

COMMON FORMATIVE ASSESSMENT PLANNING TEMPLATE

--FIRST DRAFT--

Know and distinguish the three laws

Grade Level or Course: IS 2

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Assessment Topic: Universal Forces

Selected Power Standards:

Use Newton's laws to **describe** the motion of an object as the result of multiple forces.

Graphic Organizer of “Unwrapped” Concepts and Skills

Concepts:

General knowledge of mass and motion.

Know and distinguish the difference between Newton's Three Laws of Motion and understand the application of friction, gravity, and resistance.

1. Law of Inertia: A body in motion stays in motion
2. $F=ma$ Force = mass x acceleration
3. For every Action there is an equal and opposite reaction
 - Identify and understand the three types of friction: Rolling, Static, Fluid.
 - Gravity
 - Friction/Resistance

Skills:

1. Use Newton's Laws
2. Understand the motion of an object.

Big Ideas from “Unwrapped” Power Standards

1. Demonstrate general knowledge of mass and motion.
2. Define and apply Newton’s three laws of motion.
3. Identify the universal forces and their affects on objects.

Essential Questions Matched to Big Ideas

1. How is the motion of an object related to the distance traveled and the amount of time it has been moving?
 - 1a. How is force related to the mass and acceleration of an object?
2. List Newton’s three laws. How do Newton’s three laws of motion affect the motion of an object?
3. What are the universal forces acting on everything and how do they effect the object?

SECTION 1: Selected-Response Items—

True or False (1 pt each)

- ___ 1. When forces on an object are unbalanced the object accelerates (2; S5)
- ___ 2. Objects with different charges attract each other due to centripetal force. (3; S1)
- ___ 3. The SI unit for force is the Jule (2; S1)
- ___ 4. When two objects collide, momentum is conserved (1, 2; S3)

Identify which of the four universal forces are responsible for the following: (1pt each)

A) Weak Nuclear B) Strong Nuclear C) Electromagnetic D) Gravity

Match the letter of the Universal force with the number of the corresponding statement

- ___ 5. Radioactive decay of some elements (3; S1)
- ___ 6. Causes weight (3; S5)
- ___ 7. Causes static cling (3; S1)
- ___ 8. Holds the protons and the neutrons of the nucleus together (3; S3)
- ___ 9. Causes the north and south poles of a compass needle to move (3; S2)

Problems (2 pts each)

10. Paul tries to climb a rope to get to the second floor of a building. If Paul's mass is 45 kg, what is the tension on the rope he is hanging on? (2; S4)

Want: Formula: Work: Answer (w/ units):

11. How much force would Julia apply to the rope if she was trying to pull Paul up with an acceleration of 2 m/s^2 ? (1,2; S5)

Want: Formula: Work: Answer (w/ units):

12. A force of 30,000 N is needed to accelerate Julio's truck at a velocity of 4 m/s^2 . What is the mass of the truck? (2; S4)

Want: Formula: Work: Answer (w/ units):

Answer Key:

- | | |
|-----------------------|-------|
| 1. T | 6. A |
| 2. F- Electromagnetic | 7. D |
| 3. F- Newton | 8. C |
| 4. T | 9. B |
| 5. T | 10. C |
10. $F_t = mg$ $45 \times 9.8 = 441\text{N}$
11. $F_P = m(g + a) = 45(9.8 + 2) = 531\text{N}$
12. $m = F/a$ $30,000/4 = 7500 \text{ kg}$

SECTION 2: Extended Constructed-Response—

While on Spring break, Marco decides to go skydiving. Explain the forces on Marco who has a mass of 60kg using Newton’s three laws as he descends through the air before and after the parachute is released.
(S:4,5)

**Task-Specific Scoring Guide:
Exemplary**

- All “Proficient” criteria *plus*:
- Shows proficiency of force
- Verifies answer by showing systematic mathematical equations

Proficient

- Correct answer
- Shows algebraic with all steps
- Written explanation show desired level of competency in forces and motion

Progressing

- Shows some knowledge of forces and motion
- Meets ____ of the “Proficient” criteria in 2 areas

Beginning

- Shows minimal levels of understanding
- Task to be repeated after remediation

Teacher’s Evaluation_____

Comments regarding student’s performance:

SECTION 3: Short Constructed-Response

Student Directions: Write a Big Idea response for each of the following Essential Questions. Include supporting details and any vocabulary terms from the “unwrapped” concepts you have been learning for each response. Your responses will be evaluated using the Generic Scoring Guide below.

1. How fast is the earth traveling if the orbit is __ # miles and the earth travels this distance in 365 days? What forces are acting on the earth as it moves along its orbit?

- The speed of the earth is the distance traveled divided by the time needed to travel that distance
- The gravitational force pulls the earth towards the sun
- The momentum of the earth pulls the earth to travel in a straight line

2. What are Newton’s three laws and how do they affect the motion of an object?

- First: Object in motion stays in motion, object at rest stays at rest. The object will not move unless there is an unbalanced force.
- Second: $F=ma$. The force on an object is equal to the mass of the object and the acceleration that it is undergoing.
- Third: For every action there is an equal and opposite reaction. The object pulls on a second object in the same amount of force that the second object pulls on the first object

3. What are the essential forces acting on a radioactive apple hanging from a tree branch and how do the forces affect the object?

- Gravitational: Everything is attracted to everything else
- Electromagnetic: That positive is attracted to negative
- Strong Nuclear: The force that holds the nucleus together
- Weak Nuclear: The force that allows radioactivity to occur

Generic Scoring Guide:

Exemplary

- All “Proficient” criteria *plus*:
- Makes connections to other areas of school or life
- Provides example(s) as part of explanation

Proficient

- States Big Ideas correctly in own words
- Is able to write Newton’s three laws in their own words
- Provides supporting details for each one
- Is able to identify the four universal forces and how they apply to the radioactive apple
- Includes vocabulary of “unwrapped” concepts in explanation

Progressing

- Meets 2 of the “Proficient” criteria
- Is able to write the textbook definition of Newton’s three laws
- Is able to identify the universal forces but not able to state how the apple is effected by them

Beginning

- Meets fewer than 2 of the “Proficient” criteria
- Task to be repeated after remediation

Teacher’s Evaluation_____

Comments regarding student’s performance:

