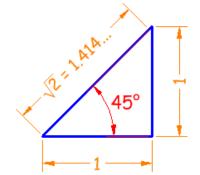
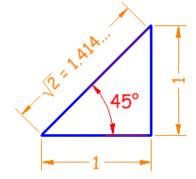
#### #1 Precalculus – Hustle MA© National Convention 2017

Find the cosine of the marked angle on the triangle to the nearest tenth:



## #1 Precalculus – Hustle MA© National Convention 2017

Find the cosine of the marked angle on the triangle to the nearest tenth:

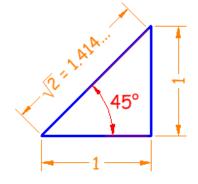


Answer :
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Round 1 2 3 4 5

#### #1 Precalculus – Hustle MA© National Convention 2017

Find the cosine of the marked angle on the triangle to the nearest tenth:

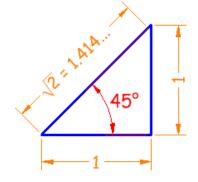


Answer : \_\_\_\_\_

Round 1 2 3 4 5

## #1 Precalculus – Hustle MA© National Convention 2017

Find the cosine of the marked angle on the triangle to the nearest tenth:



Answer	:						Answer	·:					
Round	1	2	3	4	5		Round	1	2	3	4	5	

#### #2 Precalculus – Hustle MA© National Convention 2017

If the circle with parametric equations  $x=3+3\cos t$  and  $y=5+3\sin t$  is written in the form  $(x-h)^2 + (y-k)^2 = r^2$ , where (h,k)

are the Cartesian coordinates of the center of the circle and *r* is the length of the radius of the circle, find the value of h+k+r.

## #2 Precalculus – Hustle MA© National Convention 2017

If the circle with parametric equations  $x=3+3\cos t$  and  $y=5+3\sin t$  is written in the form  $(x-h)^2 + (y-k)^2 = r^2$ , where (h,k)

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Answer : \_\_\_\_\_

Round 1 2 3 4 5

Answer

Round

Answer : \_\_\_\_\_

Round 1 2 3 4 5

## #2 Precalculus – Hustle MA© National Convention 2017

If the circle with parametric equations  $x=3+3\cos t$  and  $y=5+3\sin t$  is written in

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If the circle with parametric equations  $x=3+3\cos t$  and  $y=5+3\sin t$  is written in

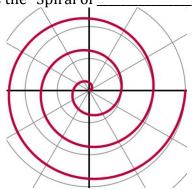
the form  $(x-h)^2 + (y-k)^2 = r^2$ , where (h,k)

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:						Answer	· · _				
1	2	3	4	5		Round	1	2	3	4	5

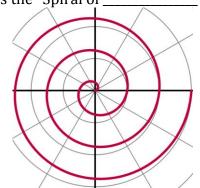
#### #3 Precalculus – Hustle MA© National Convention 2017

Fill in the blank: The following polar curve is known as the "Spiral of \_\_\_\_\_\_".



## #3 Precalculus – Hustle MA© National Convention 2017

Fill in the blank: The following polar curve is known as the "Spiral of \_\_\_\_\_\_".



Answer :	
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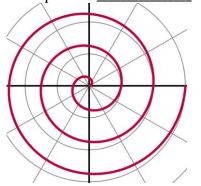
Round 1 2 3 4 5

## Answer : \_\_\_\_\_

Round 1 2 3 4 5

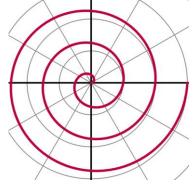
## #3 Precalculus – Hustle MA© National Convention 2017

Fill in the blank: The following polar curve is known as the "Spiral of \_\_\_\_\_".



## #3 Precalculus – Hustle MA© National Convention 2017

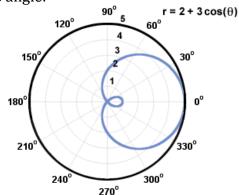
Fill in the blank: The following polar curve is known as the "Spiral of \_\_\_\_\_\_".



