

1. As you are driving to school one day, you pass a construction site for a new building and stop to watch for a few minutes. A crane is lifting a batch of bricks on a pallet to an upper floor of the building. Suddenly a brick falls off the rising pallet. You clock the time it takes for the brick to hit the ground at 2.5 seconds. A falling brick can be dangerous, and you wonder how fast the brick was going when it hit the ground. Since you are taking physics, you quickly calculate the answer. (Note that the acceleration of a freely-falling object near the Earth's surface is  $9.8 \text{ m/s}^2$ .)

2. Consider again the brick in the previous problem. From what height did the brick fall?

3. A rocket car accelerates continuously for 20 seconds, reaching a final speed of 350 m/s. How far does it travel during the final 10 seconds of its acceleration period?

4. A ship is traveling at 5 m/s when it passes a person in the water. The ship immediately reverses its engines. The ship's engines are capable of accelerating the ship at  $0.3 \text{ m/s}^2$ . How long after the ship initially passes the person will it return to the person's location to effect a rescue?

5. A man is riding a bicycle at a constant speed of  $7.1 \text{ m/s}$  when he drops a wrench from his toolkit. Ten seconds after he drops the wrench, a man riding a motorcycle picks it up and, starting from rest (i.e.,  $v=0 \text{ m/s}$ ), chases the bicycle to return it. The motorcycle accelerates continuously at  $3 \text{ m/s}^2$ . How long (in seconds) after the bicyclist drops the wrench will the motorcyclist catch him?