Simple Machines Mini-Lab: The Lever

Using the PhET Colorado "Balancing Act" Simulation

Name: Date: Class:

Simulation Link

Balancing Act (lever / torque): https://phet.colorado.edu/en/simulation/balancing-act

Open the simulation and go to the "Intro" screen first, then try the "Balance Lab" screen for the later sections.

Background

A lever is a simple machine made of a rigid bar that pivots around a fixed point called the fulcrum. A lever balances when the turning effect (mass × distance from the fulcrum) on one side equals the turning effect on the other side. Changing either the mass or the distance from the fulcrum changes the amount of force needed to balance or lift a load.

Section A — Multiple Choice

1. What is the fixed point that a lever pivots around called?

A. The load
B. The fulcrum
C. The effort
D. The axis

2. In "Balancing Act," a heavier object on one side of the lever can be balanced by a lighter object on the other side if the lighter object is placed:

A. closer to the fulcrum
B. farther from the fulcrum
C. at the exact same spot as the heavy object
D. off the plank entirely

3. If two objects of equal mass are placed on opposite sides of the lever at equal distances from the fulcrum, the lever will:

A. tip toward the left
B. tip toward the right
C. balance
D. spin continuously

4. Which rule correctly describes when a lever balances?

A. Left mass = Right mass, regardless of distance
B. Left mass × Left distance = Right mass × Right distance
C. Left distance = Right distance, regardless of mass
D. The heavier object always determines balance alone

5. Moving an object farther from the fulcrum on a balanced lever will:

A. have no effect on the balance

B. increase its turning effect, tipping the lever toward that side

C. decrease its mass automatically

D. make the object disappear from the simulation

6. A see-saw at a playground is an example of a lever because it:

A. has particles that vibrate in place

B. pivots around a central fulcrum with weight on each side

C. changes a liquid into a gas

D. uses friction to generate heat only

7. Mechanical advantage of a lever refers to:

A. how much the lever weighs

B. how much the lever multiplies or changes the input force

C. the color of the lever

D. how fast the lever moves

Section B — Mini-Lab: Balancing the Lever

Place objects of different mass on each side of the lever/plank in the simulation. For each trial, record the mass and distance from the fulcrum on each side, whether it balanced, and calculate mass × distance (torque) for each side.

Trial	Left Mass (kg)	Left Distance (m)	Left Mass×Dist	Right Mass (kg)	Right Distance (m)	Right Mass×Dist
1						
2						
3						
4						
5						

Section C — Changing One Variable at a Time

Keep the mass on both sides the same. Only change the distance from the fulcrum on one side until it balances again. Record your results.

Trial	Mass Each Side (kg)	Left Distance (m)	Right Distance Needed to Balance (m)	Was it Equal to the Left Distance?
1				
2				
3				