# Balanced and Unbalanced Forces

Engage

What To Do:

1. Stand by your table or chair and hold on to it.

2. When your teacher tells you to raise one foot, so you are standing on your other foot.

3. Carefully let go of the table or chair.

4. Do the same thing but have one eye closed.

5. Repeat with both eyes closed.

6. Sit in your chair and describe what happened in the space below.

7. Watch the following video and describe what you observe happening in the video. "Walking a Tightrope Between Mountains" https://www.youtube.com/watch?v=TSfGS7rv3co

Explore

We can show forces by using arrows (they are easy to draw and give lots of information about the force).
Look below at some examples.
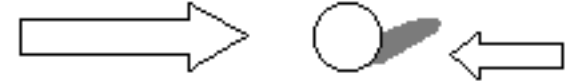
1. The arrows are showing 2 forces acting on it. Are they applied or normal forces? _____

2. What do you think the size of the arrows is telling you?

_____

3. Just by looking at the arrows can you tell if the ball is in motion or at rest?_____

4. If you think it is in motion, in which direction would you say?_____

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Look at the picture below and answer the questions.
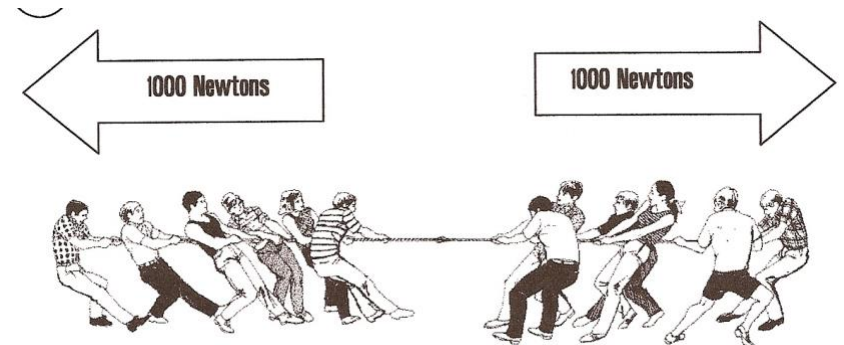
Questions:

1. How many people are pulling on each side? _____

2. Describe the size of the arrows in the picture.

_____

3. What is the measurement of force in each arrow? _____

4. Are the forces the same on each side or different?_____
5. Which direction do you expect the rope to move? _____
6. What would have to change for the rope to move?

_____

Look at the picture below and answer the questions.

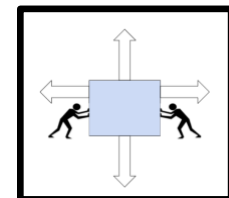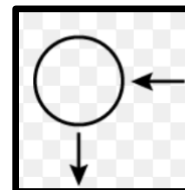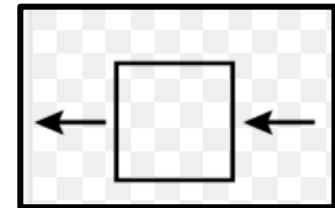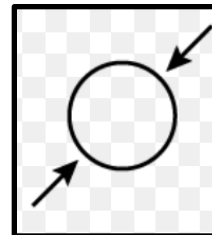200 Newtons

100 Newtons
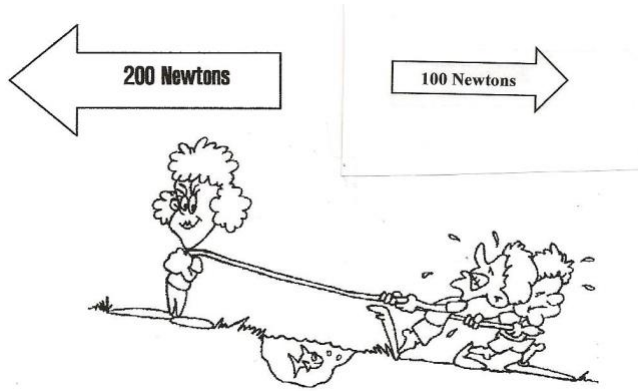
Questions:

1. How many people are pulling on the right side? _____
2. How many people are pulling on the left side? _____
3. Describe the arrows in the picture. _____
_____
4. What is the force in the arrow to the right? _____
5. What is the force in the arrow to the left? _____
6. Are the forces the same on each side or different?_____
7. In what direction will the rope move? _____

