1.1 Revisit the Primary Trigonometric Ratios

Student Text Pages
6–15

Suggested Timing
70 min

Tools
- *The Geometer's Sketchpad®*
- computers
- calculators

Optional
- pencil and paper
- rulers
- protractors

Related Resources
BLM 1-3 Section 1.1 Revisit the Primary Trigonometric Ratios
BLM T-2 *The Geometer's Sketchpad®3*
BLM T-3 *The Geometer's Sketchpad®4*

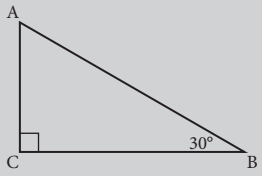
Link to Prerequisite Skills

Students should complete Prerequisite Skills questions 2, 4, 8, and 10 before proceeding with this section.

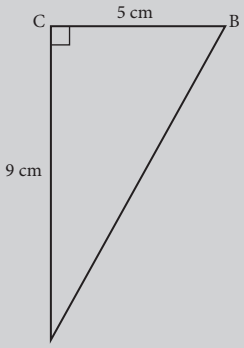
Warm-Up

1. Find the measure of the unknown angle or side.

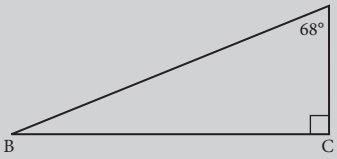
a) Find ∠A.



b) Find side *c* to the nearest tenth.



c) Find ∠B.



2. Which pair of angles are complementary angles?

a) 30° and 50° **b)** 30° and 60°

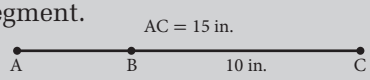
c) 20° and 70° **d)** 45° and 55°

3. List two different pairs of complementary angles.

4. Find the length for AB in each line segment.

a)

b)



Warm-Up Answers

1. a) 60° **b)** 10.3 cm **c)** 22°

2. b), c)

3. Answers may vary. Sample answer: 1° and 89°, 10° and 80°.

4. a) 11 cm **b)** 5 in.

Teaching Suggestions

Warm-Up

- Write the Warm-Up questions on the board or on an overhead. Have students complete the questions independently. Then, discuss the solutions as a class.

Section Opener

- Begin with a brief discussion of the photograph. You may want to generate a discussion about careers that use trigonometry.

Investigate

- Have students work in pairs to complete the Investigate. This allows them to discuss their results.
- Emphasize the importance of ensuring that the sides are labelled correctly with respect to the angle.
- You may want to include a memory map for using the primary trigonometric ratios.
- You may want to supply a copy of the table in question 1 for students to complete.
- Draw 3-4-5 and 9-12-15 triangles on dot paper or grid paper if *The Geometer's Sketchpad*® is not available.
- Memory aid diagrams are useful for these laws.

Investigate Answers (pages 6–7)

1.–4.

Triangle	AB	AC	BC	$\angle A$	$\frac{BC}{AB}$	sin A	$\frac{AC}{AB}$	cos A	$\frac{BC}{AC}$	tan A
ABC #1	5 cm	4 cm	3 cm	37°	0.6	0.6	0.8	0.8	0.75	0.75
ABC #2	15 cm	12 cm	9 cm	37°	0.6	0.6	0.8	0.8	0.75	0.75

5. no

6. a) The ratios are equal.

b) $\sin B = \frac{4}{5}$; $\cos B = \frac{3}{5}$; $\tan B = \frac{4}{3}$

7. They are equal.

8. $\sin A = \frac{a}{c}$; $\cos A = \frac{b}{c}$; $\tan A = \frac{a}{b}$

Examples

- Have students work through the Examples as a class before proceeding to the Discuss the Concepts.
- Emphasize that the longest side of a right triangle is the hypotenuse. Have students always label the sides before finding the angles in trigonometric ratios.
- Make sure that their calculators are in degree mode: Press MODE. Ensure that DEGREE is selected.
- You may want students to write the problems and their solutions on a chart to use as a reference or study guide.
- You might want to evaluate the ratios to four decimal places before finding the angle measure as in Example 5:

$$\cos A = \frac{17}{22}$$
$$\cos A \doteq 0.7727$$
$$\angle A \doteq \cos^{-1}(0.7727)$$
$$\angle A \doteq 39.4°$$

Key Concepts

- Have the students make a mind map for the key concepts.

Common Errors

- Some students may label sides incorrectly, especially the adjacent and opposite ones.

R_x Have students draw an arrow from the angle to the opposite side and a curved arrow to the adjacent side. Have them label the sides accordingly.

Accommodations

Memory—place SOH-CAH-TOA posters in a few places around the classroom. Include a vertical version with the associate words beside the letters.

Sine
Opposite
Hypotenuse

Visual—have three students make a large right triangle in the classroom, using long pieces of string for the sides. The students each hold a letter A, B, or C. Choose an angle and have a student take a card with one of the words *opposite*, *adjacent*, or *hypotenuse* and stand in the correct position along one of the sides.

Perceptual—provide a screen capture of *The Geometer's Sketchpad*® icons next to where they appear in the written instructions.

Gifted and Enrichment—have students construct several non-right triangles to help verify that the trigonometric ratios only apply to right triangles

Language—provide a partner to assist with reading the instructions for the Investigate

Discuss the Concepts

- Have students come up with a general conclusion. (The sine of an angle is equal to the cosine of its complementary angle.)

Discuss the Concepts Suggested Answers (page 13)

D1. It is an acronym for remembering the numerator and denominator of the trigonometric ratios sine, cosine, and tangent.

D2. No; need two sides, or one side and one of the acute angles.

D3. $\sin 40° = \cos 50°$ is true. For any $\angle A$ less than 90°, the statement $\sin A = \cos(90° - A)$ is true.

Practise (A)

- Encourage students to refer to the Investigate and the Examples before asking for assistance.

Apply (B)

- Not all questions should be assigned. You may want to assign the even numbered or every second part in each exercise.
- For **questions 10** to **12**, refer students to Warm-Up question 4.

Extend (C)

- Assign the Extend questions to students who are not being challenged by the questions in Apply.
- For **question 13**, remind students of the similar triangles property (i.e., $\angle A$ is equal to $\angle B$ because of the parallel lines).
- For **question 14**, students can add the area of the rectangle to the area of the triangle, or use the formula for the area of a trapezoid:

  Area of trapezoid $= \frac{1}{2}h(a + b)$, where a and b are the lengths of the parallel sides and h is the height.

Mathematical Process Expectations

Process Expectation	Questions
Problem Solving	10–14
Reasoning and Proving	n/a
Reflecting	n/a
Selecting Tools and Computational Strategies	1–14
Connecting	n/a
Representing	n/a
Communicating	n/a

Ongoing Assessment

- While students are working, circulate and see how well each person works. This may be an opportunity to begin observing and recording individual students' learning skills.

Extra Practice

- You may wish to use **BLM 1-3 Section 1.1 Revisit the Primary Trigonometric Ratios** for remediation or extra practice.