

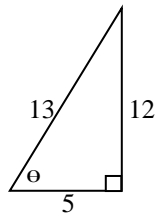
MATH117 Pre-Calculus for Scientists and Engineers SAMPLE TEST 4 (page 1)

4pts 1. a) Convert $\frac{-5\pi}{4}$ radians to degrees.

b) Convert 96° to radians

4pts 2. Find the length of an arc that subtends a central angle of 2radians in a circle with radius 2 miles.

4pts 3.



Given the right triangle to the left determine a) $\sin \theta$
b) $\tan \theta$

4pts 4. A thirty foot ladder leans against a building so that the angle between the ground and the ladder is 65° . How high does the ladder reach on the building?

In problems 5-8 use a unit circle, give the reference angle and quadrant, and then use trigonometric definition to give the numerical answer. (4 points each)

5. $\sin(210^\circ)$

6. $\cot(-450^\circ)$

7. $\cos(300^\circ)$

8. $\sec(210^\circ)$

4pts 9. Given $\tan \theta = -5/12$ and $\cos \theta > 0$ a) Find $\sin \theta$

b) Find $\cot \theta$

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4pts 10. Find the area of a triangle with sides of length 10cm and 2cm with included angle 120° .

4pts 11. Find the exact value of a) $\sin^{-1} \frac{-\sqrt{3}}{2}$

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

4pts 12. Rewrite the expression as an algebraic expression in x: $\sin(\cos^{-1} x)$

4pts 13. Use the Law of Sines to solve the triangle ABC: $c = 80.4$, $\angle A = 20^\circ$, $\angle C = 25^\circ$

4pts 14. Use the Law of Cosines to determine side b: $a = 24$, $c = 30$, $\angle B = 30^\circ$

4pts 15. Simplify the trigonometric expression $\frac{\sec^2 x - 1}{\sec^2 x}$

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4pts 16. Verify $\frac{1 + \tan^2 x}{1 - \tan^2 x} = \frac{1}{\cos^2 x - \sin^2 x}$

4pts 17. Find the exact value of $\cos\left(\frac{13\pi}{12}\right)$ using an addition or subtraction formula.

4pts. 18. Prove the cofunction identity below using an addition or subtraction formula

$$\tan\left(\frac{\pi}{2} - u\right) = \cot u$$

4pts 19. Verify $\sin 2\theta = 2\sin \theta \cos \theta$

4pts 20. Use an appropriate half-angle formula to find the exact value of $\sin 22.5^\circ$.

4pts 21. Write the product as a sum $\sin 2x \sin 5x$.

4pts 22. Verify $\frac{\sin 4x}{\sin x} = 4 \cos x \cos 2x$

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4pts 23. Find all solutions on $[-2\pi, 2\pi]$ where $\cos \theta = \frac{-1}{2}$

4pts 24. Find all solutions on $[0, 2\pi]$ where $3\sin^2 \theta - 7\sin \theta + 2 = 0$

4pts 25. Find all solutions on $[-2\pi, 2\pi]$ where $2\sin^2 \theta + \cos \theta = 1$

4pts 26. Find all solutions on $[0, 2\pi]$ where $\cos \frac{\theta}{2} - 1 = 0$

4pts 27. Find all solutions on $[0, 2\pi]$ where $\cos 2\theta + \cos \theta = 2$