SPH3U0 Newton’s Third Law Practice Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Draw fully labelled diagrams clearly showing: a) the action forces and b) the reaction forces involved in the following situations:

2. Two skaters, Mickey and Goofy, get into an argument on a frictionless ice rink. Mickey (mass 5.0 kg) pushes Goofy (mass 12.0 kg) with an applied force of 13.0 N West.

a) Draw a diagram showing the action-reaction forces involved. What is the force of Goofy on Mickey?

b) Find the acceleration of each skater.

h) A basketball player jumps directly up from the floor for a rebound

g) A horse pulls a cart forward

f) A dart is launched east from a spring launcher

e) A ball falls down toward the Earth

d) The moon orbits around the Earth

1. A rocketship is propelled forward by the gases expelled from the engine
2. A skaterboarder steps forward off of his skateboard
3. A person swims forward in water
4. A person swims forward in water

**SPH3U0 Third Law Problems Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

1. Wile E. Coyote and Roadrunner have taken their chase onto the ice! They are standing at rest on smooth ice. Coyote has a mass of 85 kg and Roadrunner has a mass of 65 kg. Roadrunner pushes Coyote with a force of 126 N north over a time interval of 0.55 seconds.

a) Draw a diagram showing the action and reaction forces between Coyote and Roadrunner.

b) What is the reaction force of Coyote and Roadrunner?

c) Find the acceleration of each skater and the final velocity of each skater at the end of

the 0.55 seconds when they are interacting.

2. Two boxes are being pushed on a smooth table surface as shown below. Find:

forward

Fapp

85.0 N [F]

B

14.0 kg

A

25.0 kg

a) The acceleration of the boxes

b) The force of A on B.

c) The force of B on A.

3. Repeat problem #2 now assuming that the table surface is *rough* and that frictional forces of 22.0 N and 11.0 N

are now acting on boxes A and B respectively.

**Answers:**

*1. c) Coyote: a= 1.5 m/s2 [N]; V2=0.82 m/s [N] Roadrunner : a= 1.9 m/s2 [S]; v2= 1.1 m/s [S]*

*2. a) 2.18 m/s2 [F] b) 30.5 N [F] c) 30.5 N [B] 3. a) 1.33 m/s2 [F] b) 29.7 N [F] d) 29.7 N [B]*