FCAT Review – Forces and Changes in Motion

SC.6.P.13.1 - Investigate and describe types of forces including contact forces and forces acting at a distance, such as electrical, magnetic, and gravitational.

SC.6.P.13.2 - Explore the Law of Gravity by recognizing that every object exerts gravitational force on every other object and that the force depends on how much mass the objects have and how far apart they are.

SC.8.P.8.2 - Differentiate between weight and mass recognizing that weight is the amount of gravitational pull on an object and is distinct from, though proportional to, mass.

SC.6.P.13.3 - Investigate and describe that an unbalanced force acting on an object changes its speed, or direction of motion, or both.

SC.6.P.12.1 - Measure and graph distance versus time for an object moving at a constant speed. Interpret this relationship.

Essential Questions and Answers

1. What is a force?

A force is a push or a pull acting upon an object.

A force usually results from an interaction. The interaction can be a physical one, or a non-physical one. Forces resulting from physical interaction are called 'Contact Forces' and examples include Frictional, Tension, Air resistance and Spring force.

A force resulting from non-physical interaction is called 'Action-at-a-distance force' and examples include gravitational, electrical or magnetic force.
2. **What are the types of forces?**

There are two types of forces:

1. **Contact Forces**
   - Frictional Force - The friction force is the force exerted by a surface as an object moves across it or makes an effort to move across it.
   - Tension Force - The tension force is the force that is transmitted through a string, rope, cable or wire when it is pulled tight by forces acting from opposite ends.
   - Normal Force - The normal force is the support force exerted upon an object that is in contact with another stable object.
   - Air Resistance Force - The air resistance is a special type of frictional force that acts upon objects as they travel through the air.

2. **Applied Force** - An applied force is a force that is applied to an object by a person or another object.
3. **Spring Force** - The spring force is the force exerted by a compressed or stretched spring upon any object that is attached to it.
2. **Action-at-a-Distance Forces**
   - **Gravitational Force** - The force of gravity is the force with which the earth, moon, or other massively large object attracts another object towards itself.
   - **Electrical Force** - The attractive or repulsive interaction between any two charged objects.
   - **Magnetic Force** - A force of attraction or repulsion that acts at a distance. It is due to a magnetic field, which is caused by moving electrically charged particles.

3. **What is the Law of Gravity?**
   The Law of Gravity states that two bodies exert a gravitational attraction for each other that increases as their masses increase and as the distance between them decreases.
   Example: The more mass and object has the greater the gravitational force.

4. **What is weight?**
   Weight is a force caused by gravity. Because it is a force, it is also measured in Newton (N). It is the gravitational force between the object and the Earth. An object will have greater weight if it has more mass.
5. **What is mass?**

Every object is made up of matter (Matter is anything you can touch physically) The more matter an object has, the bigger it is, and the more mass it has. Mass is measured in kilograms, kg, or grams, g. Things that have a big mass are harder to move, or harder to stop than objects with little mass.

![Diagram showing mass comparison between Earth and Moon](image)

6. **What is a balanced force?**

Balance forces are two forces acting in opposite directions on an object, and equal in size. Anytime there is a balanced force on an object, the object stays still or continues moving continues to move at the same speed and in the same direction.

![Diagram showing balanced force](image)
7. **What is an unbalanced force?**

**Unbalanced forces**

- Unlike balanced forces, we say unbalanced forces when two forces acting on an object are not equal in size.

Unbalanced forces causes can cause:
- a still object to move
- a moving object to speed up or slow down
- a moving object to stop
- a moving object to change direction

*Unbalanced forces make the wagon in the diagram speed up.*
8. What does a Distance vs. Time graph show?

If an object is moving at a constant speed, it means it has the same increase in distance in a given time.

Sample Questions:

1. Luis rubbed a balloon on his hair and held the balloon next to the wall. He observed the balloon stick to the wall. Which of the following is responsible for the balloon sticking to the wall?

   A. friction  
   B. gravity  
   C. electric force  
   D. magnetic force
2. Which of these objects can exert a force across a distance?

A. 

B. 

C. 

D. 