

Define inertia.

Distinguish between force and net force.



Inertia

Inertia

Pictured below is a ping pong ball on a table.
Observe.



Inertia

Why did the ball start to move?



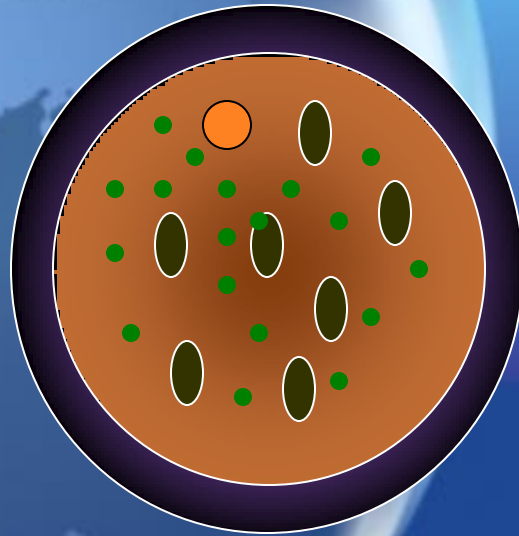
Inertia

Why did the ball continue to move?



Inertia

- A man rotates his bowl of soup to get to a tasty carrot. What happens?



Inertia

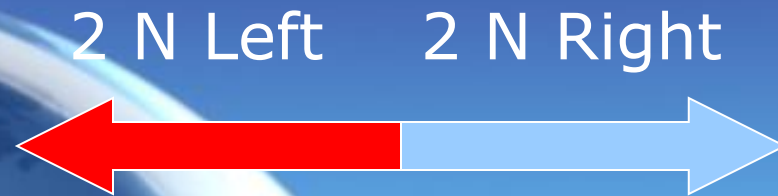
- Inertia is a property of all objects to remain as they are.
 - Objects in motion stay in motion
 - Objects at rest stay at rest
- Inertia was first introduced by Galileo

Net Forces

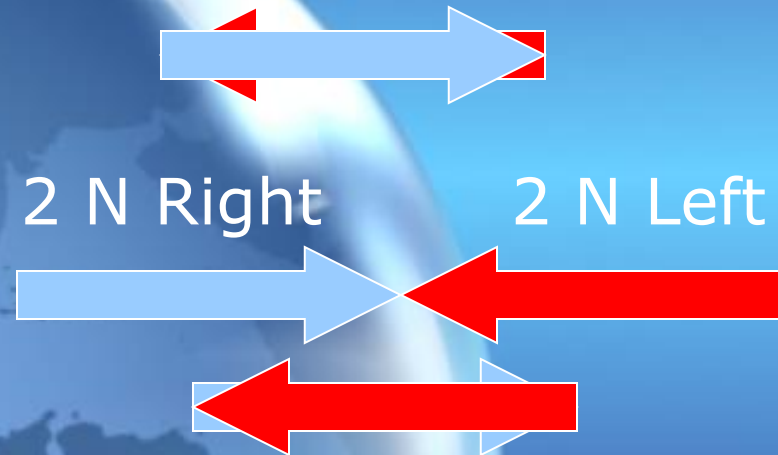
- The net force on an object is the combination of all forces acting on that object
- Net force = ΣF



