Key Concept Review

1. How far will a humanoid robot travel in 3.0 s, accelerating at 1.0 cm/s² [forward], if its initial velocity is 5.0 cm/s [forward]?

2. What is the displacement of a logging truck accelerating from 10 m/s [right] to 20 m/s [right] in 5.0 s?

Question 2

3. How far will a car travel if it starts from rest and experiences an acceleration of magnitude 3.75 m/s² [forward] for 5.65 s?

4. Determine the acceleration of a bullet starting from rest and leaving the muzzle 2.75×10^{-3} s later with a velocity of 460 m/s [forward].

5. An aircraft starts from rest and accelerates at 42.5 m/s² until it takes off at the end of the runway. How long will it take the aircraft to travel down the 2.6 km runway?

6. If a cyclist traveling at 14.0 m/s skids to a stop in 5.60 s, determine the skidding distance. Assume uniform acceleration.

Question 6

7. Approaching a flashing pedestrian activated traffic light, a driver must slow down to a speed of 30 km/h. If the crosswalk is 150 m away and the vehicle's initial speed is 50 km/h, what must be the magnitude of the car's acceleration to reach this speed limit?

8. A train's stopping distance, even when full emergency brakes are engaged, is 1.3 km. If the train was travelling at an initial velocity of 90 km/h [forward], determine its acceleration under full emergency braking.

Connect Your Understanding

9. A rocket starts from rest and accelerates uniformly for 2.00 s over a displacement of 150 m [W]. Determine the rocket's acceleration.

10. A jet starting from rest reaches a speed of 241 km/h on 96.0 m of runway. Determine the magnitude of the jet's acceleration.

11. What is a motorcycle's acceleration if it starts from rest and travels 350.0 m [S] in 14.1 s?

Question 11

12. Determine the magnitude of a car's acceleration if its stopping distance is 39.0 m for an initial speed of 97.0 km/h.

13. A typical person can tolerate an acceleration of about −49 m/s² [forward]. If you are in a car travelling at 110 km/h and have a collision with a solid immovable object, over what minimum distance must you stop so as to not exceed this acceleration?

14. Determine a submarine's acceleration if its initial velocity is 9.0 m/s [N] and it travels 1.54 km [N] in 2.0 min.
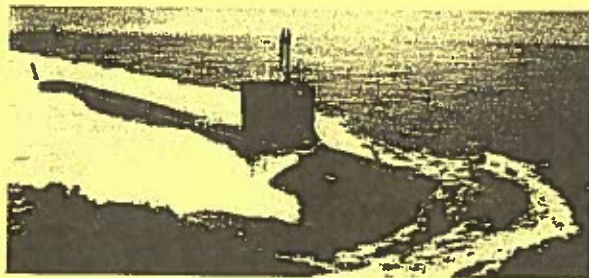
Question 14

Reflection

15. Why do you think it is important to understand the kinematics equations?

For more questions, go to PHYSICS•SOURCE