

Preparation for Precalculus Final Exam

Wednesday and Thursday December 9/10

1. Work the practice final by yourself first:
<https://www.telstarbob.net/bbrown/Precalculus/FinalReviewProblemsPages.pdf>
2. Watch video on any problems for which you need help:
<https://youtu.be/HWA9x7uTuhQ>
3. Ask me for help on any problem you have.
4. You may improve your homework grade up until midnight Tuesday December 8.
5. Review the study guides for tests 1-4 attached to this page.

Precalculus Test 1 Study Guide

To be prepared you need to do the following:

1. Watch all chapter 5 videos shown on the schedule. <https://www.telstarbob.net/bbrown/math1113dailyfall2020.htm>
2. Complete all the MyMathLab Homework.
3. Watch https://www.youtube.com/watch?v=OkP_iQ9XEgI Video on Real Zeros of Polynomials
4. Try Test 1 Practice by yourself
<https://www.telstarbob.net/bbrown/Precalculus/PrecalculusTest1ReviewProblems.pdf>
5. Watch video on how to work each practice problem
<https://www.youtube.com/watch?v=-Ty0qB87Ods>
Ask me any questions you might have.
6. Request a Zoom Video Conference if you need extra tutoring.

Key Concepts to Understand for Test 2

1. Understand angles in degrees or radians
2. Understand degrees, minutes, seconds
3. Be able to convert angle in degrees, minutes, seconds to an angle in degrees in decimal form.

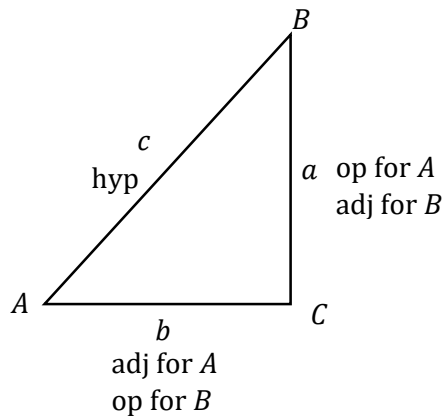
$$D^{\circ}M'S'' = D + \frac{M}{60} + \frac{S}{3600}$$

4. Calculate arc length s , radius r , or angle θ using $s = r\theta$, **θ must be in radians!**
5. Calculate arc area A , radius r , or angle θ using $A = \frac{1}{2}r^2\theta$, **θ must be in radians!**
6. Be able to convert radians to degrees and degrees to radians.

$$A \text{ radians to degrees: } A \text{ radians} \times \frac{180 \text{ degrees}}{\pi \text{ radians}} = \frac{A(180)}{\pi} \text{ degrees}$$

$$B \text{ degrees to radians: } B \text{ degrees} \times \frac{\pi \text{ radians}}{180 \text{ degrees}} = \frac{\pi B}{180\pi} \text{ radians}$$

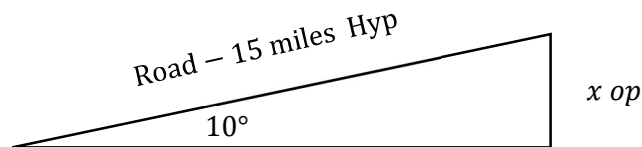
7. Solve right triangle problems given a, b, c, A, B, C and calculate trig functions. Always label the triangle to keep sides and angles correctly associated. **Do not start a problem without drawing a good accurate sketch!**



