

MATH 7
ASSIGNMENT 25: REVIEW PART II
MAY 10, 2020

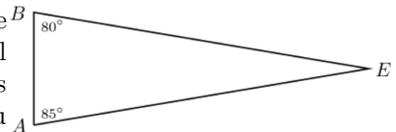
REVIEW OF THIS SCHOOLNOVA YEAR

Here is a new list of problems to help you review. Remember that when doing these problems, you will have to refresh a few things we studied this year. You can look back at your homework or you can open the previous assignments on the SN website. Try to do all of the problems, but you don't have to finish all of them. Hand in what you can do. Some of these might be challenging and we will discuss them in class.

HOMEWORK

1. A tree casts a 60 m long shadow when the angle of elevation of the sun is 30° . How tall is the tree? [Angle of elevation is the angle that line from tip of shadow on ground to top of tree makes with the horizontal.]
2. Prove that the area of a triangle $\triangle ABC$ can be computed using the formula $A = \frac{1}{2}AB \cdot AC \cdot \sin \angle A$. [Hint: what is the altitude from vertex B ?]

- To determine the distance to the enemy gun (point E in the figure below), the army unit placed two observers (points A, B in the figure below) and asked each of them to measure the angles using a special instrument. The results of the measurements are shown below. If it is known that the distance between the observers is 400 meters, can you determine how far away from observer A is the enemy gun?



3. Find all real numbers x such that $(\cos x)^2 = 3/4$
5. Solve the following equations
 - (a) $(\sin x)^2 - \sin x = 0$ [Hint: start by defining $y = \sin x$.]
 - (b) $2(\sin x)^2 - 3\sin x + 1 = 0$
 - (c) $4\cos x + \frac{3}{\cos x} = 8$
 - (d) $(\sin x)^2 = (\cos x)^2$ [Hint: $\tan x = \sin x / \cos x$.]

6. Find all real numbers x for which it is true that

$$\frac{625^{\cos^2 x}}{25^{\cos x}} < 1$$

7. How many ways are there to seat 5 students in a class that has 5 desks? if there are 10 desks?
8. Use Pascal's triangle (and the binomial theorem) to expand the polynomial $(x + 2)^5$.
9. Imagine a non-conventional Olympic tournament where every player has to play once with every other player instead of the conventional single-elimination.
 - (a) If 16 athletes entered the competition, how many matches will take place?
 - (b) Now the tournament is modified to include multiple stages. After each stage of the tournament, the bottom half of all players leave the competition and the top half continue to the next stage. If the same 16 players enter the tournament and at each stage every player still has to compete once against every other player left in tournament, how many matches in total need to be played until a single athlete is left and is declared the champion?