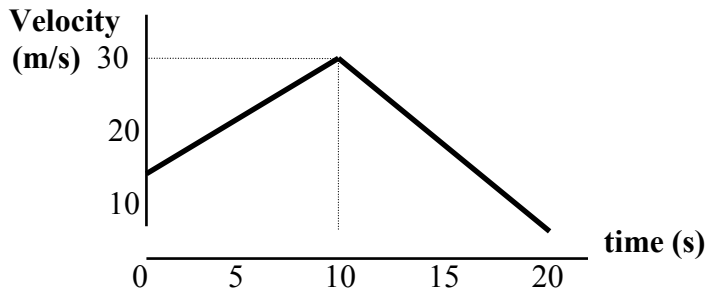


## PHYSICS 12 PROJECTILE MOTION WORKSHEET 1

1. Determine the acceleration for the two segments shown as well as the total distance travelled in the 20 s period.



2. Normie Neutron rides a super-streamline go-cart from rest down a street that has an incline of  $9.5^\circ$ . The total vertical drop in elevation from the top of the street to bottom is 48 m.
- How far did the go-cart travel?
  - Assuming negligible friction or wind resistance, how fast was Normie travelling when he reached the bottom of the street?
  - The brakes are then applied, bringing the cart to a stop in 4.7 s. How far does the go-cart travel in that time?
3. Two physics students attempt to play vertical catch with a baseball. Student **A** holds the ball at street level, while student **B** is on an apartment balcony, 17.0 m up from the street.
- What is the *minimum* speed at which student **A** must throw the ball in order for student **B** to just be able to catch it?
  - Student **A**, who has rippling biceps, actually tosses the ball straight up at 25.0 m/s.
    - How high does the ball go?
    - At what times is student **B** able to catch the baseball?
4. Student **B**, still on the balcony *and* with the baseball, throws the ball straight up at 21.7 m/s.
- How long will student **A**, still at street level, have to wait until the ball reaches him?
  - How fast will it be going?
5. A ball rolls with a speed of 2.0 m/s across a table top that is 1.0 m above the ground. Upon reaching the edge of the table, it follows a parabolic path to its landing spot on the floor. How far along the floor is this spot from the table?
6. A rescue pilot drops a survival kit while her plane is flying at an altitude of 2000 m with a forward velocity of 100 m/s. If air friction is ignored, how far in advance of the starving explorer's drop zone should she release the package?
7. A rifle is fired horizontally from 1.90 m above the ground. The bullet is found to have travelled 200 m. Ignoring air friction, at what speed must the bullet have been travelling as it left the barrel?
8. A ski jumper leaves the horizontal end of the ramp with a velocity of 25 m/s and lands 70 m from the base of the ramp. How high is the end of the ramp above the landing area?
9. An astronaut stands on the edge of a lunar crater 100 m deep and throws a half-eaten moon-pie

horizontally with a speed of 5.00 m/s. If gravity on the Moon is 1/6 that on Earth, what horizontal distance will the moon-pie travel before hitting the floor of the crater?

10. A ball is projected horizontally at 21 m/s from a point 40 m above the ground.

Determine:

a) the horizontal distance travelled by the ball before hitting the ground.

b) the ball's instantaneous velocity as it hits the ground.

1.  $2 \text{ m/s}^2$ ,  $-3 \text{ m/s}^2$ , 350 m 2. a) 290 m b) 31 m/s c) 73 m 3. a) 18.3 m/s b) i) 31.9 m ii) after 0.81 s and 4.30 s

4. a) 5.11 s b)  $-28.4 \text{ m/s}$  5. 0.90 m 6. 2020 m 7. 321 m/s 8. 38 m 9. 55.5 m 10. a) 60 m b) 35 m/s at  $53^\circ$  down