Net Force



$$\Sigma F = 0$$



$$\Sigma F = 0$$

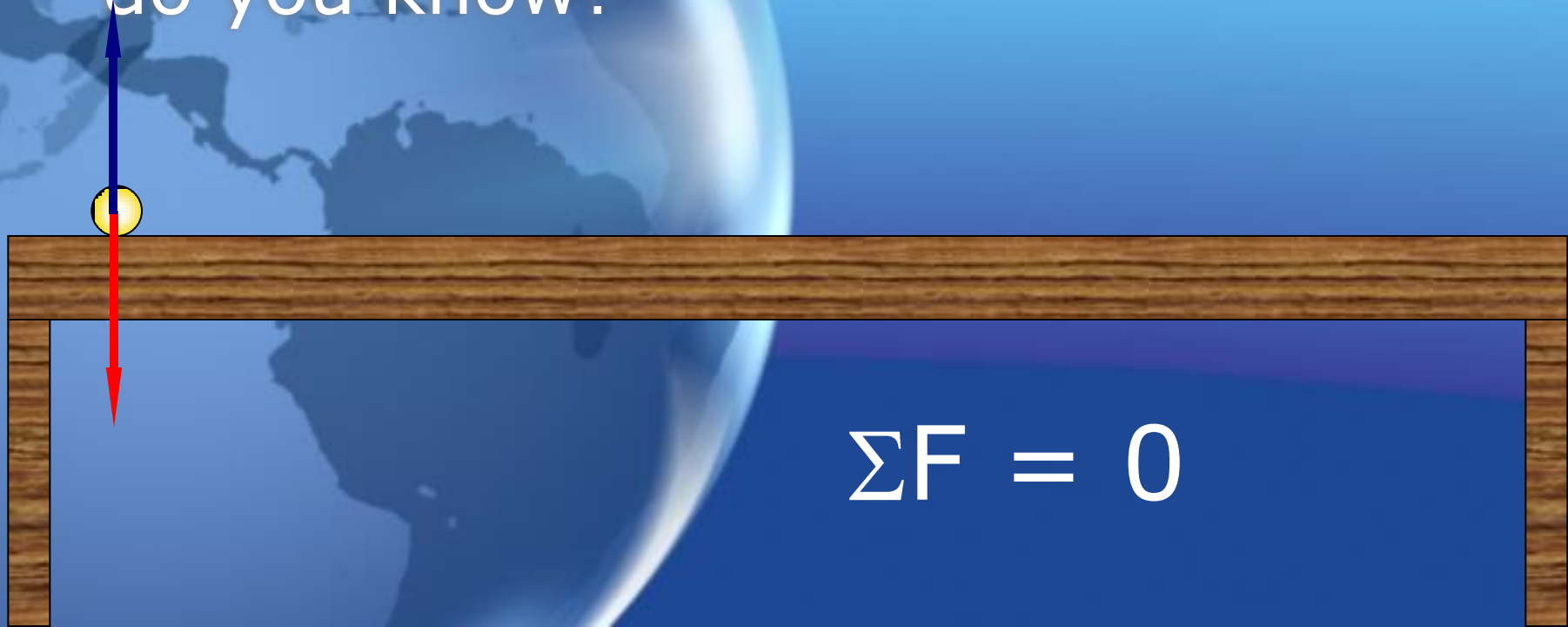
Balanced Forces

- If these forces cancel out, the net force is equal to zero. ($\Sigma F = 0$)
- No change in motion will occur from these balanced forces.



