Name: Number: Date:

Unit P3 Review (Forces)

$F_{NET} = ma$	$F_G = mg$

1. What is true about the net force of an object that is moving forward at a constant speed?

2. What is true about the net force of an object that is moving forward and speeding up?

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3. A car's engine pushes the car forward with a force of 5100 Newtons. The friction on the car is 1800 Newtons.
   (a) Draw a free body diagram.
      i. Make sure all the forces are labeled with letters.
      ii. Put the numbers in the diagram at the proper place
      iii. Draw the direction of the net force and calculate its magnitude

   (b) The car has a mass of 970 kg. What is the acceleration of the car?

Knowns/Unknowns	Plug & Chug	Answer w/ Units

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4. What is **inertia** and what law does it correspond to?

5. Which of Newton's laws best explains each of these? Explain your answer in at least one complete sentence.
   (a) Jen goes shopping at the grocery store. She notices that as she adds items to the cart it gets harder to push.

   (b) A rocket pushes fuel down so that the fuel can push the rocket up.

   (c) When you are in a car and you slam on your brakes, your body keeps moving forward.

6. You want a 6-kg bowling ball and a 0.5-kg whiffle ball to have the same acceleration. Which one needs more force?

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7. Identify the Reaction Force in each of these cases:
   (a) You jump off the ground by pushing off of it. The action force is the force of your feet pushing the ground down.

   (b) A tennis player hits a ball with his racket. The action force is the force of the racket on the ball.

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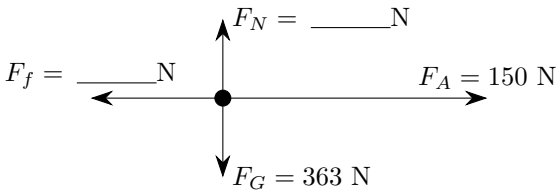
8. A 37-kg crate accelerates at a rate of 2.0 m/s^2.
   (a) Calculate the net force on the crate.

Knowns/Unknowns	Plug & Chug	Answer w/ Units

   (b) Assume that the net force is in the forward direction. Fill in the blanks in the following free-body diagram



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9. What is the difference between mass and weight?

10. If you go to a different planet, what happens to your mass and your weight?

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11. Consider a 12-kg bowling ball.
   (a) What is the bowling ball's weight on earth?

Knowns/Unknowns	Plug & Chug	Answer w/ Units

   (b) What is the bowling ball's weight on Mars where $g = 3.71\,\text{m/s}^2$?

Knowns/Unknowns	Plug & Chug	Answer w/ Units

$F_{NET} = ma$	$F_G = mg$

12. A rocket has a mass of 430 kg.

(a) Calculate the weight (that is, Force of Gravity) of the rocket.

Knowns/Unknowns	Plug & Chug	Answer w/ Units

(b) Its engines apply an upward force of 5600 Newtons. Assume there is no air resistance. Draw a free body diagram.

i. Make sure all the forces are labeled with letters.

ii. Put the numbers in the diagram at the proper place

iii. Draw the direction of the net force and calculate its magnitude

(c) The rocket has a mass of 430 kg. What is the acceleration of the rocket?

Knowns/Unknowns	Plug & Chug	Answer w/ Units