



GO COUGARS!



p 415 **Homework Questions**

In Exercises 1-8, use the figure to find the exact value of the trigonometric function.



1. $\sin \theta$
 3. $\cos 2\theta$
 5. $\tan 2\theta$
 7. $\csc 2\theta$

In Exercises 9-18, find the exact solutions of the equation in the interval $[0, 2\pi)$.

9. $\sin 2x - \sin x = 0$
 11. $4 \sin x \cos x = 1$
 13. $\cos 2x - \cos x = 0$
 15. $\sin 2x - \cos x = 0$
 17. $\sin 4x - 2 \sin 2x$

In Exercises 19-22, use a double-angle formula to rewrite the expression.

19. $6 \sin x \cos x$
 21. $4 - 8 \sin^2 x$

In Exercises 23-28, find the exact values of $\sin 2u$, $\cos 2u$, and $\tan 2u$ using the double-angle formulas.

23. $\sin u = -\frac{4}{5}$, $\pi < u < \frac{3\pi}{2}$
 25. $\tan u = \frac{3}{4}$, $0 < u < \frac{\pi}{2}$
 27. $\sec u = -\frac{5}{2}$, $\frac{\pi}{2} < u < \pi$

In Exercises 29-34, use the power-reducing formulas to rewrite the expression in terms of the first power of the cosine.

29. $\cos^4 x$
 31. $\sin^2 x \cos^2 x$
 33. $\sin^2 x \cos^2 x$

$$\left(\frac{1 - \cos 2x}{2}\right) \left(\frac{1 + \cos 2x}{2}\right)$$

$$\frac{1 - \cos^2 2x}{4}$$

$$2 \left(1 - \left(\frac{1 + \cos 4x}{2}\right)\right)$$

$$2 \left(\frac{1 - 1 - \cos 4x}{2}\right)$$

$$\frac{2 - (1 + \cos 4x)}{2}$$

$$\frac{1 - \cos 4x}{2}$$

$$\frac{\sin 2x}{\cos 2x} - \frac{\cos x}{\sin x} = 0$$

$$\frac{2 \sin x \cos x}{2 \cos^2 x - 1} - \frac{\cos x}{\sin x}$$

$$\frac{2 \sin^2 x \cos x - 2 \cos^3 x + \cos x}{(2 \cos^2 x - 1) \sin x} = 0$$

$$\cos x (2 \sin^2 x - 2 \cos^2 x + 1) = 0$$


$$\cos x (2 \sin^2 x - 2(1 - \sin^2 x) + 1) = 0$$

$$\cos x (2 \sin^2 x - 2 + 2 \sin^2 x + 1) = 0$$

$$\cos x (4 \sin^2 x - 1) = 0$$

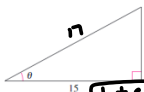
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GO COUGARS!



p 415 **Homework Questions**

In Exercises 35-40, use the figure to find the exact value of the trigonometric function.



35. $\cos \frac{\theta}{2}$
 37. $\tan \frac{\theta}{2}$
 39. $\csc \frac{\theta}{2}$

In Exercises 41-48, use the half-angle formulas to determine the exact values of the sine, cosine, and tangent of the angle.

41. 75°
 43. $112^\circ 30'$
 45. $\frac{\pi}{8}$
 47. $\frac{3\pi}{8}$

42. 165°
 44. $67^\circ 30'$
 46. $\frac{\pi}{12}$
 48. $\frac{7\pi}{12}$

In Exercises 49-54, find the exact values of $\sin(u/2)$, $\cos(u/2)$, and $\tan(u/2)$ using the half-angle formulas.

49. $\sin u = \frac{5}{13}$, $\frac{\pi}{2} < u < \pi$
 51. $\tan u = -\frac{5}{8}$, $\frac{3\pi}{2} < u < 2\pi$
 53. $\csc u = -\frac{5}{3}$, $\pi < u < \frac{3\pi}{2}$

In Exercises 55-58, use the half-angle formulas to simplify the expression.

55. $\sqrt{\frac{1 - \cos 6x}{2}}$
 57. $-\sqrt{\frac{1 - \cos 8x}{1 + \cos 8x}}$

In Exercises 59-62, find all solutions of the equation in the interval $[0, 2\pi)$. Use a graphing utility to graph the equation and verify the solutions.

59. $\sin \frac{x}{2} + \cos x = 0$
 61. $\cos \frac{x}{2} - \sin x = 0$

$$\cos \frac{\theta}{2} = \frac{15}{17}$$

$$\tan \frac{\theta}{2} = \frac{16}{15}$$

$$\csc \frac{\theta}{2} = \frac{17}{16}$$

$$\sin \frac{150^\circ}{2} = \sqrt{\frac{1 - \cos 150^\circ}{2}} = \sqrt{\frac{1 + \frac{\sqrt{3}}{2}}{2}}$$

$$= \sqrt{\frac{2 + \sqrt{3}}{4}} \cdot \frac{1}{2}$$

$$= \frac{\sqrt{2 + \sqrt{3}}}{2}$$

$$\tan \frac{150^\circ}{2} = \frac{\sqrt{2 + \sqrt{3}}}{\sqrt{2 - \sqrt{3}}}$$

$$\sin \frac{x}{2} = \pm \sqrt{\frac{1 - \cos x}{2}} + \cos x = 0$$

$$\frac{1 - \cos x}{2} = \cos^2 x$$

$$1 - \cos x = 2 \cos^2 x$$

$$0 = 2 \cos^2 x + \cos x - 1$$

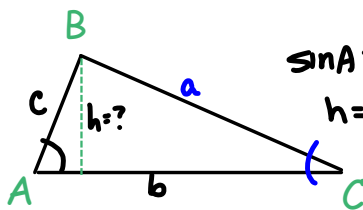
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6.1 Area and the Law of Sines

c

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Suppose you want to find the area of this triangle, but you only know $m\angle A$ and length b and c . How would you find the height?



