

2nd LAW, ACCELERATION AND FREE FALL PRACTICE PROBLEMS

Answer the following questions in your notebook. Show all mathematics and, when appropriate, write answers in complete sentences.

1. A boy pushed forward on a cart of groceries with a total mass of 40.0 kg. What is the acceleration of the cart if the net force on the cart is 60.0 N?
2. An automobile with a mass of 1200 kg accelerates at a rate of 3.0 m/s^2 in the forward direction. What is the net force acting on the automobile?
3. A 25 N force accelerates a boy on a skateboard at 0.5 m/s^2 . What is the mass of the boy and the skateboard?
4. What is the upward acceleration of a helicopter with a mass of 5000 kg if a force of 10,000 N acts on it in an upward direction?
5. An automobile with a mass of 1000 kg accelerates when the traffic light turns green. If the forward force on the car is 5000 N and the air resistance is 1000 N, what is the car's acceleration? (Hint: first, you must find the net force)
6. During a test crash, an air bag inflates to stop a dummy's forward motion. The dummy's mass is 75 kg. If the net force on the dummy is 825 N toward the rear of the car, what is the dummy's deceleration?
7. A bicycle takes 8.0 seconds to accelerate at a constant rate from rest to a speed of 4.0 m/s. If the mass of the bicycle and rider together is 85 kg, what is the net force acting on the bicycle? (Hint: first, calculate acceleration. See p.35 in your textbook.)
8. Distinguish between velocity and acceleration.
9. From a stopped position, a wooden ball rolls down a ramp with a constant acceleration of 3 m/s^2 (3 m/s per second). After 4 seconds have passed, how far has the wooden ball traveled? (Hint: use equations in your notebook for determining distance and acceleration).
10. What is the velocity of the wooden ball in question #2 at exactly 4 seconds?
11. If it takes 8 seconds for an apple to fall from the top of a tree, how tall is the tree? Neglect air resistance.
12. If the same apple from question #4 falls from the top of the tree (neglecting air resistance), is its velocity increasing, decreasing, or staying the same? Explain. Is the apple's acceleration increasing, decreasing, or staying the same? Explain.

MORE QUESTIONS ON THE BACK!! YAY!!