Balanced Forces

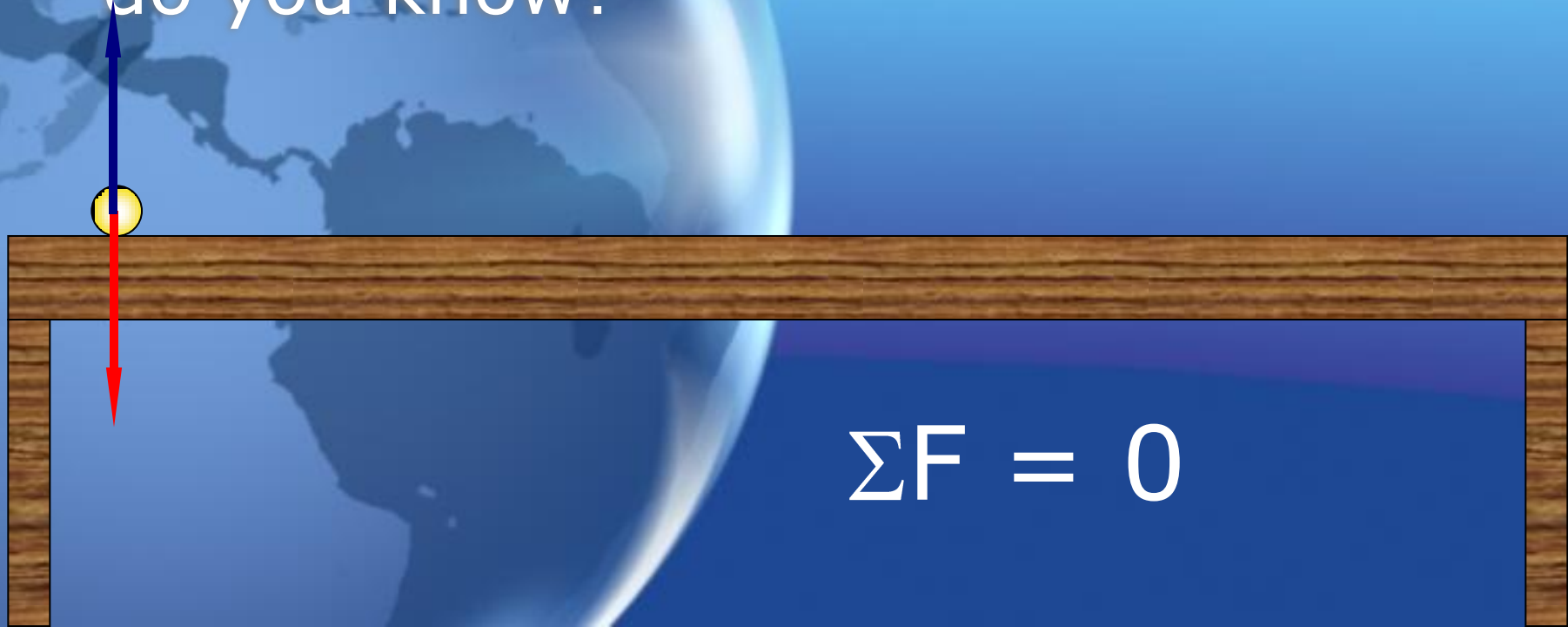
- What forces are acting on the ball?
- Are these forces balanced? How do you know?



$$\Sigma F = 0$$

Balanced Forces

- What forces are acting on the ball?
- Are these forces balanced? How do you know?



