

Hustle Test #841 Trigonometry



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#1 Trigonometry – Hustle MAθ National Convention 2013	#1 Trigonometry – Hustle MAθ National Convention 2013		
Find the length of the hypotenuse of a right triangle with legs of length 3 and 7.	Find the length of the hypotenuse of a right triangle with legs of length 3 and 7.		
Answer :	Answer :		
Round 1 2 3 4 5	Round 1 2 3 4 5		
#1 Trigonometry – Hustle	#1 Trigonometry – Hustle		
MAθ National Convention 2013	MAθ National Convention 2013		

Find the length of the hypotenuse of a right triangle with legs of length 3 and 7.

Find the length of the hypotenuse of a right triangle with legs of length 3 and 7.

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

Round 1 2 3 4 5 Round 1 2 3 4 5

### #2 Trigonometry – Hustle MA0 National Convention 2013

#### #2 Trigonometry - Hustle MA0 National Convention 2013

Evaluate:

$$\cot^{2}\left(\frac{9\pi}{17}\right) - \tan^{2}\left(\frac{9\pi}{17}\right) + \cos^{2}\left(\frac{9\pi}{17}\right) + \sec^{2}\left(\frac{9\pi}{17}\right) - \csc^{2}\left(\frac{9\pi}{17}\right) + \sin^{2}\left(\frac{9\pi}{17}\right)$$

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$$\cot^{2}\left(\frac{9\pi}{17}\right) - \tan^{2}\left(\frac{9\pi}{17}\right) + \cos^{2}\left(\frac{9\pi}{17}\right) + \sec^{2}\left(\frac{9\pi}{17}\right) - \csc^{2}\left(\frac{9\pi}{17}\right) + \sin^{2}\left(\frac{9\pi}{17}\right)$$

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

Round 1 2 3 4 5

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

Round 1 2 3 4 5

#### #2 Trigonometry – Hustle MAθ National Convention 2013

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$$\cot^{2}\left(\frac{9\pi}{17}\right) - \tan^{2}\left(\frac{9\pi}{17}\right) + \cos^{2}\left(\frac{9\pi}{17}\right) + \sec^{2}\left(\frac{9\pi}{17}\right) - \csc^{2}\left(\frac{9\pi}{17}\right) + \sin^{2}\left(\frac{9\pi}{17}\right)$$

**Evaluate:** 

$$\cot^{2}\left(\frac{9\pi}{17}\right) - \tan^{2}\left(\frac{9\pi}{17}\right) + \cos^{2}\left(\frac{9\pi}{17}\right) + \sec^{2}\left(\frac{9\pi}{17}\right) - \csc^{2}\left(\frac{9\pi}{17}\right) + \sin^{2}\left(\frac{9\pi}{17}\right)$$

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

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

Round 1 2 3 4 5

#3	Trigonometry - Hu	stle
MA	AO National Convent	ion 2013

In right triangle *SUN* with right angle U, NU=48, SN=73, and SU=55. Find **csc** *N* as a common fraction.

#### #3 Trigonometry – Hustle MA0 National Convention 2013

In right triangle *SUN* with right angle U, NU=48, SN=73, and SU=55. Find **csc** *N* as a common fraction.

_			
Answer			

Round 1 2 3 4 5

#### #3 Trigonometry - Hustle MA0 National Convention 2013

In right triangle *SUN* with right angle U, NU=48, SN=73, and SU=55. Find **csc** *N* as a common fraction.

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

Round 1 2 3 4 5

#### #3 Trigonometry - Hustle MA0 National Convention 2013

In right triangle *SUN* with right angle U, NU=48, SN=73, and SU=55. Find **csc** *N* as a common fraction.

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

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

Round 1 2 3 4 5

Simplify 
$$\frac{\sin 2A}{1-\cos 2A}$$
.

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.

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

Round 1 2 3 4 5

#4 Trigonometry - Hustle MAθ National Convention 2013

Simplify  $\frac{\sin 2A}{1-\cos 2A}$ .

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

Round 1 2 3 4 5

#4 Trigonometry - Hustle MAθ National Convention 2013

Simplify  $\frac{\sin 2A}{1-\cos 2A}$ .

