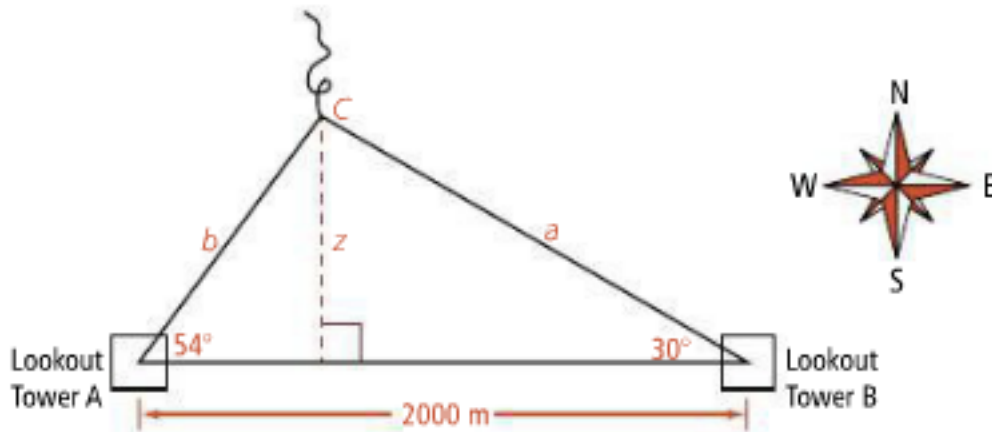


Unit 7: Right Triangles and Trigonometry Project

Locating a Forest Fire

Rangers in the two lookout towers at a state forest notice a plume of smoke, shown at point C in the diagram. The towers are 2000 m apart. One ranger observes the smoke at an angle of 54° . The other ranger observes it at an angle of 30° . Both angles are measured from the line that connects the two towers. When the rangers call to report the fire, they must state the location of the fire using distances to the north and west of Lookout Tower B.



Task: Find how far to the north and west of Lookout Tower B the fire is located. Round your answers to the nearest tenth of a meter.

Part 1: Applying What You Learned

Look back at the information about the fire in a state forest.

Select all of the following that are true. Explain your reasoning.

A. $\sin 54^\circ = \frac{z}{b}$

B. $\cos 30^\circ = \frac{z}{2000}$

C. $\tan 30^\circ = \frac{z}{2000}$

D. $\sin 30^\circ = \frac{z}{a}$

E. $\tan 54^\circ = \frac{z}{2000}$

F. $\cos 54^\circ = \frac{z}{b}$

Part 2: Applying What You Learned

Look back at the information about the fire in a state forest.

A. What is the measure of the angle between the distances labeled a and b ?

B. Write and solve an equation using the Law of Sines to find the distance between Lookout Tower A and the fire. Round to the nearest tenth.

C. Write and solve an equation using the Law of Sines to find the distance between Lookout Tower B and the fire. Round to the nearest tenth.

Part 3: Apply What You've Learned

Look back at the information about the fire in a state forest.

For parts (a) and (b), refer to the distances you found in Part 2.

A. Use the Law of Cosines to verify the distance between Lookout Tower A and the fire.

B. Use the Law of Cosines to verify the distance between Lookout Tower B and the fire.

C. Write an equation that can be used to find the how far west of Lookout Tower B the fire is located.

Part 4: Completing the Task

Look back at your results from Parts 1-3. Use the work you did to complete the following.

Solve the problem in the Task by finding how far to the north and west of Lookout Tower B the fire is located. Round your answers to the nearest tenth of a meter. Show all your work and explain each step of your solution.

Part 5: On Your Own

Another fire is sighted by the rangers at the two lookout towers. The ranger at Lookout Tower A observes the smoke at an angle of 65° . The ranger at Lookout Tower B observes the smoke at an angle of 45° . Both angles are measured from the line that connects the two lookout towers.



How far north of Lookout Tower A is this fire located? Round your answers to the nearest tenth of a meter.