$$\Sigma F = 0$$

Balanced Forces

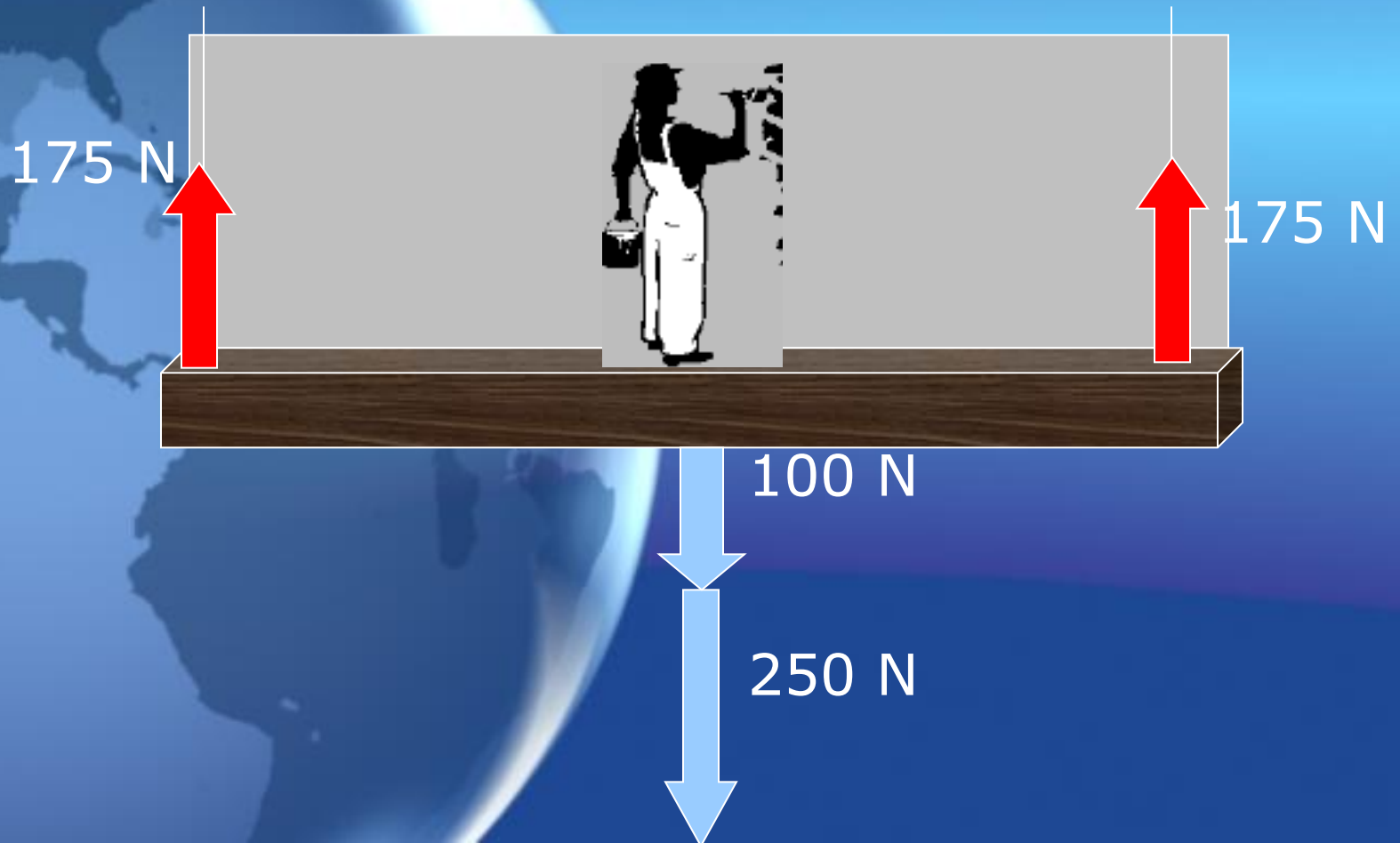
- For each of the previous examples, no change occurred in the object's motion.
 - The object at rest stayed at rest.
 - The object in motion remained at that constant velocity.
- If the net force on an object is zero, it will continue with the same motion.