8. Understand SOHCAHTOA and never forget $c^2 = a^2 + b^2$ for a right triangle where c is hyp
9. 180 degrees in any triangle. $A + B + C = 180^\circ$, acute angles A & B sum to 90°
10. For a point (x, y) on the unit circle: $x^2 + y^2 = 1$
 $\sin \theta = y, \cos \theta = x, \text{ and } \tan \theta = \frac{y}{x}$ $\csc \theta = \frac{1}{y}, \sec \theta = \frac{1}{x} \text{ and } \cot \theta = \frac{x}{y}$
11. For a point (x, y) on a circle with radius r , $x^2 + y^2 = r^2$, $r = \sqrt{x^2 + y^2}$
 $\sin \theta = \frac{y}{r}, \cos \theta = \frac{x}{r}, \text{ and } \tan \theta = \frac{y}{x}$ $\csc \theta = \frac{r}{y}, \sec \theta = \frac{r}{x} \text{ and } \cot \theta = \frac{x}{y}$
12. Note: $\csc \theta = \frac{1}{\sin \theta}, \sec \theta = \frac{1}{\cos \theta} \text{ and } \cot \theta = \frac{1}{\tan \theta}$
13. Be able to substitute variables and given constants into a trig function and perform required calculation.
14. Understand that a periodic function $f(x)$ with period T repeats itself
 $f(x) = f(x \pm T) = f(x \pm 2T) = f(x \pm nT)$, where n is an integer
15. Use a calculator to calculate trig functions making sure that you have the **calculator in the correct mode (radians or degrees)**.

16. Be able to graph trig functions such as $A \sin \omega x + B$ and $A \cos \omega x + B$,
 Amplitude = $|A|$, always positive, Period $T = \frac{2\pi}{|\omega|}$ always positive
17. Understanding the amplitude and period of a sinusoidal function can provide clues on what the graph should look like.
18. When calculating the phase shift of a function $f(kx + B)$, rewrite as $f\left[k\left(x + \frac{B}{k}\right)\right]$
 The phase shift will be $\frac{B}{k}$, shifted to the left if positive, and shifted to the right if negative.
19. Solve a right triangle application problem using the appropriate trig function. Draw a picture, label the picture (known/unknown), and decide on a trig function to use that will use your unknown and known values. Solve for the unknown.

Example: A 15 mile road up a mountain is inclined 10 degrees. Calculate the total rise in elevation at the end of the road.



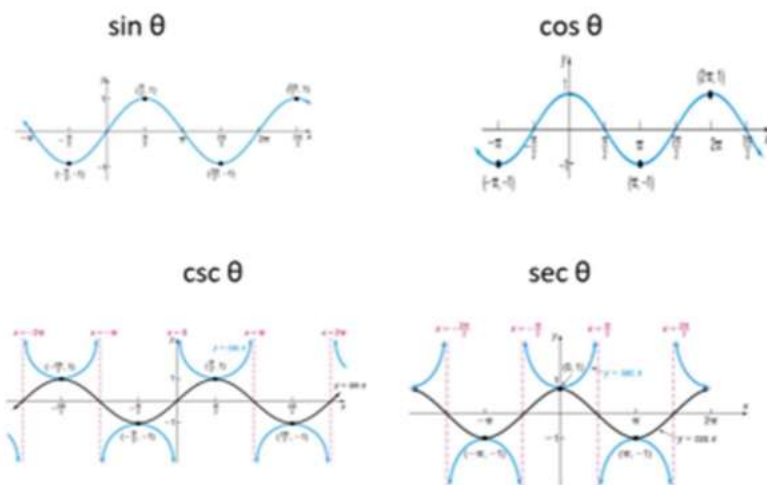
$$\frac{x}{15} = \frac{\sin 10^\circ}{1}, \quad x = 15 \sin 10^\circ = 2.60 \text{ miles}$$

Test 3 Study Guide To be prepared, you should have done or should do the following:

