4.3

# Solve Problems Involving Two Right Triangles

Teaching Suggestions

• You may wish to cover this section over two days to allow students time to consolidate their learning. Assign all the Practise questions and Connect and Apply questions 6 and 7 the first day. On the second day, provide further contextual examples and assign the remainder of the Connect and Apply questions and the Extend questions.

Investigate

• Have students complete the Investigate individually.
• As a class, discuss strategies to estimate the distance to the front of the room. If the floor is tiled, students could estimate the dimensions of the tiles and count the number of tiles to the front of the room. Alternatively, they could estimate the number of paces to the front of the room.
• A possible extension for **question 7** would be to average all the student's estimates and use the average to calculate the length of the front wall. Discussions should involve the fact that different locations resulted in different lengths and angles but all of the final answers should be reasonably close.

Investigate Responses (page 197)

4. Answers may vary. For example, approximately 5 m to the front of the classroom, $\angle BDC = 26°$, and $\angle BDA = 48°$.

5. The two small triangles on the paper are similar to two larger triangles from the same viewing point which have their opposite sides along the front of the classroom. Given the measured angles and the estimated distance to the front of the classroom I can use tangent ratios to find the lengths of the two sides, which together represent the length of the front wall.

6. Answers may vary. For my process I defined three new points E, F, and G as shown in the diagram.
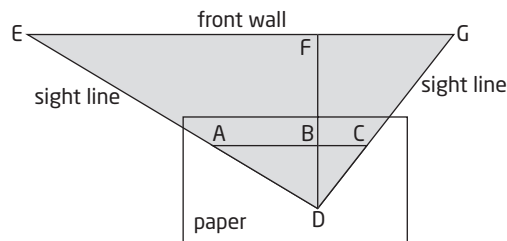
In △DFE,

$$\tan 48° = \frac{EF}{5}$$
$$EF = 5 \tan 48°$$
$$EF \doteq 5.55$$

In △DFG,

$$\tan 26° = \frac{GF}{5}$$
$$GF = 5 \tan 26°$$
$$GF \doteq 2.44$$

$$EF + GF = 5.55 + 2.44$$
$$= 7.99$$

The front wall of the classroom is approximately 8 m in length.

7. Answers may vary. Results should be similar. Differences in results could be caused by differences in estimates and by rounding.

Examples

- In **Example 1**, a problem-solving approach is developed. The common side of two right triangles allows students to use information from one triangle to determine information about the other triangle.
- In **Example 2**, two triangles are connected at a common vertex. A straight angle is used to determine the measure of an adjoining angle.
- In **Example 3**, students solve a problem involving two overlapping right triangles.
- Emphasize the importance of sketching and labelling a diagram.

Communicate Your Understanding

- Have students discuss the questions in pairs before discussing the answers as a class.
- For **question C1**, encourage multiple ideas on how to solve the problem.
- You may wish to use **BLM 4–6 Section 4.3 Solve Problems Involving Two Right Angles** for remediation or extra practice.

> **Communicate Your Understanding Responses (page 200)**
>
> **C1** First, use a cosine ratio based on the given length and angle in △TUV to find the length of TV. Next, use a tangent ratio based on the previously calculated length and the given angle in △STV to find the length of side SV.
>
> **C2** Answers may vary.

Practise, Connect and Apply, Extend

- Encourage students to refer to the Examples for assistance and to develop and record a plan before trying to solve each problem.
- **Question 7** refers to the Chapter Problem. You may wish to have students highlight their solution for referral when completing the Chapter Problem Wrap-Up.
- For **question 9**, students should divide the figure into a right triangle on the left and a rectangle on the right.
- For **question 10**, have students consider a cone formed by the radius and the 49th parallel. Students should sketch and label the cone prior to determining the radius and circumference of the circular base of the cone.

Mathematical Processes Integration

The table shows questions that provide good opportunities for students to use the mathematical processes.

Process Expectations	Selected Questions
Problem Solving	7–11
Reasoning and Proving	6, 7, 10
Reflecting	6, 9–11
Selecting Tools and Computational Strategies	1–11
Connecting	6, 7, 9–11
Representing	1–5, 7, 8, 10, 11
Communicating	6, 7