Explain

Forces

Balanced

Unbalanced

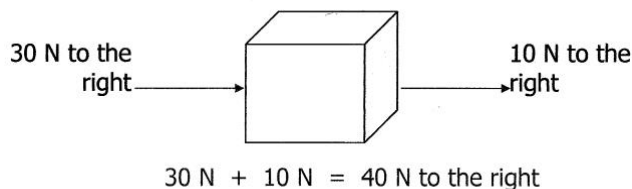Cut out and glue the following pictures on the back of the flaps above.

Net Forces

To find the net force when forces are acting in the same direction, simply add them together.

30 N to the right ———→ 10 N to the right ———→

30 N + 10 N = 40 N to the right

To find the net force when forces are acting in opposite directions, simply subtract the small force from the larger force.

30 N to the right ———→ ←——— 10 N to the left

30 N - 10 N = 20 N to the right
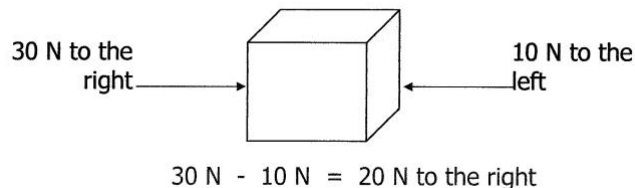
When the net force is zero, the forces are balanced. Balanced forces do not cause a change in an object's motion.

30 N to the right ———→ ←——— 30 N to the left

30 N - 30 N = no change in motion
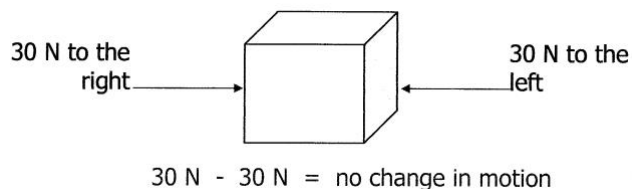
Materials: Net Forces Cards

What To Do:
1. Look at the cards you and your partner have been given.
2. Place the 5 "word" cards on your table.
3. Look at the "forces" cards and place them in the correct categories found on the word cards.

Questions:
1. Which "forces" cards belong in the category Moves Up? _____
2. Which "forces" cards belong in the category Moves Down? _____
3. Which "forces" cards belong in the category Moves Left? _____
4. Which "forces" cards belong in the category Moves Right? _____
5. Which "forces" cards belong in the category Stays Still? _____

