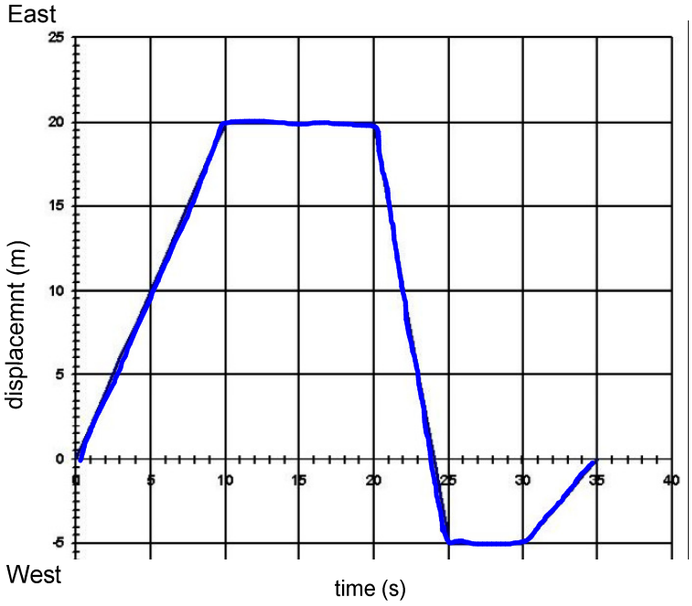
More Practice & Review

1) Use a scale diagram to find the resultant of 90 km [W35°S], 60 km [E], and 70km [W75°N]

2) Calculate the resultant of 58 m [N], 12 m [S], 45 m [E], and 112 m [W].

3) East



(a) What was the instantaneous velocity at t = 7.25 s?

(b) What was the displacement at t = 35 s?

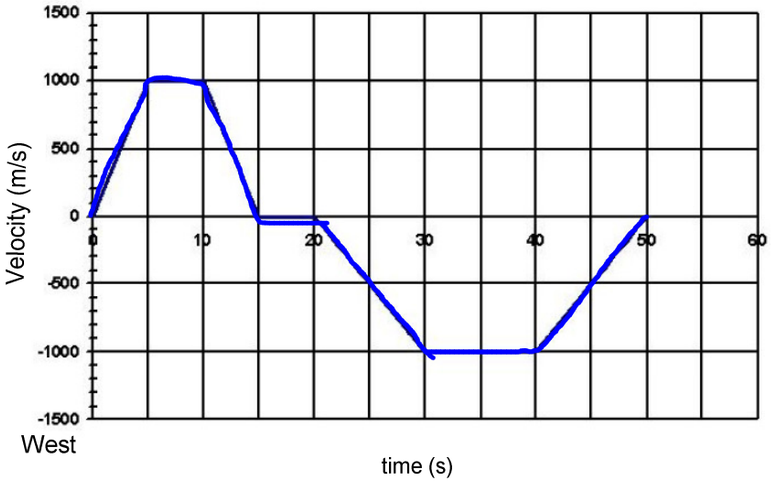
(c) What was the distance travelled during the 35 s trip?

(d) What was the average speed for the entire trip? Average velocity?

(e) What was the instantaneous velocity at t = 21.83 s?

(f) What was the average velocity for the first 25 s?

4) East



(a) Determine the displacement and distance traveled.

(b) Determine the average speed and velocity.

(c) What was the instantaneous acceleration at t = 42.3 s? at t = 24.8 s?

5) A car accelerates from rest to 32 m/s [E] in 12.5 s. (a) Find the average acceleration. (b) What distance is does this car cover in that time?

6) A plane lands with a velocity of 47 m/s [E]. It takes 17 s to stop. (a) What was the average acceleration of the plane? (b) What distance was required to stop?

7) A police car initially at 100 km/h [E] accelerates at 5 km/h/s [E] (your speed increases by 5 km/h each second) for 8.9 s. (a) What is the final velocity of the car? (b) What distance was covered during the acceleration?

8) A car traveling at 25 m/s [E] accelerates to 10 m/s in 5.0 s. (a) What is the acceleration of the car? (b) What distance was covered in that time? (c) What distance is need to come to a stop? (hint: find the time needed to come to a stop first)

Physics 112: Force Practice #2

1. A box is being pulled across the floor at a constant velocity with an applied force of 333 N. The coefficient of kinetic friction is 0.26. What is the mass of the box? (130 kg)

2. A 22 kg crate is pulled at a constant velocity with an applied force of 161 N. Calculate the coefficient of kinetic friction. (0.75)

3. A 28 kg object is being pulled with an applied force of 188 N. The coefficient of kinetic friction is 0.12. What is the net force acting on the object? (155 N)

4. A 31 kg box is moved with a net force of 32 N. The applied force necessary is 174 N. What is the coefficient of kinetic friction? (0.47)

5. A sled has a weight of 425 N and is being pulled with a net force of 17 N. The coefficient of kinetic friction is 0.16. What is the applied force? (85 N)

1. A towrope is used to pull a 1750 kg car across a flat surface, giving it an acceleration of 1.35 m/s^2. What force does the rope exert? (F = 2360 N)

