

NEWTON'S 2ND LAW SAYS AN OBJECT'S ACCELERATION DEPENDS ON ITS MASS, AND THE AMOUNT OF FORCE USED ON IT.



YOU CAN WRITE THIS LAW IN TERMS OF FORCE (F)...

$$F = m \times a$$

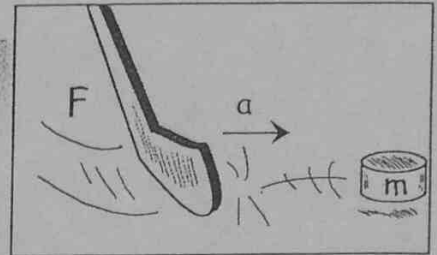


OR DIVIDE BOTH SIDES BY MASS (m)...

$$\frac{F}{m} = \frac{m \times a}{m}$$

AND WRITE IT IN TERMS OF ACCELERATION (a):

$$\frac{F}{m} = a$$



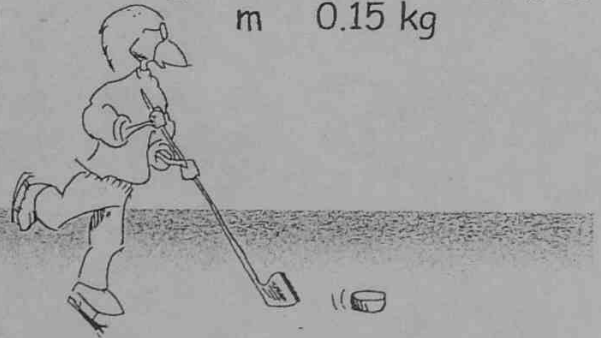
HERE, THE PUCK ACCELERATES, OR SPEEDS UP, IN THE DIRECTION OF THE FORCE.

$$a = \frac{F}{m}$$

THE MORE FORCE YOU USE, THE MORE IT ACCELERATES...
...BUT ACCELERATION IS LESS FOR PUCKS WITH MORE MASS.

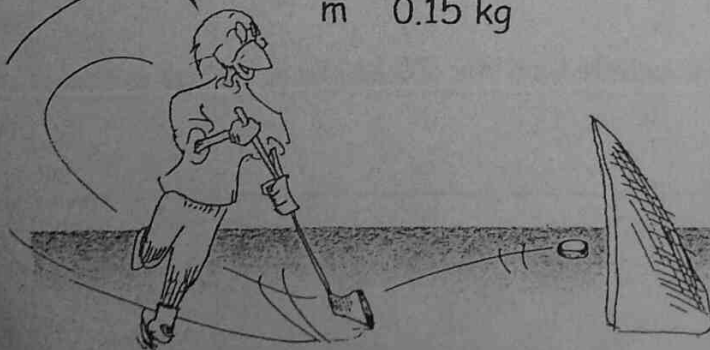
NOW WATCH! USING ONLY 0.15 N OF FORCE ON THIS 150 g HOCKEY PUCK WILL ONLY CAUSE IT TO SPEED UP SLIGHTLY.

$$a = \frac{F}{m} = \frac{0.15 \text{ N}}{0.15 \text{ kg}} = 1 \text{ m/s}^2$$



BUT IF I USE 15 N OF FORCE, THE PUCK PICKS UP SOME SERIOUS SPEED.

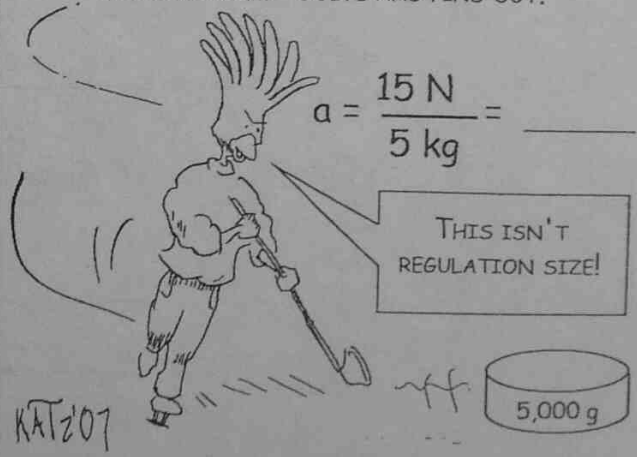
$$a = \frac{F}{m} = \frac{15 \text{ N}}{0.15 \text{ kg}} = 100 \text{ m/s}^2$$



WILL APPLYING THE SAME AMOUNT OF FORCE TO A PUCK WITH MORE MASS RESULT IN LESS ACCELERATION? SOLVE AND FIND OUT.

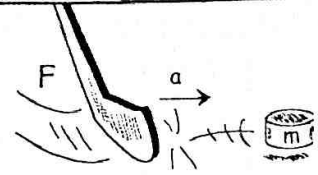
$$a = \frac{15 \text{ N}}{5 \text{ kg}} = \underline{\hspace{2cm}}$$

THIS ISN'T REGULATION SIZE!





STUDY QUESTIONS



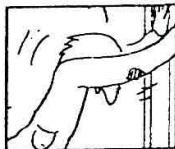
Directions: Answer the following questions to the best of your ability.



1. Translate the equation $F = ma$ into a sentence.



2. How does the amount of force you use affect the acceleration of a hockey puck?



3. Suppose you push two boxes with a force of 5 N. One box has a mass of 1 kg and one box has a mass of 2 kg. Which box will speed up faster? Why?



4. After being hit with a hockey stick, a .20 kg puck accelerates at 50 m/s^2 . What is the amount of force exerted on the puck?



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