Name _____Answer Key_____
Honors Physics
Period _____

A

Date _____
Forces WS #3H
Mrs. Nadworny

Newton's Third Law

Directions – Read textbook pages 138 – 140. Solve the following problems using the GUESS method and correct significant figures. Answer in complete sentences where appropriate. Be sure to show ALL work!

1. Earth's mass is approximately 81 times the mass of the Moon. If Earth exerts a gravitational force of magnitude F on the Moon, the magnitude of the gravitational force of the Moon on the Earth is

   A) 9F B) 81F C) $\frac{F}{81}$ D) F

2. A cannonball with a mass of 1.0 kilogram is fired horizontally from a 500.-kilogram cannon, initially at rest, on a horizontal, frictionless surface. The cannonball is acted on by an average force of 8.0×10^3 newtons for 1.0×10^{-1} second. What is the magnitude of the average net force acting on the cannon?

   A) 1.6 N B) 8.0×10^3 N C) 16 N D) 4.0×10^6 N

3. A 100.-kilogram cart accelerates at 0.50 meter per second squared west as a horse exerts a force of 60. newtons west on the cart. What is the magnitude of the force that the cart exerts on the horse?

   A) 10. N B) 60. N C) 50. N D) 110 N

4. As a 5.0×10^2-newton basketball player jumps from the floor up toward the basket, the magnitude of the force of her feet on the floor is 1.0×10^3 newtons. As she jumps, the magnitude of the force of the floor on her feet is

   A) 5.0×10^2 N B) 1.5×10^3 N C) 1.0×10^3 N D) 5.0×10^5 N

5. A baseball bat with a mass of 4.75 kg exerts a force of 20.0 N on a 0.350 kg baseball. Find the resultant acceleration of each object.

   $$\text{bat - a} = \frac{F}{m} = \frac{-20.0\text{N}}{4.75\text{ kg}} = -4.21\,\frac{m}{s^2} \text{ (backwards)}$$

   $$\text{ball - a} = \frac{F}{m} = \frac{20.0\text{N}}{0.350\text{kg}} = +57.1\,\frac{m}{s^2} \text{ (forwards)}$$

   

6. According to Newton's third law, if a car hits a garbage can, will they both experience the same acceleration? Explain.

   No. They will experience equal and opposite forces, but due to the difference in masses, the acceleration will be different.