The Race Around the Park

A Story About Speed and Velocity

Emma and Noah visited a large neighborhood park with their family on a Saturday morning.
The park had a running path that went all the way around a beautiful lake.
Dad smiled. "Who wants to race to the big oak tree?"
"I do!" Emma shouted.
"So do I!" Noah laughed.
Both children started running.
Emma ran very fast.
Noah ran a little slower.
When they reached the tree, Dad smiled.
"You both moved quickly."
"But today we're going to learn the difference between speed and velocity."

Science Fables

How Fast Did We Go?

Dad looked at his stopwatch.

"Emma ran 100 meters in 20 seconds."

"How fast was I?" Emma asked.

Dad smiled.

"Speed tells us how fast something moves."

It only uses two things:

- Distance traveled
- Time taken

"So speed doesn't care which way we ran?" Emma asked.

"Exactly!" Dad replied.

It only cares how much distance you covered."

WHAT IS SPEED?

Speed tells us how fast something moves.
It depends on two things:

Distance traveled

Time taken

SPEED FORMULA

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

Speed tells us how fast something moves, but it does not tell us the direction.

Science Fables

Going Somewhere

Dad pointed farther down the trail.

"Now let's try something different," he said.

He asked the children to run straight to the playground.

When they arrived, Dad asked, "Did you notice something?"

"This time," he explained, "I didn't just care about how fast you ran."

"I also cared where you ended up."

"When speed also tells us the direction of motion, we call it velocity."

Emma smiled.

"So velocity is speed with direction!"

"Exactly!" Dad replied.

WHAT IS VELOCITY?

Velocity is speed with direction.

Speed + Direction = Velocity

Examples:

- 8 km/h north ↑
- 5 m/s east →
- 12 km/h south ↓
- 7 m/s west ←

Speed tells us how fast.
Velocity tells us how fast and in which direction.

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A Funny Walk

Dad drew a circle on the walking path.

"Walk one complete lap around the lake."

The children did as he said.

When they returned to the exact place where they had started, Dad asked,

"How far did you walk?"

"One whole lap!" Noah answered.

"Correct."

"But where did you end up?"

"Right where we started."

Dad nodded.

"So your distance was one whole lap."

"But your displacement was zero."

"Velocity depends on displacement, not just distance."

DISTANCE vs. DISPLACEMENT

DISTANCE

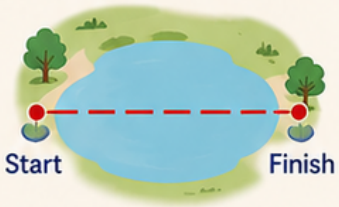
Total path traveled.
No direction.
Always a positive number.

One lap around the lake

Distance = 400 m

DISPLACEMENT

Straight-line change from start to finish.
Includes direction.



Back to the starting point

Displacement = 0 m

KEY IDEA

You can walk a long distance, but if you end up where you started, your displacement is zero.

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Two Friends, Same Speed

Soon, two cyclists came along the path.

"One is going north at 10 km per hour," said Dad.

"The other is going south at 10 km per hour."

"They have the same speed!" Emma laughed.

"They do," Dad said. "But their velocities are different because they are moving in opposite directions."

"So speed tells us how fast. Velocity tells us how fast and which direction."

"Now I understand!" Noah said.

"Me too!" Emma smiled.

SAME SPEED, DIFFERENT VELOCITIES

- Speed = how fast something moves.
- Velocity = how fast something moves and in which direction.
- Same speed, different direction = different velocities.

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SCIENCE ELEMENT

SPEED

Speed tells us **how fast** something moves.

It depends on:

- Distance traveled
- Time taken

Speed = Distance ÷ Time

Examples:

A bicycle moving 15 km/h

A car moving 60 mph

VELOCITY

Velocity tells us **how fast** AND **in which direction** something moves.

It depends on:

- Displacement
- Time

Examples:

Both have the **same speed** (20 km/h) but different **velocities** because the directions are different.

DISTANCE vs. DISPLACEMENT

DISTANCE

- Total path traveled
- No direction
- Always a positive number

Example: Walk one lap around the park.
Distance = 400 m

DISPLACEMENT

- Straight-line change from start to finish
- Includes direction
- Can be zero

Example: Walk one lap and return to where you started.
Displacement = 0 m

EVERYDAY EXAMPLES

Car speedometers show **speed**.

GPS navigation uses **velocity** (because direction matters).

Athletes measure **speed** to see how fast they run.

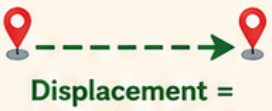
Pilots use **velocity** to know how fast they are going and in which direction.

REMEMBER

Speed = How fast

Velocity = How fast + Direction

Distance = Total path traveled



Displacement = Shortest straight-line change from start to finish

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