Acceleration Worksheet.

Name: _____

Acceleration is the rate of change in the velocity of an object. To determine the rate of acceleration, you use the formula below. The units for acceleration are meters per second per second or m/s^2.

Work the problems using the following equations. Draw a box around your answers and **show all your work**

v_f = *velocity final* v_0 = *initial velocity* a = *acceleration* d = *displacement* t = *time*

$$v_f = v_0 + at \qquad d = v_0t + \tfrac{1}{2}at^2 \qquad v_f^2 = v_0^2 + 2ad$$

A positive value for acceleration shows speeding up, and negative value for acceleration shows slowing down. Slowing down is also called negative acceleration or *deceleration*.

EXAMPLES

1. A skater increases her velocity from 2.0 m/s to 10.0 m/s in 3.0 seconds. What is the skater's acceleration?

Looking for Acceleration of the skater	**Solution** $\text{Acceleration} = \frac{10.0\ \text{m/s} - 2.0\ \text{m/s}}{3\ \text{s}} = 2.7\ \text{m/s}^2$ The acceleration of the skater is 2.7 meters per second per second.
Given Initial velocity = 2.0 m/s Final velocity = 10.0 m/s Change in time = 3 seconds	
Relationship	

2. A car accelerates at a rate of $3.0\ m/s^2$. If its original velocity is 8.0 m/s, how many seconds will it take the car to reach a final velocity of 25.0 m/s?

Looking for The time to reach the final velocity.	**Solution** $\text{Time} = \frac{25.0\ \text{m/s} - 8.0\ \text{m/s}}{3.0\ \text{m/s}^2} = 5.7\ \text{s}$ The time for the car to reach its final velocity is 5.7 seconds.
Given Initial velocity = 8.0 m/s; Final velocity = 25.0 m/s Acceleration = $3.0\ m/s^2$	
Relationship	

1. While traveling along a highway a driver slows from 24 m/s to 15 m/s in 12 seconds. What is the automobile's acceleration? (Remember that a negative value indicates a slowing down or deceleration.)

2. A parachute on a racing dragster opens and changes the velocity of the car from 85 m/s to 45 m/s in a period of 4.5 seconds. What is the acceleration of the dragster?

3. The table below includes data for a ball rolling down a hill. Fill in the missing data values in the table and determine the acceleration of the rolling ball.

Time (seconds)	Velocity (km/h)
0 (start)	0 (start)
2	3
	6
	9
8	
10	15

Acceleration = _____

4. A car traveling at a velocity of 30.0 m/s encounters an emergency and comes to a complete stop. How much time will it take for the car to stop if it decelerates at -4.0 m/s^2?

5. A cart rolling down an incline for 5.0 seconds has an acceleration of 4.0 m/s^2. If the cart has a beginning velocity of 2.0 m/s, what is its final velocity?

6. A helicopter's velocity increases from 25 m/s to 60 m/s in 5 seconds. What is the acceleration of this helicopter?

7. As she climbs a hill, a cyclist slows down from 25 mi/hr to 6 mi/hr in 10 seconds. What is her deceleration?

8. A motorcycle traveling at 25 m/s accelerates at a rate of 7.0 m/s^2 for 6.0 seconds. What is the final velocity of the motorcycle?

9. A cyclist accelerates from rest at a rate of 7.0 m/s^2. How long will it take the cyclist to reach a velocity of 18 m/s?

10. A skateboarder traveling at 7.0 meters per second rolls to a stop at the top of a ramp in 3.0 seconds. What is the skateboarder's acceleration?

11. An engineer must design a runway to accommodate airplanes that must reach a ground velocity of 61 m/s before they can take off. These planes are capable of being accelerated uniformly at the rate of 2.5 m/s^2

a) How long will it take the planes to reach takeoff velocity?
b) What must be the minimum length of the runway?

12.A driver of a car going 25 m/s suddenly sees the lights of a barrier 40.0 meters ahead. It takes the driver 0.75 seconds to apply the brakes, and the acceleration during braking is -10 m/s^2 . Determine whether the car hits the barrier.

13. A rocket is traveling at 900m/s is accelerating until it reaches 8000m/s and covers 60,000m during its acceleration. What is the rockets acceleration?

ANSWERS 1) -.75m/s^2 2) -8.9m/s^2 3) 1.5 km/hr · s 4) 7.5s 5) 22m/s 6) 7m/s^2 7)-1.9 mi/hr · s 8) 67m/s 9) 2.5s 10)-2.3m/s^2 11) a 24.4s b 744.2m 12) 50m 13)526.6 m/s^2