GreatHearts
Irving

Remote Learning Packet

NB: Please keep all work produced this week. Details regarding how to turn in this work will be forthcoming.

March 30 - April 3, 2020

Course: 11 Physics
Teacher: Miss Weisse natalie.weisse@greatheartsirving.org
Resource: 11.Physics.TextbookPacket.033020 — *This is NOT the Giancoli Textbook!* I have written notes for you.

Weekly Plan Checklist:

Monday, March 30
- [ ] Read & Understand Notes on Momentum
- [ ] Complete Unit 8 Worksheet 0A Problems
- [ ] Email Miss Weisse with Questions!

Tuesday, March 31
- [ ] Read & Understand Notes on Impulse
- [ ] Complete Unit 8 Worksheet 0B Problems
- [ ] Email Miss Weisse with Questions!

Wednesday, April 1
- [ ] Review Notes From Monday and Tuesday
- [ ] Complete Unit 8 Worksheet 1 Problems
- [ ] Email Miss Weisse with Questions!

Thursday, April 2
- [ ] Read & Understand Notes on Momentum, Impulse, & Everything We Know About Motion of Objects
- [ ] Complete Unit 8 Worksheet 2 Problems
- [ ] Email Miss Weisse with Questions!

Friday, April 3
- [ ] Reread all notes from this week
- [ ] Review and re-attempt all problems assigned this week that you missed the first time
- [ ] Complete Unit 8 Quiz 1 (see note below)

Statement of Academic Honesty

I affirm that the work completed from the packet is mine and that I completed it independently.

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Student Signature

I affirm that, to the best of my knowledge, my child completed this work independently

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Parent Signature

DAILY PLANS

Monday, March 30

- ➔ Read Pages 2-7 of the Textbook Packet that accompanied the lesson plans
- ➔ Complete the following problems on a sheet of paper with a full heading — Unit 8 Worksheet 0A

1. A particle has a mass of 10 kg and a velocity of 5 m/s. What is the momentum of the particle? Please write your answer twice, once with each possible unit of momentum.
2. If a 6.0 kg bowling ball is rolled with a velocity of 3.5 m/s, what is the momentum of the ball?
3. Which has more momentum, a 3.0 kg mass moving at 9.0 m/s or a 5.0 kg mass moving at 5.0 m/s?
4. A bicycle has a momentum of 25.00 kg·m/s and a velocity of 2.5 m/s. What is the bicycle's mass?
5. What is the velocity of a 0.5 kg ball that has a momentum of 3.00 kg·m/s?
6. A bicycle has a momentum of 24 kg·m/s. What momentum would the bicycle have if it had …
    a. … twice the mass and was moving at the same speed?
    b. … the same mass and was moving with twice the speed?
    c. … three times the mass and was moving with one-half the speed?
    d. … three times the mass and was moving with twice the speed

Tuesday, March 31

- ➔ Read Pages 8-13 of the textbook Packet that accompanied the lesson plans
- ➔ Complete the following problems on a sheet of paper with a full heading — Unit 8 Worksheet 0B

1. A constant force of 50 N is applied to a 20kg block for 10 seconds.
    a. What is the impulse acting on the block?
    b. What is the change in the momentum of the block?
    c. What is the final speed of the block if it was originally at rest?
    d. What is the final speed of the block if it was originally moving at 15 m/s?
2. A 0.20 kg ball was struck by a baseball bat from rest up to a speed of 35 m/s. The ball was in contact with the bat for 0.02 seconds.
    a. What is the change in momentum of the ball?
    b. What was the impulse exerted on the ball?
    c. Calculate the average force exerted on the ball by the bat.

Wednesday, April 1

- ➔ Review Notes From Monday and Tuesday

- ➔ Complete the following problems on a sheet of paper with a full heading — Unit 8 Worksheet 1

1. The following questions refer to the motion of a baseball.
   a. While being thrown, a net force of 132 N acts on a baseball (mass = 140 g) for a period of 4.5×10^{-2} sec. What is the magnitude of the change in momentum of the ball?

   b. If the initial speed of the baseball is v = 0.0 m/s, what will its speed be when it leaves the pitcher's hand?

   c. When the batter hits the ball, a net force of 1150 N, opposite to the direction of the ball's initial motion, acts on the ball for 9.0×10^{-3} s during the hit. What is the final velocity of the ball?

2. If you throw a ball horizontally while standing on roller skates, you roll backwards. Will you roll backwards if you go through the motions of throwing the ball, but hold on to it instead? Explain your reasoning.

3. Which has the greater change in momentum, a 50 gram clay ball that strikes a wall at 1 m/s and sticks or a 50 gram superball that strikes a wall at 1 m/s and bounces away from the wall at 0.8 m/s? Explain your reasoning.

4. Discuss the following in terms of impulse and momentum:
   a. Why are padded dashboards safer than hard dashboards in automobiles?

   b. Why are nylon ropes, which stretch considerably under stress, favored by mountain climbers?

   c. When starting a heavy train, why will train engineers sometimes back up, stop, and then proceed forward? (This technique is called "bunching slack.")

(Thursday & Friday Assignments on Next Page)

Thursday, April 2

- ➔ Read Pages 14-19 of the textbook Packet that accompanied the lesson plans

- ➔ Complete the following problems on a sheet of paper with a full heading — Unit 8 Worksheet 0B

1. A large SUV and a zippy convertible traveling at equal speeds have a head-on collision.
    a. Which vehicle will experience the greater force of impact? Justify your answer.

    b. Which vehicle will experience the greater change in momentum? Justify your answer.

    c. Which vehicle will experience the greater acceleration? Justify your answer.

2. A rocket, weighing 4.36×10^4N, has an engine that provides an upward force of 1.2×10^5N. It reaches a maximum speed of 860 m/s.
    a. Draw a force diagram for the rocket.

    b. For how much time must the engine burn during the launch in order to reach this speed?

    c. What is the impulse of the rocket?

3. A golf ball that weighs 0.45 N is dropped from a height of 1.0 m. Assume that the golf ball has a perfectly elastic collision with the floor.
    a. Construct a motion map for the golf ball from the time it is dropped until it reaches its highest point of rebound.

    b. Determine the time required for the ball to reach the floor.

    c. What will the <u>instantaneous momentum</u> of the golf ball be immediately *before* it strikes the floor?

    d. What will be the <u>change in momentum</u>, (Δp) from the instant before the ball collides with the floor until the instant after it rebounds from the floor? (Illustrate with a vector diagram.)

    e. Suppose that the golf ball was in contact with the floor for 4.0×10^{-4}s. What was the average force on the ball while it was in contact with the floor?

Friday, April 3

- ➔ Review Notes From Monday, Tuesday, and Thursday

- ➔ Complete the following problems on a sheet of paper with a full heading — Unit 8 QUIZ 1
    - ◆ Who knows if this will be graded like a quiz, but, treat it like a quiz! Review problems you've done this week, then, when you're ready, put them away and attempt these problems.

1. Calculate the momentum of a 1000 kg sports car traveling at 30.0 m/s.

2. Determine the impulse needed to increase the car's speed from 30.0 m/s to 35 m/s.

3. In a sad turn of events, the same sports car, formerly traveling at 35 m/s, plows into a rock wall and comes to rest in 0.25 seconds. Determine the size of the force the rock wall exerts on the car.

4. How does the size of the force the rock wall exerts on the car compare to the force the car exerts on the rock wall? Briefly explain. Which of Newton's laws of motion applies to your answer?