

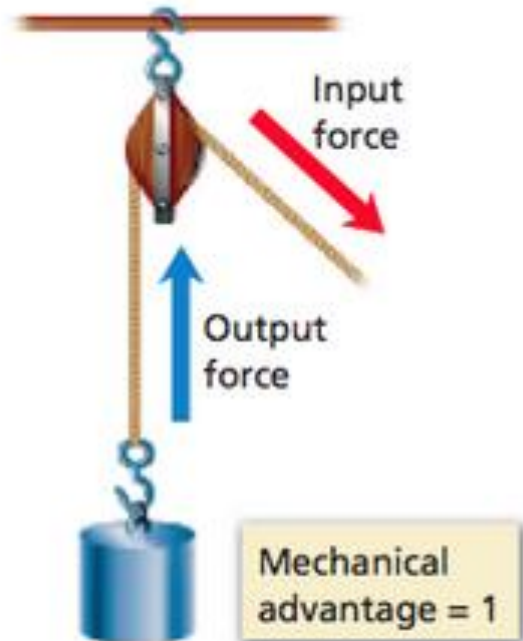
Teacher notes

- These are VERY simple pulleys! In the first challenge, the string can simply go over the strong beam.
- You could extend this by investigating more complicated pulleys using e.g. cotton reels.
- The first challenge could be extended by building a strong structure to support the pulley instead of a beam. (However I was surprised how long this seemingly simple challenge took!)
- The lift challenge could be self-contained in a cereal box etc.

Teacher notes

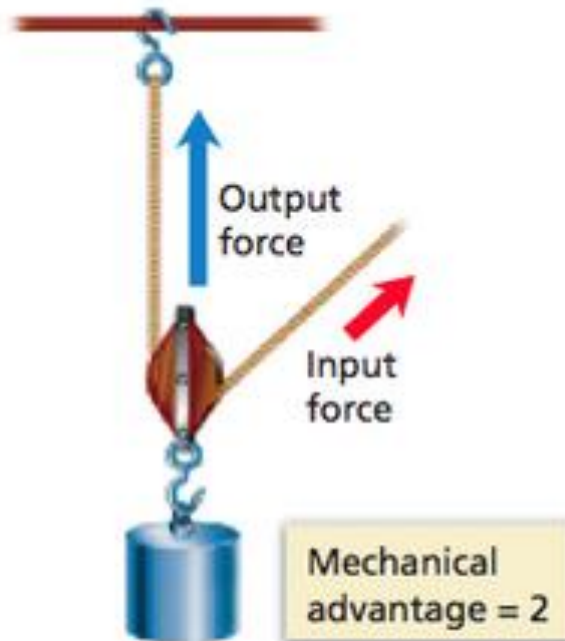
Fixed Pulley

A fixed pulley does not change the amount of force applied. It does change the direction of the force.



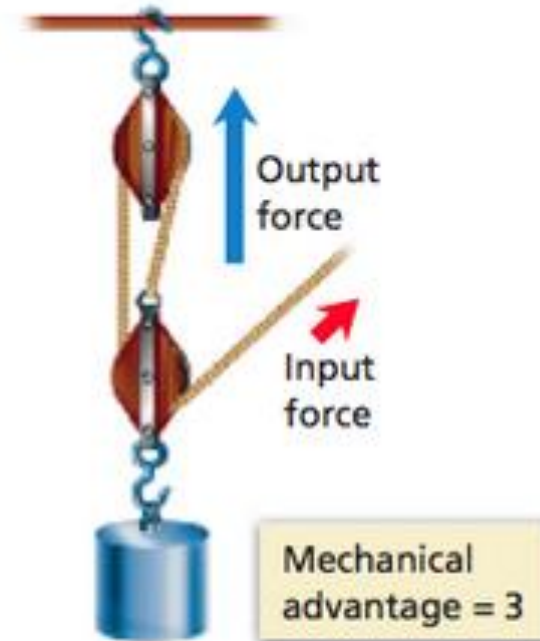
Movable Pulley

A movable pulley increases the amount of force applied. It does not change the direction of the force.

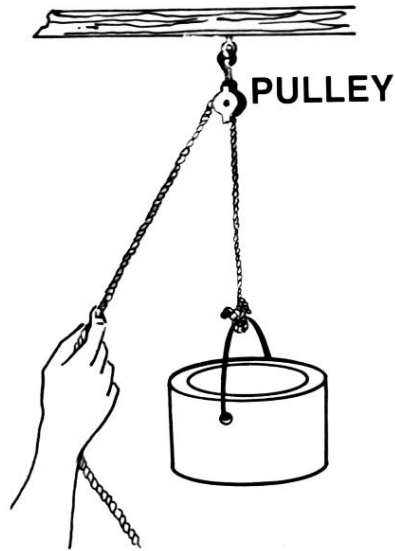


Block and Tackle

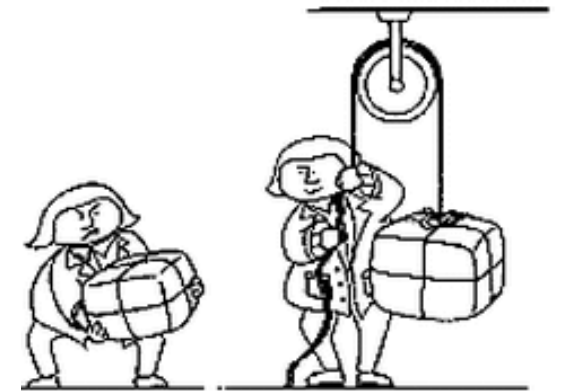
A block and tackle is a pulley system made up of fixed and movable pulleys.



