

WEBQUEST TASK #2: IMPULSE AND IMPULSE-MOMENTUM THEOREM

Instructions: Please type your answers into a new document before submitting it to TurnItIn.com. For problems, utilize the equation editor (ask for help if you need it!) **You will NOT be able to upload this during class on the due date and I will NOT write a pass to the library for you to do so.** You will need to upload it **BEFORE** you come to class on the day it is due.

SECTION A: IMPULSE

You will be using the links provided on the website in order to answer the following questions.

1. What is the definition of **impulse**?
2. What **symbol(s)** is used when representing impulse in equations?
3. What is the **equation** for impulse? Define each of the variables in the equation, and include the units for each variable.
4. Is impulse a **vector or a scalar** quantity?
5. What are the **units** for impulse?

SECTION B: IMPULSE-MOMENTUM THEOREM

You will be using the links provided on the website in order to answer the following questions.

6. What does **the Impulse-Momentum Theorem** state (use correct physics terms)?
7. What **equation(s)** describe the Impulse-Momentum Theorem ?
8. **Explain**, in terms of the impulse-momentum theorem:
 - a. How can you change an object's **momentum**?
 - b. If you change an object's momentum, what about the object's **motion** changes?
 - c. What is the **relationship** between the applied net force acting on an object and the time through which that force is applied? (i.e. – if one increases, the other ___?)
9. How could you use a **Force vs. Time graph** for an object to determine the overall impulse exerted on the mass in the system?
10. On Physics Classroom Lesson 1b: Find the **Representing Rebound Collisions Questions** in the middle of the page:
 - a. Answer the questions about the **velocity-time graphs**
 - b. Complete the **Quick Quiz Table** for situations 1, 3, and 5. Show your work.
11. If a large trailer truck collides with a Mini Cooper:
 - a. Does the truck experience the greater / smaller / same **time of impact**? Why?
 - b. Does the truck experience the greater / smaller / same **force of impact**? Why?
 - c. Does the truck experience the greater / smaller / same **impulse**? Why?
 - d. Does the truck experience the greater / smaller / same **change in momentum**? Why?
 - e. Does the truck experience the greater / smaller / same **change in velocity**? Why?
 - f. Does the truck experience the greater / smaller / same **acceleration**? Why?

Check in with Instructor: _____

SECTION C: VIDEO ANALYSIS

You will be using the video provided on the website in order to answer the following questions.

12. The video demonstrates the results of throwing an egg into various barriers:

CASE A: The egg is thrown into a brick wall.

CASE B: The egg is thrown into a bed sheet.

Predictions:

- In which situation would the egg experience the greatest **change in momentum**?
 - In which situation would the egg experience the **greatest impulse**?
 - In which situation would the egg experience the **largest force**?
13. After watching the video, **summarize** the explanation of results given by the narrator.
14. **Describe** at least one relevant example of this demonstration (or the theorem in general) to your daily activities, hobbies, or interests.

SECTION D: MOMENTUM-IMPULSE GAME CHALLENGE

You will be using the online simulation (link on website) in order to apply what we learned in this WebQuest to quantify what happens in various collisions.

Part I:

- Click the green **"Run Now"** button to open the simulation
- Click on the blue **"Advanced"** tab at the top. Click **"1 Dimension"** in the green box on the top right.
- Click the check box that says **"Show Values"** at the bottom of the green box on the right.
- Drag** the red Object 1 all the way to the left and the green Object 2 all the way to the right.
- Hit Play and then hit Pause **immediately before** Object 1 collides with Object 2.

15. For the initial movement of the objects...

- Identify** the initial momentum of Object 1
- Identify** the initial momentum of Object 2
- Calculate** the total initial momentum of the system (assume 2 sig figs)

Hit Play again and then hit Pause **immediately after** Object 1 collides with Object 2 (don't allow an object to hit a wall)

16. For the final movement of the objects...

- Identify** the final momentum of Object 1
- Identify** the final momentum of Object 2
- Calculate** the total final momentum of the system (assume 2 sig figs)

17. What can you conclude about the momentum of the system?

18. What type of collision is this?

Part II:

- Hit the red **"Reset All"** button. Again, click **"1 Dimension"** and **"Show Values"**.
- In the green box on the right, move the **"Elasticity"** slider all the way to the left so it reads 0% elasticity.
- Once more, **drag** the red Object 1 all the way to the left and the green Object 2 all the way to the right.
- Hit Play and then hit Pause **immediately before** Object 1 collides with Object 2.

19. For the initial movement of the objects...

- d. **Identify** the initial momentum of Object 1
- e. **Identify** the initial momentum of Object 2
- f. **Calculate** the total initial momentum of the system (*assume 2 sig figs*)

*Hit Play again and then hit Pause **immediately after** Object 1 collides with Object 2 (don't allow an object to hit a wall)*

20. For the initial movement of the objects...

- d. **Identify** the final momentum of Object 1
- e. **Identify** the final momentum of Object 2
- f. **Calculate** the total final momentum of the system (*assume 2 sig figs*)

21. What can you conclude about the momentum of the system?

22. What type of collision is this?

Check in with Instructor: _____