6. Calculate the net force on card A. _____

7. Are the forces balanced or unbalanced? _____

8. Does the object move or stay still? _____

9. Calculate the net force on card C. _____

10. Are the forced balanced or unbalanced? _____

11. Does the object move or stay still? _____

12. Calculate the net force on card M. _____

13. Are the forces balanced or unbalanced? _____

14. Does the object move or stay still? _____

15. What happens to objects with unbalanced forces?
_____
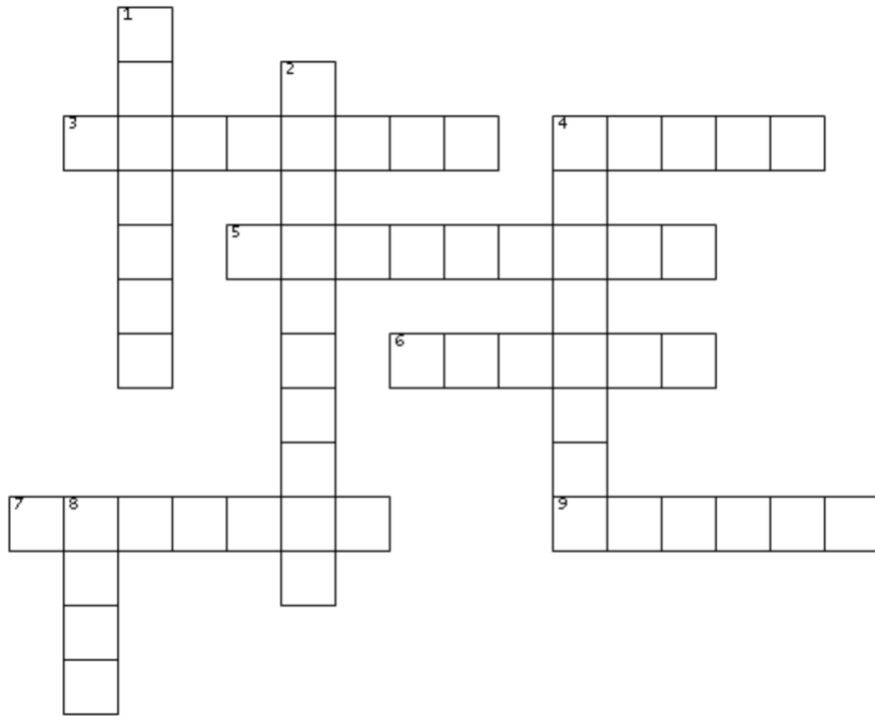
ACROSS

3. When two forces acting in opposite directions on a object are equal in size
4. A push or a pull
5. A force that attacks some metal objects
6. The unit for force
7. A force that is exerted on an object by a person or other object
9. A force that surfaces exert to prevent solid objects from passing through each other

DOWN

1. The force that attracts an object toward the center of the earth
2. When two forces acting on an object are not equal in size
4. The resistance to sliding
8. Using force to move an object toward you

Evaluate

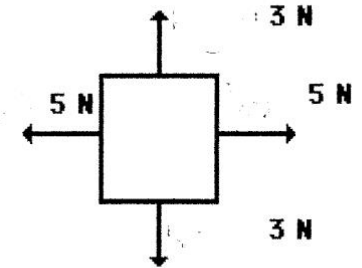Name _____   period ____

EXIT TICKET

Balanced and Unbalanced Forces

1. The net force acting on the box is –

    a. 0 N
    b. 6 N
    c. 10 N

2. The forces acting on this box are –

    a. Balanced
    b. Unbalanced
    c. NonNewtonian
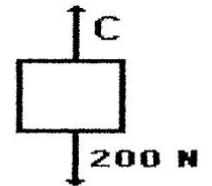

3. What will happen to the box?

    a. It will move to the right.
    b. It will move upwards.
    c. It will not change its motion

4. The net force on the box to the right is 900 N. The down force is 200 N. How much force is acting in the direction of C?

    a. 200 N
    b. 1100 N
    c. 700 N

$F_{net} = 900$ N, up

5. The forces action on the box are-

    a. Balanced
    b. Unbalanced
    c. NonNewtonian

Moves left	Moves down	Moves up
	Stays still	**Moves right**

A — 3 N (up), 2 N (down), 1 N (down)

D — 4 N (left), 2 N (right), 2 N (right)

G — 4 N (left), 2 N (right), 3 N (right), 2 N

J — 3 N (left), 3 N (left), 5 N (right), 3 N

M — 4 N (left), 2 N (right)

C — 4 N (up), 3 N (down), 2 N (down)

F — 2 N (up), 2 N (up), 5 N (down)

I — 3 N (left), 2 N (right)

L — 4 N (up), 3 N (down)

B — 3 N (left), 3 N (right)

E — 4 N (left), 5 N (right)

H — 2 N (up), 2 N (down)

K — 2 N (up)