Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period \_\_\_\_\_\_\_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**Lesson 3: Getting Steep**

Inclined planes are simple machines that provide a way to increase the mechanical advantage of a given system. Inclined planes reduce the amount of force required to complete work; however, they do so at the expense of having to move an object a longer distance. Can you determine how these machines work?

**Doing the Science**

1. Start the Machines Simulation by clicking on the “Sim” tab.

2. Click the “Inclined Planes” button at the bottom of the screen.

3. Make sure that the inclined plane angle is set on 0º and the 1.0-kilogram mass is attached to the Force device.

4. Click the “Pull” button on the Force Device. Note and record in Table 1 the force value *after* the mass is moving.

5. Click the “Reset” button.

6. Change the inclined plane angle to 10º by using the red up and down arrows.

7. Repeat step 4, making sure to note and record your data in Table 1.

8. Repeat steps 6 and 7 for inclined plane angles of 20 º, 30 º, and 40 º.

**Table 1. Inclined Plane Angle and Moving Forces**

|  |  |
| --- | --- |
| **Angle (º)** | **Force While Mass Is Moving****(Current Force in Newtons)** |
| **0** |  |
| **10** |  |
| **20** |  |
| **30** |  |
| **40** |  |

**Do You Understand?**

1. Which inclined plane angle required the smallest force to move the mass to the top of the inclined plane?

2. How much force (in newtons) would have been required if no inclined plane was used to lift the mass up to the same height as the top of the inclined plane? Explain how the inclined plane made the task easier?