STEM Challenge Project



Lifting weights
challenge



Learning Intentions

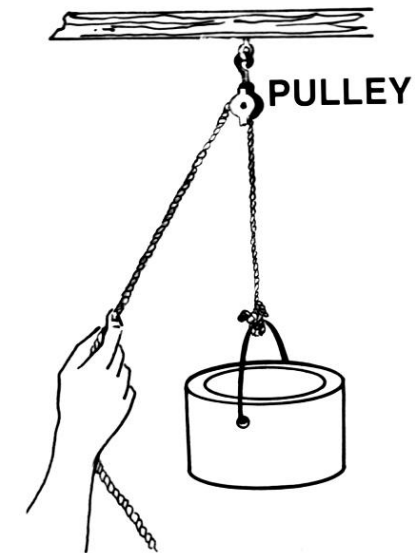
- To build up our skills such as **teamwork** and **communication**
- To use the **engineering design process** to solve a problem

How will you be successful today?

- What does successful **teamwork** look like?
- What can you do to be a good **communicator**?

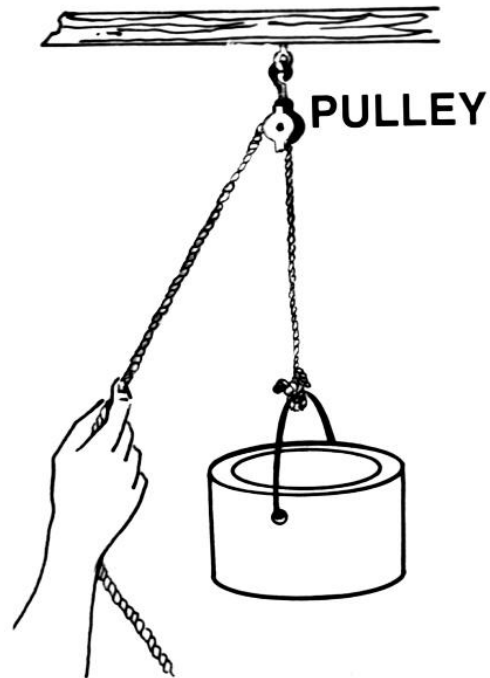
Lifting challenge

- You are a dragon researcher investigating a new dragon nesting site at the top of a cliff, with 3 abandoned dragon eggs.
- You need to lower the eggs down and bring research items up carefully.
- You have been advised to build a lifting machine with a pulley to make this easier.
- If the eggs or research equipment break or fall out you will not be able to complete your research.



What is a pulley?

- <http://no-ads-youtube.com/video/scishow-kids/need-a-lift-try-a-pulley?v=Nj4J7QNeBNk> Very simple pulley for lift, crane, flag 3m30



Lifting Challenge

Build a **strong beam** at least 30cm wide between 2 stools.

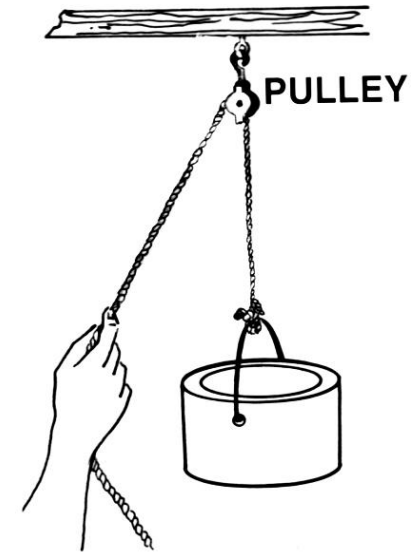
Engineer a **lifting machine** using a **pulley** which can safely carry the items up and down.

- You will be given a choice of materials:
 - **Newspaper – max 4 sheets**
 - **A4 paper – max 4 sheets**
 - **Lollypop sticks – max 4**
 - **String – 1m long piece**
 - **Paperclips – max 2**
 - **Pipecleaner – max 1**
 - **3 marbles in a pot (dragon eggs) – you cannot use the pot**
 - **Beanbag (research equipment)**
 - **Sellotape**
- Test your lifting machine and try to improve it



Lifting challenge

- What are the problems with this task?
- What can you predict being difficult?
- Imagine how you could solve this problem.

