

## PRACTICE EXAM 1 - TRIGONOMETRY - SUMMER 2021 - NEWTON

**Instructions.** You may work on this exam on your own time, using any resource you like (open notes, open book, open Internet). Please do not post the questions online. I will check if the questions have been posted, and solutions matching those online solutions will receive a zero. You still need to understand the material yourself, even if you are looking up some things. Show all your work and explain your solutions fully in order to get full credit. Copying from the book without understanding is not enough, and many internet solutions are outright wrong or missing information and explanations. Avoid using a calculator. You won't need one, since you don't have to simplify your numerical answers. **Leave your answers exact, do not convert to decimal** (as in, leave things with the square roots, fractions,  $e$ ,  $\pi$ ).

Your work on this exam should be your own. Working with other students can get you both a zero. Trust and believe in yourself over other students and the internet.

When the question asks for an explanation of the work or your process, that means you should give an explanation in words, in addition to the mathematical work you showed to get to the answer. However, this isn't an English test, I don't care about whether it's a complete sentence, or whether you misspelled something, had bad grammar, etc. As long as you give some sort of correct explanation in words, it will be fine.

Good luck! Do your best! You'll do great.

- (1) Solve the right triangle ABC with  $C = 90^\circ$ ,  $A = 30^\circ$ , and  $a = 2$ . Show all your work. What would happen instead if  $a$  were not given (could you still solve the triangle? How far could you get)?

- (2) A forester is measuring the height of a tree while climbing the tree next to it. The two trees are 20 feet apart. The forester measures the angle of elevation to the top of the tree to be 60 degrees and the angle of depression to the bottom to be 30 degrees. Find the height of the tree. Show all your work.

- (3) Simplify the expression as much as possible (while still leaving your answer exact):

$$3 \sin^2\left(\frac{\pi}{3}\right) + \cos\left(\frac{\pi}{4}\right)$$

Give a reason for each step of your work.