

FORMATTING: This is semi-formal writing, here. That means show some professionalism. You must not type it out, but you do need to be very clear.

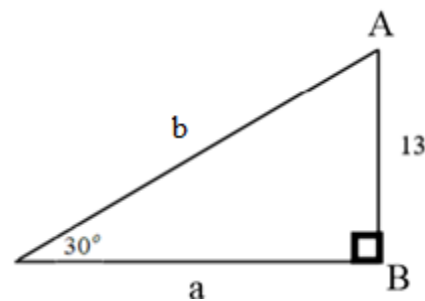
1. Plain white background. You can use paper and scan it, or use a pen tablet and save directly to PDF. If you use paper, it needs to be plain 8 1/2- by 11-inch paper that you then scan to PDF.
2. Leave at least 1/2-inch margins, and plenty of white space (for teacher annotations) between and around problems, throughout the assignment. Cramped work will cost 10% of your grade, and may not be graded at all, if it's too cramped.
3. Do not use more than one column. I'm looking for #2 UNDER #3 (and so on), not crammed in beside it!
4. Write DARK. I have glaucoma, and if your writing is too faint for me to read, you'll just get a '0' and I will move on to the next paper. One trick is to re-copy your work on the highest density setting on a copying machine, until your writing really stands out. I don't mind if you use pen. Just put a line through mistakes.
5. I set a semi-bad example, because I'm worried about 100 students making copies of my solutions, which is a waste of paper, so my solutions tend to be at least slightly cramped, compared to what I'm asking of you.

Chapter 1 Content

1. Arc Length and Area of Sector. Suppose we have a circle of radius $r = 10$.
 - a. (5 pts) Find the arc length on the circle, that is intercepted by an angle of 1317° . Round to 3 decimal places.
 - b. (5 pts) Find the *exact* area of the sector that is intercepted (swept through) by an angle of $\theta = \frac{3\pi}{4}$.
2. Answer the questions about the equation $\tan(\theta) = \frac{5}{4}$.
 - a. (5 points) Sketch two triangles that satisfy $\tan(\theta) = \frac{5}{4}$.
 - b. (5 pts) Assume the terminal side of the angle θ lies in the 3rd quadrant. Find the other five trigonometric functions of θ .
 - c. (5 pts) Again, assuming θ 's terminal side lies in Q III, and $0 \leq \theta < 2\pi$, find θ , in radians *and* degrees, rounded to 3 decimal places.
 - d. (5 pts) Give *all* solutions to the equation $\tan(\theta) = \frac{5}{4}$, in degrees *and* radians, rounded to three (3) decimal places.
3. (5 pts) Sketch one period of the graphs of $y = \sin(x)$ and $y = \csc(x)$ on the same set of coordinate axes.
4. The radii of the pedal sprocket, the wheel sprocket, and the wheel of the bicycle in the figure are 6 inches, 2 inches and 26 inches, respectively. A cyclist is pedaling at a rate of 1.5 revolutions per second.

- a. (5 pts) Find the speed of the bicycle in feet per second.
 b. (5 pts) Convert your answer, above, to miles per hour. Round final answers to 1 decimal place.
5. (5 pts) Sketch the graph of $f(x) = 3 \sin\left(\frac{\pi}{6}x + 18\pi\right) + 6$.
6. (5 pts) Write the cosine function that achieves its maximum height of $y = 11$ centimeters at time $t = 18$ seconds and its minimum height of $y = -4$ centimeters at $t = 30$ seconds.

7. (5 pts) Solve the triangle in the figure on the right. That means, find all lengths and angles. Exact answers required.



8. (5 pts) Find the exact value of $\arccos\left(\sin\left(\frac{11\pi}{6}\right)\right)$

9. (5 pts) Draw the sketch and use it to find an algebraic expression that is equivalent to $\sin(\arctan(3x))$.

Chapter 2 Content

10. (5 pts) Find the values of all six trigonometric functions, given $\tan(u) = \frac{2}{3}$ and $\sin(u) < 0$.
11. (5 pts) Find $\sin\left(\frac{u}{2}\right)$, $\cos\left(\frac{u}{2}\right)$, and $\tan\left(\frac{u}{2}\right)$, given that $\cos(u) = \frac{3}{4}$ and $\frac{3\pi}{2} \leq u < 2\pi$.
12. Consider the equation $2\sin^2(x) - 1 = 0$.
- a. (5 pts) Find all solutions x , in radians *and* degrees, to the equation in the interval $[0, 2\pi)$.
 b. (5 pts) Find all real solutions x , in radians *and* degrees.
13. (5 pts) Re-write $\sin\left(\cos^{-1}\left(\frac{2}{x}\right)\right)$ as an algebraic expression.
14. Find the *exact* value of $\sin\left(\frac{5\pi}{6}\right)$ in two ways: (Hint: If degrees are easier for you, *use degrees*.)
- a. (5 pts) Use a Sum identity.
 b. (5 pts) Use a Half-Angle identity
15. (5 pts) Re-write $\cos(\arcsin(x) + \arccos(x))$ as an algebraic expression. (Hint: Use Sum identity.)

16. (5 pts) Find $\sin(2u)$, $\cos(2u)$ and $\tan(2u)$, given that $\sin(u) = \frac{4}{7}$ and $\cos(u) < 0$.

17. (5 pts) Find the arc length on a circle of radius $r = 8$ that is intercepted by an angle of 1356° .