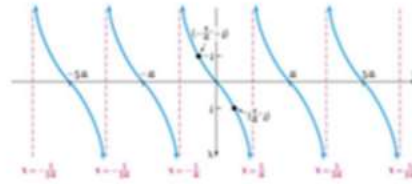
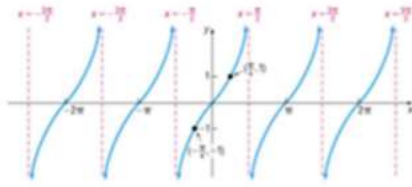
1. Watched all the videos on Chapter 8.
<https://www.telstarbob.net/bbrown/math1113dailyfall2020.htm>
2. Completed all the homework for Chapter 8.
3. Watch the Test 3 Essential Concepts Video <https://youtu.be/xTdRnSRLBjA>
4. Work the practice test by yourself.
<http://telstarbob.net/bbrown/Precalculus/Test3ReviewProblemsPages.pdf>
5. Watch Practice test 3 video if you need help on any problem.
<https://www.youtube.com/watch?v=mLXyd03igQU>
6. Ask me any questions or request a Zoom Video Tutoring Session if you need additional help.
7. Be able to establish additional trig identities using the trig identities at the end of this guide. To do this you will need to remember how to use algebraic rules about manipulating fractional expressions.

For example $\frac{a}{b} + \frac{c}{d} = \frac{ad+bc}{bd}$, and $\frac{a}{b} - \frac{c}{d} = \frac{ad-b}{bd}$

8. Be able to manipulate trig identities and use them in solutions to trig equations. Be able to factor trig equations like $2\cos^2\theta + \cos\theta - 1 = 0$ and solve them for θ .
9. Solve Trig Equations Using Unit Circle – Easiest if you understand unit circle and the solution(s) lie(s) on the unit circle.
10. Solve Trig Equations Using Your Calculator - This is the only way if the solution(s) are not angles readable on the unit circle. **Must have calculator in the correct mode (angles or radians).**
11. Understand that $\sin\theta$ and $\cos\theta$ are always ≤ 1 and ≥ -1 . The absolute value (magnitude) is between 0 and 1. Because $\csc\theta = 1/\sin\theta$ and $\sec\theta = 1/\cos\theta$, $\csc\theta$ and $\sec\theta$ must always be between 1 and $+\infty$ and $-\infty$ and -1. Graphs below illustrate this.



12. Also understand that the value of $\tan\theta$ and $\cot\theta$ is between $-\infty$ and $+\infty$. Graphs below illustrate this concept.



13. Find inverse function f^{-1} of trig function f .

14. Establish trig identities. You can use the identities listed in this guide.

15. Be careful in solving $x^2 = k$ (k is positive). $x = \pm\sqrt{k}$. Do not miss half the problem because you forgot this.

All of these ideas are illustrated in the Practice Test.

Test 4 Study Guide To be prepared, you should have done or should do the following:

1. Watched all the videos on Chapter 9.
<https://www.telstarbob.net/bbrown/math1113dailyfall2020.htm>
 2. Completed all the homework for Chapter 9.
 3. Watch the Solving Triangles Video
<https://www.youtube.com/watch?v=-stNTubilEo&feature=youtu.be>
 4. Work the practice test by yourself.
<http://telstarbob.net/bbrown/Precalculus/Test4ReviewProblemsPages.pdf>
 5. Watch Practice test 4 video if you need help on any problem.
<https://www.youtube.com/watch?v=Ps2oJ7OzGRE>
 6. Solve a number of triangle problems in which there are no right angles. **It is absolutely imperative that you start with an accurately labeled diagram with all angles and sides info that you are given.** You will use Law of Sines and Law of Cosines depending on the problem
 7. Use Law of Sines to solve one/two triangle problems in which you determine whether there is one triangle solution or no triangle solution. Remember that after solving for an angle say B_1 , determine whether there is another solution B_2 , whose sine is the same. That would be $180 - B_1$. Then, if $B_2 +$ the other given angle is less than 180 degrees, there are two solutions. You complete the problem by using Law of Sines to solve for the other side.
 8. Solve triangle problems using Law of Cosines. **Here, if you have two sides and the angle between them, you can solve for the other side. Also, if you have all sides, you can solve for all angles using the alternate version of the Law of Cosines.**
 9. Find the area of a triangle. **If you have two sides and the included angle θ , the area is $\frac{1}{2}$ the product of the two sides times $\sin \theta$. If you have all three sides, use Heron's formula.**
 10. Solve word problems involving triangles. **Draw an accurate picture.**
- All of these ideas are illustrated in the Practice Test.