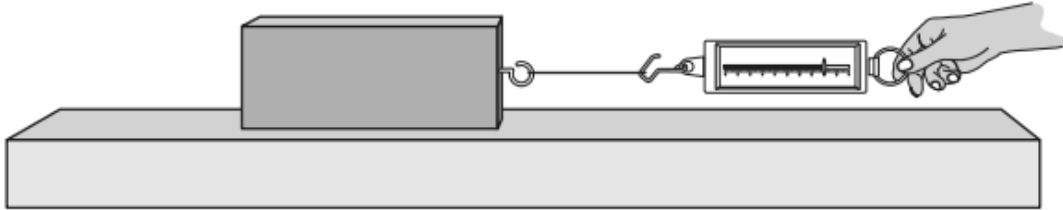


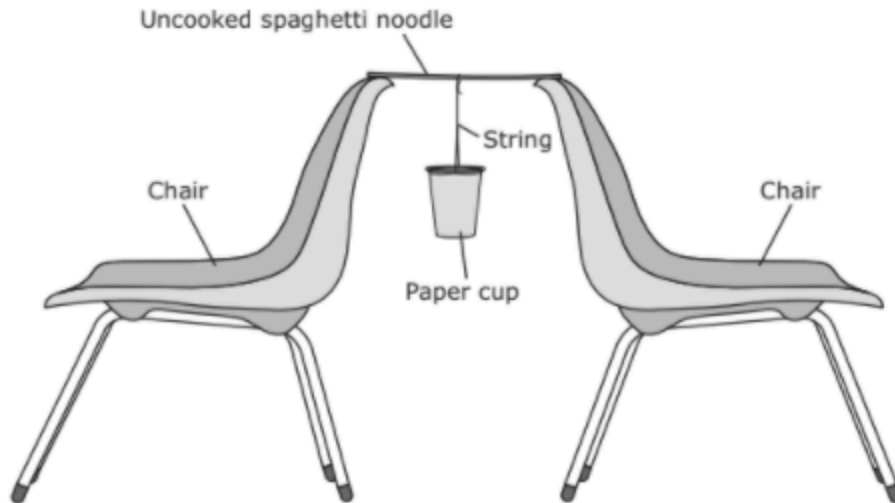
- 19** Students design an experiment to determine how much force is needed to move blocks of wood of different masses slowly across a lab table.



Which procedure should students include in their design?

- A** Conduct five trials, using a different scale to pull each block of wood
- B** Conduct five trials, pulling a different side of each block each time
- C** Conduct five trials, using a different table for each trial
- D** Conduct five trials, pulling each block of wood in the same way for each trial

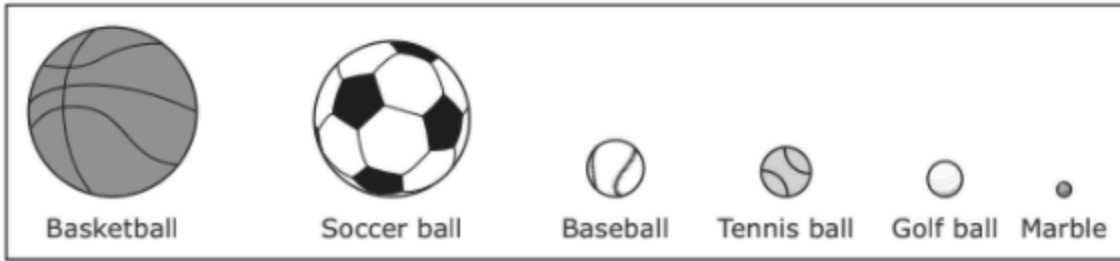
- 11** A student conducts the investigation shown in the diagram. In this experiment a paper cup hangs from a string tied to a single uncooked spaghetti noodle. The student measures and records the mass of a penny. The student then adds pennies to the paper cup one at a time.



