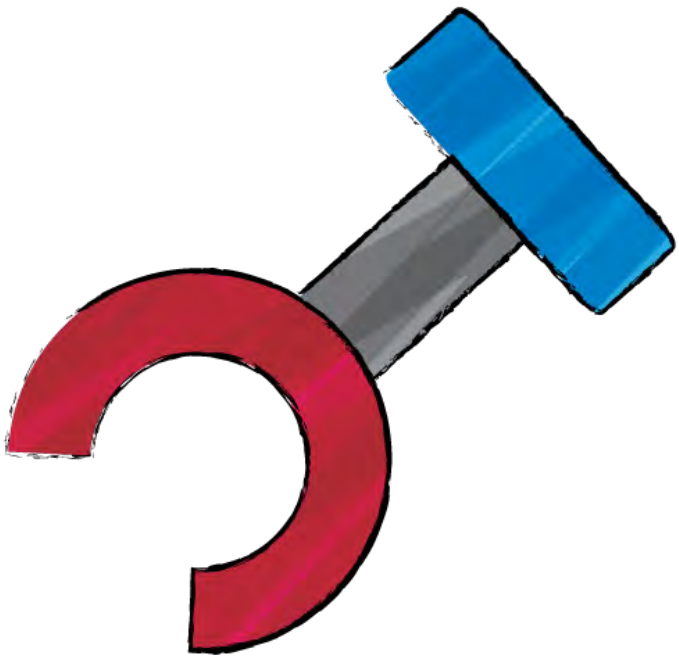
FOUNDATIONS

MINDS-i®

STEM INTEGRATED ROBOTICS

UNIT 6
Mechanical & Structural Engineering



Introduction

In this lesson students will begin to learn how gravity affects the way objects behave and inversly how they are designed and built.

Concepts

1. How the force of gravity affects levers, cams, span and torque

Materials

- Power Point, Levers, Cams & Span
- MINDS-i Design Journal
- Worksheet, “Levers, Cams & Span”
- Access to Internet

Procedure

Time: 1 Day(s)

Day 1:

Prep:

Before students arrive in class access the powerpoint presentation Levers, Cams & Span.

Presentation:

As the class follows through the presentation have the students take notes in their Journals. Discuss the various effects of leverage and gravity listed in the presentation. Review 3-5 Key points to check students understanding of core concepts.

Exercise:

After discussion, handout the worksheet “Levers, Cams & Span” and give the students time to complete the exercise. Allow the students access to internet and any relevant research materials.

Background

Vocabulary

- Leverage:
  The exertion of force by means of a lever or an object used in the manner of a lever.
- Span:
  The full extent of something from end to end; the amount of space that something covers.
- Cam:
  A projection on a rotating part in machinery, designed to make sliding contact with another part while rotating and to impart reciprocal or variable motion to it.
- Torque:
  A twisting force that tends to cause rotation.
- Fulcrum:
  The point on which a lever rests or is supported.

- Balance:
  An even distribution of weight enabling someone or something to remain upright and steady.
- Gravity:
  The force that attracts a body toward the center of the earth, or toward any other physical body having mass.

Resources

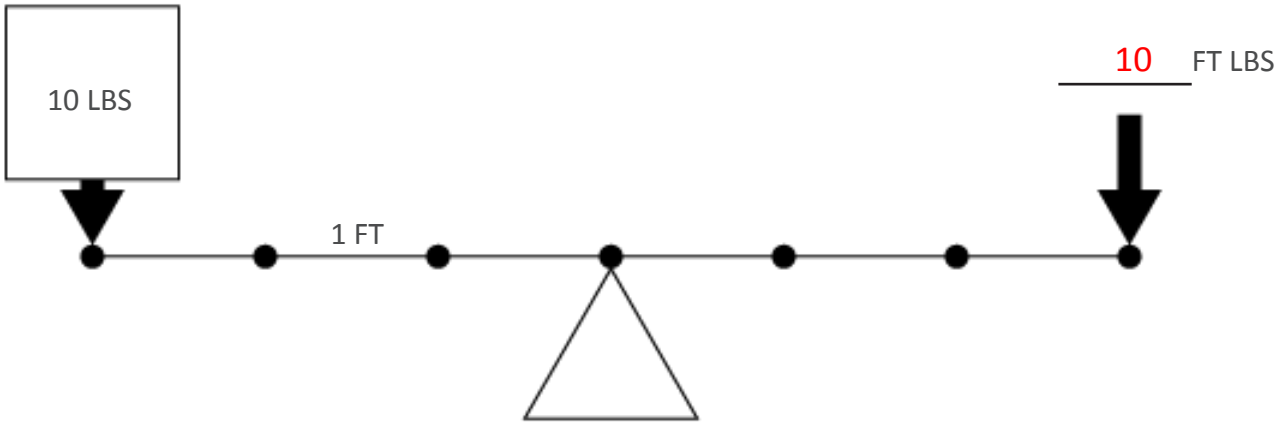
- http://en.wikipedia.org/
- www.google.com
- www.youtube.com

Levers, Cams & Span

ANSWER KEY

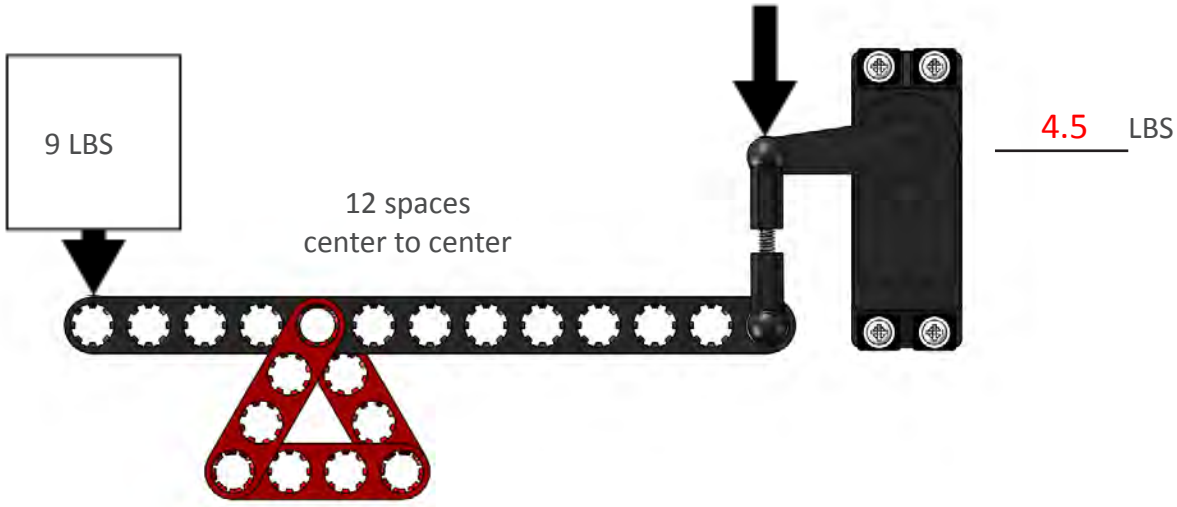
Solve for the unknown in the following examples.

1.

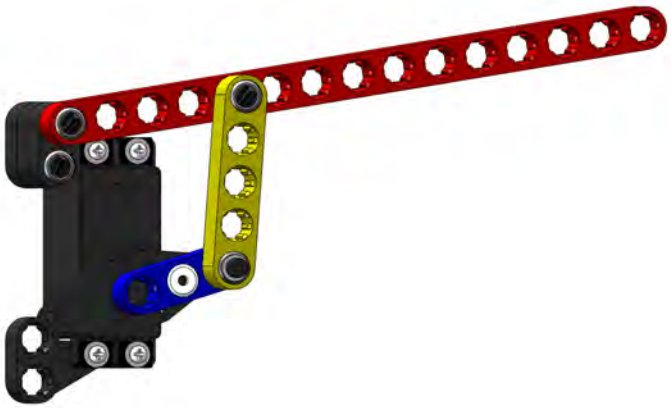


2.

3.



1.

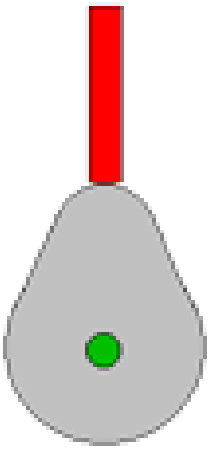


HIGH = 6 spaces

RISE = 4 spaces

LOW = 2 spaces

2.



