1. Define the following terms:
   a. Force

push or pull - 1 BODY EXERTS ON ANOTHER

   b. Net Force

SUM OF ALL FORCES ON OBJECT

   c. Balanced Forces

COMBINED FORCES - $F_{net} = 0$

   d. Equilibrium

$F_{net} = 0$ — STATE OF MATTER

   e. Normal Force

PERPENDICULAR FORCE THAT A SURFACE EXERTS ON OBJECT THAT PRESS ON it.

   f. Free-Body Diagram

SHOWS ALL FORCES ACTING ON OBJECT

   g. Mass

AMOUNT OF MATTER IN OBJECT - kg

   h. Weight

PULL OF GRAVITY ON OBJECT - Newtons

   i. Friction

FORCE that RESISTS MOTION - 2 SURFACES touching

j. Static Friction

FRICT. BETWEEN 2 SURFACES - NOT MOVING

k. Rolling Friction

FRICT. RESISTS MOTION OF BODY ROLLING ON SURFACE

l. Sliding Friction

FRICT. BETWEEN 2 SURFACES MOVING PAST EACH OTHER

m. Air Friction

OPPOSITION OF ATMOSPHERE TO MOTION

n. Viscous Friction

RESISTANCE TO MOTION OF FLUID (WATER)

o. Vector Quantity

HAS BOTH SIZE + DIRECTION

2. In the "Friction" lab, when the energy car and sled were launched on the level track, what was true of the values for acceleration for both?

NEGATIVE

3. **Why** were the acceleration values as described in the previous question?

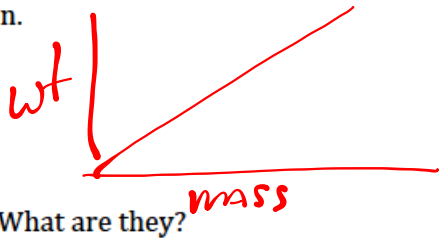
DECELERATION

4. If an organism gains weight does it also gain mass?

YES

5. What is the relationship between mass and weight? Use the graph from the "What is a Newton?" lab to help you answer the question.

STRONG, DIRECT



6. The weight of an object depends upon 2 factors. What are they?

- MASS
- GRAVITY STRENGTH

7. What is the formula for calculating weight?

$W = m \cdot g$

8. What is the SI unit of mass?

kg

9. What is the SI unit of force?

N = newton

10. What is the SI unit of weight?

N = newton

11. What can change the speed and/or direction of an object?

FORCE

12. If an object is at rest, what's true of the net force on the object?

$F_{net} = 0$

13. What's also true about the acceleration of the object in the previous question?

$a = 0$

14. If an object is moving in a straight line at constant speed, what's true of the net force on the object?

$F_{net} = 0$

15. What's also true about the acceleration of the object in the previous question?

$a = 0$

16. What's the relationship between balanced forces and a net force of zero?

if $F_{net} = 0$, balanced force is result

17. Is force a vector quantity? Why or why not?

YES - has direction

18. Does mass change with location? Why or why not?

NO - b/c changing location doesn't add/subtract matter

19. Does weight change with location? Why or why not?

YES - Gravity strength can change

20. Do all forces act through direct contact? If not, name a force that does not require direct contact to affect objects.

NO - Gravity

For each problem below, carry out these steps:

- Write the **formula** that you will use to solve the problem
- Re-write the formula, substituting known values **with units**
- Write the answer using the proper **unit**
- Check you answer for the proper number of **significant figures**
- Check you work for accuracy

1. If a cow has a mass of 300 kg, what is its weight on Earth?

$$W = m \cdot g = (300\,kg)(9.8\,N/kg) = 3000\ N$$

2. If a human travels to Mars, and has a mass of 75 kg and a weight of 278 Newtons, what is the strength of gravity on Mars?

$$g = \frac{W}{m} = \frac{278\,N}{75\,kg} = 3.7\ N/kg$$

3. If the strength of gravity on Saturn is 11.2 N/kg, and a pretzel has a mass of 0.01 kg, what is the weight of the pretzel on Saturn?

$$W = m \cdot g = (0.01\,kg)(11.2\,N/kg) = 0.1\ N$$

4. If the 1.00 cm flag of an energy car passes through a photo gate in 0.0725 seconds, what is the speed of the energy car?

