Newton’s Second Law of Motion F = m x a

Explain your answers

The force applied to objects A, B, and C in the diagram below is equal. The masses of the objects being pushed are indicated. Based on this information, answer the questions below.

**Starting Line** **Finish Line**

**5.0 kg**

**A**

**2.5 kg**

B

**C**

**0.5 kg**

1. The contestant whose object accelerates most is \_\_\_\_\_\_.

2. The contestant whose object accelerates less than B's is \_\_\_\_\_\_.

3. The contestant whose object accelerates twice as much as A's is \_\_\_\_\_\_.

4. The contestant whose object accelerates ten times less than C's is \_\_\_\_\_\_.

5. Assuming a force of 50 N is applied to each object by each contestant, what is the acceleration of object A? \_\_\_\_\_\_ B? \_\_\_\_\_\_ C? \_\_\_\_\_\_ [SHOW WORK]

6. Now suppose the race ends in a tie and all objects have the same acceleration. This means that the force applied to each object is different. If the acceleration is 50 m/sec/sec, what force is applied on A? \_\_\_\_\_\_ B? \_\_\_\_\_\_ C? \_\_\_\_\_\_ [SHOW WORK]

Newton’s Second Law of Motion F = m x a

**Starting Line** **Finish Line**

**5.0 kg**

**A**

B

**2.5 kg**

**C**

**0.5 kg**

1. The contestant whose object accelerates most is C

*a = f/m since the force is equal, the smallest mass will accelerate the most*

2. The contestant whose object accelerates less than B's is A.

*a = f/m since the force is equal, the largest mass will accelerate the least*

3. The contestant whose object accelerates twice as much as A's is \_\_\_\_\_\_ .

*a = f/m since the force is equal, the largest mass has twice the mass of B*

4. The contestant whose object accelerates ten times less than C's is \_\_\_\_\_\_ .

*a = f/m since the force is equal, the largest mass has 10 times the mass of C*

5. Assuming a force of 50 N is applied to each object by each contestant, what is the acceleration of object A? 10 m/s/s B? 20 m/s/s C? 100 m/s/s

*a = f/m A a =50 N/5 kg B a =50 N/2.5 kg C a =50 N/0.5 kg*

6. Now suppose the race ends in a tie and all objects have the same acceleration. This means that the force applied to each object is different. If the acceleration is 50 m/sec/sec, what force is applied on A? 250 N B? 125 N C? 25 N

*f = ma FA =5 kg(50 m/s/s) FB =2.5 kg(50 m/s/s) FC =0.5 kg(50 m/s/s)*