2. A racing car undergoes a uniform acceleration of 4.00 m/s^2. If the net force causing the acceleration is 3000 N, what is the mass of the car? (m = 750 kg)

3. A 5.2 kg bowling ball is accelerated from rest to a velocity of 12 m/s as the bowler covers 5.0 m of approach before releasing the ball. What force is exerted on the ball during this time? (F = 75 N)

4. A high jumper falling at a 4.0 m/s lands on foam pit and comes to rest compressing the pit 0.40 m. If the pit is able to exert an average force of 1200 N on the high jumper breaking the fall, what is the jumper's mass? (m = 60 kg)

5. When a 20 kg child steps off a 3.0 kg (initially) stationary skateboard with an acceleration of 0.50 m/s^2, with what acceleration will the skateboard travel in the opposite direction? – hint: apply Newton's third law (a = 3.3 m/s^2)

6. On Planet X, a 50 kg barbell can be lifted by only exerting a force of 180 N.
    a. What is the acceleration of gravity on Planet X? (a = 3.6 m/s^2)
    b. What minimum force is needed to lift this barbell on Earth? (F = 490 N)

7. An applied force of 20 N is needed to accelerate a 9.0 kg wagon at 2.0 m/s2 along a sidewalk.
    a. How large is the frictional force? (F_f = 2.0 N)
    b. What is the coefficient of friction? (μ = 0.023)

8. A 2.0 kg brick has a sliding coefficient of friction of 0.38. What force must be applied to the brick for it to move at a constant velocity? (F_a = 7.5 N)

9. In bench pressing 100 kg, a weight lifter applies a force of 1040 N. How large is the upward acceleration of the weights during the lift? (a = 0.59 m/s^2)

10. An elevator that weighs 3 000 N is accelerated upward at 1.5 m/s^2. What force does the cable apply to give this acceleration? (F_a = 3460 N)

11. An 873 kg dragster, starting from rest, attains a speed of 26.3 m/s in 0.59 s.
    a. Find the average acceleration of the dragster during this time interval. (a = 44.6 m/s^2)
    b. What is the size of the average force on the dragster during this time interval? (F = 38 900 N)
    c. If the driver has a mass of 68 kg, what force does the seatbelt exert on the driver? (F = 3030 N)

12. The downward acceleration of a karate chop is –6500 m/s^2. If the mass of the forearm is 0.70 kg, what is the force exerted by the arm? (F = –4550 N)

13. A car with a mass of 1550 kg is driving on track initially going 10 m/s. The driver accelerates to 30 m/s in 10 s. What is the average force acting on the car during that time? (F = 3100 N)

14. A car has a mass of 710 Kg. It starts from rest and travels 40 m in 3.0 s. What is the average force acting on the car assuming a uniform acceleration? (F = 6300 N)

15. A force of –9000 N is used to stop a 1500 kg car traveling 20 m/s. What breaking distance is needed to bring the car to a halt? (d = 33 m)

16. A 65 kg diver jumps of a 10 m high platform.
    d. Find the swimmer's velocity the instant he reaches the water. (v = –14 m)
    e. The swimmer comes to a stop 2.0 m below the surface of the water. Calculate the net stopping force exerted by the water. (F = 3200 N)

17. A 5.0 kg remote controlled car is used in an experiment to determine the coefficient of friction between the car's tires and the floor. The car is driven at a uniform velocity and then the tires are locked. The car comes to rest in 3.2 m in a time of 1.7 s. Assuming the only force stopping the car is friction; calculate the coefficient of friction between the tires and the floor. (μ = 0.23)

PRACTICE PROBLEMS

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19. An Atwood machine consists of masses of 3.8 kg and 4.2 kg. What is the acceleration of the masses? What is the tension in the rope?

20. The smaller mass on an Atwood machine is 5.2 kg. If the masses accelerate at 4.6 m/s^2, what is the mass of the second object? What is the tension in the rope?

21. The smaller mass on an Atwood machine is 45 kg. If the tension in the rope is 512 N, what is the mass of the second object? What is the acceleration of the objects?

22. A 3.0 kg counterweight is connected to a 4.5 kg window that freely slides vertically in its frame. How much force must you exert to start the window opening with an acceleration of 0.25 m/s^2?

23. Two gymnasts of identical 37 kg mass dangle from opposite sides of a rope that passes over a frictionless, weightless pulley. If one of the gymnasts starts to pull herself up the rope with an acceleration of 1.0 m/s^2, what happens to her? What happens to the other gymnast?

24. A Fletcher's trolley apparatus consists of a 1.90 kg cart on a level track attached to a light string passing over a pulley and holding a 0.500 kg mass suspended in the air. Neglecting friction, calculate

(a) the tension in the string when the suspended mass is released

(b) the acceleration of the trolley

25. A 40.0 g glider on an air track is connected to a 25.0 g mass suspended by a string passing over a frictionless pulley. When the mass is released, how long will it take the glider to travel the 0.85 m to the other end of the track? (Assume the mass does not hit the floor, so there is constant acceleration during the experiment.)