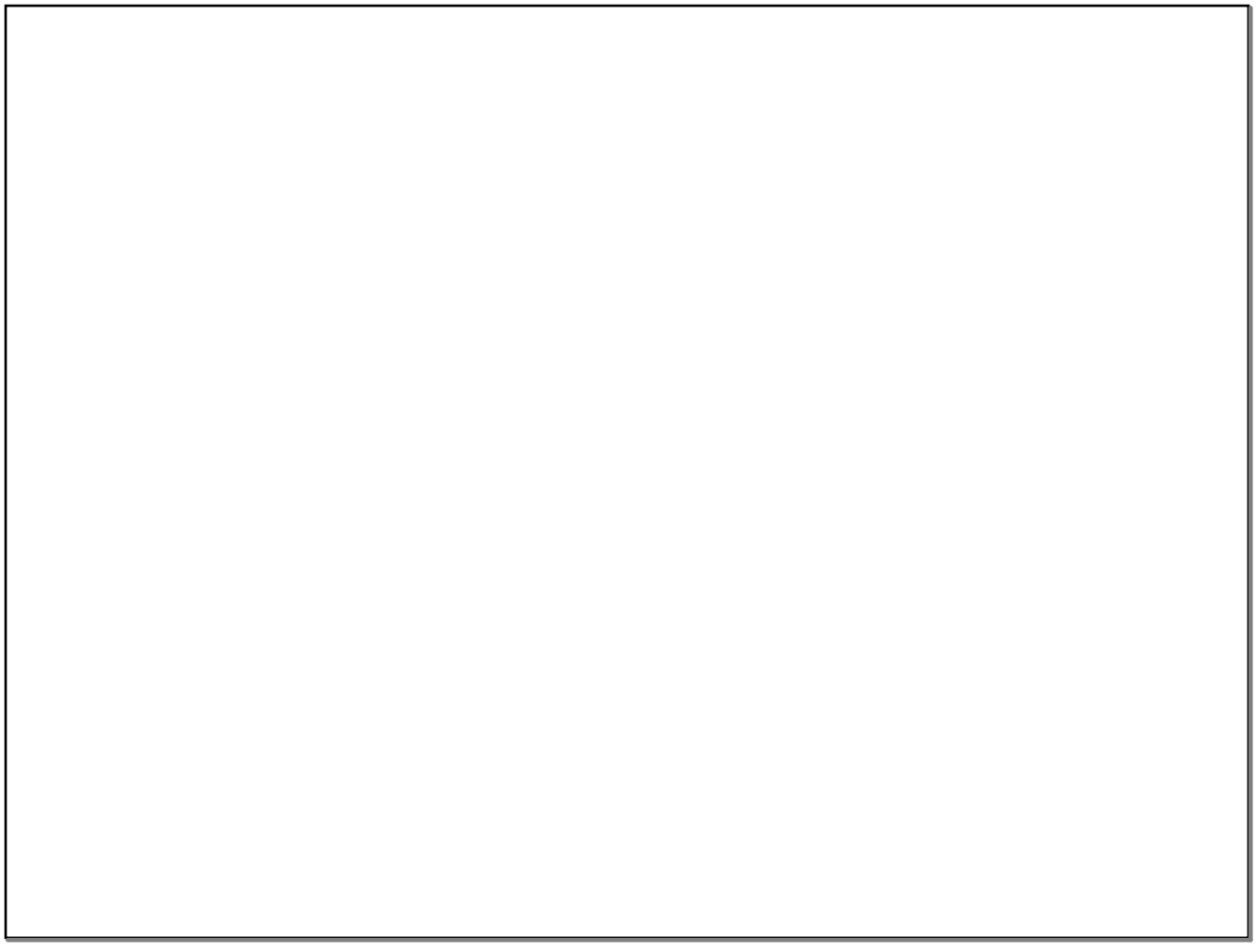
$$s = d/t = \frac{1.00\,cm}{0.0725\,s} = 13.8\ cm/s$$

