Acceleration is the **rate of change of speed**, how fast an object **changes speed** in a **given period of time**.

- **Acceleration** can be **positive (speeding up)** or **negative (slowing down, deceleration)**.

$$\text{Acceleration (a)} = \frac{\text{Change in speed}}{\text{Change in time}}$$

Acceleration	Pronunciation	Example
5 mph per second	5 miles per hour per second	The car is increasing its speed 5 mph every second.
-5 mph/sec	negative 5 miles per hour per second	The car is slowing down 5 mph every second.
10 km/s/s	10 kilometers per second per second	The car is accelerating 10 km per second each second.
10 km/s²	10 kilometers per second squared	The car's acceleration is10 km/s²

CFU

Read the acceleration.

Car A. **18 mph/s** **Car B.** **31 km/hr/s**

Which bowling ball has the greater acceleration? Explain.

A  3 m/s²

B  4 m/s²

$$\text{Acceleration (a)} = \frac{\text{Change in speed}}{\text{Change in time}}$$

Which object has the least acceleration? Explain.

Which object has the greatest acceleration? Explain.

A B C


3 m/s²


0.5 m/s²


0.8 m/s²

Acceleration is calculated as

$$\text{Acceleration (a)} = \frac{\text{Change in speed}}{\text{time}}$$

$$\text{Acceleration (a)} = \frac{\text{Final speed – starting speed}}{\text{time}}$$

Mr. Sanchez is driving his car. He accelerates from **50 mph** to **70 mph** in **10 seconds**. Calculate the **acceleration.**

$$\text{Acceleration (a)} = \frac{70 \text{ mph} - 50 \text{ mph}}{10 \text{ seconds}} = \frac{20 \text{ mph}}{10 \text{ seconds}} = 2 \text{ mph/second}$$

The car's speed is increasing 2 mph each second.

CFU

Mr. Sanchez slows from 70 mph to 50 mph. What is his **change in speed**? Explain.

A **20 mph**

B **50 mph**

C **-20 mph**

Acceleration is calculated as

$$\text{Acceleration (a)} = \frac{\text{Change in speed}}{\text{time}}$$

$$\text{Acceleration (a)} = \frac{\text{Final speed – starting speed}}{\text{time}}$$

1. A person walking starts at **0 m/s** and after **6 seconds** is traveling at **5 m/s**. What is the acceleration of the walker? Explain.

2. A car speeds up from **22 m/s** to **26 m/s** in **2 seconds**. What is the average acceleration of the car? Explain

Acceleration can be shown in a table.

$$\text{Acceleration (a)} = \frac{\text{Change in speed}}{\text{time}}$$

$$\text{Acceleration (a)} = \frac{\text{Final speed} - \text{starting speed}}{\text{time}}$$

Mr. Sanchez is driving his car. He **accelerates** from **50 mph** to **70 mph** in **10 seconds**. Show the change in a table.

Seconds	Acceleration	Speed
0 (start)		50 mph
1	2 mph/sec	52 mph
2	2 mph/sec	54 mph
3	2 mph/sec	56 mph
4	2 mph/sec	58 mph
5	2 mph/sec	60 mph
6	2 mph/sec	62 mph
7	2 mph/sec	64 mph
8	2 mph/sec	66 mph
9	2 mph/sec	68 mph
10	2 mph/sec	70 mph

CFU

What is the speed and acceleration 6 seconds after Mr. Sanchez starts to speed up?

1 Analyze the table.
2 Calculate the speed. (write)
Hint: the acceleration shows the increase in speed during each second.
3 Explain.

You get on your bike next to a tree. You pedal hard and increase your speed **4 m/s each second** for 5 seconds. Complete the Bicycle Speed column.

Time	Acceleration (change of speed each second)	Bicycle Speed	Explanation
start		**0 m/s**	Bicycle is at rest
1	**4 m/s^2**	**4 m/s**	The speed increases 4 m/s each second.
2	**4 m/s^2**	**8 m/s**	The speed increases 4 m/s each second.
3	**4 m/s^2**		
4	**4 m/s^2**		
5	**4 m/s^2**		

Skill Closure

1 Analyze the table.
2 Calculate the speed. (write)
Hint: the acceleration shows the increase in speed during each second.
3 Explain.

Your dad gets a new car. He steps on the gas and accelerates quickly up to 60 mph. It takes 5 seconds. That means the car goes 12 mph per second. Complete the Vehicle Speed column.

Time	Acceleration (change of speed each second)	Vehicle Speed	Explanation
start		0 mph/s	Car is at full stop or at rest.
1	12 mph/s	12 mph/s	The speed increases 12 mph each second.
2	12 mph/s	24 mph/s	The speed increases 12 mph each second.
3	12 mph/s		
4	12 mph/s		
5	12 mph/s		

Concept Closure

Write an explanation.

John is entered in a 10K running race. When the starter's gun sounds, John accelerates quickly to get into the lead. He goes 20 meters in 5 seconds. Phil says John's rate of acceleration is 5 m/s. Do you agree with Phil? Why or why not?

Summary Closure

What did you learn today about describing acceleration?

Word Bank

acceleration
deceleration
change of speed
change of time
m/sec/sec m/s^2