Free Fall Practice Name:______________________ Date:__________ Block:______

Use $g = 10\ m/s^2$ unless indicated otherwise.

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 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 Distance

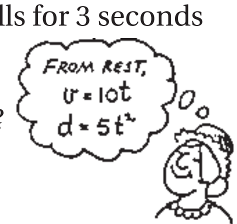
1. Speed is one thing; distance another. *Where* is the arrow you shoot up at 50 m/s when it runs out of speed? __________

2. How high will the arrow be 7 seconds after being shot up at 50 m/s? __________

3. a. Aunt Minnie drops a penny into a wishing well and and it falls for 3 seconds before hitting the water. How fast is it going when it hits? __________

   b. What is the penny's average speed during its 3-second drop? __________

   c. How far down is the water surface? __________

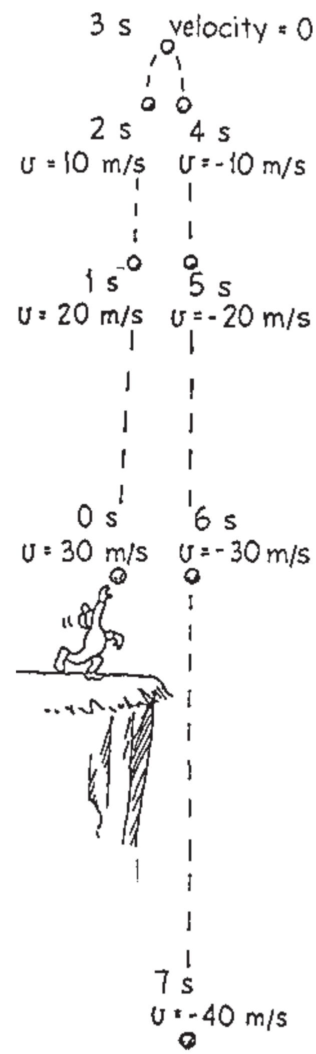


4. Aunt Minnie didn't get her wish, so she goes to a deeper wishing well and throws a penny straight down into it at 10 m/s. How far does this penny go in 3 seconds? __________

Straight Up and Down

- Table 1 shows the velocity data of the figure for $t = 0$ to $t = 8$ seconds. Complete the table.
  Distances traveled are from the starting point (the *displacements*).
- Table 2 is for a greater initial velocity. Complete it.

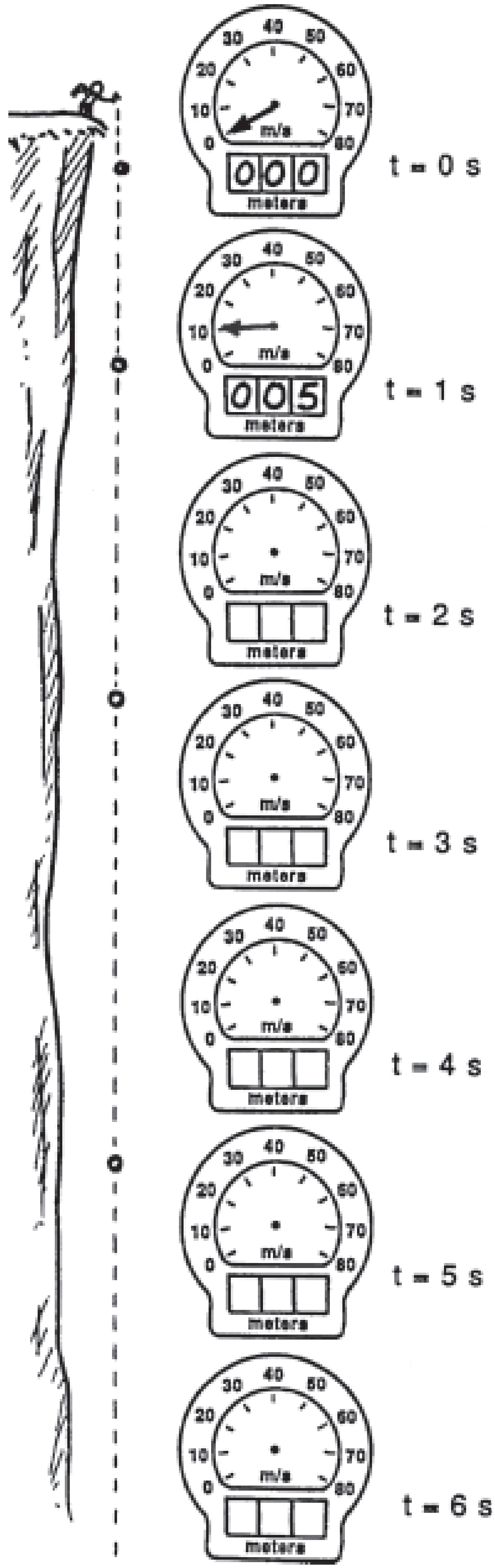
Let up be (+) and down be (-). Then use your kinematics equations to answers to table blanks.



