

Name _____

Physics

4.3 Newton's Second Law Worksheet

Directions: Answer the following questions with information obtained from the lecture.

Show all work in your answers including equation and substitution with units.

1. Santa is cruising in the air in his sled. His reindeer are pushing full steam ahead with 8,000 N of force. Santa and his sled are encountering 4000 N of air resistance (he's a big guy) and the total weight of Santa, sled, reindeer and toys is 1000 Kg.

- a) Draw a freebody diagram using the scale 1cm = 1000 N on the diagram below. Label all vectors



- b) Determine the net force in the x-direction

- c) Is Santa accelerating? Show your work.

- d) What is 1 Newton equal to? Use Newton's Second Law in your answer.

2. Santa's reindeer are tired so he decides to jump out of a plane with his bag of presents. Santa is accelerating for the first part of the jump at 9.81 m/s^2 due to no air resistance (he magically turned it off). If Santa has a mass with toys of 300 Kg, find:

Show all work in your answers including equation and substitution with units.

- a) Draw a freebody diagram using the scale $1\text{cm} = 500\text{N}$ on the diagram below. Label all vectors.



- b) What is the net force in the y direction?

- c) Santa accidentally hits the button to turn off air friction and slows down to a constant speed as he falls. How much air friction is he encountering if it causes him to stop accelerating?

- d) Draw these vectors on the freebody diagram using a red colored pencil.

3. Rudolph the Red Nosed reindeer is running to help Santa. If he is running with a net force of 500 N and is accelerating at 3.1 m/s^2 , determine Rudy's mass in kilograms.

- b) What is Rudy's weight in lbs? (use $1 \text{ kg} = 2.205 \text{ lbs}$)