Balanced Forces

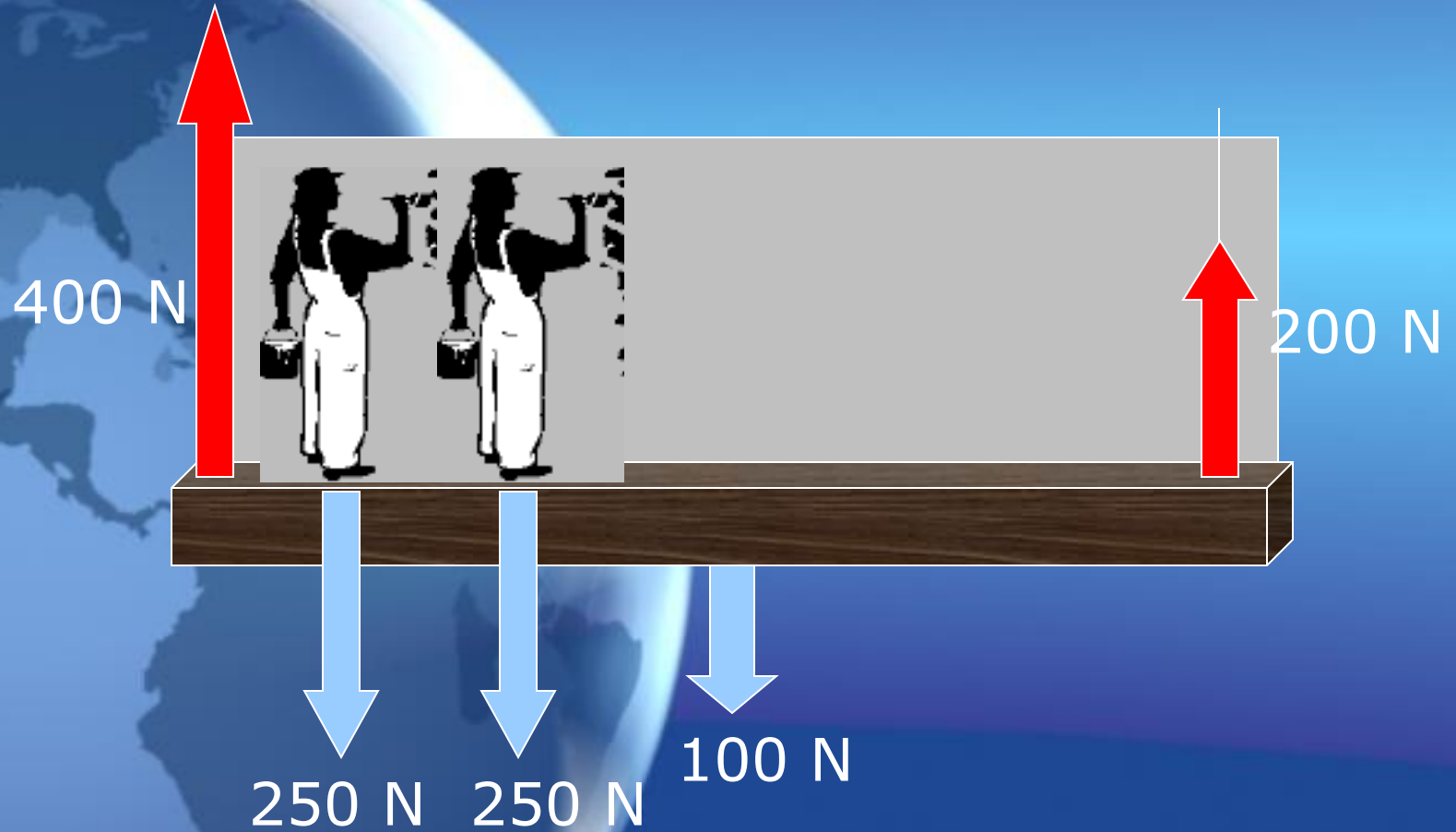


- Isabelle Inertia hangs from two rings.
- Is her motion changing?
- If Isabelle weighs 100 Newtons, what would the force of tension on each line be?

Balanced Forces



Balanced Forces



Net Forces

- What type of net force will cause a change in motion?
- Why did the ball initially begin to move?

Net Force

1 N Right 2 N Left



$$\Sigma F = 1 \text{ N Left}$$

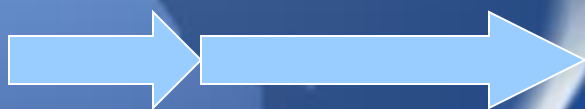
1 N Left 2 N Right



$$\Sigma F = 1 \text{ N Right}$$

1 N Right

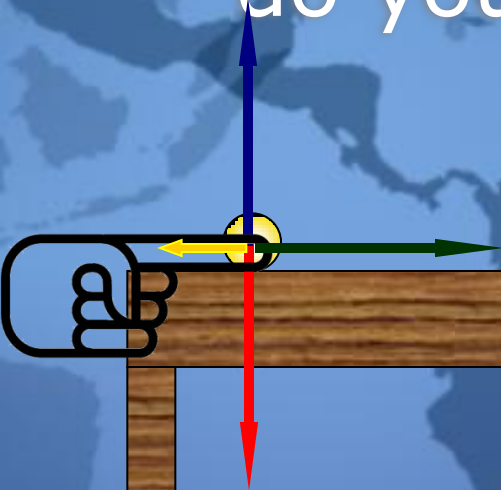
2 N Right



$$\Sigma F = 3 \text{ N Right}$$

Unbalanced Forces

- What forces are acting on the ball?
- Are these forces balanced? How do you know?

