} ab \sin C$. Use this formula to write an expression for the area of an equilateral triangle with side length s . Justify your answer.



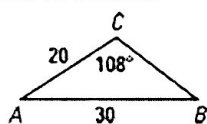
12. Given triangle ABC with $b = 8$, $c = 5$, and $A = 58^\circ$, find a . Round the answer to two decimal places.

13. Solve triangle ABC given that $a = 19$, $b = 10$, and $c = 14$.

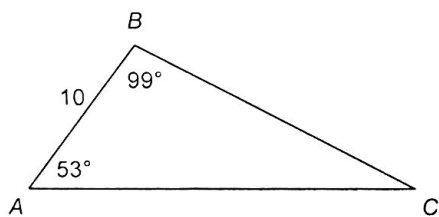
14. Solve $\triangle ABC$.



15. Solve $\triangle ABC$.



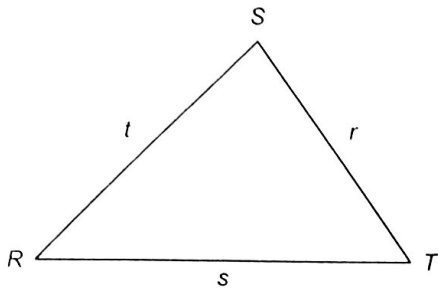
16. Consider $\triangle ABC$ in the diagram below.



a. Can you use the Law of Sines or the Law of Cosines to solve the triangle? Explain.

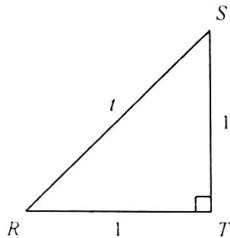
b. Find the lengths of the unknown sides and angle. Round to the nearest whole number.

17. Use the Law of Sines and Law of Cosines to write three expressions equivalent to r .



Essay

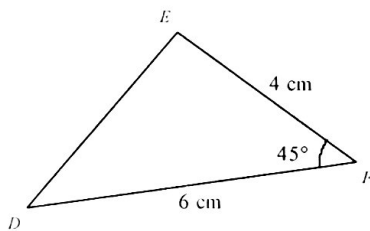
18. Triangle RST is an isosceles right triangle.



Part A: Determine the exact value of t . Use radical notation if necessary, and do not approximate. Show your work.

Part B: Use triangle RST to determine the exact value of $\sin 45^\circ$. Use radical notation if necessary, and do not approximate. Show your work.

Refer to triangle DEF to answer **Parts C** and **D**.



Part C: Use your answer to **Part B** to determine the exact value for the area of triangle DEF .

Part D: Using a calculator, determine the area of triangle DEF to the nearest tenth of a cm^2 .