

Interaction Forces (p. 102 - 107)

Examples:
 - Rockets
 - Guns

I. Identifying Interaction Forces

1. Forces always come in pairs.

Circle One : True False

2. What is the difference between $F_{A \text{ on } B}$ and $F_{B \text{ on } A}$? (Interaction pair)

$F_{A \text{ on } B}$ = Force of object A on object B
 $F_{B \text{ on } A}$ = Force of object B on object A

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Equal each other!

3. Define the term interaction pair (action-reaction pair of forces).

Interaction Pair - two forces in opposite directions ~~of~~ must have equal magnitude

Opposite direction!

4. Two forces exist together or not at all.

Circle One : True False

II. Newton's Third Law

1. Define Newton's Third Law.

Newton's Third Law - all forces come in pairs
 (Two forces in a pair act on different objects and are equal in strength and opposite in direction.)

2. Write out the formula to determine Newton's Third Law.

$$F_{A \text{ on } B} = -F_{B \text{ on } A}$$

Snapping Rubber Band

3. If a soccer ball is sitting on a table, why are the table and Earth not considered an interaction pair?

Acting on same object (soccer ball), but not each other. (in this system)

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4. What are the two interaction pairs of the soccer ball on the table?

1. $F_{\text{ball on table}} = -F_{\text{table on ball}}$

2. $F_{\text{ball on Earth}} = -F_{\text{Earth on ball}}$

5. An interaction pair must consist of two forces of equal magnitude pointing in the same direction.

Circle One : True False

opposite

6. Why can acceleration caused by the force of an object interacting with Earth be ignored?

- Too small a value. (relative size of object to Earth is very small.)

III. Force Of Ropes & Strings

1. Define the term tension.

Tension - force exerted by a string or rope

2. All ropes or strings in calculations are assumed to be massless.

3. What are the two forces of a rope that interact when an object is hanging below?

1. $F_{\text{top on bottom}}$
2. $F_{\text{bottom on top}}$

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Top

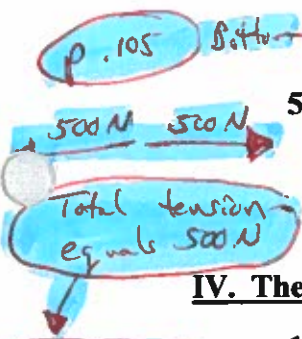
4. The tension of rope is equal to the weight of objects held by it.

Tension everywhere in the rope is equal to bucket's weight.

Circle One : True False

5. How is the tension on a tug-of-war rope determined?

$F_A \text{ on rope} = F_{\text{right on left}}$
 $F_B \text{ on rope} = F_{\text{left on right}}$



IV. The Normal Force

1. Define the term normal force.

Normal Force - perpendicular contact force exerted by a surface on another object

2. Which statement is false concerning the normal force?

- a. The downward force that opposes the normal force is gravity due to Earth.
- b. The normal force is always perpendicular to the plane of contact.
- c. The normal force involves contact between two objects.
- d. The normal force is equal to the weight of the object.

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3. Assume that a box with a string tied to it is sitting on a table. If you lift the box with the string or press down on the box, identify the forces involved.

1. F_N (Normal force)
2. $F_{\text{string on box}}$ (Force applied by person)
3. F_g (Weight)

$$F_N = F_g - F_{\text{string on box}}$$

4. How does the normal force of the table compare to the box when the box is :

Not lifted too!

Lifted : Normal force of table is less than box

Pressed Down : Normal force of table is more than box

doesn't break