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

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

Round 1 2 3 4 5

#5 Trigonometry – Hustle MA0 National Convention 2013	#5 Trigonometry – Hustle MAθ National Convention 2013			
Evaluate <b>sin75° – sin15°</b> . Your answer should contain no double radicals.	Evaluate <b>sin75°</b> – <b>sin15°</b> . Your answer should contain no double radicals.			
Answer :	Answer :			
Round 1 2 3 4 5	Round 1 2 3 4 5			

#5 Trigonometry – Hustle MAθ National Convention 2013

Evaluate **sin75°** – **sin15°**. Your answer should contain no double radicals.

#5 Trigonometry – Hustle MAθ National Convention 2013

Round 1 2 3 4 5

Evaluate  $sin75^{\circ}-sin15^{\circ}$ . Your answer should contain no double radicals.

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

# #6 Trigonometry - Hustle MAθ National Convention 2013

Solve for *x* over  $[0^{\circ}, 360^{\circ}]$ :  $\cos x = \frac{1}{2}$ . Express your answer(s) in degrees.

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Round 1 2 3 4 5

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

Round 1 2 3 4 5

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

Round 1 2 3 4 5

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

#### #7 Trigonometry – Hustle MAθ National Convention 2013

#### #7 Trigonometry - Hustle MA0 National Convention 2013

Find the least positive solution, in degrees,

for 
$$\sin^2\left(\frac{3}{2}x\right) = \frac{1}{4}$$
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Round 1 2 3 4 5

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Round 1 2 3 4 5

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Round 1 2 3 4 5

#8 Trigonometry - Hustle
MA0 National Convention 2013

#8 Trigonometry – Hustle MAθ National Convention 2013

Let  $i = \sqrt{-1}$ . Write 2 + 2i in exponential form with least positive 0.

Let  $i = \sqrt{-1}$ . Write 2 + 2i in exponential form with least positive  $\theta$ .

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

Round 1 2 3 4 5

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

Round 1 2 3 4 5

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

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Round 1 2 3 4 5

# #9 Trigonometry – Hustle MAθ National Convention 2013

Write the polar coordinates  $(r, \theta) = \left(2, \frac{\pi}{3}\right)$  in Cartesian coordinates, (x, y).

#### #9 Trigonometry – Hustle MAθ National Convention 2013

Write the polar coordinates  $(r, \theta) = \left(2, \frac{\pi}{3}\right)$  in Cartesian coordinates, (x, y).

Answer	:	
AIISWCI	•	

Round 1 2 3 4 5

#### #9 Trigonometry - Hustle MA0 National Convention 2013

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

Round 1 2 3 4 5

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

Round 1 2 3 4 5

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

Let 
$$i = \sqrt{-1}$$
. Simplify  $\left(1 + i\sqrt{3}\right)^6$ .

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

Round 1 2 3 4 5

#10 Trigonometry - Hustle MA0 National Convention 2013

Let  $i = \sqrt{-1}$ . Simplify  $\left(1 + i\sqrt{3}\right)^6$ .

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

Round 1 2 3 4 5

#10 Trigonometry - Hustle MA0 National Convention 2013

Let  $i = \sqrt{-1}$ . Simplify  $(1 + i\sqrt{3})^6$ .

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

Round 1 2 3 4 5

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

#11 Trigonometry – Hustle MAθ National Convention 2013	#11 Trigonometry – Hustle MA0 National Convention 2013		
Find the sum of the complex cube roots of unity.	Find the sum of the complex cube roots of unity.		
Answer :	Answer :		
Round 1 2 3 4 5	Round 1 2 3 4 5		
#11 Trigonometry – Hustle MAθ National Convention 2013	#11 Trigonometry - Hustle MA0 National Convention 2013		
Find the sum of the complex cube roots of unity.	Find the sum of the complex cube roots of unity.		

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

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

Round 1 2 3 4 5

#12 Trigonometry - Hustle	
MAθ National Convention 2013	

Find the area of triangle *ABC* if BC=10, AC=20, and the measure of angle ACB is 120 degrees.

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

Round 1 2 3 4 5

#12 Trigonometry - Hustle MA0 National Convention 2013

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Round 1 2 3 4 5

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Round 1 2 3 4 5

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# #13 Trigonometry - Hustle MA0 National Convention 2013

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

Round 1 2 3 4 5

### #13 Trigonometry - Hustle MA0 National Convention 2013

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

Round 1 2 3 4 5

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

#14 Trigonometry - Hustle	
MAθ National Convention 2013	

Find the area, in square inches, of a triangle with side lengths 2 in., 3 in., and 4 in.

