SCIENCE FOUNDATIONS

Position-time graphs

Difficulty level: Intermediate

Science Foundations

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Overview of the concept

This is how you read a delivery truck's route on a graph and see at a glance when it was moving, stopped, or speeding up, without watching the whole trip. A flat stretch on the graph means the truck was parked, and a steep stretch means it was moving fast. A parent tracking a school bus can tell from the graph whether it is running on time or stuck in traffic. Knowing position-time graphs tells you how to turn a whole journey into a single picture you can read in seconds.



Rule

Position-time graphs: the slope of a position-time graph is the velocity.

A flat line means the object is not moving, a straight rising line means steady velocity, and a steeper slope means a higher velocity.

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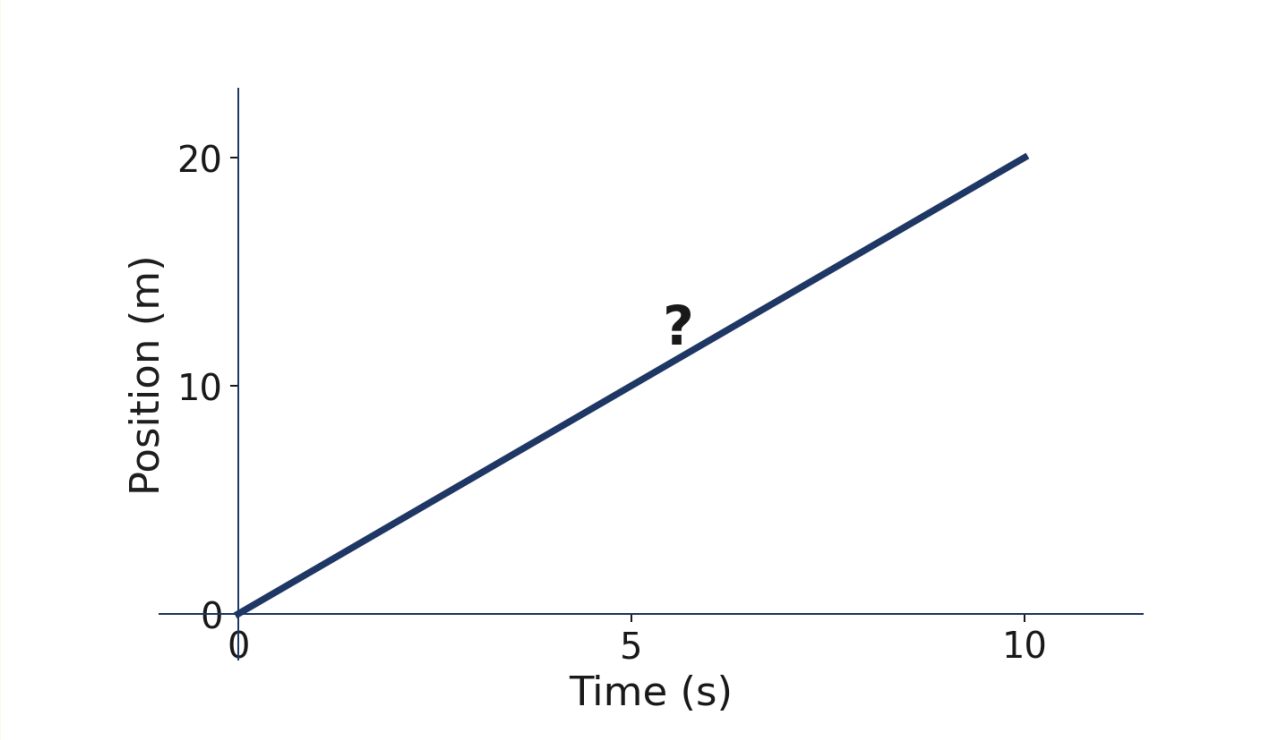
Worked examples

EXAMPLE 1

Q Read a position-time graph: position rises from 0 m to 20 m in 10 s. Velocity?



SOLUTION

Find the slope: rise over run.

Rise is 20 m, run is 10 s.

Divide:
20 ÷ 10 = 2 m/s

The result is velocity 2 m/s.

