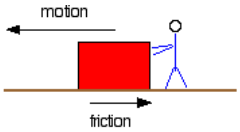
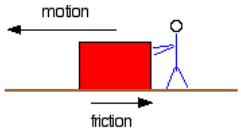


FRICTION ACTIVITIES



FRICTION AND TYPE OF MOTION

PROBLEM: How does the force required to overcome the friction acting on an object at **first acceleration** compare with the force required to keep the object **moving at a constant speed and direction?**

HYPOTHESIS: ***The amount of force needed to overcome friction at first acceleration is*** *(more than, less than, equal to)* ***the force needed during constant speed.***

PROCEDURE:

1. Attach spring scale to block with side A (large surface area) facing down.
2. Record the force required when block first accelerates and the force that is shown once the block is moving at a constant speed.
3. Do 3 trials and compute the average force required.

RESULTS:

TYPE OF MOTION	FORCE REQUIRED (N)	AVERAGE FORCE (N)
AT FIRST ACCELERATION	**1.** **2.** **3.**	
CONSTANT SPEED	**1.** **2.** **3.**	

FRICTION AND TYPE OF SURFACE

PROBLEM: How does **the roughness of the surface** between two solid objects affect the force required to overcome the friction between them?

HYPOTHESIS: ***The amount of force needed to overcome friction over a smooth surface is*** *(more than, less than, equal to)* ***the friction over sandpaper.***

PROCEDURE:

1. Attach the spring scale to the block with side A facing down.
2. Record the amount of force required at first acceleration when block moves across the table. Do 3 trials. Compute average.
3. Repeat while moving block across a sandpaper surface. **Your partner must hold the sandpaper in place.**

RESULTS:

TYPE OF SURFACE	FORCE REQUIRED (N)	AVERAGE FORCE (N)
SMOOTH SURFACE (TABLE TOP)	**1.** **2.** **3.**	
ROUGH SURFACE (wax paper)	**1.** **2.** **3.**	

FRICTION AND SURFACE AREA

PROBLEM: How does **the amount of surface area** of an object that is in contact with the table affect the force required to overcome the friction between the obejct and the table?

HYPOTHESIS: ***The amount of force needed to overcome the friction of a smaller surface area is (****less than, equal to, more than****) what is needed for larger surface area.***

PROCEDURE:

1. Measure surface area of side A (length x width)
2. Repeat steps 1 and 2 from "Friction and Type of Surface"
3. Measure surface area of side B (narrow side)
4. Repeat same steps with side B of the block facing downward.

RESULTS:

SIZE OF SURFACE (cm2)	FORCE REQUIRED (N)	AVERAGE FORCE (N)
	1. **2.** **3.**	
	1. **2.** **3.**	

SLIDING FRICTION VS ROLLING FRICTION

PROBLEM: How does the force required to overcome **sliding friction** compare with the force required to overcome **rolling friction**?

HYPOTHESIS: ***The amount of force needed to overcome sliding friction is (****more than, less than, equal to****)the force needed to overcome rolling friction.***

PROCEDURE:

1. Measure force required to slide Block (side A) across table.
2. Place 100g weight in car with wheels.
3. Attach spring scale to car and measure force required at first acceleration. Do 3 times and compute average.
4.

RESULTS:

TYPE OF FRICTION	FORCE REQUIRED (N)	AVERAGE FORCE (N)
SLIDING	**1.** **2.** **3.**	
ROLLING	**1.** **2.** **3.**	

FRICTION ACTIVITIES DISCUSSION QUESTIONS

1. How did the force required to overcome friction at first acceleration compare with the force required to maintain constant speed? Hypothesis correct?

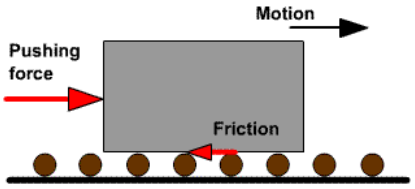
2. Explain #1 in terms of balanced and unbalanced forces.

3. How does the type of surface affect the force required to overcome friction? Hypothesis correct?

4. How does surface area affect the force required to overcome friction? Explain why. Hypothesis correct? (see teacher notes)

5. How does rolling friction compare with sliding friction? Hypothesis correct?

6. Look at the illustration below. Rolling friction was used to move the giant blocks that were used to build the pyramids in Egypt. Draw an arrow to show which way the logs were rolling. How does friction between the log and the ground actually help the logs move? Why (give two reasons based on your lab data) is it easier to move the box on logs then on the flat ground?



7. Discuss two ways to **decrease the friction** acting on an object and two ways to **increase the friction** acting on an object. (See pg. 354-355)