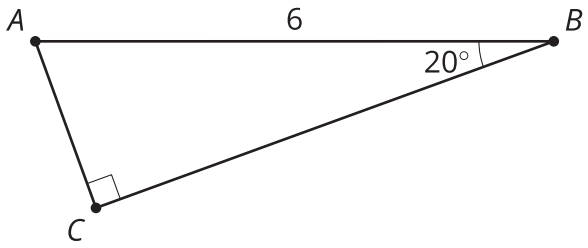
Unit 4, Lesson 7

Applying Ratios in Right Triangles

Let's solve problems by using right triangles and trigonometry.

7.1 Tilted Triangle

Calculate the lengths of sides AC and BC.



7.2 Info Gap: Trigonometry

Your teacher will give you either a problem card or a data card. Do not show or read your card to your partner.

If your teacher gives you the problem card:

1. Silently read your card and think about what information you need to answer the question.
2. Ask your partner for the specific information that you need. "Can you tell me _____?"
3. Explain to your partner how you are using the information to solve the problem. "I need to know _____ because _____."

   Continue to ask questions until you have enough information to solve the problem.
4. Once you have enough information, share the problem card with your partner, and solve the problem independently.
5. Read the data card, and discuss your reasoning.

If your teacher gives you the data card:

1. Silently read your card. Wait for your partner to ask for information.
2. Before telling your partner any information, ask, "Why do you need to know _____?"
3. Listen to your partner's reasoning and ask clarifying questions. Only give information that is on your card. Do not figure out anything for your partner!

   These steps may be repeated.
4. Once your partner says they have enough information to solve the problem, read the problem card, and solve the problem independently.
5. Share the data card, and discuss your reasoning.

7.3 Tallest Tower

1. The tallest building in the world is the Burj Khalifa (BURJZH kha-LEE-fah) in Dubai (as of January 2024).

   Someone is standing on the bridge about 250 meters from the bottom of the building. They have to look up at about a 73-degree angle to see the top. How tall is the building? Explain or show your reasoning.

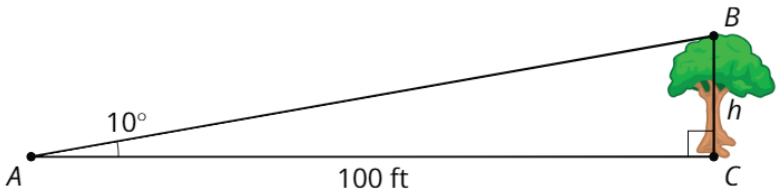
2. The largest masonry building in the world is City Hall in Philadelphia (as of January 2024). If you're standing on the street about 1,300 feet from the bottom of the building, you have to look up at about a 23-degree angle to see the top. How tall is the building? Explain or show your reasoning.

Are you ready for more?

You're sitting on a ledge 300 feet from a building. You have to look up 60 degrees to see the top of the building and down 15 degrees to see the bottom of the building. How tall is the building?

Lesson 7 Summary

Using trigonometry and properties of right triangles, we can calculate and estimate measures in different right triangles. We can use these skills to estimate unknown heights of objects that are too tall to measure directly. For example, we can't reach the top of this tree with a measuring tape.



To calculate the height of the tree, we could stand where the angle between the top and bottom of the tree is 10 degrees. Since we know the distance to the tree (the adjacent leg) and would like to know the height (the opposite leg), we need to use tangent. So $\tan(10) = \frac{h}{100}$. In the calculator we can look up that $\tan(10)$ is 0.176. Then we can calculate that h is about 17.6. That means the tree is 17.6 feet tall.