Name: _____   Date: _____   Period: _____

Newton's 2nd Law Practice Problems

Directions: For each of the following problems, "dissect" the problem by pulling out the word problem the known or given information to help you find the unknown information. Be sure to show your work, circle your final answers. For each question, you must provide you answer in both extended form and scientific notation. Use your textbook and notes to assist you.

1. The gravitational force that the Earth exerts on the moon equals 2.03×10^{20}N. The moon's masse equals 7.35×10^{23} kg. What is the acceleration of the moon due to Earth's gravitational pull?

2. Assume that a catcher in a professional baseball game exert a force of -65.0 N to stop the ball. If the baseball has a mass of 0.145 kg, what is the acceleration as it is being caught?

3. A type of elevator called a cage is used to raise and lower miners in a mine shaft. Suppose the cage carries a group of miners down the shaft. If the unbalanced force on the cage is 60.0 N, and the mass of the loaded cage is 1.50×10^2 kg, what is the acceleration on the cage?

4. The tallest man-made structure at present is the Warszawa Radio mast in Warsaw, Poland. This radio mast rises 646 m above the ground, nearly 200 m more than the Sears Tower in Chicago. Suppose a worker at the top of the Warszawa Radio mast accidentally knocks a tool off the tower. If the force acting on it is 3.6 N, and its acceleration is 9.8 m/s^2, what is the tool's mass?

5. The whale shark is the largest of all fish and can have the mass of three adult elephants. Suppose that a crane is lifting a whale shark into a tank for delivery to an aquarium. The crane must exert an unbalanced force of 2.5×10^4 N to life the shark from rest. If the shark's acceleration equals 1.25 m/s^2, what is the shark's mass?

6. A freight train slows down as it approaches a train yard. If a force of -3.8 × 10⁶ N is required to provide an acceleration of -0.33 m/s², what is the train's mass?

7. In drag racing, acceleration is more important than speed, and therefore drag racers are designed to provide high accelerations. Suppose a drag racer has a mass of 1250 kg and accelerates at a constant rate of 16.5 m/s². How large is the unbalanced force acting on the racer?

8. A 5.22 × 10⁷ kg luxury cruise ship is moving at its top speed as it comes into port. The ship then undergoes an acceleration equal to -0.357 m/s² until it comes to rest at its anchorage. How large must the unbalanced force acting on the ship be in order to bring the ship to rest at the proper location?

9. The giant sequoia redwood trees of the Sierra Nevada mountains in California are said never to die from old age. Instead, an old tree dies when its shallow roots become loosened and the tree fails over. Removing a dead mature redwood from a forest is no easy feat, as the tree can have a mass of nearly 2.0 × 10⁶ kg. Suppose a redwood with this mass is lifted with an overall upward acceleration of 0.85 m/s². How large is the unbalanced force lifting the tree?

10. A house is lifted from its foundation onto a truck for relocation. The unbalanced force lifting the house is 2850 N. This force causes the house to move from rest to an upward speed of 0.15 m/s in 5.0 s. What is the mass of the house? (Hint: 2 problems)