

UNIT 3 PRACTICE PROBLEMS

PHYSICS 1

3.1 ACCELERATION

1. A race car's velocity increases from 4.0 m/s to 36 m/s over a 4.0-s time interval. What is its average acceleration?
2. A car is coasting backwards downhill at a speed of 3.0 m/s when the driver gets the engine started. After 2.5 s, the car is moving uphill at 4.5 m/s. If uphill is chosen as the positive direction, what is the car's average acceleration?
3. A bus is moving at 25 m/s when the driver steps on the brakes and brings the bus to a stop in 3.0 s. **(a)** What is the average acceleration of the bus while braking? **(b)** If the bus took twice as long to stop, how would the acceleration compare with what you found in part a?
4. Rohith has been jogging to the bus stop for 2.0 min at 3.5 m/s when he looks at his watch and sees that he has plenty of time before the bus arrives. Over the next 10.0 s, he slows his pace to a leisurely 0.75 m/s. What was his average acceleration during this 10.0 s?
5. If the rate of continental drift were to abruptly slow from 1.0 cm/y to 0.5 cm/y over the time interval of a year, what would be the average acceleration?

3.3 FREELY FALLING OBJECTS

6. A construction worker accidentally drops a brick from a high scaffold. **(a)** What is the velocity of the brick after 4.0 s? **(b)** How far does the brick fall during this time?
7. A student drops a ball from a window 3.5 m above the sidewalk. How fast is it moving when it hits the sidewalk?
8. A tennis ball is thrown straight up with an initial speed of 22.5 m/s. It is caught at the same distance above the ground. **(a)** How high does the ball rise? **(b)** How long does the ball remain in the air? Hint: The time it takes the ball to rise equals the time it takes to fall.
9. You decide to flip a coin to determine whether to do your Physics or English homework first. The coin is flipped straight up. **(a)** If the coin reaches a high point of 0.25 m above where you released it, what was its initial speed? **(b)** If you catch it at the same height as you released it, how much time did it spend in the air?