5. If the speed of an energy car is measured at 140 cm/s at one photo gate, and 0.60 seconds later has a speed of 110 cm/s, what is the acceleration of the energy car?

$$a = \frac{v_f - v_i}{t} = \frac{110\,cm/s - 140\,cm/s}{0.60\,sec} = \frac{-30\,cm/s}{0.60\,s}$$

$$= -50.\ cm/s^2$$

January 20, 2015



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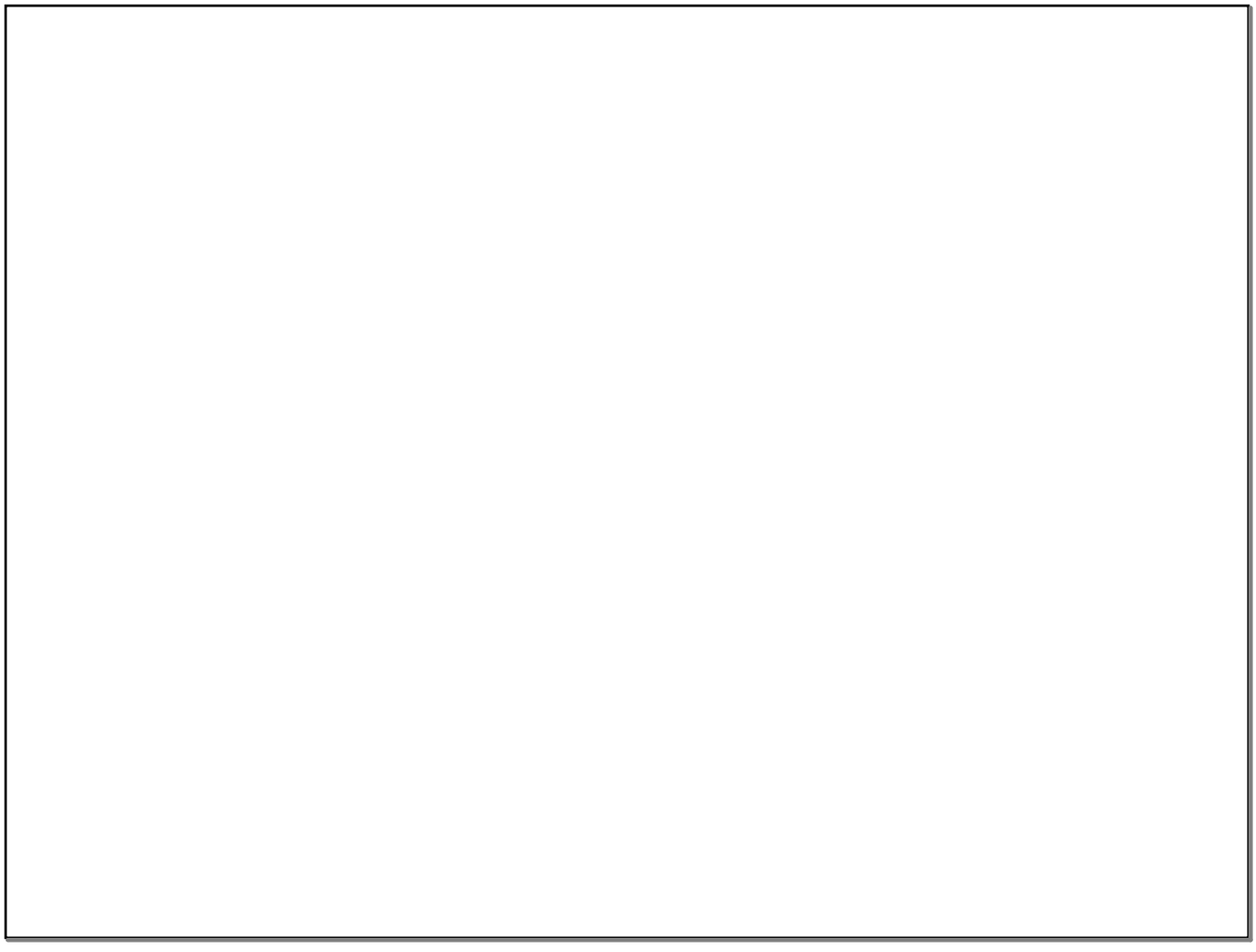