$$\sin A = \frac{h}{c} \quad \sin C = \frac{h}{a}$$

$$h = c \sin A \quad h = a \sin C$$

$$\text{Area} = \frac{1}{2} b (c \sin A) = \frac{1}{2} bc \sin A$$

$$\text{Area} = \frac{1}{2} b (a \sin C) = \frac{1}{2} ab \sin C$$

$$\left(\frac{1}{2} bc \sin A = \frac{1}{2} ab \sin C = \frac{1}{2} ac \sin B \right) \times$$

$$= \frac{1}{2} ac \sin B$$

$$\frac{bc \sin A}{abc} = \frac{ab \sin C}{abc} = \frac{ac \sin B}{abc}$$

$$\text{Law of Sines} \quad \frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$

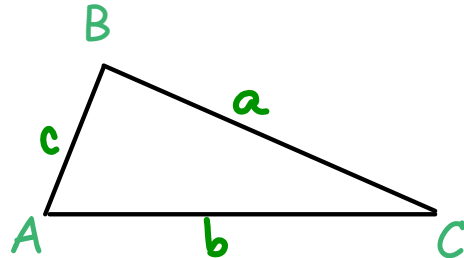
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AREA of a TRIANGLE given SAS

$$\text{Area} = \frac{1}{2}ab \sin C$$

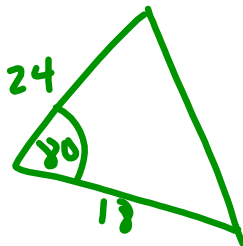
or $\frac{1}{2}ac \sin B$

or $\frac{1}{2}bc \sin A$



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Find the area of a triangular lot containing side lengths that measure 24 yds and 18 yds, and form an angle of 80° .



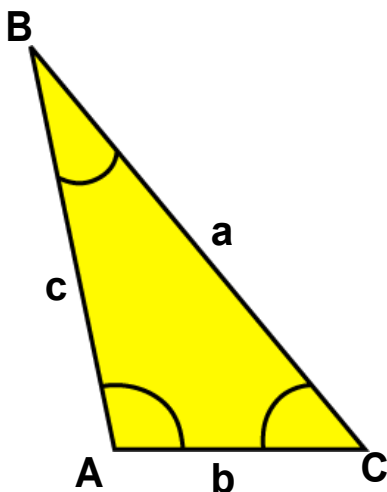
$$A = \frac{1}{2}(24)(18)\sin 80^\circ$$
$$= 212.72 \text{ yds}^2$$

Using the three equations for the area of a triangle we can derive the

Law of Sines

$$\frac{1}{2}bc \sin A = \frac{1}{2}ac \sin B = \frac{1}{2}ab \sin C$$

Law of Sines



$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$

Law of sines is used with
AAS, ASA, SSA

HINT

Use the law of sines to find the missing pieces

$A = 30^\circ$

$a = 32 \text{ ft}$

$B = 45^\circ$

$b = 45.25 \text{ ft}$

$C = 105$

$c = 61.82$

$$\frac{\sin 30}{32} = \frac{\sin 45}{b}$$

$$\frac{1}{2}b = \frac{1}{\sqrt{2}}(32)$$

$$b = 2\left(\frac{1}{\sqrt{2}}\right)(32)$$

$$\frac{\sin 105}{c} = \frac{\sin 30}{32}$$

$$32 \sin 105 = c \sin 30$$

$$\frac{32 \sin 105}{\sin 30} = c$$

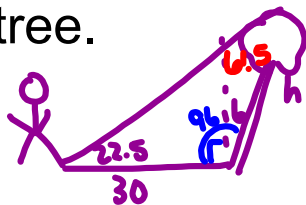
$$61.82 = c$$

INSTRUCTIONS

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Word Problems

You are standing 30 meters from the base of a tree that is leaning 6° from vertical away from you. The angle of elevation from your feet to the top of the tree is 22.5° . Find the height of the tree.



$$\frac{\sin 6.5}{30} = \frac{\sin 22.5}{h}$$

$$30 \sin 22.5 = h \sin 6.5$$

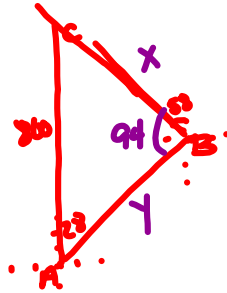
$$\frac{30 \sin 22.5}{\sin 6.5} = h$$

$$13.06 \text{ m.} = h$$

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Word Problems

On a small lake, a child swam from point A to point B at a bearing of N 28°E. The child then swam to point C at a bearing of N 58°W. Point C is 800 meters due north of point A. How many total meters did the child swim?



$$\frac{\sin 94}{800} = \frac{\sin 28}{x}$$

$$\frac{\sin 94}{800} = \frac{\sin 58}{y}$$

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Homework

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3, 5, 9, 17, 21,
29, 33, 35, 37, 45

due next Thursday

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