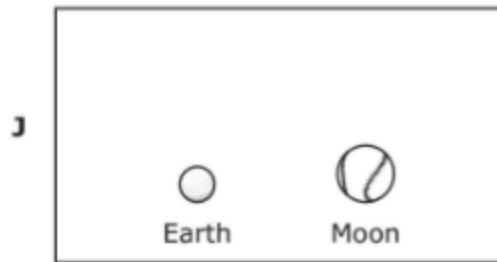
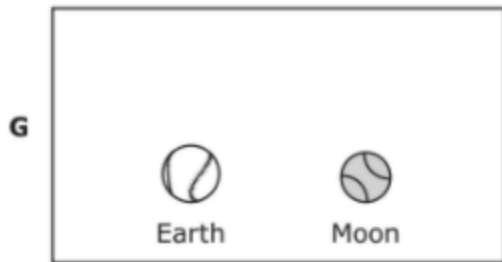
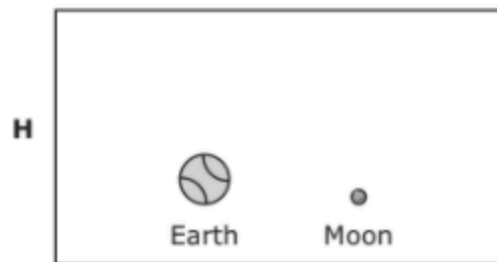
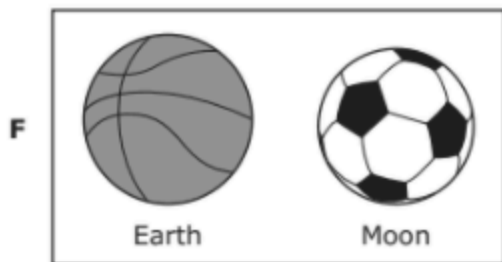
Which question is the student most likely trying to answer with this investigation?

- A** How many spaghetti noodles will it take to hold up the mass of a penny?
- B** How much force will it take to break the spaghetti noodle?
- C** How long should the string that holds the paper cup be in order to support the greatest mass of pennies?
- D** How does the distance between the two chairs affect the amount of force it takes for the spaghetti noodle to break?

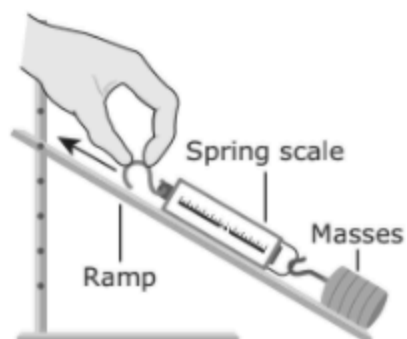
12 Students chose objects to model the relative sizes of Earth and the moon.



Which set of objects best compares the sizes of Earth and the moon?



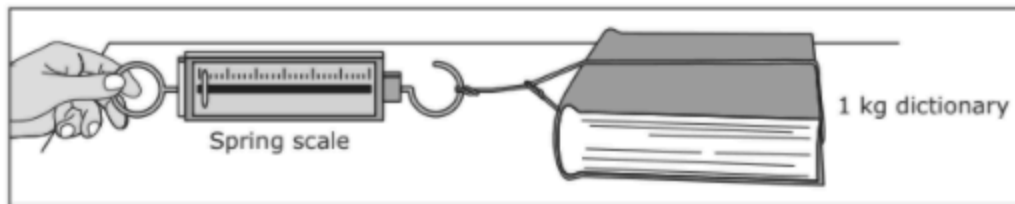
- 29** Students investigate force. The masses they use begin at rest on the ramp. The setup the students use is shown.



