

Name _____

**WHAT DOES THE
LOAD CAPACITY OF A
CART HAVE TO DO WITH**

MATH?



Video Link:

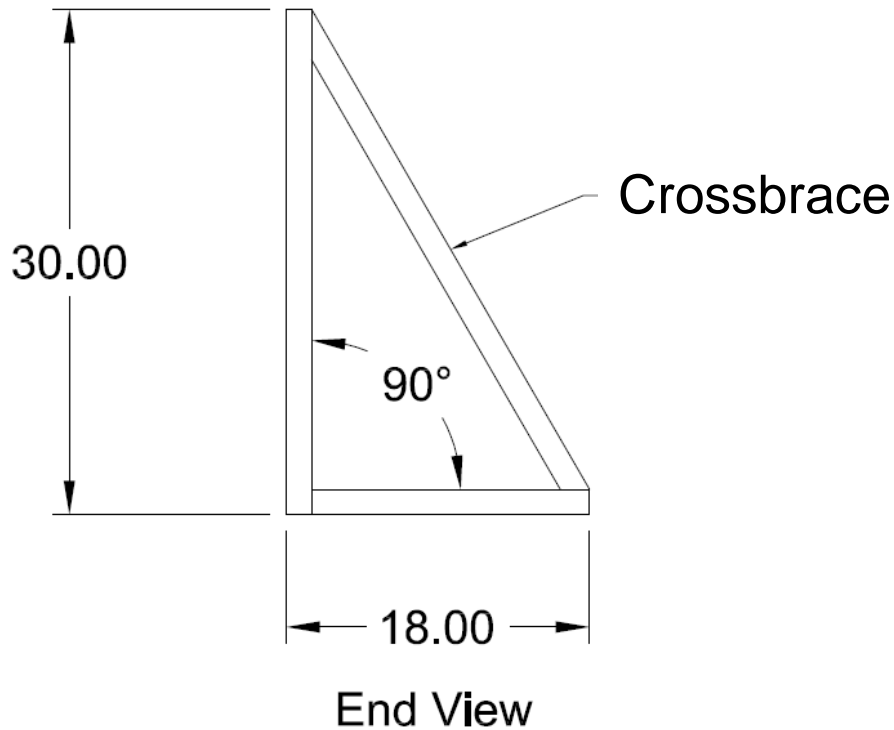
<https://www.youtube.com/watch?v=MAS8htdbH4Y>

Summary: In this video, students are challenged to determine the length of a cross brace for a cart. They also need to determine the angle to set the cross brace at. The Pythagorean Theorem and right triangle trigonometry is needed to determine these dimensions. The importance of a strong weld is also discussed as the load the cart may need to carry could be very heavy and a solid cross brace put on securely is necessary.

Company Information: KI is an international manufacturer of office and institutional furniture. KI has ten different manufacturing plants, with its headquarters located in Green Bay, Wisconsin. Each plant focuses on a different aspect of business. At the Green Bay plant the focus is on chairs, desks and tables. The largest part of what KI-Green Bay produces is for educational markets, in both K-12 and post-secondary settings. In 2012, KI shipped about 876,000 combined units total.

Part 1 (0:00-0:48)

- Play video (0:00-0:44), pause at prompt (0:45-0:48) for “Break 1” to answer the discussion questions.
- What type of product are they talking about making?
- Why would a cross brace be needed for the cart?
- Based on the blueprint on the next page, what information is needed and what formulas can be used to determine these missing parts.



Part 2 (0:49-1:25)

- Play video (0:49-1:20) verifying that you determined the correct formulas needed to find the missing length and angles, pause at prompt (1:21-1:25) for “Break 2” to answer the discussion question.
- Determine the cross brace length using the Pythagorean Theorem at this point.

Part 3 (1:26-1:44)

- Play video (1:26-1:40) verifying you determined the correct length of the cross brace, pause at prompt (1:41-1:44) for “Break 3” to answer the discussion question.
- Determine the angles the cross brace is set using the tangent function at this point.

Part 4 (1:45-2:14)

- Play video (1:45-2:08) verifying that you determined the correct angles for how the cross brace should be set, pause at prompt (2:08-2:14) for “Break 4” to answer the discussion questions.
- Did you calculate the angles differently?
- Once one of the angles is determined, is there another way to determine the other missing angle besides taking $180-90-31 = 59$.

Part 5 (2:15-3:13)

- Play video (2:15-3:13) and then answer the discussion questions.
- What material is being used to create this part of the cart?
- What does it look like are some of the issues with the weld? (Go back to 2:47 to look closely).
- Why is it so important to have a strong weld here?
- What other things could be done to make the cart even stronger if a heavier load is needed?
- Once this part of the cart is complete, what else will probably be done to complete the cart?

This material is based on work supported by the National Science Foundation under Grant No. DUE-1406857. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.