

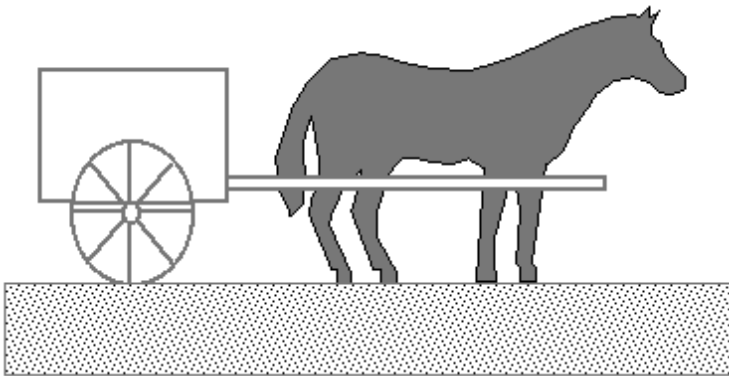
CHAPTER 7

HORSE & CART

The horse & cart problem:

FORCES:

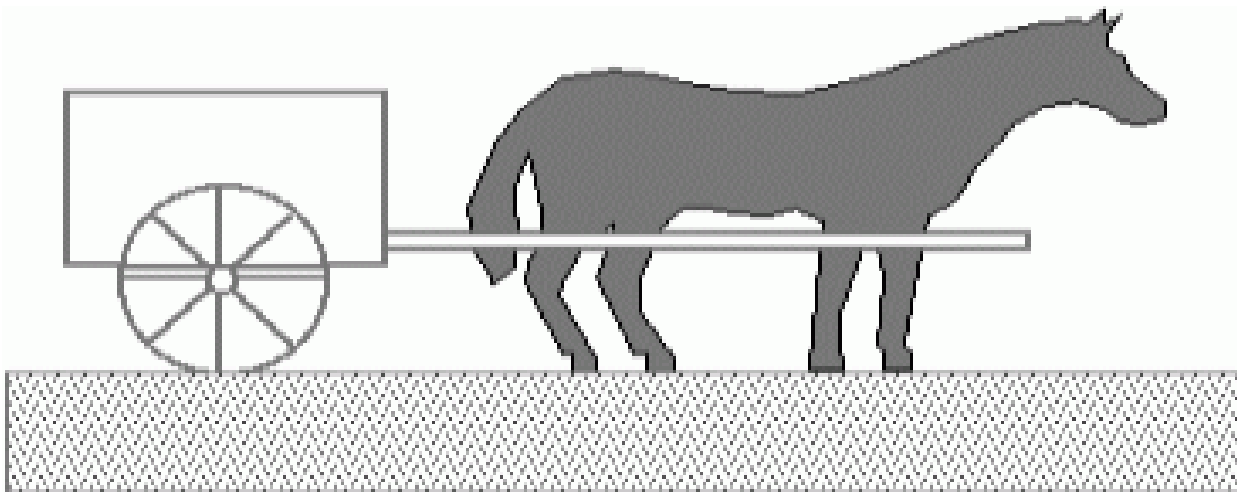
- Ground
- Wagon
- Horse



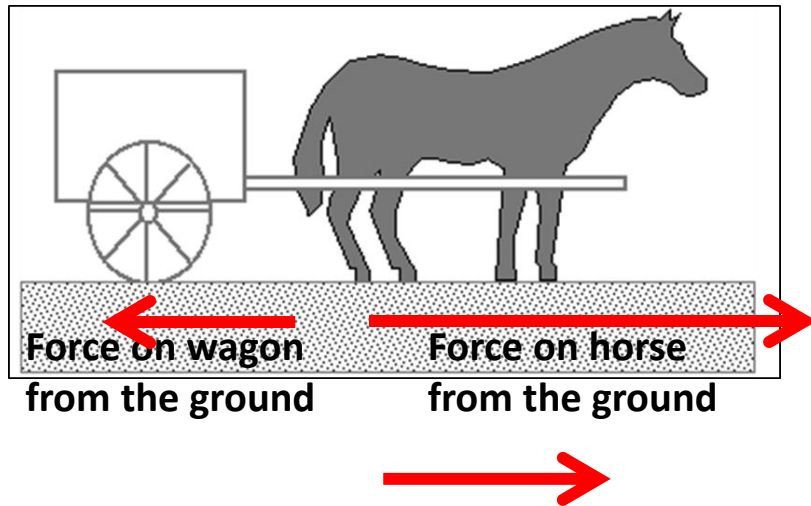
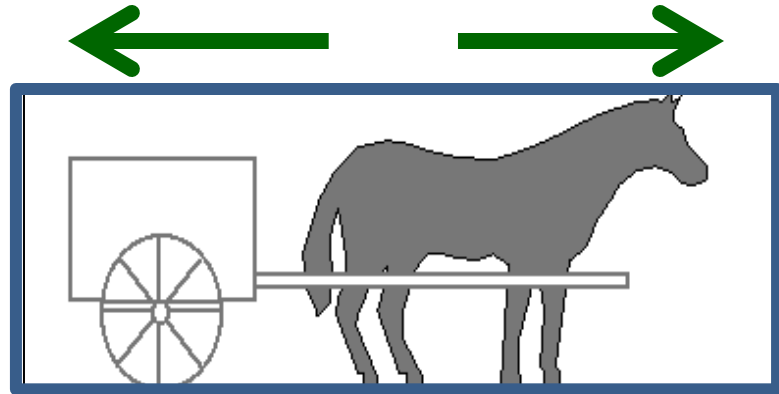
<http://www.batesville.k12.in.us/physics/phynet/mechanics/newton3/Images/HorseCart3.GIF>

