

Newton's Second Law

$$F = ma$$

1. What is the net force on a sled that has a mass of 25 kg with a 55 kg child on it while accelerating down a hill at a rate of 6.5 m/s^2 ?
2. What is the mass of a car that exerts a force of 1800 N on the ground when accelerating at a rate of 2.5 m/s^2 ?
3. What is the acceleration of a 100 kg motorcycle that exerts a force 2500 N on the ground?

4. What is the net force of a 65 kg student cannon balling into a pool with an acceleration of 10 m/s^2

Newton's Laws Worksheet

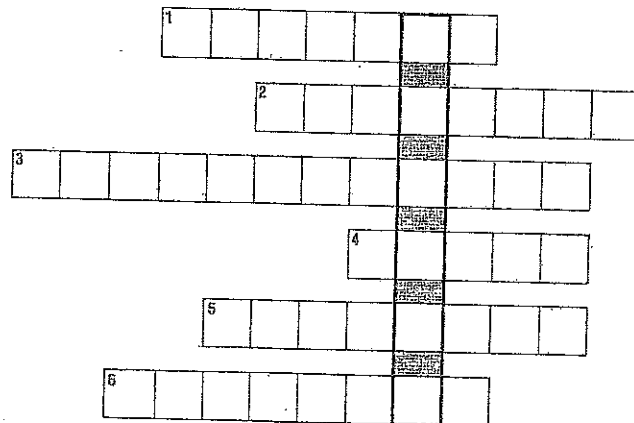
Name: _____

Show all work on a separate sheet of paper.

PROBLEMS

1. A little boy pushes a wagon with his dog in it. The mass of the dog and wagon together is 45 kg. The wagon accelerates at 0.85 m/s^2 . What force is the boy pulling with?
2. A 1650 kg car accelerates at a rate of 4.0 m/s^2 . How much force is the car's engine producing?
3. A 68 kg runner exerts a force of 59 N. What is the acceleration of the runner?
4. A crate is dragged across an iced covered lake. The box accelerates at 0.08 m/s^2 and is pulled by a 47 N force. What is the mass of the box?
5. 3 women push a stalled car. Each woman pushes with a 425 N force. What is the mass of the car if the car accelerates at 0.85 m/s^2 ?
6. A tennis ball, 0.314 kg, is accelerated at a rate of 164 m/s^2 when hit by a professional tennis player. What force does the player's tennis racket exert on the ball?
7. When an F-14 airplane takes-off an aircraft carrier it is literally catapulted off the flight deck. The plane's final speed at take-off is 68.2 m/s. The F-14 starts from rest. The plane accelerates in 2 seconds and has a mass of 29,545 kg. What is the total force that gets the F-14 in the air?
8. A sports car accelerates from 0 to 27 m/s, in 6.3 seconds. The car exerts a force of 4106 N. What is the mass of the car?
9. A little car has a maximum acceleration of 2.57 m/s^2 . Does the acceleration of the little car increase or decrease if it tows another car that has the same mass?
10. A boy can accelerate at 1.00 m/s^2 over a short distance. If the boy were to down an energy drink and suddenly have the ability to accelerate at 5.6 m/s^2 , then how would his new energy drink force compare to his earlier force?

11. A cartoon plane with four engines can accelerated at 8.9 m/s^2 when one engine is running. What is the acceleration of the plane if all four engines are running and each produces the same force?
12. A little boy of mass = 40 kg, is riding in a wagon pulled by his HUGE dog, Howard. What is the acceleration of the wagon is the dog pulls with a force of 30 N?
13. A speed boat in the water experiences an acceleration of 0.524 m/s^2 . The boat's mass is 842 kg. What is the force that the boat's engines are putting out?
14. Which of Newton's Laws are used in shaking a Ketchup bottle to get the Ketchup out when it is "stuck" in the bottle?
15. An ice skater is spinning when she begins to draw in her arms. As she does this, what happens to her rate of spin? Which of Newton's Laws does this fall under?
16. Write the term that matches each description in items 1 through 6 below on the spaces provided. Unscramble the boxed letters to spell the term that answers question 7.



1. A measure of an object's tendency to remain at rest or continue at constant speed.
2. How far something travels.
3. How far something ends up from its starting place.
4. A push or a pull.
5. Forces that result in no change in an object's motion.
6. The force that resists motion.
7. An object will remain at rest or move in a straight line with constant speed unless it is acted upon by a force. This is the definition of Newton's first law of _____.