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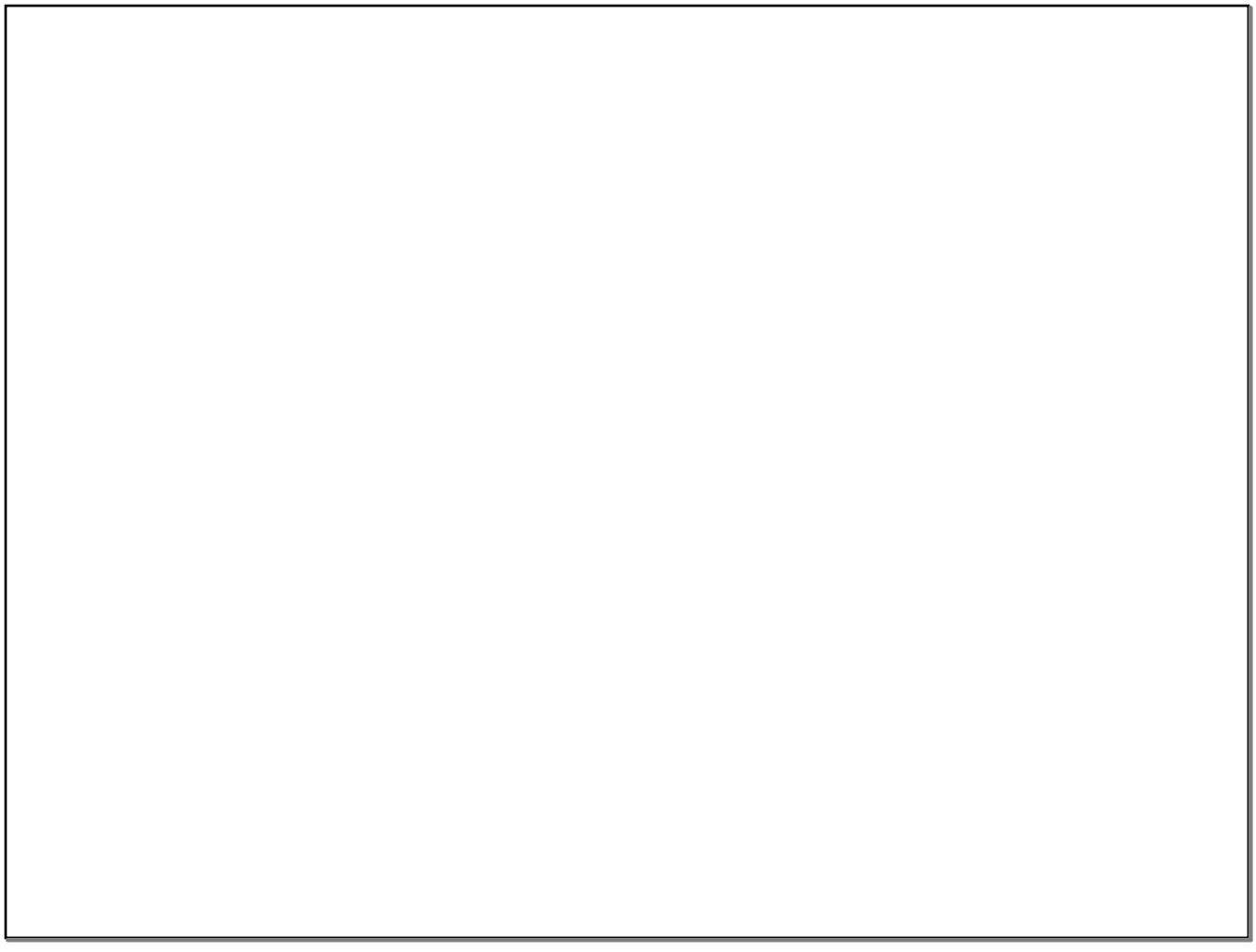

