COS Pre-Calculus Placement Instructions

This assessment will help determine if this level of Math-U-See is a good place for your child to start. Each level of Math-U-See builds upon the concepts taught in previous levels. Successful placement involves finding the highest level your child has fully mastered and placing them one level above that.

1 Prior to beginning the assessment:

- Understand that the goal isn't to get all the questions correct. We are determining which concepts they have not yet mastered.
- Encourage your child and let them know that this is an assessment and NOT a test.
- Recognize they might already know some of the concepts taught in this level.
- Let your child know there may be questions they don't yet understand.
- Print the assessment and ensure you have a pencil and eraser.
- Your child may want extra paper to work through the questions.

2 Let your child know while taking the assessment:

- If they don't understand or can't do a question have them move to the next one.
- If they want to attempt a question but are not sure they understand it, have them mark it with a happy face.
- If they cannot answer 3 or more questions in a row, it is okay to stop doing this assessment.

3 Grading the assessment:

- A question that your child has marked with a happy face indicates to you that this concept is not completely understood and must be reviewed.
- For incorrect answers, ask your child how they arrived at their answer. If they understand the concept, they should be able to correct the mistake on their own. This is considered a computational error. For the sake of this assessment do not mark this as incorrect.
- If there are only one or two concepts they need to learn or review from a given level, it may be possible to just remediate those and start in the next level higher.

4 Analyzing the results:

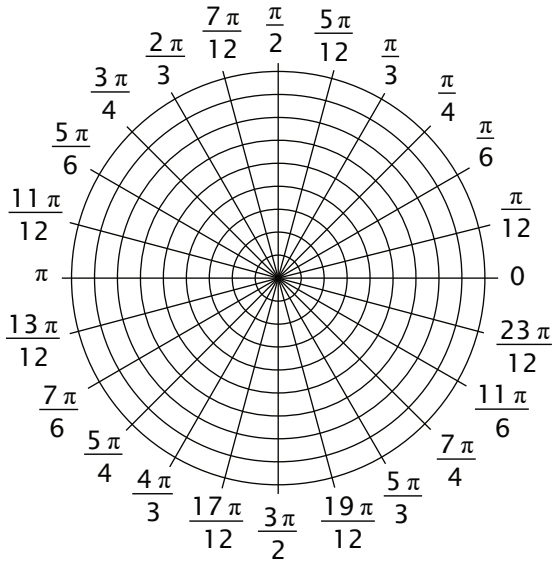
Most answers are incorrect or have happy faces.	5 or more answers are incorrect or have happy faces.	Most answers are correct and there are no happy faces.
Have them try the assessement for	**Your child is ready for**	**Have them try the assessment for**
Algebra 2	**Pre-Calculus**	**Calculus**

If you have questions after your child has taken the assessment, please contact us with the results and we will be able to help you determine the best level for them.

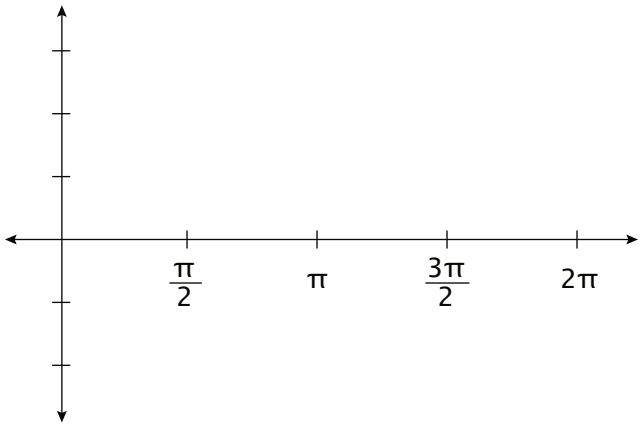
FINAL EXAM

Graph.