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_			
Answer	:		

Round 1 2 3 4 5

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

Round 1 2 3 4 5

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Find the area, in square inches, of a triangle with side lengths 2 in., 3 in., and 4 in.

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

Round 1 2 3 4 5

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

#15 Trigonometry - Hustle
MAθ National Convention 2013

#15 Trigonometry - Hustle MA0 National Convention 2013

Simplify  $\csc\theta \left(1-\cos^2\theta\right)$ .

Simplify  $\csc\theta (1-\cos^2\theta)$ .

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

Round 1 2 3 4 5

#15 Trigonometry - Hustle MA0 National Convention 2013

Simplify  $\csc\theta \left(1-\cos^2\theta\right)$ .

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

Round 1 2 3 4 5

#15 Trigonometry - Hustle MA0 National Convention 2013

Simplify  $\csc\theta (1-\cos^2\theta)$ .

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

Round 1 2 3 4 5

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

#16 Trigonometry - Hustle
MA0 National Convention 2013

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Simplify  $\cos(270^{\circ} - \alpha)\cot(180^{\circ} - \alpha)$ .

Simplify  $\cos(270^{\circ} - \alpha)\cot(180^{\circ} - \alpha)$ .

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

Round 1 2 3 4 5

#16 Trigonometry - Hustle MA0 National Convention 2013

Simplify  $\cos(270^{\circ} - \alpha)\cot(180^{\circ} - \alpha)$ .

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

Round 1 2 3 4 5

#16 Trigonometry - Hustle MAθ National Convention 2013

Simplify  $\cos(270^{\circ} - \alpha)\cot(180^{\circ} - \alpha)$ .

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

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

Round 1 2 3 4 5

#### #17 Trigonometry - Hustle MA0 National Convention 2013

In a triangle with sides a, b, and c, it is found that (a+b+c)(a+b-c)=3ab. Find the degree measure of the angle opposite side c.

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Round 1 2 3 4 5

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Round 1 2 3 4 5

#### #17 Trigonometry - Hustle MA0 National Convention 2013

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

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

Round 1 2 3 4 5

#18 Trigonometry - Hustle	
MAθ National Convention 20	<b>13</b>

#### #18 Trigonometry - Hustle MA0 National Convention 2013

Find the period, in radians, of  $f(x) = \cos(64x) + \sin(4x) + \tan(4x) + \cot(18x)$ .

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

Round 1 2 3 4 5

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

Round 1 2 3 4 5

#18 Trigonometry - Hustle MA0 National Convention 2013

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

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

Round 1 2 3 4 5

# #19 Trigonometry - Hustle MA0 National Convention 2013

#19 Trigonometry - Hustle MA0 National Convention 2013

Evaluate: 
$$\cos \left( \cos^{-1} \frac{5}{13} + \cos^{-1} \frac{3}{5} \right)$$

Evaluate:  $\cos \left( \cos^{-1} \frac{5}{13} + \cos^{-1} \frac{3}{5} \right)$ 

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

Round 1 2 3 4 5

#19 Trigonometry - Hustle MA0 National Convention 2013

Evaluate:  $\cos \left( Cos^{-1} \frac{5}{13} + Cos^{-1} \frac{3}{5} \right)$ 

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

Round 1 2 3 4 5

#19 Trigonometry - Hustle MA0 National Convention 2013

Evaluate:  $\cos \left( \cos^{-1} \frac{5}{13} + \cos^{-1} \frac{3}{5} \right)$ 

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

Round 1 2 3 4 5

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

# #20 Trigonometry - Hustle MA0 National Convention 2013

# Find the cosine of the acute angle between the direction vectors of the lines $l_1 = (0, -3.4) + t(2, -1.2)$ and $l_2 = (1.3.0) + s(1, -2.3)$ .

#### #20 Trigonometry - Hustle MA0 National Convention 2013

Find the cosine of the acute angle between the direction vectors of the lines  $l_1 = (0, -3,4) + t(2, -1,2)$  and  $l_2 = (1,3,0) + s(1, -2,3)$ .

