

Name: _____ Date: _____

PHYSICS

Acceleration & Velocity Calculations

| | | | |
|--|---|--|---|
| Velocity $\vec{v} = \frac{\Delta x}{t}$ Final velocity | Acceleration $a = \frac{\vec{v}_f - \vec{v}_0}{t}$ | Acceleration $a = \frac{2 \cdot (\Delta x - \vec{v}_0 \cdot t)}{t^2}$ | a = acceleration (m/s ²) v = speed (m/s) \vec{v} = velocity (m/s) t = time (s) d = distance (m) Δx = “how far” or displacement (m) f = final 0 = initial |
| Final velocity $\vec{v}_f = \vec{v}_0 + a \cdot t$ | How Far $\Delta x = \vec{v}_0 \cdot t + \frac{1}{2} a \cdot t^2$ | | |

Instructions

- Read each question carefully.
- Identify the numbers, match them to the correct variables.
- Convert time to seconds. 1 min = 60 s; 1 hr = 3600 s. If time is already in units of seconds, no conversion is needed.
- Convert distance to meters. 1 km = 1000 m. If distance is already in units of meters, no conversion is needed.
- Choose the correct equation to solve for the variable in the question.
- Type your answer into the answer box.

Part 1. Calculate Acceleration. Complete the table and solve for acceleration.

| Problem | Initial velocity \vec{v}_0 (m/s) | Final velocity \vec{v}_f (m/s) | Time t (s) | Acceleration a (m/s ²) |
|--|---------------------------------------|-------------------------------------|---------------|---------------------------------------|
| 1. Henry rode his bicycle. He was moving at 2.5 m/s. He sped up to 10.0 m/s in 5.0 s. Calculate the acceleration. | | | | |
| 2. Darius was driving his car. The car was moving at 30 m/s, then suddenly slowed to 10 m/s in 8.0 s. Calculate the acceleration. | | | | |
| 3. Bob rode his skateboard down a hill for 5.6 seconds. His velocity increased from 2.0 m/s to 12.0 m/s. Calculate the acceleration. | | | | |

Part 2. Calculate Acceleration. Complete the table and solve for acceleration.

| Problem | Initial velocity \vec{v}_0 (m) | How far Δx (m) | Time t (s) | Acceleration a (m/s ²) |
|---|-------------------------------------|---------------------------|---------------|---------------------------------------|
| 4. Henry rode his bicycle. He was moving at 2.5 m/s. He sped up for 6.0 seconds over 44.0 m. Calculate the acceleration. | | | | |
| 5. Darius was driving his car. The car was motionless, then got faster in 8.0 seconds over 120 m. Calculate the acceleration. | | | | |
| 6. Bob rode his skateboard at 3.0 m/s. He then skated down a hill for 6.4 s. The length of the hill's slope was 36 m. Calculate the acceleration. | | | | |

Part 3. Calculate How Far. Complete the table and solve for “How Far”.

| Problem | Initial velocity \vec{v}_o (m) | Acceleration a (m/s ²) | Time t (s) | How far Δx (m) |
|--|-------------------------------------|---------------------------------------|---------------|---------------------------|
| 7. Henry rode his bicycle. He was moving at 2.5 m/s. He accelerated for 7.2 s at 0.84 m/s ² . Calculate how far he moved as he got faster. | | | | |
| 8. Darius was driving his car. The car was motionless, then got faster in 8.0 seconds at 7.33 m/s ² . Calculate how far the car moved as it got faster. | | | | |
| 9. Bob rode his skateboard at 14.0 m/s. He slowed for 2.2 s with at -4.90 m/s ² . Calculate how far Bob moved as he got slower. | | | | |

Part 4. Calculate Acceleration. Complete the table and solve for final velocity.

| Problem | Initial velocity \vec{v}_o (m/s) | Acceleration a (m/s ²) | Time t (s) | Final velocity \vec{v}_f (m/s) |
|---|---------------------------------------|---------------------------------------|---------------|-------------------------------------|
| 10. Henry rode his bicycle. He was moving at 2.5 m/s. He accelerated for 7.2 s at 0.84 m/s ² . Calculate his final velocity after he sped up. | | | | |
| 11. Darius was driving his car. The car was motionless, then got faster in 8.0 seconds at 7.33 m/s ² . Calculate his final velocity after the car sped up. | | | | |
| 12. Bob rode his skateboard at 14.0 m/s. He slowed for 2.2 s with at -4.90 m/s ² . Calculate Bob's final velocity after he slowed. | | | | |