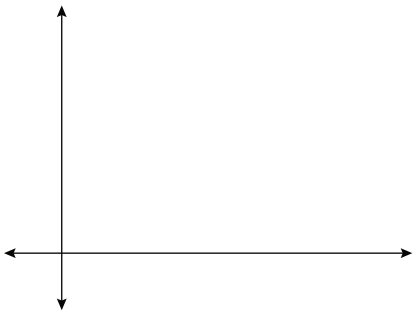
1. $r = \frac{2}{\cos\theta}$



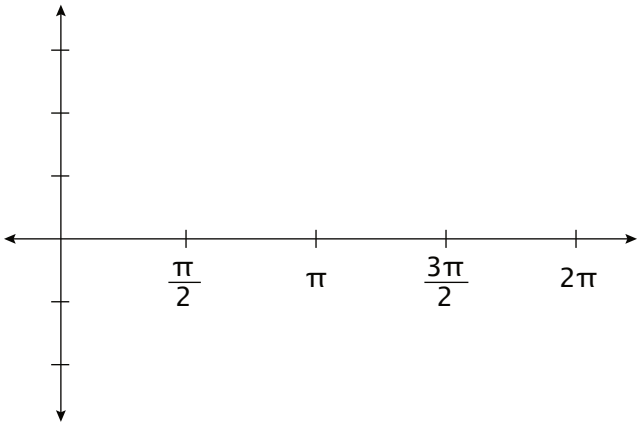
2. $y = 3 \sin x$



3. $f(x) = e^x$



4. $y = \tan x$



Solvefor x.

5. $e^{2x} - e^{x} = 2$

6. $\frac{\sqrt{x+3}}{2} < 1$

7. $|x - 2| < -1$

8. $e^{2x} = 5$

Provethe identities.

9. $\tan \theta \csc \theta = \sec \theta$

10. $\csc^2\theta[\sin^2(90° - \theta)] + 1 = \csc^2 \theta$

Evaluate.

11. $\lim_{x \to \infty} \frac{1}{x}$

12. $\lim_{x \to -5} \frac{x^2 + 3x - 10}{x + 5}$

13. $\sum_{i=1}^{4} \{i^2 - 1\}$

14. sin 135° + cos 60°

Follow the directions.

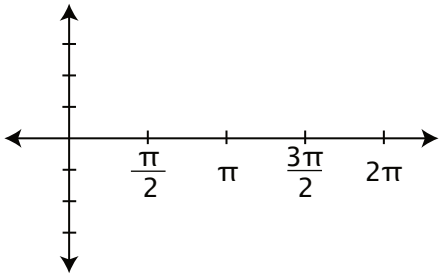
15. If $f(x) = 2X - 3$ and $g(x) = X^2 + 1$, find $f(g(x))$.

16. Give the domain and range of the following function: $f(x) = \sqrt{x + 3}$

17. Change $7\pi/4$ radians to degrees.

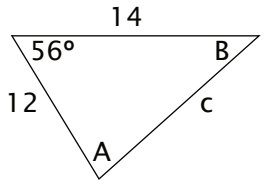
18. Give the reference angle and the quadrant for 250°.

19. Graph $2 \sin x - 1$, using the graph at right.



20. Find the first four terms of the following geometric sequence, with $a_1 = -4$ and $r = 1/2$.

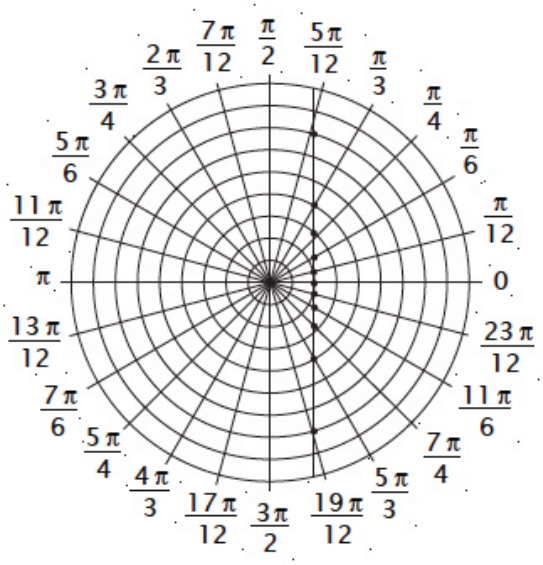
21. Solve for the unknown sides and angles for the triangle shown.