	1.		2.	
Time in seconds	Velocity m/s	Distance m	Velocity m/s	Distance m
0	30	0	40	0
1	20			
2	10			
3	0			
4	-10			
5	-20			
6	-30			
7	-40			
8	-50			

Free Fall

1. 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.
   - Draw the position of the speedometer pointer and
   - Write in the correct odometer reading for each time.



a. The speedometer reading increased by the same amount,

____________m/s, each second. The change in velocity

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.

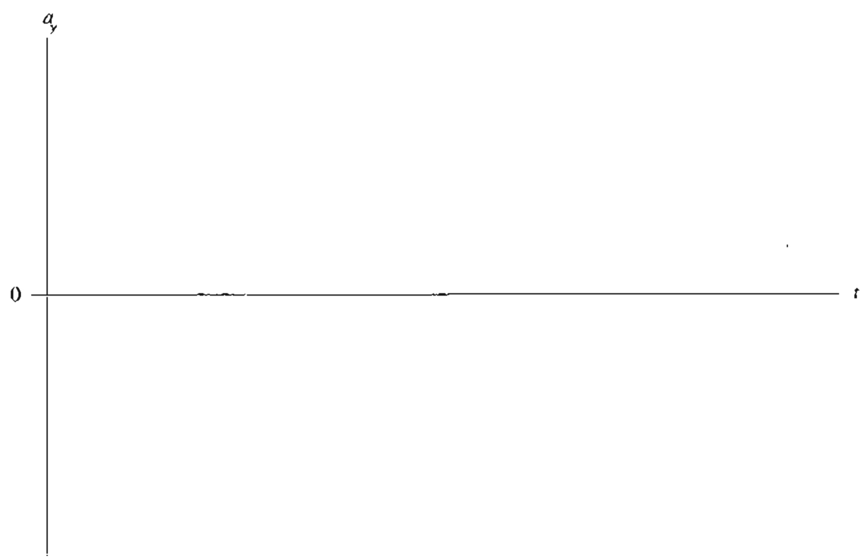
2. A ball is thrown straight up into the air. At each of the following instants, is the acceleration of the ball **+g**, -**g**, **0**, less than **g**, or greater than **g**?

   a. Just after leaving your hand? ________________

   b. At the very top (maximums height)?___________

   c. Just before hitting the ground?________________

3. A ball is thrown straight up into the air. It reaches a height h, then falls back down to the ground. On the axes below, graph the ball's acceleration from an instant after it leaves the thrower's hand until the instant before it hits the ground. Indicate on your graph the times during which the ball is moving upwards, at its peak, and moving downwards.



4. On a single graph, using the axes below, graph
   a. The acceleration of a rock dropped from a bridge into the river below and
   b. The acceleration of a rock thrown straight down (not dropped) from a bridge into the river below.

   Start your graphs at the moment the rock leaves the person's hand to the moment before it strikes the water Be sure and label which graph is which.