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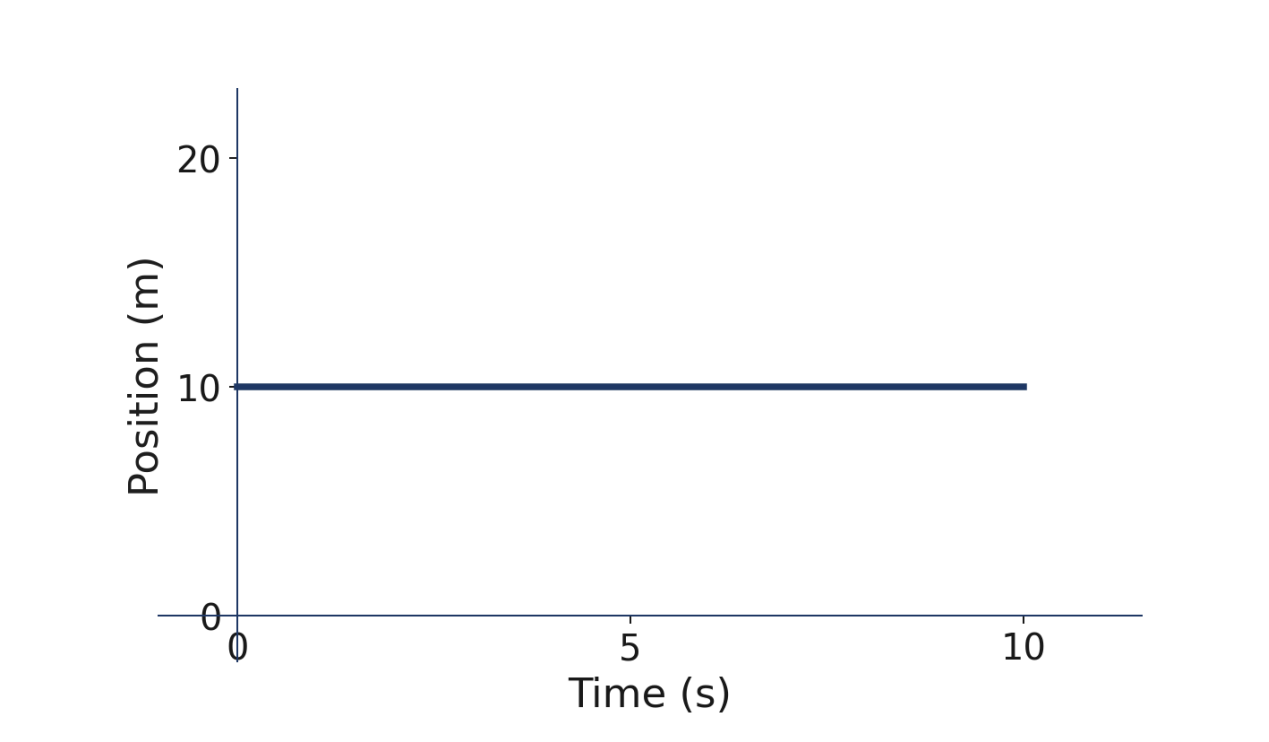
EXAMPLE 2

Q Read a flat position-time line at 10 m. What is happening?



SOLUTION

Check the slope: a flat line has slope zero.

Slope is velocity, so velocity is zero.

Conclude: the object is at rest at 10 m.

The result is at rest at 10 m.

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Practice questions

1 Slope of a position-time graph is what?

- A Position
- B Velocity
- C Time
- D Distance

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2 Flat line means what?

- A Moving forward
- B Moving backward
- C Speeding up
- D At rest

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3

0 m to 30 m in 10 s: velocity?

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Straight rising line means what?

A Constant velocity

B Changing velocity

C At rest

D Moving backward

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5 Curved line means what?

A Constant velocity

B At rest

C Changing velocity

D Faster velocity

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6 Steeper slope means what?

A Slower velocity

B Faster velocity

C Constant velocity

D At rest

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7 Position 15 m, flat for 4 s: velocity?

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8 Rising then flat: what happened?

A Moved, then stopped

B Stopped, then moved

C Moved at a steady speed

D Moved backward

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9

Falling line means what?

A Moving backward

B Moving forward at a steady speed

C At rest

D Speeding up

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A position-time graph curves upward, getting steeper and steeper. What is happening to the velocity?

A It is increasing

B It is decreasing

C It stays the same

D It is zero

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ANSWER KEY

1. Velocity

2. At rest

3. 3 m/s

4. Constant velocity

5. Changing velocity

6. Faster velocity

7. 0 m/s

8. Moved, then stopped

9. Moving backward

10. It is increasing

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