22. The decay constant of a substance is determined to be .0069. How much of 10 grams will remain after 365 days? Use $Q(t) = 10e^{-kt}$, where t = time in days and Q(t) is the quantity remaining at time t.

PreCalculus Pre/Post Placement Test
Answer Key

1.



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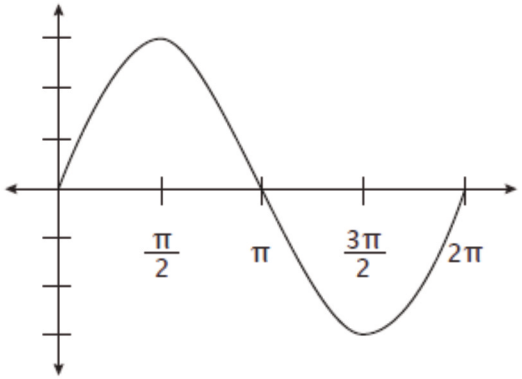

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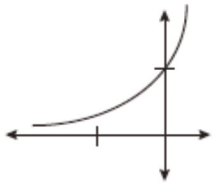

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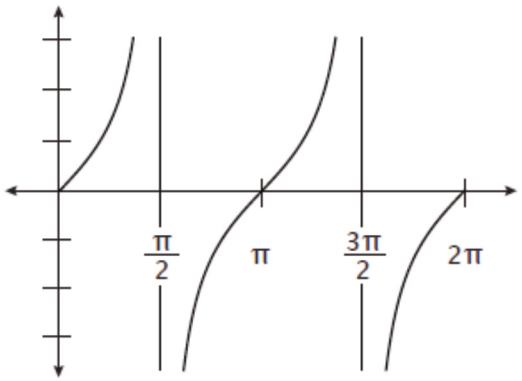


5. $e^{2X} - e^X = 2$

$Y^2 - Y = 2$ (substituting Y for e^X)

$Y^2 - Y - 2 = 0$

$(Y+1)(Y-2) = 0$

$Y+1=0$	$Y-2=0$
$Y=-1$	$Y=2$
$e^X=-1$	$e^X=2$
$\ln e^X = \ln(-1)$	$\ln e^X = \ln 2$
not a real solution	$X=\ln 2$
	$X \approx .6931$

6. $\frac{\sqrt{X+3}}{2} < 1$

$\sqrt{X+3} < 2$

$\left(\sqrt{X+3}\right)^2 < 2^2$

$X+3 < 4$

$X < 1$

7. No real solutions because absolute value is always positive.

8. $e^{2X} = 5$

$\ln e^{2X} = \ln 5$

$2X \approx 1.6094$

$X \approx .8047$

9. $\tan\theta\csc\theta = \sec\theta$

$\left(\frac{\sin\theta}{\cos\theta}\right)\left(\frac{1}{\sin\theta}\right) = \frac{1}{\cos\theta}$

$\frac{1}{\cos\theta} = \frac{1}{\cos\theta}$

10. $\csc^2\theta\left[\sin^2(90°-\theta)\right] + 1 = \csc^2\theta$

$\frac{1}{\sin^2\theta}\left[\cos^2\theta\right] + 1 = \frac{1}{\sin^2\theta}$

$\frac{\cos^2\theta}{\sin^2\theta} + \frac{\sin^2\theta}{\sin^2\theta} = \frac{1}{\sin^2\theta}$

$\frac{\cos^2\theta + \sin^2\theta}{\sin^2\theta} = \frac{1}{\sin^2\theta}$

$\frac{1}{\sin^2\theta} = \frac{1}{\sin^2\theta}$

11. $\lim_{X\to\infty} \frac{1}{X} = 0$

As the numerator grows larger, the fraction grows smaller, but will never reach or pass 0.