HIGH = 3.45 in

RISE = .625

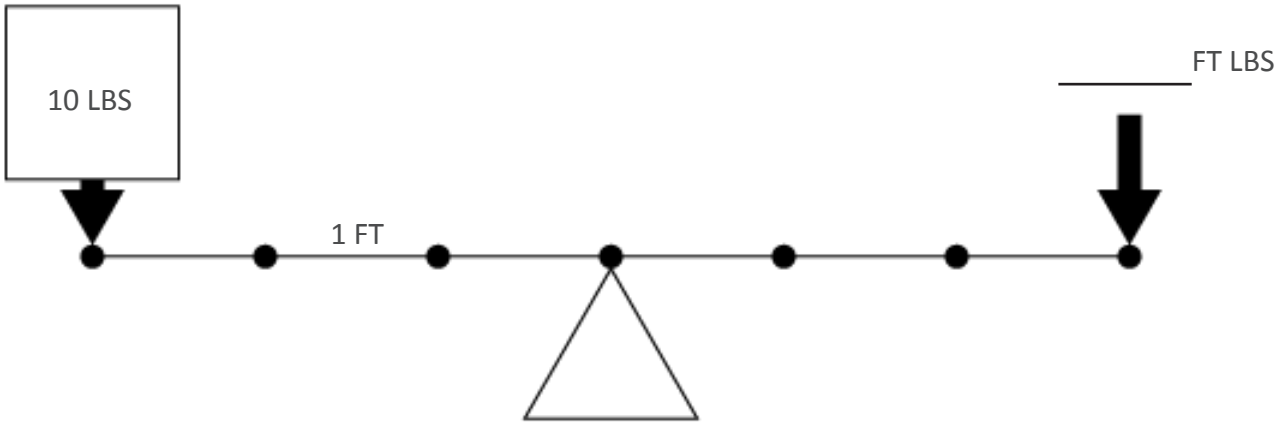
LOW = 2.825 in

3. What is the Span of the lever in question #2 ? 6 FT

Levers, Cams & Span

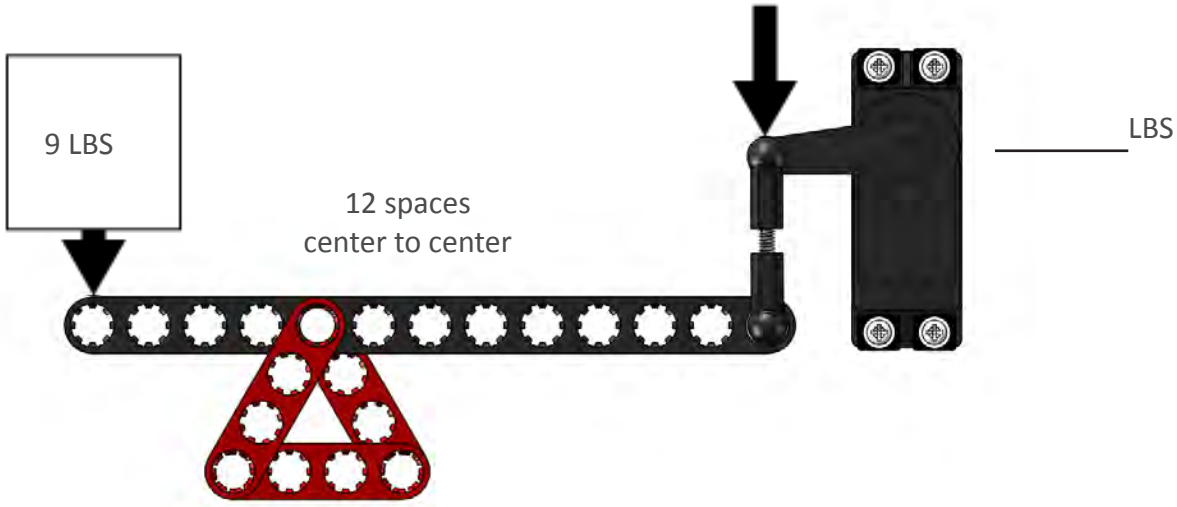
Solve for the unknown in the following examples.

1.

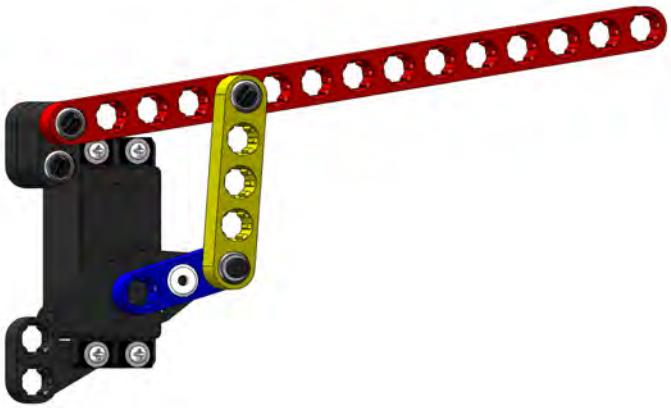


2.

3.



1.

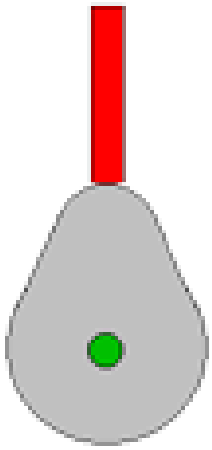


HIGH = 6 spaces

RISE = _____

LOW = 2 spaces

2.



HIGH = 3.45 in

RISE = .625

LOW = _____ in

3. What is the Span of the lever in question #2 ? _____FT