Answer	:							Answer	:					
Round	1	2	3	4	5			Round	1	2	3	4	5	

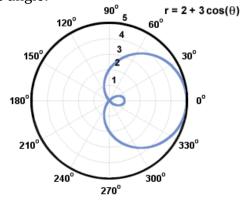
#### #4 Precalculus – Hustle MA© National Convention 2017

Find the ordered pair of polar coordinates for the point on the inner loop farthest from the pole, using the least possible positive radianmeasure angle:



## #4 Precalculus – Hustle MA© National Convention 2017

Find the ordered pair of polar coordinates for the point on the inner loop farthest from the pole, using the least possible positive radianmeasure angle:

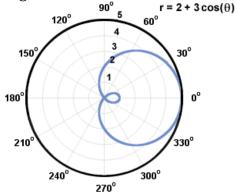


Answer : \_\_\_\_\_

Round 1 2 3 4 5

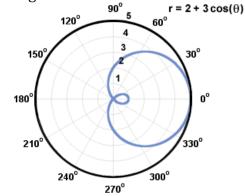
#### #4 Precalculus – Hustle MA© National Convention 2017

Find the ordered pair of polar coordinates for the point on the inner loop farthest from the pole, using the least possible positive radianmeasure angle:



## #4 Precalculus – Hustle MA© National Convention 2017

Find the ordered pair of polar coordinates for the point on the inner loop farthest from the pole, using the least possible positive radianmeasure angle:



Answer	:					Answer	:					
Round	1	2	3	4	5	Round	1	2	3	4	5	

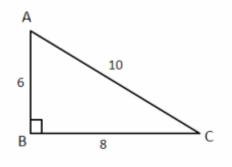
Round 1 2 3 4 5

Answer : \_

#### **#5 Precalculus – Hustle MAO National Convention 2017**

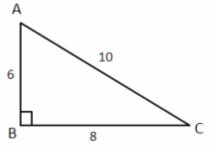
Which angle in the diagram has measure equal

to  $\operatorname{Arcsin}\frac{3}{5}$ ? List the letter of the vertex of the angle:



#### **#5 Precalculus - Hustle** MA<sub>O</sub> National Convention 2017

Which angle in the diagram has measure equal to Arcsin $\frac{3}{5}$ ? List the letter of the vertex of the angle:

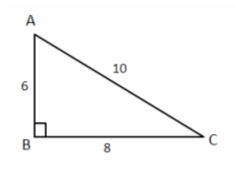


Answer :	
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Round 1 2 3 4 5

#### **#5 Precalculus – Hustle MAO National Convention 2017**

Which angle in the diagram has measure equal to  $\operatorname{Arcsin} \frac{3}{5}$ ? List the letter of the vertex of the angle:

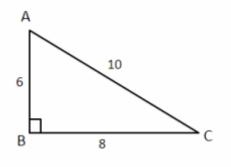


# **#5 Precalculus - Hustle** MAO National Convention 2017

Round 1 2 3 4 5

Answer : \_

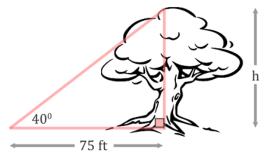
Which angle in the diagram has measure equal to  $\operatorname{Arcsin} \frac{3}{5}$ ? List the letter of the vertex of the angle:



Answer	:					Answer	:					
Round	1	2	3	4	5	Round	1	2	3	4	5	

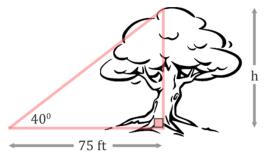
#### #6 Precalculus – Hustle MA© National Convention 2017

Given that  $\tan 40^{\circ} \approx 0.84$ , find *h*, the height of the tree, to the nearest foot:



