☺   The Physics of "Elf"   ☺

10 pts. due <u>Fri. Dec. 20 by 2:30 pm</u>   <u>Thank you for not complaining that you need to do a few calculations.</u> **Name:**_____ **Hr:** _____

If you currently have an A or A- you may skip any 2 of the scenes. If you currently have a B+, B, or B-, you may skip one scene. Anything lower? Complete all 7.

<u>SCENE A</u> -BUDDY GETS ATTACKED BY THE RACCOON

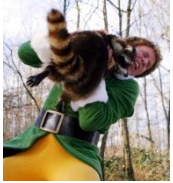**Explain how this scene involves 1 of Newton's laws 3 laws. Make sure to write legibly and use complete sentences.**

1st Law-

2nd Law-   *absent? A raccoon just jumps on him.   You can watch the scene on YouTube if you'd like. ☺*

3rd Law-

<u>SCENE B</u> - BUDDY GETS HIT BY A TAXI

i) Circle the approximate speed of the taxi in the movie in this scene: 1 mph / (8 mph) / 50 mph

ii) The taxi stops when it hit him. If Buddy weighs 195 pounds and he and the taxi are in contact for 0.6 seconds, what is the force that acts on him?

<u>SCENE C</u> -BUDDY MEETS HIS DAD

i) How long does Buddy say it took him to get from the North Pole to New York? ___*He says "all day and all night," so 24 hours total. ☺*_____
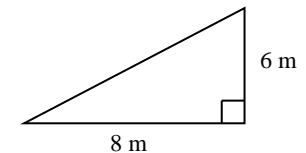
ii) It is approximately 3,413 miles from the North Pole to New York City. Let's say he walked at a constant speed. Calculate what that speed would be in m/s and in mph.

iii) Could Buddy walk that fast? ☺ _____

<u>SCENE D</u> -BUDDY RIDES THE ESCALATOR

i) Circle approximately how it takes Buddy to ride up the escalator: 1 sec / (7 sec) / 30 sec.

ii) Calculate his constant speed on the escalator using the diagram to the right to find distance.

(right triangle diagram: vertical side labeled 6 m, horizontal side labeled 8 m)
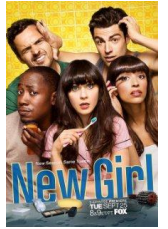
<u>**SCENE E BUDDY MEETS JOVIE**</u>   *(Jovie is Zooey Deschanel from "New Girl" if it's bothering you ☺)*

i) Circle the approximate height of the tree that Jovie is decorating: 1 foot / 10 feet / 30 feet

ii) If Jovie drops an ornament from that height, at what speed would it be traveling just before hitting the ground in m/s?

<u>**SCENE F   BUDDY GETS IN A SNOWBALL FIGHT**</u>

i) Buddy throws one last snowball to hit the last bad guy. Circle approximately how long the last snowball was in the air: 0.1 sec. / 2 sec. / 2,500 sec.

ii) If he throws it with a velocity of 24 m/s at 57° N of E, how far away (Δx) must the bad guy have been? Remember the Δt above is your **total time**.

<u>**SCENE G   BUDDY SITS ON HIS NORTH POLE FATHER'S LAP**</u>   *Absent? You don't need any information from the video for this scene.*

i)   If Buddy weighs 195 pounds, how many kilograms is that?

ii)   If Buddy weighs 195 pounds, what is his weight in Newtons?

iii) If Buddy jumped with an additional acceleration to gravity of -2 m/s², what force would his north pole father feel?