

# Speed, Velocity and Acceleration Calculations Worksheet

$$s = \text{distance}/\text{time} = d / t$$

$$v = \text{displacement}/\text{time} = \Delta x / t$$

**Part 1 - Speed Calculations:** Use the speed formula to calculate the answers to the following questions. Be sure to show your work for each problem (write the formula, numbers with correct units, and the answer with the correct units).



1. Calculate the speed for a car that went a distance of 125 kilometers in 2 hours time.

Equation:	$s = \frac{d}{t}$
Plug numbers into the equation	$s = \frac{125 \text{ km}}{2 \text{ hr}}$
Final Answer w/ units	$s = 62.5 \frac{\text{km}}{\text{hr}}$

2. A baseball is thrown a distance of 60 meters. What is its speed if it takes 0.5 seconds to cover the distance?

Equation:	$s = \frac{d}{t}$
Plug numbers into the equation	$s = \frac{60 \text{ m}}{0.5}$
Final Answer w/ units	$s = 120 \text{ m/s}$

3. How much time does it take for a bird flying at a speed of 45 kilometers per hour to travel a distance of 1,800 kilometers?

Equation:	$s = \frac{d}{t}$
Plug numbers into the equation	$45 \frac{\text{km}}{\text{hr}} = \frac{1800}{t} \quad t = \frac{1800}{45}$
Final Answer w/ units	$t = 40 \text{ hr}$

4. A comet is cruising through the Solar System at a speed of 50,000 kilometers per hour for 4 hours time. What is the total distance traveled by the comet during this time?

Equation:	$s = \frac{d}{t}$
Plug numbers into the equation	$50,000 \frac{\text{km}}{\text{hr}} = \frac{d}{4 \text{ hr}} \quad d = s \times t$ $d = 50,000 \times 4$
Final Answer w/ units	$d = 200,000 \text{ km}$

**Part 2 - Speed and Velocity Calculations:** For problems 5 – 10 use the speed and velocity formulas to solve the following problems. Show your work (formula, numbers with correct units and answer with correct units).

5. Bob rides his bicycle on a bike path that is 75 kilometers long to get to his house that is due east of the bike path. If it takes Bob 15 hours then

a. What is his speed?

<b>Equation:</b>	$S = \frac{d}{t}$
<b>Plug numbers into the equation</b>	$S = \frac{75 \text{ km}}{15 \text{ hr}}$
<b>Final Answer w/ units</b>	$S = 5 \frac{\text{km}}{\text{hr}}$

b. What is his velocity?

<b>Equation:</b>	$V = \frac{\Delta x}{t}$
<b>Plug numbers into the equation</b>	$V = \frac{+75 \text{ km}}{15 \text{ hr}}$
<b>Final Answer w/ units</b>	$V = +5 \frac{\text{km}}{\text{hr}}$

6. Jessica jogs on a path that is 25 kilometers long to get to a park that is south of the jogging path. If it takes Jessica 2.5 hours then

a. What is her speed?

<b>Equation:</b>	$S = \frac{d}{t}$
<b>Plug numbers into the equation</b>	$S = \frac{25 \text{ km}}{2.5 \text{ hr}}$
<b>Final Answer w/ units</b>	$S = 10 \frac{\text{km}}{\text{hr}}$

b. What is her velocity?

<b>Equation:</b>	$V = \frac{\Delta x}{t}$
<b>Plug numbers into the equation</b>	$V = \frac{-25 \text{ km}}{2.5 \text{ hr}}$
<b>Final Answer w/ units</b>	$V = -10 \frac{\text{km}}{\text{hr}}$



7. What is the velocity of a motorcycle traveling 10 km west in 3 hours?

Equation:	$V = \frac{\Delta x}{t}$
Plug numbers into the equation	$V = \frac{-10 \text{ km}}{3 \text{ hr}}$
Final Answer w/ units	$V = -3.33 \frac{\text{km}}{\text{hr}}$

8. How much time does it take a person to walk 12 km north at a velocity of 6.5 km/h?

Equation:	$V = \frac{\Delta x}{t}$ $t = \frac{\Delta x}{V}$
Plug numbers into the equation	$6.5 \frac{\text{km}}{\text{h}} = \frac{+12 \text{ km}}{t}$
Final Answer w/ units	$t = +1.84 \text{ hr}$

9. If the velocity of a car is 45 km/h west, how far can it travel in 0.5 hours?

Equation:	$V = \frac{\Delta x}{t}$
Plug numbers into the equation	$-45 \frac{\text{km}}{\text{h}} = \frac{\Delta x}{.5 \text{ hr}}$
Final Answer w/ units	$22.5 \text{ km} = \Delta x$

10. What is the velocity of a rocket that goes 700 km north in 25 seconds?

Equation:	$V = \frac{\Delta x}{t}$
Plug numbers into the equation	$V = \frac{+700 \text{ km}}{25 \text{ s}}$
Final Answer w/ units	$V = +28 \frac{\text{km}}{\text{s}}$

**Part 3 – Acceleration Calculations:** For problems 11- 13 use the acceleration formula to solve the following problems. Show your work (formula, numbers with correct units and answer with correct units).

$$a = (\text{Final Velocity} - \text{Initial Velocity}) / \text{Time} = (v_f - v_o) / t$$

11. A driver starts his parked car and within 5 seconds reaches a speed of 60 km/h, as he travels east. What is his acceleration?

Equation:	$a = \frac{v_f - v_o}{t}$
Plug numbers into the equation	$a = \frac{(+60 - 0)}{5}$
Final Answer w/ units	$a = 12 \frac{\text{m}}{\text{s}^2}$

12. A slug traveling at 3 mm/h, East decided to race the slug next to him increasing his velocity to 5 mm/h, East in one hour. What was the slug's acceleration?

Equation:	$a = \frac{v_f - v_o}{t}$
Plug numbers into the equation	$a = \frac{5 - 3}{1 \text{ hr}}$
Final Answer w/ units	$a = 2 \frac{\text{mm}}{\text{hr}^2}$

13. In a summer storm, the wind is blowing with a velocity of 8 m/s north. Suddenly in 3 seconds, the wind's velocity is 23 m/s north. What is the wind's acceleration?

Equation:	$a = \frac{v_f - v_o}{t}$
Plug numbers into the equation	$a = \frac{23 - 8}{3}$
Final Answer w/ units	$a = 1.875 \frac{\text{m}}{\text{s}^2}$