

10.3: Procedures

You will determine whether forces are balanced.

1. Draw a table in which to record balanced and unbalanced forces for each situation. **Do not fill in data until you have read the instructions for obtaining that data.**

Table 10.3.1: Balanced and unbalanced forces for each situation

System	Forces Acting + Direction	Balanced or Unbalanced
Straight Arm lifting Dumbbells		
Straight Arms holding Dumbbells		
Bicep Curl with Dumbbells		
Bicep Curl holding Dumbbells		
Mass Placed on Meter Stick		
Mass Sitting on Meter Stick		
Pendulum at Position A		
Pendulum at Position B		
Mass Pushed		
Mass Sliding		
Mass Stopped		

Dumbbells

2. Stand with your arms at your side, and hold one dumbbell in each hand. Lift the dumbbells with straight arms (left image), and hold them in place for 10 seconds. Then lift the dumbbells with a bicep curl (right image), and hold them in place for 10 seconds. Each person on the team should try this. Name or describe the forces acting on the dumbbells for each action with the dumbbells, in your data table, and use an arrow to indicate the direction of each force. Record whether forces on the dumbbells were balanced or unbalanced for each action with the dumbbell, in your data table.



Figure 10.3.1: <https://getthehealthyu.com/Investigation/elevated-bicep-curl/>

Mass on a Bridge

3. Make a long but stable bridge with the meter stick and 2 lab chairs. Place the 1000 gram mass in the center of the meter stick. Then allow the mass to sit on the bridge for 10 seconds. Remove the mass from the meter stick bridge. Name or describe the forces acting on the mass for each action with the mass, in your data table, and use an arrow to indicate the direction of each force. Record whether forces were balanced or unbalanced for each action with the mass, in your data table.

Pendulum

4. Make a pendulum that hangs from the center of the meter stick bridge, using a heavy key chain and ribbon by tying the ribbon in a bow (so it may easily be untied). Start the pendulum swinging, and observe its motion. Name or describe the forces acting on the mass for each position of the pendulum, in your data table, and use an arrow to indicate the direction of each force. Record whether forces were balanced or unbalanced for each position of the key chain, in your data table. Record whether the forces on the key chain were balanced or unbalanced for each position, in your data table.



Figure 10.3.2: Pendulum

Sliding

5. Place the 1000 gram mass on the table and give it a good push to send it sliding; allow the mass to slide on the table and come to a stop. Name or describe the forces acting on the mass for each action with the mass, in your data table, and use an arrow to indicate the direction of each force. Record whether forces were balanced or unbalanced for each action with the mass, in your data table.

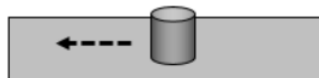


Figure 10.3.3: Sliding mass

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