Law of Sines and Law of Cosines Word Problems

1. A bystander watched a window washer on the side of a building at a 76⁰ angle of elevation. Later, he notices that the window washer is at a 49⁰ angle of elevation when viewed from the same spot. How far down the building has the window washer moved if the bystander stands 20 ft from the building?
2. A circus high wire act walks up an approach wire to a reach a high wire. The approach wire is 122 feet long and is currently anchored so that the angle it forms with the ground is at the maximum of 35⁰. A greater approach angle caused the aerialist to slip. However, the aerialists find that there is enough room to anchor the approach wire 30 feet back in order to make the approach angle less severe. When this is done, how much farther will they have to walk up the approach wire, and what will the new approach angle be?
3. Two airplanes leave the airport at the same time. The first flies 150 km/hr in a direction of 320⁰. The second flies 200 km/h at a bearing of 200⁰. After 3 hours, how far apart are the planes?
4. The angle of depression from a medical emergency helicopter to its landing space is 56⁰. If the helicopter is flying at 1000 ft., find the distance from the helicopter to the landing space (horizontal distance).
5. The longer diagonal of a parallelogram makes angles of 38⁰ and 44⁰ with the sides, and its length is 15 in. Determine the length of the shorter side of the parallelogram.
6. In an isosceles triangle, each of the two sides is 23 inches and the included angle is 58⁰. Find the length of the third side.
7. A park ranger establishes an observation post from which to watch for poachers. Despite losing her map, the ranger does have a compass and a rangefinder. She observes some poachers, and the rangefinder indicates that they are 500 ft. from her position. They are headed toward big game that she knows to be 375 ft. from her position. Using her compass, she finds that the poachers are at a bearing of 355⁰ from her post and the big game is at a bearing of 42⁰. What is the distance between the poachers and the game?
8. Two surveyors sight a hot air balloon coming straight at the first surveyor who is 100 yd. in front of the second. The angle of elevation from the first surveyor to the balloon is 75⁰, while the angle of elevation from the second surveyor to the balloon is 54⁰. If the balloon is traveling at a fixed altitude, determine its height above the ground.
9. A ranger in fire tower A spots a fire at a direction of 295⁰. A ranger in fire tower B, located 45 miles at a direction of 45⁰ from tower A, spots the same fire at a direction of 255⁰. How far from tower A is the fire? From tower B?
10. The two diagonals of a parallelogram are 30 inches and 25 inches in length. If one of the angles formed by the diagonals is 71⁰, find the length of the sides of the parallelogram? (Hint: the diagonals of a parallelogram bisect each other.)
11. Because of the emptiness of the terrain, Wyoming decided to give away triangular plots of land. Billy, one of the recipients of the land grant, was given special permission by the state to determine the size of his own lot. Billy began by driving a stake into the ground and walking 145 miles due east where he drove a second stake into the ground. He then turned to a bearing of 234⁰ and walked another 163 miles where he drove a third stake into the ground.
12. How far is the first stake from the third?
13. What is the area of the lot?
14. Two points P and Q are across from one another on opposite sides of a river. A line segment AB runs through point Q and from each end, the following measurements are taken: AQ = 824 ft.; QB = 662 ft.; <QAP = 42⁰; <QBP = 57⁰. Determine the length of QP. (QP is not perpendicular to AB.)