

Forces and Motion

From High-speed Jets to Wind-up Toys

Investigation #1: Wind-up Walking Toys

Gather These Things:

Walking toy

Chart

Pencil

Clock with second hand

Toothpicks

Metric ruler (with each cm divided into tenths)

Investigation #2: Which Way Did It Go?

Gather These Things:

Toy wagon

Walking toy

Long, smooth board

Broom handle or other vertical bar

Investigation #3: Investigating Friction?

Gather These Things:

Heavy string

Spring scale (force measure)

Round pencils

Hardback book (2-4 pounds)

Investigation #4: Friction – Does It Rub You the Wrong Way?

Gather These Things:

Smooth board (about 60cm long)

Stack of books

Toy car that rolls easily

Metric ruler or tape measure

Piece of scrap carpet

Wooden block

Piece of scrap wood

A piece of sandpaper (long enough to wrap around the wooden block)

Investigation #5: That's Heavy, Dude

Gather These Things:

Small plastic cup (4 to 8 ounce)

Large index card

Sheet of paper

Plastic tub or bucket

For Optional Activity

Sheet of newspaper

Table

Safety glasses

A thin yardstick or thin wooden strip (unfinished)

Investigation #6: Floating Pencil Race

Gather These Things:

Pencil

Paper

Tape

Scissors

Paper towels

Feathers

String or line

Watch (with a second hand)

Investigation #7: What Floats Your Boat?

Gather These Things:

Overflow cup (or a container with a spout)
Empty film canister with lids
16 pennies (minted after 1982)
Graduated cylinder
Quarter jar
Water
Liquid detergent
Balance scales if available

Investigation #8: Giving Airplanes a Lift

Gather These Things:

String
Sheet of paper
Funnel
Two Styrofoam balls (or other balls)
Ping-pong ball
Glue

Investigation #9: Crash Test Dummies

Gather These Things:

Skateboard
3 by 5 card
Doll
Long sheet of paper
Plastic cup
Small wooden blocks
Toy car that rolls
Board for ramp
Small ruler
Ball
Penny
Tape

Investigation #10: Cars and Ramps

Gather These Things:

Small car
Ramp
Four blocks
Measuring tape
Chart

Investigation #11: The Mighty Conquering Catapults:

Gather These Things:

Two hook screws with a small circular end, at least 12 cm in length
Heavy-duty rubber band (about 1 cm thick)
Pencil or marker
Lid for plastic water bottle (no more than 1 cm deep)
Double-sided mounting tape (for hanging mirrors and pictures)
A 5 cm by 10 cm by 30cm (2" by 4" by 12") piece of soft pine board
A light weight object to serve as a missile (small, stale marshmallows work well)
C clamp (to clamp board to table)
One popsicle stick
Tape measure

Investigation #12: Round and Round without Stopping

Gather These Things:

Sturdy plastic tube (like the cylinder of an old plastic ink pen or a piece of plumbing tubing)
Small weights
Heavy-duty string
One-hole rubber stopper (or something similar)
Metal hook (optional)

Investigation #13: Roller Derby with Flour

Gather These Things:

Student on roller blades or skates
Five-pound bag of flour
Metric ruler or tape measure
Chalk

Investigation #14: Balloon Jet Propulsion

Gather These Things:

Pencil
Balloons
String or fishing line
Straw
Tape

Investigation #15a: Balancing Act with a Stick

Gather These Things:

Popsicle stick (or something similar)
Four to six metal washers or nuts
Ruler
Single strand insulated wire 30 cm long
Sharpened pencil

Investigation #15b: Balancing Act 2

Gather These Things:

Metal spoon
Metal fork
Toothpick
Glass

Investigation #16: Spinning Tops

Gather These Things:

Pencil or a small dowel rod

10-cm diameter circular disc cut from cardboard or poster board (with every 60 degrees marked)

Timer or watch with second hand

Six paper clips (same size)

Six pennies

Tape

Scissors

Investigation #17: He Ain't Heavy, He's Just My Load, Brother

Gather These Things:

Board one meter long with positions marked

Triangular block

Books for weight

Spring force measure or fish scales

Heavy string or cord

Investigation #18: How Do You like Your Pulleys

Gather These Things:

Two large empty thread spools

small bucket with handle containing a weight (load)

Heavy cord

Measuring stick or tape measure

30 cm solid core insulated wire

Investigation #19: And the Wheel Goes Round

Gather These Things:

A large empty sewing spool
Pencil with an eraser
A weight
Large paper clip
Heavy string
Small handle flathead screwdriver
Big handle flathead screwdriver
Flathead metal screws (same size)
Board with two hook screws (used for activity#11)
C-clamp if needed to hold board to table
Scrap wood for screws

Investigation #20: If It Doesn't Move, How Can It Be a Machine?

Gather These Things:

Flat board about 40cm long for a ramp
Spring force measure
Object to move (about five pounds)
Stack of books
Paper
Pencil
Scissors
Black marker
Flathead screwdriver
Scrap wood pieces
Various kinds of flathead metal screws of same length