12. $\lim_{X\to -5} \frac{X^2+3X-10}{X+5} =$

$\lim_{X\to -5} \frac{(X+5)(X-2)}{X+5} =$

$\lim_{X\to -5} X-2 =$

$\lim_{X\to -5} (-5)-2 = -7$

13. $\sum_{x=1}^{4}\{x^2-1\} = (1^2-1)+(2^2-1)+(3^2-1)+(4^2-1)$
$= (1-1)+(4-1)+(9-1)+(16-1)$
$= 0+3+8+15$
$= 26$

14. $\sin 135^\circ + \cos 60^\circ = -\sin 45^\circ + \cos 60^\circ$
$= \frac{\sqrt{2}}{2} + \frac{1}{2}$
$= \frac{1+\sqrt{2}}{2}$

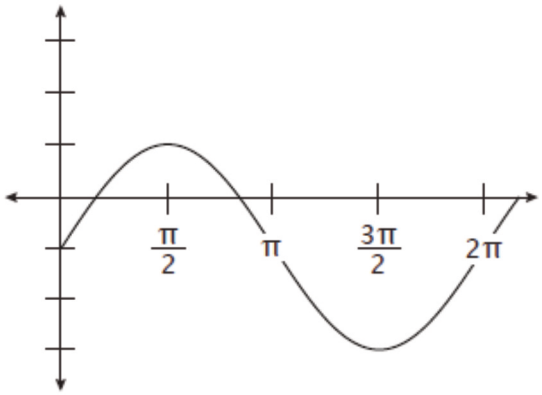
15. $f(g(x)) = f(x^2+1)$
$= 2(x^2+1)-3$
$= 2x^2+2-3$
$= 2x^2-1$

16. The domain will be all x where $x+3$ is greater than or equal to 0:
$x+3 \geq 0$
$x \geq -3$
domain: $[-3, \infty)$, or all numbers ≥ -3
range: $[0, +\infty)$

17. $\left(\frac{7\pi}{4}\right)\left(\frac{180^\circ}{\pi}\right) = \frac{(7)(180^\circ)}{4} = \frac{1{,}260^\circ}{4} = 315^\circ$

18. 70°; quadrant III

19.



20. $a_1 = -4$
$a_2 = a_1 r = (-4)\left(\frac{1}{2}\right) = -2$
$a_3 = a_2 r = (-2)\left(\frac{1}{2}\right) = -1$
$a_4 = a_3 r = (-1)\left(\frac{1}{2}\right) = -\frac{1}{2}$
$-4, -2, -1, -\frac{1}{2}$

21. $c^2 = a^2 + b^2 - 2ab\cos C$
$c^2 = (14)^2 + (12)^2 - 2(14)(12)\cos 56^\circ$
$c^2 \approx 196+144-336(.5592)$
$c^2 \approx 340-187.89$
$c^2 \approx 152.11$
$c \approx \sqrt{152.11}$
$c \approx 12.33$

$\frac{a}{\sin A} = \frac{c}{\sin C}$
$\frac{(14)}{\sin A} = \frac{(12.33)}{\sin(56^\circ)}$
$(12.33)(\sin A) = (14)(\sin 56^\circ)$
$\sin A = \frac{(14)(\sin 56^\circ)}{12.33}$
$\sin A \approx \frac{(14)(.8290)}{12.33}$
$\sin A \approx \frac{11.606}{12.33}$
$\sin A \approx .9413$
$A \approx \arcsin .9413$
$A \approx 70.3^\circ$

$B = 180^\circ - (70.3^\circ + 56^\circ)$
$B = 180^\circ - 126.3^\circ$
$B = 53.7^\circ$

22. $Q(t) = 10e^{-kt}$
$Q(365) = 10e^{-(.0069)(365)}$
$Q(365) = 10e^{-2.5185}$
$Q(365) \approx 10(.0806)$
$Q(365) \approx .806$ g