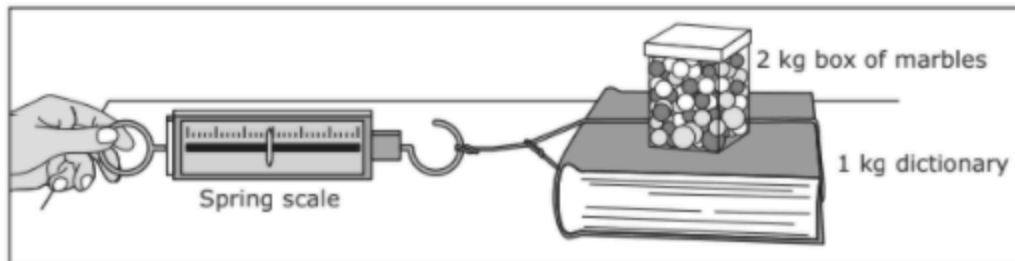
Which change will reduce the amount of force needed to move the masses?

- A** Decrease the height of the ramp
- B** Increase the height of the ramp
- C** Add an additional mass
- D** Pull the spring scale with two hands

- 19 The diagrams show two trials of an experiment in which a spring scale was used to measure force.



Trial 1

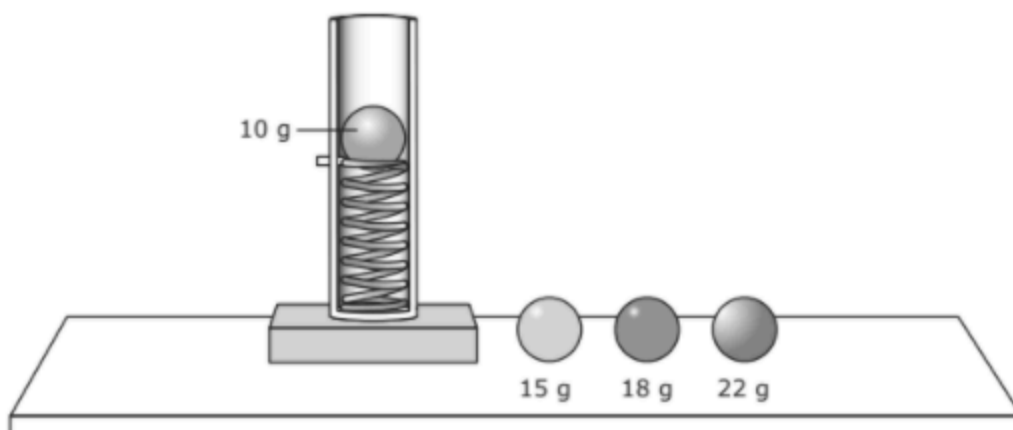


Trial 2

This experiment can be used to determine —

- A how mass affects the force needed to move objects
- B how force affects the mass of two objects
- C how the force used to pull a dictionary affects the mass of a box of marbles
- D how the mass of a box of marbles affects the mass of a dictionary

- 31** A student designs an experiment to test the force of a spring using a spring launcher and four spheres with the same diameter but with different masses.



What other piece of equipment would be most useful for this experiment?

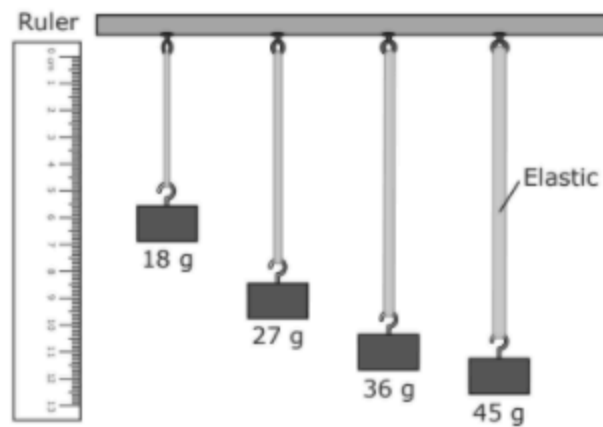
- A** A graduated cylinder to measure the volume of each sphere before the sphere is launched
 - B** A beaker to collect the spheres after they are launched
 - C** A stopwatch to measure how long it takes to load each sphere on the spring
 - D** A meterstick to measure the height each sphere reaches after the sphere is launched
- 10** A student observes that the craters on the moon are different sizes. The student designs an experiment to study the formation of craters. The materials for the experiment are marbles and a pan of flour. The student makes a hypothesis that the size of the craters made on the surface of the flour will depend on the height from which the marble is dropped. Some of the steps in the student's experiment are described below.