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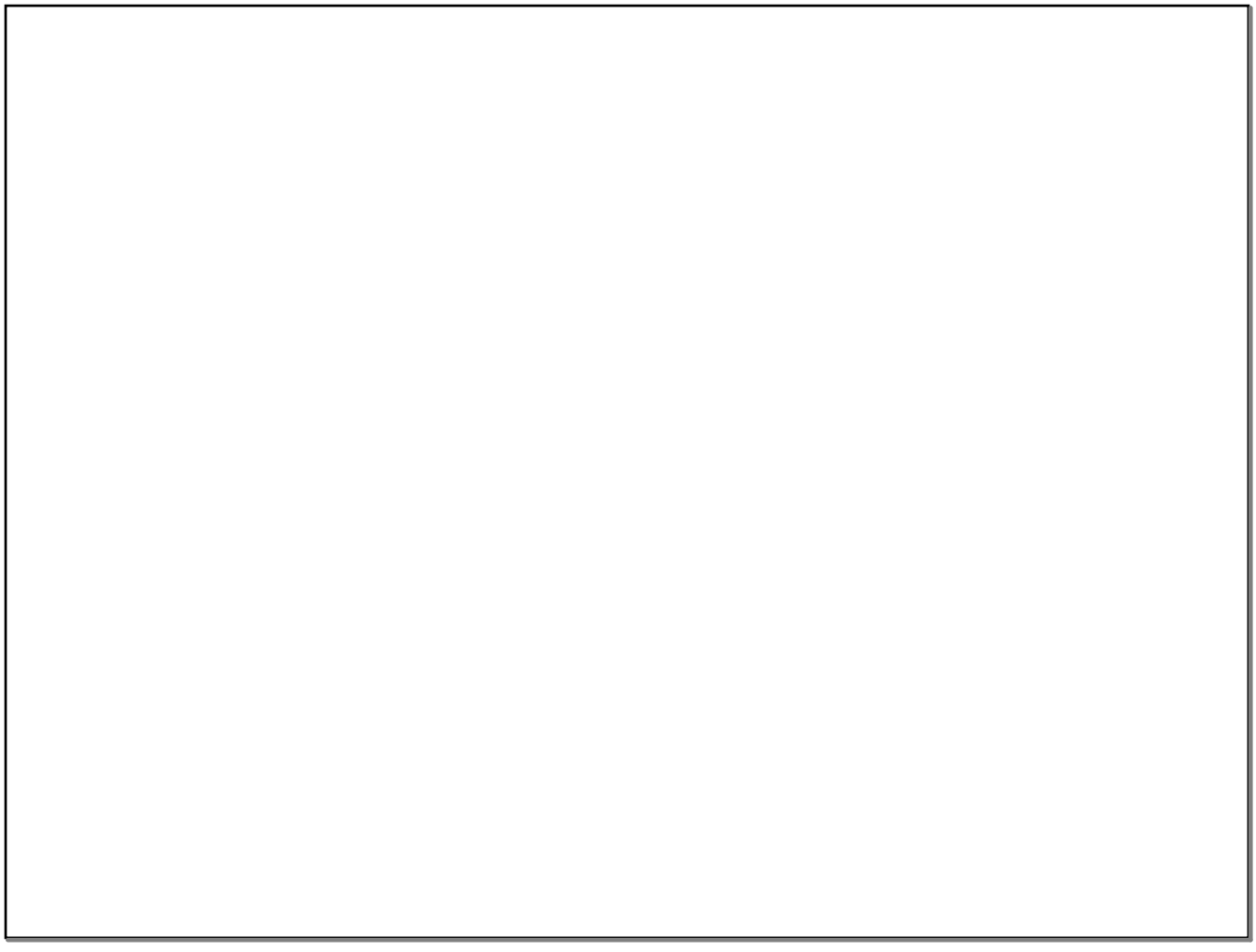

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