Answer	:	
AIISWCI	•	

Round 1 2 3 4 5

#### #20 Trigonometry - Hustle MA0 National Convention 2013

Find the cosine of the acute angle between the direction vectors of the lines  $l_1 = (0, -3,4) + t(2, -1,2)$  and  $l_2 = (1,3,0) + s(1,-2,3)$ .

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

Round 1 2 3 4 5

#### #20 Trigonometry - Hustle MA0 National Convention 2013

Find the cosine of the acute angle between the direction vectors of the lines  $l_1 = (0, -3,4) + t(2, -1,2)$  and  $l_2 = (1,3,0) + s(1,-2,3)$ .

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

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

Round 1 2 3 4 5

Find 
$$\tan \frac{\theta}{2}$$
 if  $\sin \theta = -\frac{1}{3}$  and  $\cos \theta < 0$ .

Find 
$$\tan \frac{\theta}{2}$$
 if  $\sin \theta = -\frac{1}{3}$  and  $\cos \theta < 0$ .

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

Round 1 2 3 4 5

#21 Trigonometry - Hustle MA0 National Convention 2013

Find  $\tan \frac{\theta}{2}$  if  $\sin \theta = -\frac{1}{3}$  and  $\cos \theta < 0$ .

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

Round 1 2 3 4 5

#21 Trigonometry - Hustle MA0 National Convention 2013

Find  $\tan \frac{\theta}{2}$  if  $\sin \theta = -\frac{1}{3}$  and  $\cos \theta < 0$ .

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

Round 1 2 3 4 5

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

# #22 Trigonometry - Hustle MA0 National Convention 2013

Given that  $a = \frac{1}{2}$  and (a+1)(b+1)=2, find the radian measure of  $Tan^{-1}a + Tan^{-1}b$ .

# #22 Trigonometry - Hustle MA0 National Convention 2013

Given that  $a = \frac{1}{2}$  and (a+1)(b+1)=2, find the radian measure of  $Tan^{-1}a + Tan^{-1}b$ .

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

Round 1 2 3 4 5

#### #22 Trigonometry - Hustle MA0 National Convention 2013

Given that  $a = \frac{1}{2}$  and (a+1)(b+1)=2, find the radian measure of  $Tan^{-1}a + Tan^{-1}b$ .

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

Round 1 2 3 4 5

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Given that  $a = \frac{1}{2}$  and (a+1)(b+1)=2, find the radian measure of  $Tan^{-1}a + Tan^{-1}b$ .

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

Round 1 2 3 4 5

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

# #23 Trigonometry - Hustle MA $\theta$ National Convention 2013

### #23 Trigonometry - Hustle MA0 National Convention 2013

Find the maximum value of  $y=7\sin 3x-4\sqrt{2}\cos 3x+5$ .

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

Round 1 2 3 4 5

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

Round 1 2 3 4 5

#### #23 Trigonometry - Hustle MA0 National Convention 2013

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Find the maximum value of  $y=7\sin 3x-4\sqrt{2}\cos 3x+5$ .

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

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

Round 1 2 3 4 5

# #24 Trigonometry - Hustle MA0 National Convention 2013

Find the image of (-3,7) under a rotation about the origin through an angle of  $\theta = -\frac{3\pi}{4}$ .

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

Round 1 2 3 4 5

#### #24 Trigonometry - Hustle MA0 National Convention 2013

Find the image of (-3,7) under a rotation about the origin through an angle of  $\theta = -\frac{3\pi}{4}$ .

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

Round 1 2 3 4 5

#### #24 Trigonometry - Hustle MA0 National Convention 2013

Find the image of (-3,7) under a rotation about the origin through an angle of  $\theta = -\frac{3\pi}{4}$ .

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

Round 1 2 3 4 5

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

### #25 Trigonometry - Hustle MA0 National Convention 2013

The conic with equation  $5x^2 + 3xy + y^2 = 4$  is an ellipse. The x and y-axes will coincide with the axes of the conic if the x and y-axes are rotated counterclockwise about the origin by an angle  $\theta$ . Let  $\theta_{\min}$  be the smallest such positive acute angle. Find  $\cos \theta_{\min}$ .

#25 Trigonometry - Hustle MA0 National Convention 2013

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Round 1 2 3 4 5

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

Round 1 2 3 4 5

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

Round 1 2 3 4 5

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