Ball Toss Concept Sheet

On the surface of the earth, the acceleration due to gravity is about 10 m/s^2. Ignoring air resistance, this means that the velocity of a falling object changes by about 10 m/s every second. On this sheet, you will calculate and draw the position of a ball that is tossed up in the air with an initial velocity of 60 m/s.

1. Calculate the velocity of the ball object for each second of its flight for the first 6 seconds. Record your answers in the column marked "Velocity." (Show your work below the chart.)

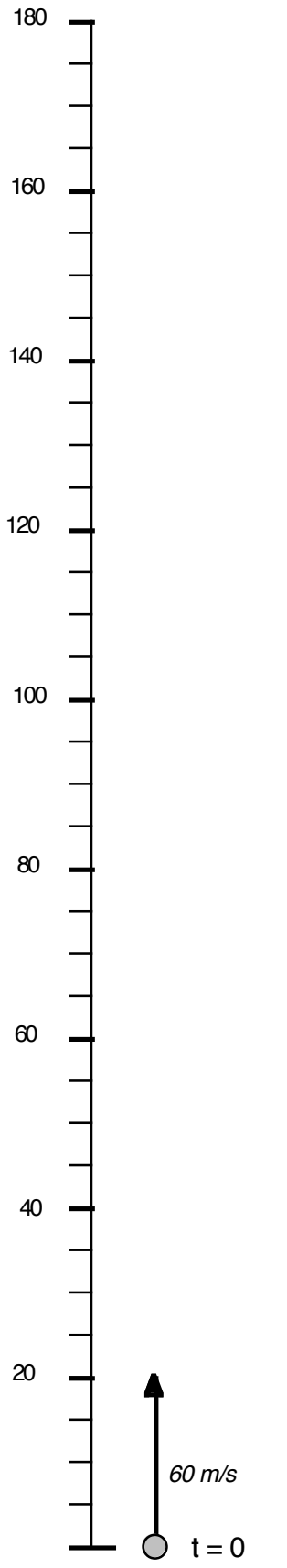
2. Calculate the height of the ball for each second. Record the answers in the "Height" column of the chart below. (Show your work below the chart.)

3. For each of the calculated values, draw a ball next to the appropriate height in the diagram. Label it with the appropriate time and speed. (The initial position is already done.)

4. Draw in arrows that could represent the velocity of the ball at each moment.

5. Answer the questions on the back of this sheet.

Time (s)	*Velocity (m/s)*	*Height (m)*
0	60	0
1		
2		
3		
4		
5		
6		



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Questions:

1. What happened to the spacing between the balls as it got higher in the air? Explain why this happened.

2. What do you think would have happened to the ball after the 6 seconds shown?

3. What will always be true about the speed of a tossed object when it is at its maximum height?

4. For a ball tossed up with an initial speed of 60 m/s, how fast would it be going after 1.5 seconds?

5. If the ball was thrown up with an initial speed of only 30 m/s, how high would it have gone?

To answer the rest of these questions, you will also need your "Free Fall Concept Sheet." Compare the speeds and positions of the ball in the two diagrams.

6. When putting the two pictures next to each other, what do you notice about the positions of the ball?

7. What do you notice about the speeds of the ball at each height?

8. What would be true about the <u>velocities</u> of the ball at each height?

9. Why do you think I chose to start the ball toss with an initial speed of 60 m/s? (Hint: how do you think the two concept sheets are connected?)

10. Imagine you throw a ball up with some initial speed and then catch when it gets back to your hand
    a. How does the time it takes the ball to go up compare to the time it takes to fall back down?

    b. What is true about the speed of the ball at its maximum height?

    c. What is true about the speed of the ball when it gets back to your hand?