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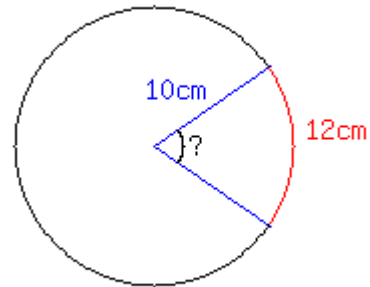
**Math 150 Practice Final B
Spring 2010**

1. Carry out the following conversions.

a. Write 126.2° in radians to the nearest 0.01.

b. Write 1.23 radians in degrees, minutes, seconds, to the nearest second.

2. An arc of a circle of radius 10cm has arclength 12 cm. What is the angle subtended in degrees to the nearest 0.1° ?



3. Suppose $\sin(\theta) = 0.28$ and θ lies in the 2nd quadrant. What are the values to the nearest 0.01 of

a. $\cos(\theta)$

b. $\tan(\theta)$

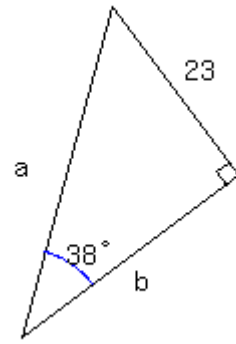
c. $\sec(\theta)$

d. $\csc(\theta)$

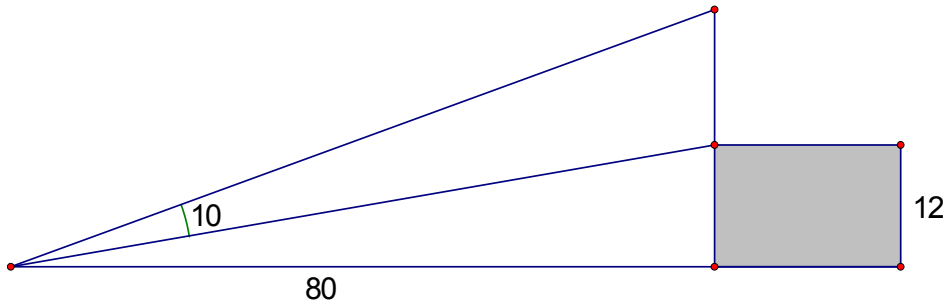
e. $\cot(\theta)$

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4. Find the length of sides a and b to the nearest 0.1 in the given right triangle with angle 38° and given side of length 23.



5. An antenna is located on top of a 12 foot tall garage. From a point on level ground 80 feet from the point directly below the base of the antenna, the antenna subtends an angle of 10° , as shown below. Approximate the length of the antenna to the nearest 0.1 feet.



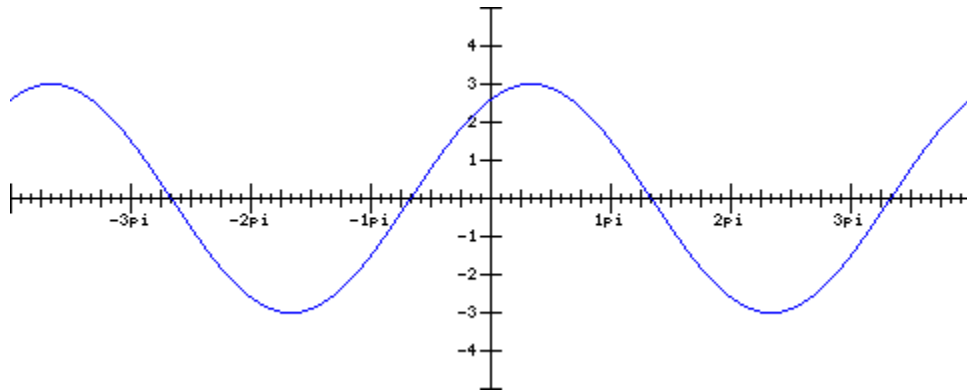
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6. Give exact values for the given functions at the given points.

