Physics 11: Kinematics with Constant Acceleration in One Dimension.

Now in a Convenient Travel Size!

1. A cat, with six toes on its front right paw, is initially at rest. The cat sees a mouse, appearing to have the correct number of toes on all of its feet. The cat accelerates toward the mouse at a constant -4.00m/s2.

a. What is the cat’s velocity after 2.0s?

b. What is the cat’s average velocity for the first 2.0s?

c. What is the cat’s displacement after 2.0s?

2. A car is travelling west at 20.0m/s. The driver slams on the brakes in order to avoid hitting a 1987kg walrus that has shockingly leapt from the bushes at the side of the road. The car skids to a halt in 32.00m.

a. What direction is the car’s acceleration?

b. What is the car’s average velocity during the braking?

c. How much time was required for the car to stop?

d. What is the acceleration?

3. A tennis ball is travelling at 16.0m/s north. The ball strikes a wall and bounces straight back at 12m/s south. The change takes 0.095s. What is the acceleration of the ball?

4. A car, painted red and with a stick-on hood scoop, has an initial velocity of -14.00m/s. The car accelerates at 1.80m/s2 for 4.000s.

a. What is the displacement of the car in that time?

b. Describe the cars motion in words.

5. A car, with a carbon fibre hood, spinner hub-caps and stick-on fender ‘vents’, is initially at rest. The car accelerates at 3.00m/s2 for a displacement of 65m.

a. How much time passes?

b. Describe the cars motion in words.

6. A man, with a handlebar moustache and a 147.6g piece of Cambozola cheese, which he purchased 2min34.8s earlier for $4.78, in his front pocket, is walking at 1.6m/s. The man sees the bus he needs to catch approaching! He accelerates at -2.40m/s2 reaching a final velocity of -6.00m/s.

a. What was his displacement?

b. Did he catch his bus?

c. Would you eat that cheese?

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7. A speeder is travelling at 20.0m/s in a 13.889m/s zone. He passes a parked police car. At the exact instant the speeder is beside the police car, the police car begins to accelerate steadily in pursuit. After 8.0s the police car catches up to the speeder.

a. How far have the cars travelled when the police car catches up?

b. What is the average speed of the police car?

c. What is the final speed of the police car?

d. What is the police car’s acceleration?

8. Two cars sit facing each other 222m apart. At t=0s both cars begin to accelerate. Car A has an acceleration of 3.00m/s2. Car B has a mass of 1200kg and is acted upon by a net force of 4800N. How much time passes before the two cars meet?

9. Consider the object below sliding to the right:

31N

30.0N

5.0kg

μ=0.50

The initial velocity of the mass is 8.00m/s right.

a. Find the acceleration of the mass.

b. How far does the mass travel before coming to rest?

10. A car, with a carbon fibre hood, spinner hub-caps and stick-on fender ‘vents’, has an initial velocity of 4.0m/s. The car accelerates at 3.00m/s2 for a displacement of 65m.

a. How much time passes?

b. Describe the cars motion in words.

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