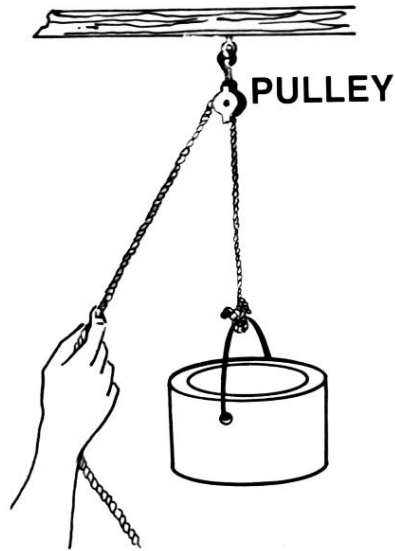




What can you learn from others?

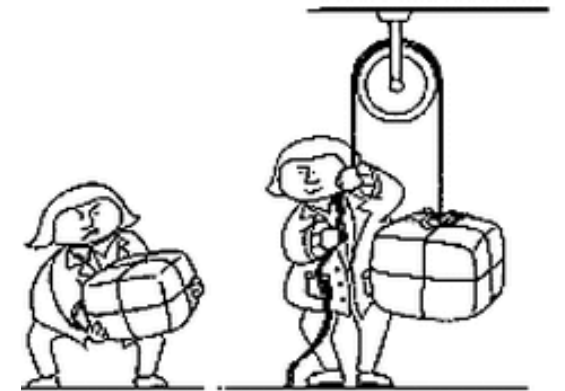
- **Learning loop** – look at other people’s work.
- How did other groups tackle the STEM challenge?
- Which ideas did you see that were successful?
- What did you see that hadn’t worked, or that you wouldn’t use?

STEM Challenge Project



Lifting weights
challenge

Part 2



Learning Intentions

- To build up our STEM skills such as **teamwork** and **communication**
- To use the **engineering design process** to solve a problem

How will you be successful today?

- What does successful **teamwork** look like?
- What can you do to be a good **communicator**?

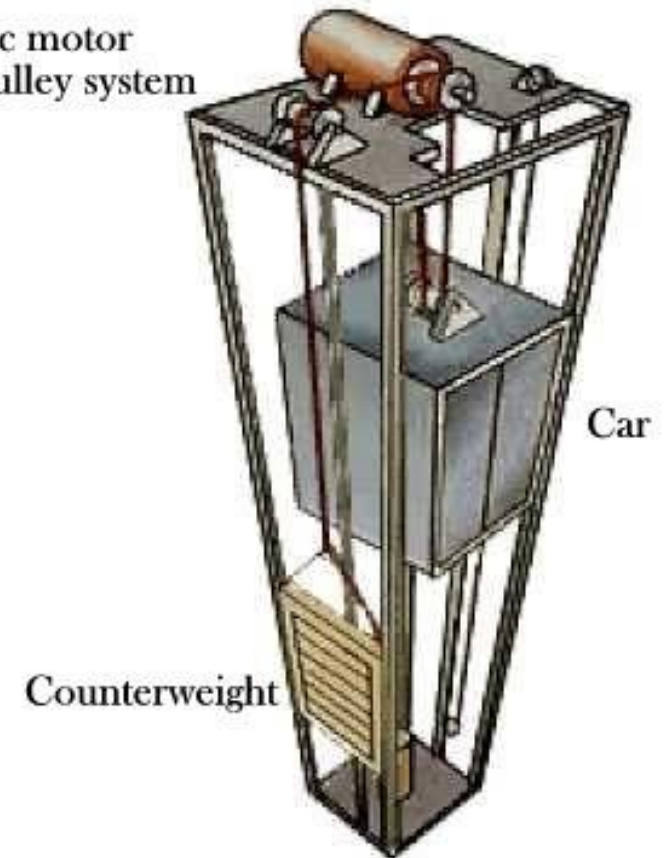
Homemade pulley

- <http://no-ads-youtube.com/video/shae-haylen/video-how-to-make-a-pulley?v=rc0cpp3i8GA> watch up to 1m40

Lift Challenge

- Design and build a **lift** which can safely carry 3 dragon eggs up and down
- This needs to include a **pulley**
- You will be given a choice of materials:
 - **Milk bottle lid with hole in centre x 1**
 - **Skewer x 1**
 - **A4 card – max 1**
 - **Circles to draw around to make pulley**
 - **Long thin card boxes – max 1**
 - **Paperclips – max 2**
 - **Lollypop sticks – max 5**
 - **String – 1 long piece (your current string should do)**
 - **Sellotape**
- Test your lift and try to improve it

Electric motor
with pulley system





What can you learn from others?

- **Learning loop** – look at other people’s work.
- How did other groups tackle the STEM challenge?
- Which ideas did you see that were successful?
- What did you see that hadn’t worked, or that you wouldn’t use?

Evaluation

- Discuss how your team approached the STEM challenge today
 - What did you learn today?
 - Which STEM skills did you develop?
- How could you improve your design?
- Can you think of another similar STEM challenge you could set yourself to try at home?

Self-assessment at end of project

- We have been developing our STEM skills by doing STEM challenges:
 - Teamwork
 - Communication
- How do you think you have developed your STEM skills?
- Which skills do you still need to improve?