θ	0	$\pi/3$	$5\pi/6$	$-3\pi/4$
$\sin(\theta)$				
$\cos(\theta)$				
$\tan(\theta)$				

7. Find the solutions to $\sin(2t + 2) = 0.7$ for $-\pi < t < \pi$. Report your answers to the nearest 0.01.

8. Write a formula for the graph shown.



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9. The average monthly high temperature for Paris (in France) is highest in July at 24°C and lowest in January at 6°C . Write a sinusoidal function that models the average monthly high temperature reflecting this data. Your answer should be a function of t where t is the number of the month, with $t = 1$ corresponding to January and $t = 12$ corresponding to December.

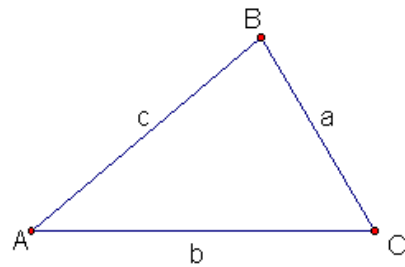
10. A ball kicked from ground with initial velocity 50ft/sec at an angle θ will travel $156.25 \sin(\theta)\cos(\theta)$ feet if there is no air resistance. What angle θ will result in the ball traveling the farthest and how far will it go (to the nearest foot)?

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11. Suppose you have a signal of the form $\cos(30,000 t)$. You wish to add a signal of the form $\cos(\omega t)$ so that the sum can be written as a product involving a factor of the form $\cos(10,000 t)$. What value should you choose for ω ?

In the next two problems, solve for the missing parts of the triangle. Note that there may be 0, 1, or 2 solutions. Give values to the nearest 0.1.

12. $A = 36^\circ$, $B = 49^\circ$, $c = 5.3$

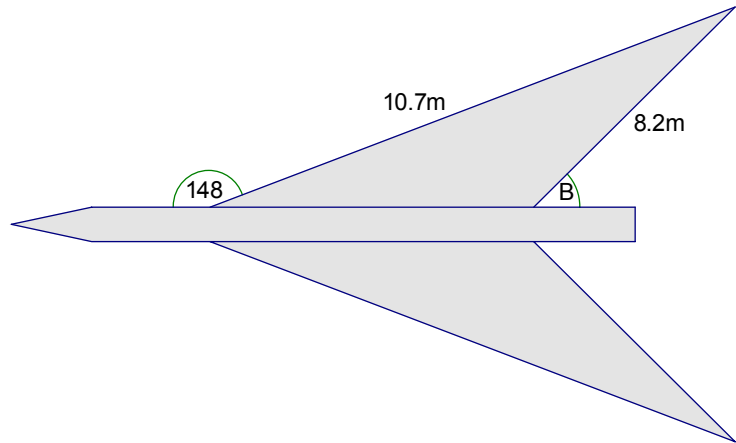


13. $A = 42^\circ$, $b = 3.7$, $C = 55^\circ$

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14. Find the area of a triangle with sides 4.5, 5.3, and 7.2 to the nearest 0.1.

15. Given the diagram of the plane at the right, with the indicated angle of 148° and lengths of 10.7m and 8.2m, find the angle B to the nearest 0.1° . Be sure to show all your work and justify your choice for B.



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16. What are the third roots of unity? Give exact answers in rectangular form.

17. Let $\mathbf{u} = \langle 2, -2, 5 \rangle$ and $\mathbf{v} = \langle 3, -3, 2 \rangle$. Find $2\mathbf{u} - 3\mathbf{v}$.

18. What is the length of the projection of $\langle 3, 5 \rangle$ onto the vector $\langle 1, 7 \rangle$? Give your answer to the nearest 0.1.

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19. For what values of B is $3x^2 + Bxy - 12y^2 = 1$ an ellipse?

20. The vector $\langle 3, -2 \rangle$ is rotated 30° counterclockwise. What is the resulting vector?
Give your answer to the nearest 0.1.