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Given that  $\tan 40^{\circ} \approx 0.84$ , find *h*, the height of the tree, to the nearest foot:



Answer : \_\_\_\_\_

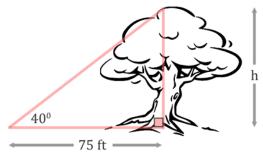
Round 1 2 3 4 5

# Round 1 2 3 4 5

Answer : \_\_\_\_\_

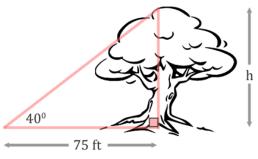
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Answer	:					Answer	:					
Round	1	2	3	4	5	Round	1	2	3	4	5	

#### #7 Precalculus – Hustle MA© National Convention 2017

Find the area enclosed by an isosceles right triangle with hypotenuse of length 24.

## #7 Precalculus – Hustle MA© National Convention 2017

Find the area enclosed by an isosceles right triangle with hypotenuse of length 24.

Answer	;	
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Round 1 2 3 4 5

Answer : \_\_\_\_\_

Round 1 2 3 4 5

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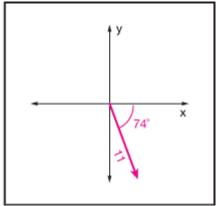
Answer : \_\_\_\_\_

Round 1 2 3 4 5

Answer : \_\_\_\_\_

#### #8 Precalculus – Hustle MA© National Convention 2017

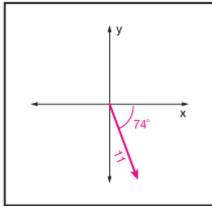
The vector in the diagram has a magnitude of 11, and the angle between the vector and the positive *x*-axis has measure 74°. Write the *y*-coordinate of the vector in the form  $n\sin\theta$ , where  $\theta$  is the least possible positive degreemeasure angle and *n* is an integer.



Round 1 2 3 4 5

#### #8 Precalculus – Hustle MA© National Convention 2017

The vector in the diagram has a magnitude of 11, and the angle between the vector and the positive *x*-axis has measure  $74^{\circ}$ . Write the *y*-coordinate of the vector in the form  $n\sin\theta$ , where  $\theta$  is the least possible positive degreemeasure angle and *n* is an integer.

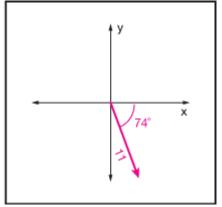


Answer : \_\_\_\_\_

Round 1 2 3 4 5

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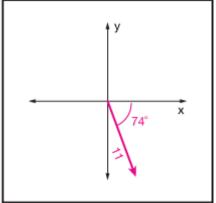




Round 1 2 3 4 5

## #8 Precalculus – Hustle MA© National Convention 2017

The vector in the diagram has a magnitude of 11, and the angle between the vector and the positive *x*-axis has measure 74°. Write the *y*-coordinate of the vector in the form  $n\sin\theta$ , where  $\theta$  is the least possible positive degreemeasure angle and *n* is an integer.





#### #9 Precalculus – Hustle MA© National Convention 2017

Find the arc length on a circle of an arc with a central angle of  $45^{\circ}$  and diameter of 10 units.

## #9 Precalculus – Hustle MA© National Convention 2017

Find the arc length on a circle of an arc with a central angle of 45° and diameter of 10 units.

Answer :	
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Round 1 2 3 4 5

Answer : \_\_\_\_\_

Round 1 2 3 4 5

#### #9 Precalculus – Hustle MA© National Convention 2017

Find the arc length on a circle of an arc with a central angle of 45° and diameter of 10 units.

## #9 Precalculus – Hustle MA© National Convention 2017

Find the arc length on a circle of an arc with a central angle of  $45^{\circ}$  and diameter of 10 units.

Answer : \_\_\_\_\_

Round 1 2 3 4 5

Answer : \_\_\_\_\_

## #10 Precalculus – Hustle MA© National Convention 2017

Evaluate the function  $y = 4\cos(2x)$  at  $x = \frac{3\pi}{8}$ .