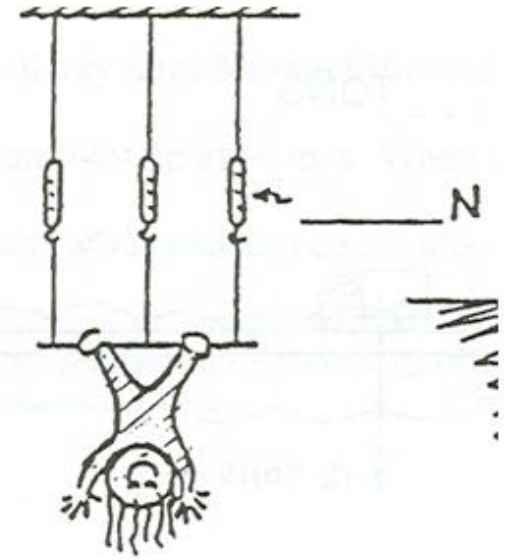
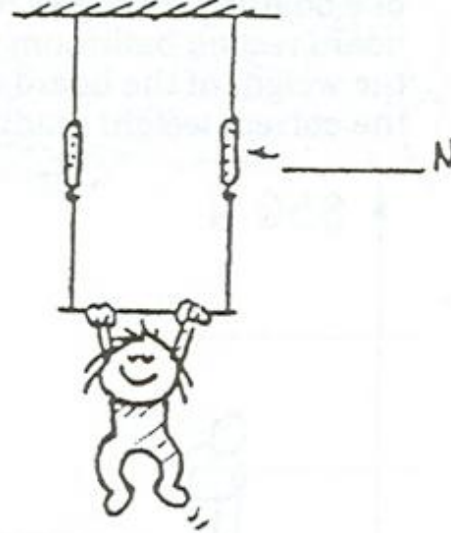
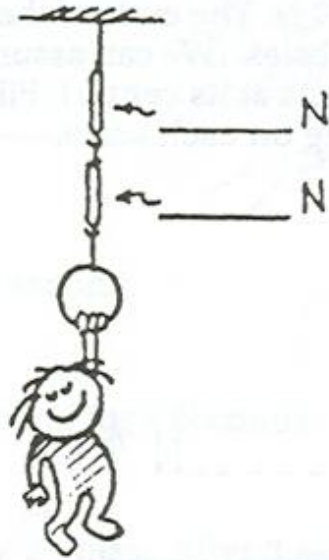
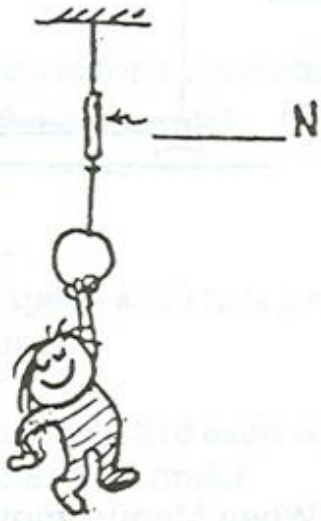


