

# Task: Roof Truss

## Student Text Pages

227

## Suggested Timing

40 min

## Related Resources

- BLM 4–17 Chapter 4 Task  
Rubric: Roof Truss

## Accommodations

**Gifted and Enrichment**—challenge students to solve  $\triangle APQ$ ,  $\triangle BPR$ , and  $\triangle RQC$

**Visual**—provide students with an enlarged copy of the diagram

## Ongoing Assessment

- Use **BLM 4–17 Chapter 4 Task Rubric: Roof Truss** to assess student achievement.

## Specific Expectations

1.04, 1.05

## Teaching Suggestions

- Have students read the entire Task. Discuss the Task and ensure students understand what they are being asked to do.
- Discuss strategies and review necessary skills and concepts to solve this problem.

## Hints for Evaluating a Response

Student responses are being assessed for the level of mathematical understanding they represent. As you assess each response, consider these questions:

- How much assistance did the student need to determine the side lengths?
- Which parts of the Task did the student complete/not complete?
- Did the student present work that was clear and easy to follow?
- Did the student demonstrate an understanding of angle properties, triangle properties, and trigonometry?

## Level 3 Notes

- Student demonstrates understanding of angle properties, triangle properties, and trigonometry.
- Student demonstrates understanding of problem solving techniques.
- Student uses mathematical language effectively.
- Student's solution is clearly organized and choices are justified.
- Student's solution contains minor errors.

## Level 3 Sample Response

Triangle ABC is equilateral, so  $\angle BAC = \angle ABC = \angle ACB = 60^\circ$ .

In  $\triangle PQR$ , let  $\angle PQR = y$ .

$$\begin{aligned}\angle PRQ &= 180 - 60 - (120 - y) \\ &= 120 - y\end{aligned}$$

Since  $\triangle PQR \cong \triangle PAQ$ ,

$$\angle APQ = 120 - y$$

$$\angle AQP = y \quad RP = AP \quad PQ = PQ \quad RQ = AQ$$

$\angle APB$  is straight, so

$$\begin{aligned}\angle BPR &= 180 - 2(120 - y) \\ &= 2y - 60\end{aligned}$$

$\angle AQC$  is straight, so

$$\angle CQR = 180 - 2y$$

The sum of the interior angles of a triangle is  $180^\circ$ , so

$$\begin{aligned}\angle CRQ &= 180 - 60 - (180 - 2y) \\ &= 2y - 60\end{aligned}$$

$$\begin{aligned}\angle BRP &= 180 - 60 - (2y - 60) \\ &= 180 - 2y\end{aligned}$$

$\triangle RQC \cong \triangle PRB$

$$QC = BR = 1 \text{ m}$$

$$PB = RC = 2 \text{ m}$$

$$\begin{aligned} \text{a) } AP &= 3 - PB \\ &= 3 - 2 \\ &= 1 \end{aligned}$$

The length of AP is 1 m.

$$\begin{aligned} \text{b) } AQ &= 3 - QC \\ &= 3 - 1 \\ &= 2 \end{aligned}$$

The length of AQ is 2 m.

$$\text{c) } PQ^2 = AP^2 + AQ^2 - 2(AP)(AQ) \cos 60^\circ$$

$$PQ^2 = 1^2 + 2^2 - 2(1)(2)(0.5)$$

$$PQ^2 = 3$$

$$PQ = \sqrt{3}$$

$$PQ \doteq 1.732$$

The length of PQ is  $\sqrt{3}$  m or approximately 1.73 m.

### What Distinguishes Level 2

- Student demonstrates some understanding of angle properties, triangle properties, and trigonometry.
- Student demonstrates some understanding of problem solving techniques.
- Student uses mathematical language somewhat effectively.
- Student's solution is somewhat organized and choices are partially or ineffectively justified.
- Student's solution contains some significant errors.

### What Distinguishes Level 4

- Student demonstrates thorough understanding of angle properties, triangle properties, and trigonometry.
- Student demonstrates thorough understanding of problem solving techniques.
- Student uses mathematical language very effectively.
- Student's solution is highly organized and choices are clearly justified.
- Student's solution contains very few or no errors.