1. Fill a round pan with flour
2. Smooth out the flour in the pan
3. _____
4. For each trial, measure the size of the crater formed and then smooth out the flour again

Which of these is most likely Step 3 in the student's experiment?

- F** Drop the same marble from different heights into the pan of flour
- G** Drop marbles of different masses from the same height into the pan of flour
- H** Drop marbles of different sizes from different heights into the pan of flour
- J** Drop a single marble one time into the pan of flour

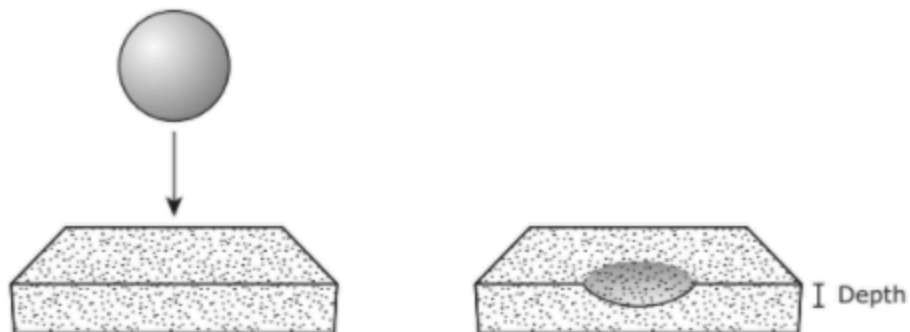
- 31** A student designs an experiment to test the effect of the width of a piece of elastic on the elastic's ability to stretch. The student selects four pieces of elastic with different widths but the same length. The student then attaches blocks with different masses to the pieces of elastic. The results of the student's experiment are shown below.



What should the student do to improve this experiment?

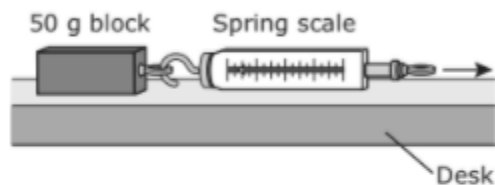
- A** Use blocks of equal mass on the four pieces of elastic
- B** Use blocks with enough mass to cause the four pieces of elastic to break
- C** Use more than four pieces of elastic and four blocks
- D** Use four pieces of elastic with different lengths but the same width

- 39** Students drop the same heavy ball onto identical blocks of soft clay from different heights. For each height they measure the depth of the dent the ball makes in the clay.



Why is the depth of the dent different in each trial?

- A** The size of the ball changes.
 - B** The material of the ball changes.
 - C** The mass of the ball when it hits the clay changes.
 - D** The force of the ball when it hits the clay changes.
- 41** A student uses a spring scale to pull a 50-gram block horizontally across a wood desk. Then the student pulls the block the same distance across surfaces of carpet, sandpaper, and glass.



Which question is this investigation most likely designed to answer?

- A** How do blocks of different sizes react to force?
- B** How do different surfaces affect the amount of force needed to move a block?
- C** How do blocks affect spring scales?
- D** How does the mass of a block change when it is pulled across a desk?

- 36** Students conduct experiments to investigate friction. Which experiment will best test the effect of friction on objects?
- F** Drop two balls from the same height at the same time
 - G** Roll two marbles on the carpet from the same starting point at the same time and with the same amount of force
 - H** Roll three marbles across three different surfaces from the same starting point at the same time and with the same amount of force
 - J** Release two balls from the top of a ramp at the same time