$$\Sigma F \neq 0$$

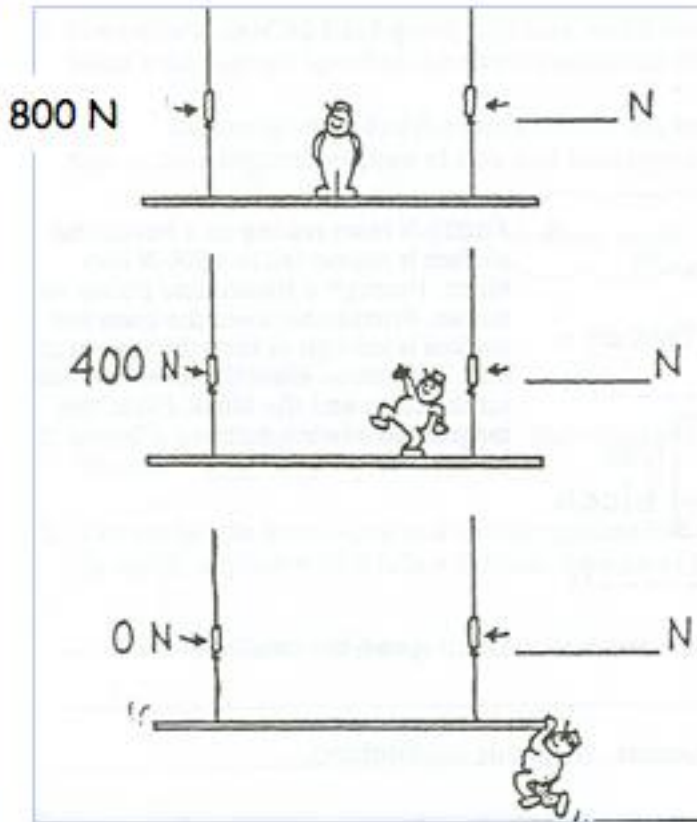
Unbalanced Forces

- Unbalanced forces cause a change in an object's velocity.
- A change in velocity is an acceleration.
 - Speeding up
 - Slowing down
 - Changing direction
- An object must have an unbalanced force acting on it in order to accelerate.

If little Nellie Newton weighs 96 N, fill in the 5 scale readings in the pictures below.

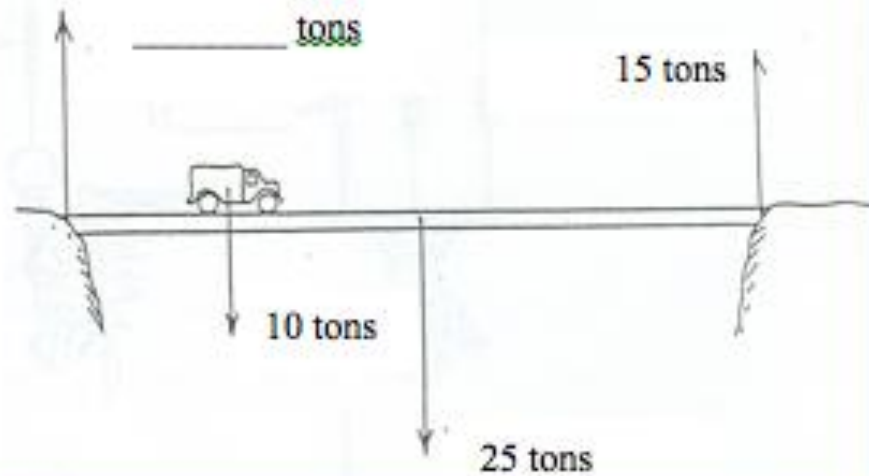
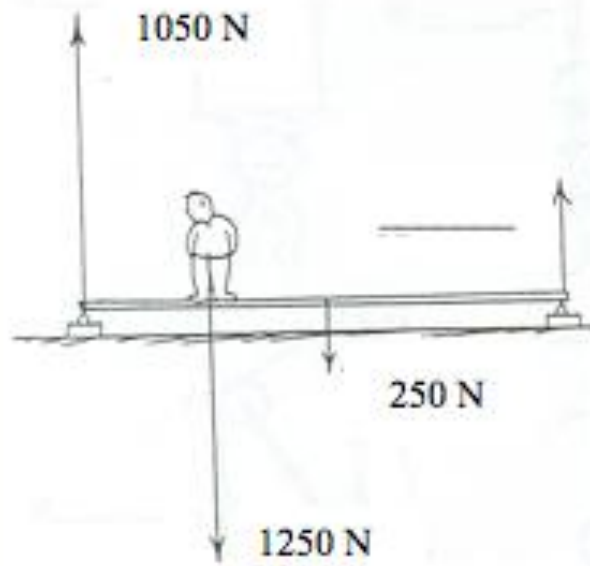
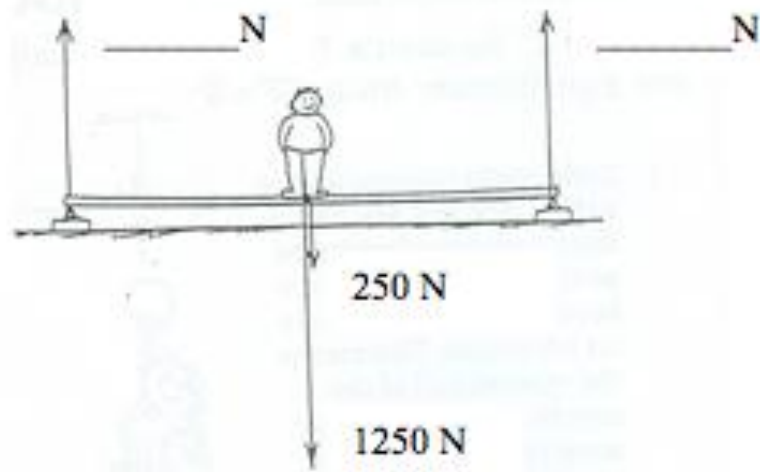