- Draw the forces using horizontal arrows drawn in the direction of the force(s) and with relative magnitude.
- The force must be drawn on the object getting pushed or pulled.
- Label the force with the object doing the pushing or pulling.
- **Color code the arrows** that represent the **action-reaction pair(s)**

- The wagon exerts a force on the horse.
- The horse exerts a force on the wagon.
- The horse exerts a force on the ground.
- The ground exerts a force on the horse.
- Label these forces with arrows going in the correct direction.

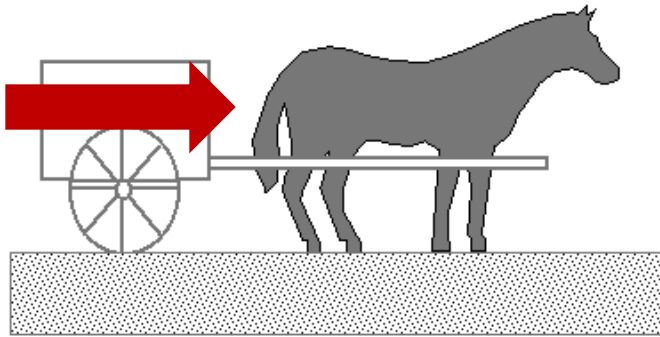


The horse and wagon as a system:



- The forces of the horse on the cart and the forces of the cart on the horse will cancel each other out.
- Another force outside of this “system” needs to act upon the “system” in order to accelerate the horse and wagon.
 - That outside force will be the ground.
- The force of the ground is greater on the horse than it is on the wagon
 - The system accelerates.

Why the wagon accelerates?



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

- There is a net (unbalanced force) on the wagon.

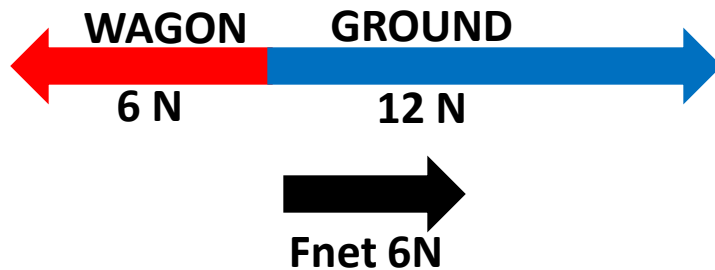
-

_____.

- Manipulating $F=ma$, the acceleration of the _____ is equal to the Force of the horse on the _____ divided by the mass of the _____.

Why the horse & wagon accelerates?

Forward Force on the Horse



- 2 forces act on the horse.

— _____
_____.

— _____
_____.

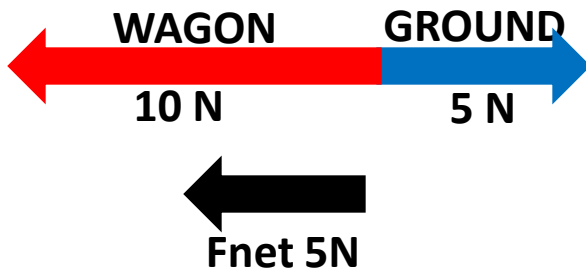
- The ground pushes the horse forward more than the wagon pulls the horse back.

- The net force is in a

_____.

When would the horse decelerate?

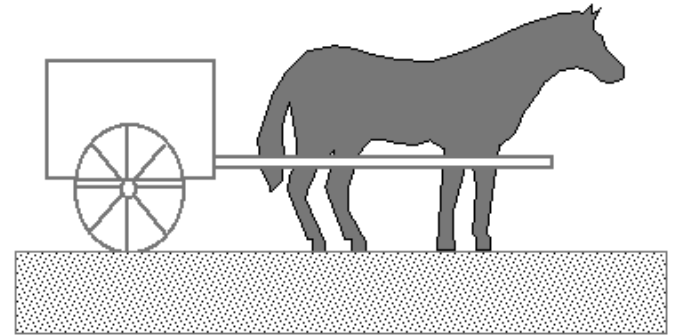
Backward Force on the Horse



- _____

- Most likely to happen

- Acceleration?



- Does the wagon pull on the horse? _____
- Does the horse pull on the wagon? _____
- Does the wagon accelerate? _____
- Does the horse accelerate? _____
- Does the ground accelerate? _____

Does the Earth accelerate?

- The horse is the one force pushing on the Earth, so there is a net force on the Earth.
- Because the Earth is massive, the acceleration rate is minimal...too little to notice.

The end....

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