#10 Precalculus – Hustle MA© National Convention 2017

Evaluate the function  $y = 4\cos(2x)$  at  $x = \frac{3\pi}{8}$ .

Answer : \_\_\_\_\_

Round 1 2 3 4 5

Answer : \_\_\_\_\_

Round 1 2 3 4 5

#10 Precalculus – Hustle MA© National Convention 2017

Evaluate the function  $y = 4\cos(2x)$  at  $x = \frac{3\pi}{8}$ .

#10 Precalculus – Hustle MA© National Convention 2017

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Answer : \_\_\_\_\_

Round 1 2 3 4 5

Answer : \_\_\_\_\_

#### #11 Precalculus – Hustle MA© National Convention 2017

Find the area enclosed by the triangle whose vertices are at the points (0,0,0), (4,0,0), and (1,2,0).

## #11 Precalculus – Hustle MA© National Convention 2017

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Answer : \_\_\_\_\_

Round 1 2 3 4 5

#### #11 Precalculus – Hustle MA© National Convention 2017

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(1,2,0).

### Answer : \_\_\_\_\_

Round 1 2 3 4 5

## #11 Precalculus – Hustle MA© National Convention 2017

Find the area enclosed by the triangle whose vertices are at the points (0,0,0), (4,0,0), and

(1,2,0).

Answer : \_\_\_\_\_

Round 1 2 3 4 5

Answer : \_\_\_\_\_

#### #12 Precalculus – Hustle MA© National Convention 2017

Find the component form of the vector with initial point (1,2,0) and terminal point (4,0,0).

## #12 Precalculus – Hustle MA© National Convention 2017

Find the component form of the vector with initial point (1,2,0) and terminal point (4,0,0).

Answer : _	
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Round 1 2 3 4 5

## Answer : \_\_\_\_\_

Round 1 2 3 4 5

#### #12 Precalculus – Hustle MA© National Convention 2017

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## #12 Precalculus – Hustle MA© National Convention 2017

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Answer : \_\_\_\_\_

Round 1 2 3 4 5

Answer : \_\_\_\_\_

#### #13 Precalculus – Hustle MA© National Convention 2017

If  $\vec{u} = \langle 1, 2, 0 \rangle$  and  $\vec{v} = \langle 4, 0, 0 \rangle$ , find  $\vec{u} \times \vec{v}$  in component form.

## #13 Precalculus – Hustle MA© National Convention 2017

If  $\vec{u} = \langle 1, 2, 0 \rangle$  and  $\vec{v} = \langle 4, 0, 0 \rangle$ , find  $\vec{u} \times \vec{v}$  in component form.

Answer : \_\_\_\_\_

Round 1 2 3 4 5

Answer : \_\_\_\_\_

Round 1 2 3 4 5

#### #13 Precalculus – Hustle MA© National Convention 2017

If  $\vec{u} = \langle 1, 2, 0 \rangle$  and  $\vec{v} = \langle 4, 0, 0 \rangle$ , find  $\vec{u} \times \vec{v}$  in component form.

#### #13 Precalculus – Hustle MA© National Convention 2017

If  $\vec{u} = \langle 1, 2, 0 \rangle$  and  $\vec{v} = \langle 4, 0, 0 \rangle$ , find  $\vec{u} \times \vec{v}$  in component form.

Answer : \_\_\_\_\_

Round 1 2 3 4 5

Answer : \_\_\_\_\_

#### #14 Precalculus – Hustle MA© National Convention 2017

Classify the conic section whose polar equation is  $r = \frac{24}{4 - 8\cos\theta}$ .

#### #14 Precalculus – Hustle MA© National Convention 2017

Classify the conic section whose polar equation is  $r = \frac{24}{4 - 8\cos\theta}$ .

