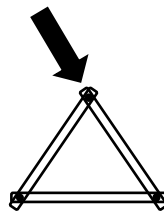
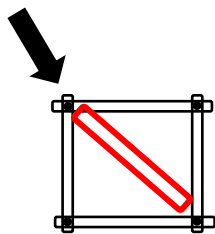


## Post-Activity Quiz **Answer Key**

1. Explain if and why the shapes below would either remain unchanged or collapse if you pressed down at the pin joints in the arrow directions. If the shape collapses, how might you strengthen it?

*Square:* The square shape would collapse because no stick (member) is present to resist or stop the compressive force. Adding a member diagonally would essentially change the shape to a triangle, which is known to be a strong shape.

*Triangle:* The triangle shape would remain unchanged since the compressive force is being stopped by the stick (member). The triangle shape is already a strong shape no additional members need to be added to strengthen it.



2. Determine the missing information in the table below:

Object	Mass (g)	Breaking Load (g)	Strength-to-Weight Ratio
1	5	<b>60</b>	12
2	2	60	<b>30</b>
3	<b>4</b>	76	19

*Calculation steps:*

$$\text{strength-to-weight ratio} = \text{breaking load} / \text{mass}$$

Object 1: Breaking load = strength-to-weight ratio x mass  
 = 12 x 5 g  
 = 60 g

Object 2: Strength-to-weight ratio = breaking load / mass  
 = 60 g / 2 g  
 = 30 (dimensionless)

Object 3: Mass = breaking load / strength-to-weight ratio  
 = 76 g / 19  
 = 4 g

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Class: \_\_\_\_\_

3. Explain how you used the engineering design process to come up with your bridge design.

Expect student answers to explain each step and how they came up with their final designs. \_\_\_\_\_

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4. Write a short paragraph to explain what you identified as the main cause of failure for your bridge.

Expect answers to explain that the tension from the added load was too much for the bridge to hold. Look for the correct use of the activity vocabulary words in the explanations.

Refer to a more detailed discussion on forces and structures in the *Fairly Fundamental Facts about Forces and Structures* lesson at

[https://www.teachengineering.org/view\\_lesson.php?url=collection/wpi\\_/lessons/wpi\\_forces/wpi\\_lesson\\_1.xml](https://www.teachengineering.org/view_lesson.php?url=collection/wpi_/lessons/wpi_forces/wpi_lesson_1.xml)

5. Based on your experience designing and building tongue depressor bridges, list three things you could have done differently to improve your design. Include a sketch showing these improvements.

Answers will vary, depending on students' designs and experiences.