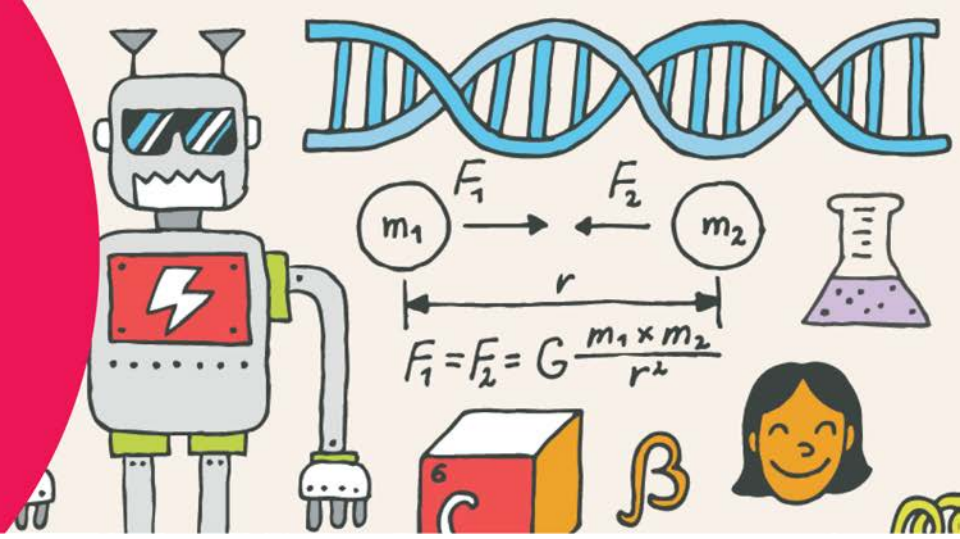
Pulleys and Gears

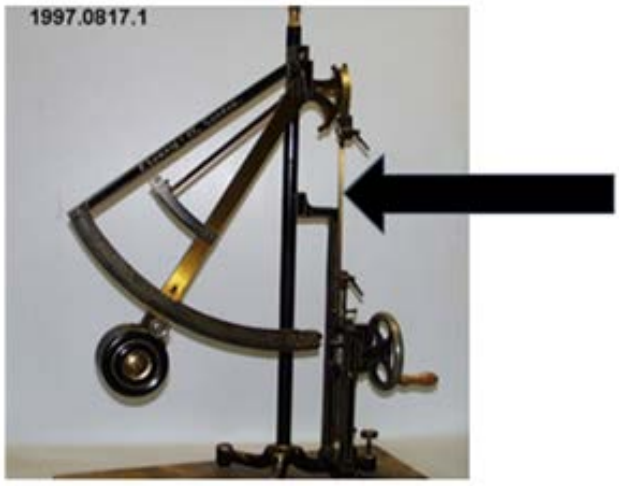
Museum Mission Answer Key



Paper Strength (p.3)

Exhibit – Artifact Alley – Materials

Can you **find** the piece of paper? Where is it?



Think: How do the gears help to pull the piece of paper to determine its strength?

The gears help by changing the plane of motion and enabling precise increments of motion.

Drill Press (p.4)

Exhibit – Artifact Alley - Tools

Find the different sized pulleys. Why do you think there are different sizes?

The different sized pulleys allow the operator to vary the speed of the motor.

Think: Circle the different functions of the gears that you can you see (circle all that apply): *All but a*

b. Increase speed
c. Increase power
d. Change plane of rotation
e. Decrease speed
f. Decrease power

Time Flies (p.5)

Exhibit – Artifact Alley - Smartphone

This is the inner workings of a clock from 1719. **Find** all the gears, how many can you count?

8 or more.

Think: What is the source of power for this clock? **(**Circle the answer you think is correct):

c. Mechanical Energy

Sounds Good (p.6)

Exhibit – Artifact Alley - Smartphone

Find the microphone boom. What is it used for?

To allow the microphone to be close to the person speaking without it being in the picture for tv or movies or being in the way of the action on a stage.

Think: Do these pulleys make it easier to lift a weight or change the direction of the force required?

Change the direction of force required.

Evolution of the Bicycle (p.7)

Exhibit – Into the Great Outdoors – Bicycle Exhibit

Think: Try the bicycle race interactive. Which bike won and why?

The safety bicycle wins. It has pedals and a chain attached to gears.

Why do you **think** some bicycles have an advantage in a race over others? Circle those that apply.

a. Number of gears
b. Size of the tires
c. Strength of the rider

Catch a Train (p.8)

Exhibit – Steam – A World in Motion – Model Train Set

Find all the pulleys and gears and list where they are.

Pulleys: *2, one in each crane*

Gears: *2 to lift the bridge*

Think: The roundhouse was used to turn the massive locomotives around. Which simple machine could be used to help make this work easier?

Gears could be used to increase the power of the system.

Ship's Ahoy (p.9)

Exhibit – Steam a World in Motion – Ship Display

Find all the pulleys and gears. How many do you see?

Pulleys: *sails, lifeboats (20 or more)* Gears: *16 + 29 ventilators (with 2 each)*

Think: Why were pulleys used on ships? Circle all that apply:

a, c, d

Lift and lower the sails

Raise a flag

Raise and lower lifeboats

Curriculum Connections

Ontario – grade 4 – Science and Technology
Understanding Structures and Mechanisms
Pulleys and Gears

1.1 assess the impact of pulley systems and gear systems on daily life
3.1 describe the purposes of pulley systems and gear systems
3.2 describe how rotary motion in one system or its components is transferred to another system or component in the same structure
3.3 describe how one type of motion can be transformed into another type of motion using pulleys or gears
3.4 describe, using their observations, how gears operate in one plane and in two planes
3.5 distinguish between pulley systems and gear systems that increase force and those that increase speed
3.6 identify pulley systems and gear systems that are used in daily life, and explain the purpose and basic operation of each
3.7 explain how the gear system on a bicycle works
3.8 identify the input components that drive a mechanism and the output components that are driven by it

Québec – Primary Cycle 2 – Science and Technology

2. Simple machines
a. Recognizes simple machines (lever, inclined plane, screw, pulley, winch, wheel) used in an object (e.g. lever in seesaw, inclined plane for an access ramp)
b. Describes the uses of certain simple machines (to adjust the force required)
4. How manufactured objects work
a. Identifies the mechanical parts (e.g. gears, cams, springs, simple machines, connecting rods)
b. Recognizes two types of motion (rotation and translation