Answer : \_\_\_\_\_

Round 1 2 3 4 5

Answer : \_\_\_\_\_

Round 1 2 3 4 5

#### #14 Precalculus – Hustle MA© National Convention 2017

Classify the conic section whose polar equation is  $r = \frac{24}{4 - 8\cos\theta}$ .

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Answer : \_\_\_\_\_

Round 1 2 3 4 5

Answer : \_\_\_\_\_

#### #15 Precalculus – Hustle MA© National Convention 2017

For the conic section with equation

 $r = \frac{24}{4 - 8\cos\theta}$ , find the vertex with the greatest

value of *r*, written in polar form with angle in the interval  $[0,2\pi)$ .

#### #15 Precalculus – Hustle MA© National Convention 2017

For the conic section with equation  $r = \frac{24}{4 - 8\cos\theta}$ , find the vertex with the greatest value of *r*, written in polar form with angle in the interval  $[0, 2\pi)$ .

Answer :	
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Round 1 2 3 4 5

Answer : \_\_\_\_\_

Round 1 2 3 4 5

## #15 Precalculus – Hustle MA® National Convention 2017

For the conic section with equation  $r = \frac{24}{4 - 8\cos\theta}$ , find the vertex with the greatest

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## #15 Precalculus – Hustle MA© National Convention 2017

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Answer	:	
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Answer : \_\_\_\_\_

Round 1 2 3 4 5

#### #16 Precalculus – Hustle MA© National Convention 2017

Find the value of  $a_{21}$  for the matrix

$$A = \begin{bmatrix} 9/2 & -2 & -7/2 \\ -1 & 1 & 1 \\ -1/2 & 0 & 1/2 \end{bmatrix}.$$

#### #16 Precalculus – Hustle MA© National Convention 2017

Find the value of  $a_{21}$  for the matrix

$$A = \begin{bmatrix} \frac{9}{2} & -2 & -\frac{7}{2} \\ -1 & 1 & 1 \\ -\frac{1}{2} & 0 & \frac{1}{2} \end{bmatrix}.$$

Answer : \_\_\_\_\_

Round 1 2 3 4 5

# Answer : \_\_\_\_\_

Round 1 2 3 4 5

#### #16 Precalculus – Hustle MA© National Convention 2017

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Answer : \_\_\_\_\_

Answer : \_\_\_\_\_

Round 1 2 3 4 5

## #17 Precalculus – Hustle MA© National Convention 2017

Find the value of the determinant of the matrix

$$A = \begin{bmatrix} \frac{9}{2} & -2 & -\frac{7}{2} \\ -1 & 1 & 1 \\ -\frac{1}{2} & 0 & \frac{1}{2} \end{bmatrix}.$$

## #17 Precalculus – Hustle MA© National Convention 2017

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$$A = \begin{bmatrix} 9/2 & -2 & -7/2 \\ -1 & 1 & 1 \\ -1/2 & 0 & 1/2 \end{bmatrix}.$$

Answer : \_\_\_\_\_

Round 1 2 3 4 5

Answer : \_\_\_\_\_

Round 1 2 3 4 5

#### #17 Precalculus – Hustle MA© National Convention 2017

Find the value of the determinant of the matrix

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Answer : \_\_\_\_\_

Answer : \_\_\_\_\_

Round 1 2 3 4 5

#### #18 Precalculus – Hustle MA© National Convention 2017

Simplify, where defined:  $\frac{\cot x \cos x}{\frac{1 - \sin^2 x}{\sin x}}$ 

#### #18 Precalculus – Hustle MA© National Convention 2017

Simplify, where defined:  $\frac{\cot x \cos x}{\frac{1 - \sin^2 x}{\sin x}}$ 

Round 1 2 3 4 5

Answer : \_\_\_\_\_

Round 1 2 3 4 5

#### #18 Precalculus – Hustle MA© National Convention 2017

Simplify, where defined:  $\frac{\cot x \cos x}{\frac{1 - \sin^2 x}{\sin x}}$ 

#### #18 Precalculus – Hustle MA© National Convention 2017

Simplify, where defined:  $\frac{\cot x \cos x}{\frac{1 - \sin^2 x}{\sin x}}$ 

Answer : \_\_\_\_\_

Round 1 2 3 4 5

Answer : \_\_\_\_\_

#### #19 Precalculus – Hustle MA© National Convention 2017

The graph of  $r = 5\cos(n\theta)$ , where *n* is a positive integer, is a rose with four petals. Find the value of *n*.