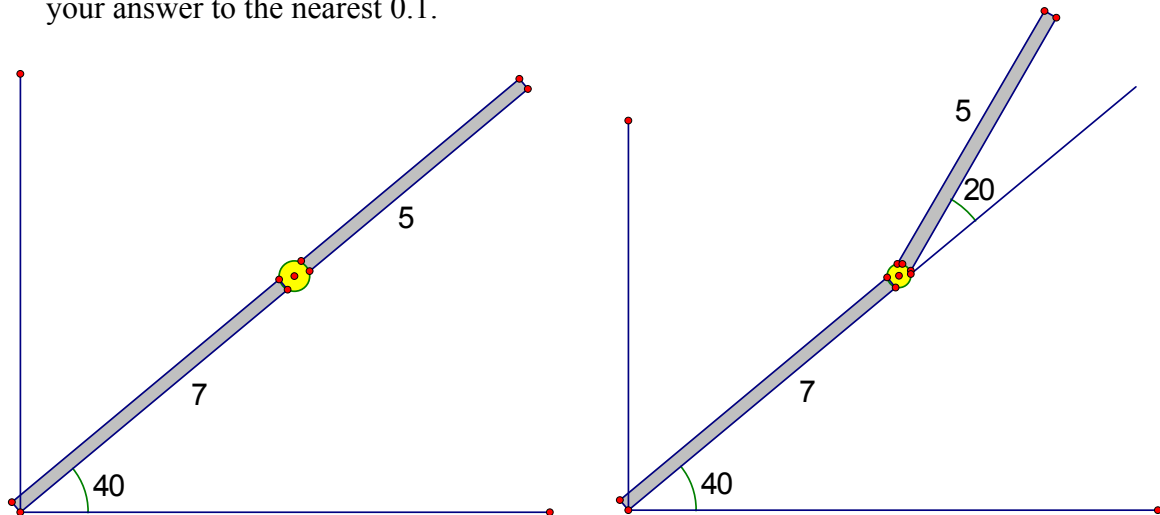
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21. Convert the following. Use radians and give your answers to the nearest 0.01.

a. Write the polar coordinates for the rectangular coordinates $(-4, 3)$ (with $r > 0$).

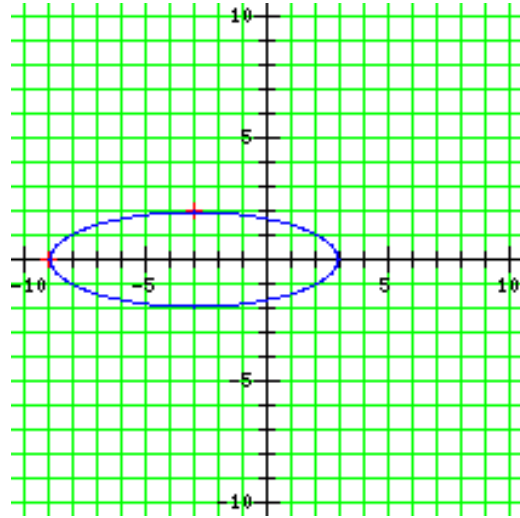
b. Write the same point $(-4, 3)$ in polar coordinates, but this time with $r < 0$.

22. A robot arm has two segments, the first 7 meters and the second 5 meters (measurements taken to the pivot in the joint connecting them). The arm starts at the origin and the two segments from a straight line at an angle of 40° with the horizontal. The second segment is then rotated 20° counterclockwise as indicated. What is the coordinate of the tip of arm after the rotation (ignore the width of the pieces)? Give your answer to the nearest 0.1.



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23. Write a formula for the ellipse in the sketch with horizontal vertices at $(3, 0)$ and $(-9, 0)$ and vertical vertices at $(-3, 2)$ and $(-3, -2)$.



24. A parabolic reflector for a flashlight is to have a diameter of 10cm. For what range of depths will the focus be inside the flashlight (i.e. will the distance from the vertex to the focus be smaller than the depth)?