If Burl is standing in the middle of the staging in the first picture, write the scale readings for the other scales.

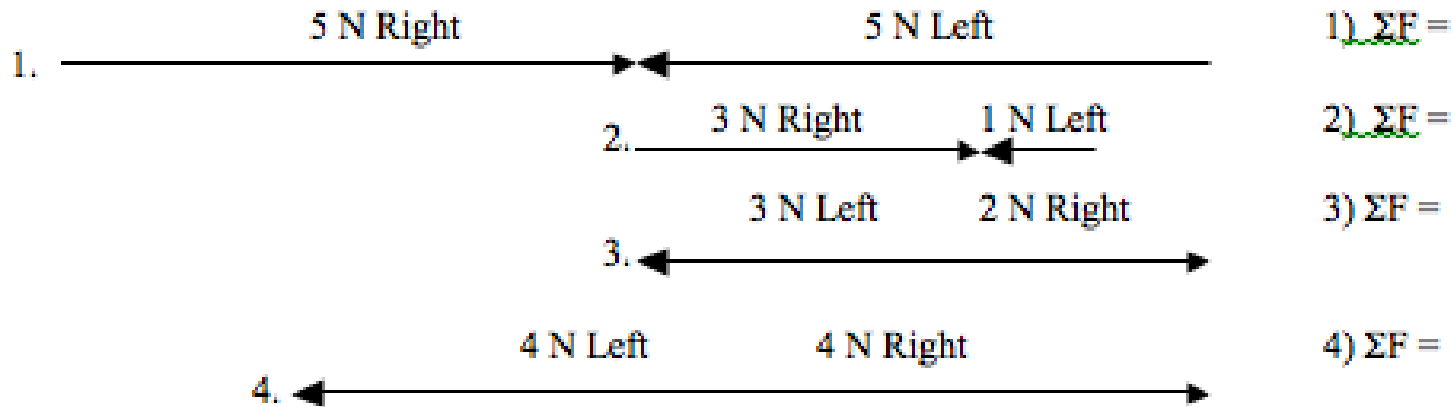


What is the total weight of Burl and the staging?

Fill in the blanks using the information given in each picture.



Determine the net force for each of the following:



5. What is the largest force present in the above examples? _____
6. What is the largest net force present in the above examples? _____
7. Which of the force pairs above would cause acceleration on an object? _____
8. Which of the force pairs above represent equilibrium? _____