## #19 Precalculus – Hustle MA© National Convention 2017

The graph of  $r = 5\cos(n\theta)$ , where *n* is a positive integer, is a rose with four petals. Find the value of *n*.

Answer :	_
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Round 1 2 3 4 5

Answer : \_\_\_\_\_

Round 1 2 3 4 5

#### #19 Precalculus – Hustle MA© National Convention 2017

The graph of  $r = 5\cos(n\theta)$ , where *n* is a

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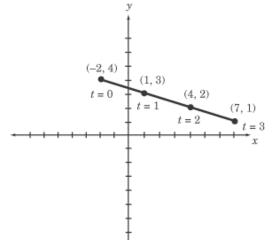
Answer : \_\_\_\_\_

Round 1 2 3 4 5

Answer : \_\_\_\_\_

## #20 Precalculus – Hustle MA® National Convention 2017

Consider the following graph:



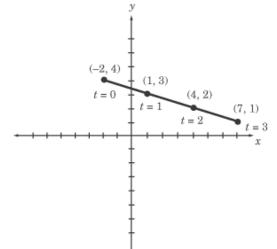
The parametric equations for this graph are x=3t-2 and y=f(t), where  $0 \le t \le 3$ . Find f(t).

Answer : \_\_\_\_\_

Round 1 2 3 4 5

## #20 Precalculus – Hustle MA© National Convention 2017

Consider the following graph:

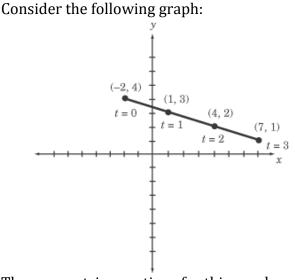


The parametric equations for this graph are x=3t-2 and y=f(t), where  $0 \le t \le 3$ . Find f(t).

Answer : \_\_\_\_\_

Round 1 2 3 4 5

#20 Precalculus – Hustle MA© National Convention 2017

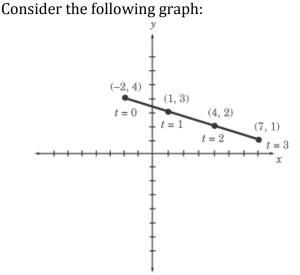


The parametric equations for this graph are x=3t-2 and y=f(t), where  $0 \le t \le 3$ . Find f(t).

Answer : \_\_\_\_\_

Round 1 2 3 4 5

## #20 Precalculus – Hustle MA© National Convention 2017

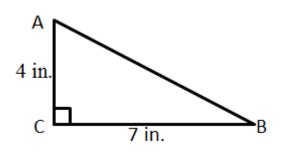


The parametric equations for this graph are x=3t-2 and y=f(t), where  $0 \le t \le 3$ . Find f(t).

Answer : \_\_\_\_\_

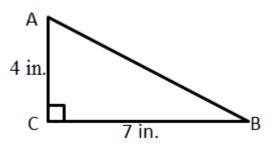
#### #21 Precalculus – Hustle MA© National Convention 2017

Find the value of  $\csc B \cdot \sin A$  using the diagram:



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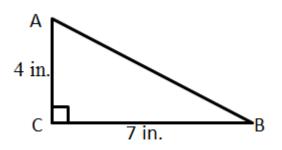


Answer : \_\_\_\_

Round 1 2 3 4 5

#### #21 Precalculus – Hustle MA© National Convention 2017

Find the value of  $\csc B \cdot \sin A$  using the diagram:

