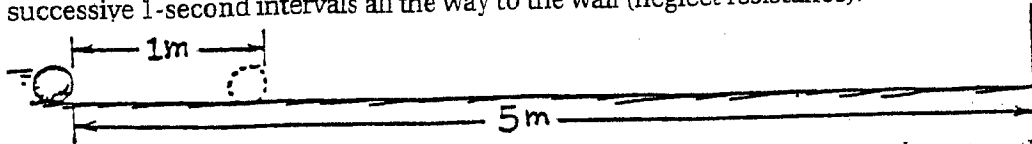**Concept-Development Practice Page 2-1**

Non-Accelerated Motion

1. The sketch shows a ball rolling at constant velocity along a level floor. The ball rolls from the first position shown to the second in 1 second. The two positons are 1 meter apart. Sketch the ball at successive 1-second intervals all the way to the wall (neglect resistance).

   |← 1m →|

   |←————————— 5 m —————————→|

   a. Did you draw successive ball positions evenly spaced, farther apart, or closer together? Why?

   _____

   b. The ball reaches the wall with a speed of _____ m/s and takes a time of _____ seconds.

2. Table I shows data of sprinting speeds of some animals. Make whatever computations are necessary to complete the table.
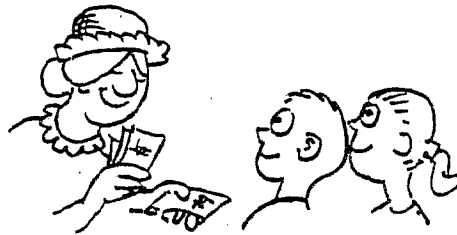
   Table I

ANIMAL	DISTANCE	TIME	SPEED
CHEETAH	75 m	3 s	25 m/s
GREYHOUND	160 m	10 s	
GAZELLE	1 km		100 km/h
TURTLE		30 s	1 cm/s

Accelerated Motion

Free Fall Speed

1. Aunt Minnie gives you $10 per second for 4 seconds. How much money do you have after 4 seconds? _____

2. A ball dropped from rest picks up speed at 10 m/s per second. After it falls for 4 seconds, how fast is it going? _____

3. You have $20, and Uncle Harry gives you $10 each second for 3 seconds. How much money do you have after 3 seconds? _____

4. A ball is thrown straight down with an initial speed of 20 m/s. After 3 seconds, how fast is it going? _____

5. You have $50 and you pay Aunt Minnie $10/second. When will your money run out? _____

6. You shoot an arrow straight up at 50 m/s. When will it run out of speed? _____

7. So what will be the arrow's speed 5 seconds after you shoot it? _____

8. What will its speed be 6 seconds after you shoot it? 7 seconds? _____ _____

Free Fall

4. A rock dropped from the top of a cliff picks up speed as it falls. Pretend that a speedometer and odometer are attached to the rock to show readings of speed and distance at 1-second intervals. Both speed and distance are zero at time = zero (see sketch). Note that after falling 1 second the speed reading is 10 m/s and the distance fallen is 5 m. The readings for succeeding seconds of fall are not shown and are left for you to complete. So draw the position of the speedometer pointer and write in the correct odometer reading for each time. Use $g = 10$ m/s^2 and neglect air resistance.

RELATIONSHIPS TO USE
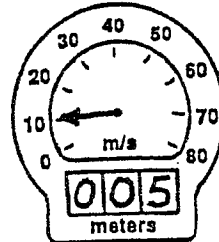
Instantaneous speed of fall from rest:

$$v = gt$$

Distance fallen from rest:

$$d = \frac{1}{2}gt^2$$
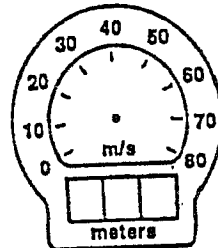
a. The speedometer reading increases by the same amount, _____ m/s, each second. This increase in speed per second is called

_____.

b. The distance fallen increases as the square of the _____.

c. If it takes 7 seconds to reach the ground, then its speed at impact is _____ m/s, the total distance fallen is _____ m, and its acceleration of fall just before impact is _____ m/s^2.
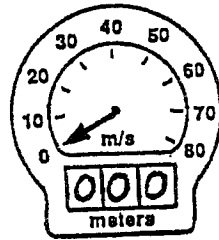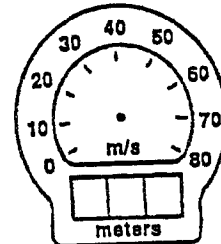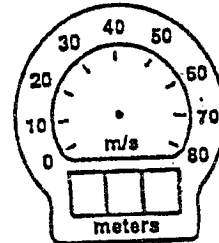

t = 0 s

t = 1 s

t = 2 s

t = 3 s
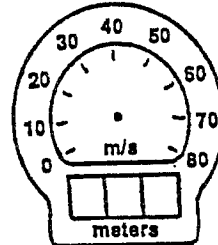
t = 4 s

t = 5 s

t = 6 s