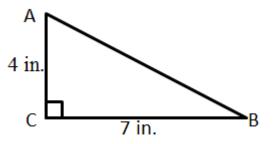


Answer : \_\_\_\_\_

Round 1 2 3 4 5

## #21 Precalculus – Hustle MA© National Convention 2017

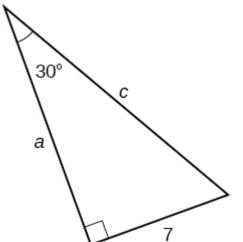
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Answer	:					Answer :							
Round	1	2	3	4	5	Round	1	2	3	4	5		

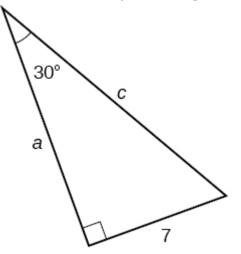
#### #22 Precalculus – Hustle MA© National Convention 2017

Find the area enclosed by the triangle:



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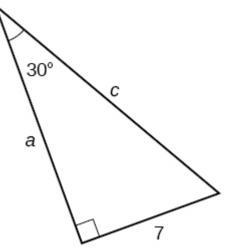
Round 1 2 3 4 5

Answer

Round

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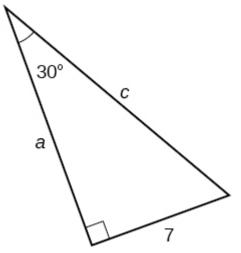


Answer : \_\_\_\_\_

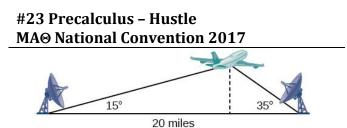
Round 1 2 3 4 5

## #22 Precalculus – Hustle MA© National Convention 2017

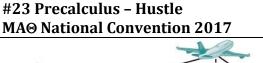
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1 2 3 4 5 Round 1 2 3 4 5	:					Answer :									
	1	2	3	4	5	Round	1	2	3	4	5				



Given that  $\tan 75^{\circ} \approx 3.73$  and  $\tan 35^{\circ} \approx 0.7$ , and that the distance between the satellites is 20 miles, find the altitude of the airplane, to the nearest mile.



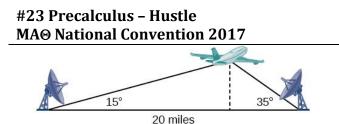


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Round 1 2 3 4 5

Answer : \_\_\_\_\_

Round 1 2 3 4 5



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#23 Precalculus – Hustle MA© National Convention 2017



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Answer :							Answer :									
Round	1	2	3	4	5				R	ound	1	2	3	4	5	

#### #24 Precalculus – Hustle MA© National Convention 2017

Solve the equation for all solutions in the interval  $[0,2\pi)$ :  $\cos(2x) - \cos x = 0$ 

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#### #24 Precalculus – Hustle MA© National Convention 2017

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Answer : \_\_\_\_\_

Round 1 2 3 4 5

#24 Precalculus – Hustle MA© National Convention 2017

Solve the equation for all solutions in the interval  $[0,2\pi)$ :  $\cos(2x) - \cos x = 0$ 

Answer : \_\_\_\_\_

Round 1 2 3 4 5

Answer : \_\_\_\_\_

#### #25 Precalculus – Hustle MA© National Convention 2017

Evaluate:  $\langle -2,1 \rangle \cdot \langle 1,7 \rangle$ 

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Answer : \_\_\_\_\_

Round 1 2 3 4 5

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Round 1 2 3 4 5

#25 Precalculus – Hustle MA© National Convention 2017

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#25 Precalculus – Hustle MA© National Convention 2017

Evaluate:  $\langle -2,1 \rangle \cdot \langle 1,7 \rangle$ 

Answer : \_\_\_\_\_

Round 1 2 3 4 5

Answer : \_\_\_\_\_