$$\text{AVERAGE VELOCITY} = \frac{\text{change in position}}{\text{elapsed time}}$$

Change in position is final position minus initial position.

The sign of the answer indicates direction.

It's a vector - it tells you something about where you ended up.

Both are in m/s

Average Speed

Tells you how fast, but no indication of direction or where you ended up.

Average Velocity

Indicates direction and where you ended up, but not about the speeds along the way.

We prefer velocity... hopefully there's a way to make it say more about the speeds along the way.

Beijing, 2008

Olympic Competition

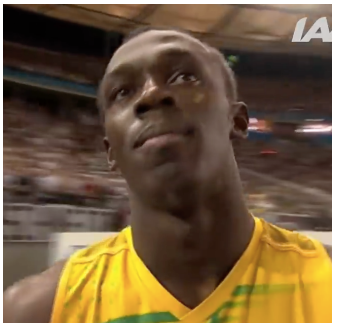
Usain Bolt runs the 100 m in a record 9.69 s.

$$\frac{100\text{ m}}{9.69\text{ s}} = 10.3\text{ m/s}$$

Beijing, 2008

Olympic Competition

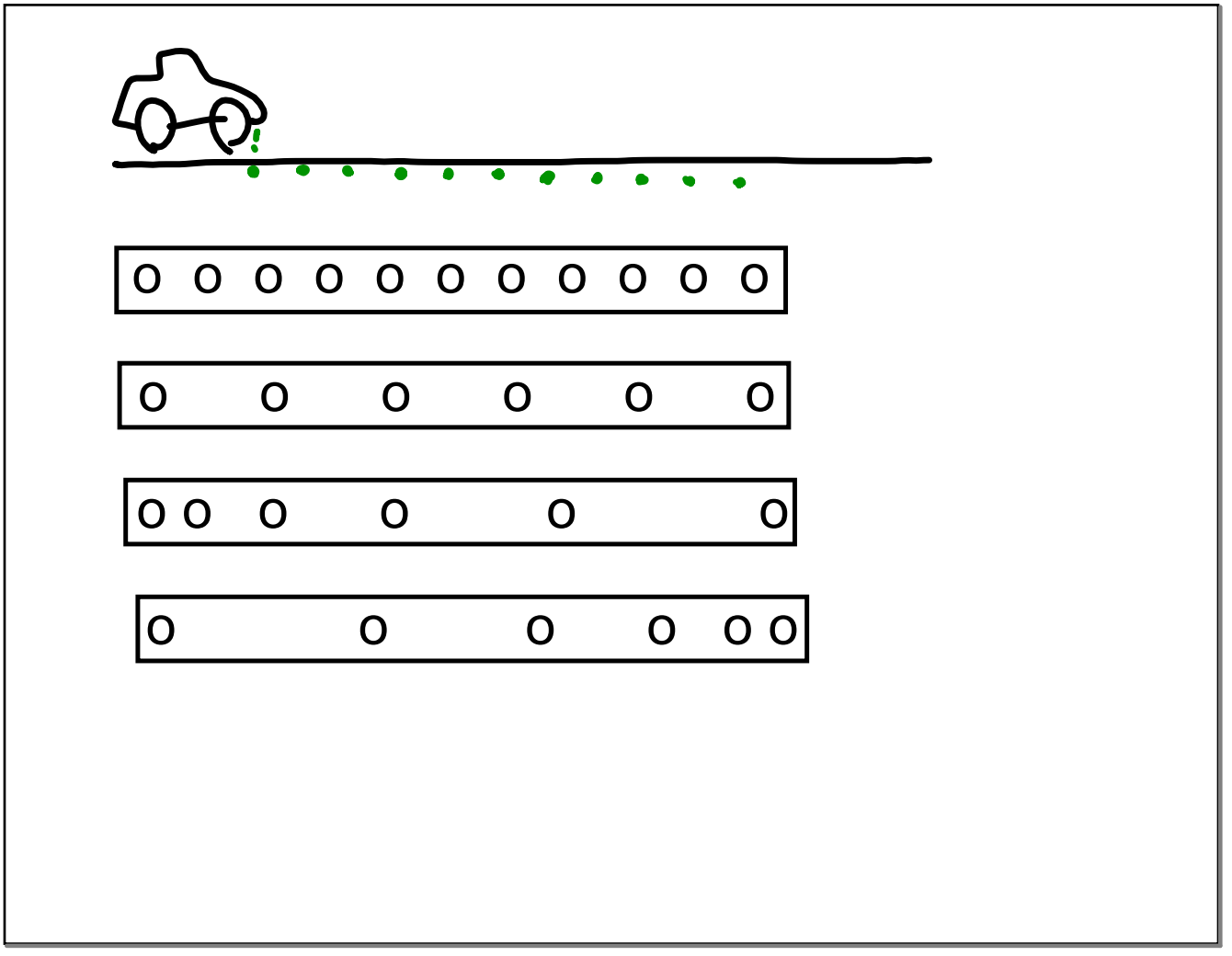
Usain Bolt runs the 100 m in a record 9.69 s.



Berlin, 2009

World Competition

Usain Bolt runs the 100 m in 9.58 s, breaking his previous record.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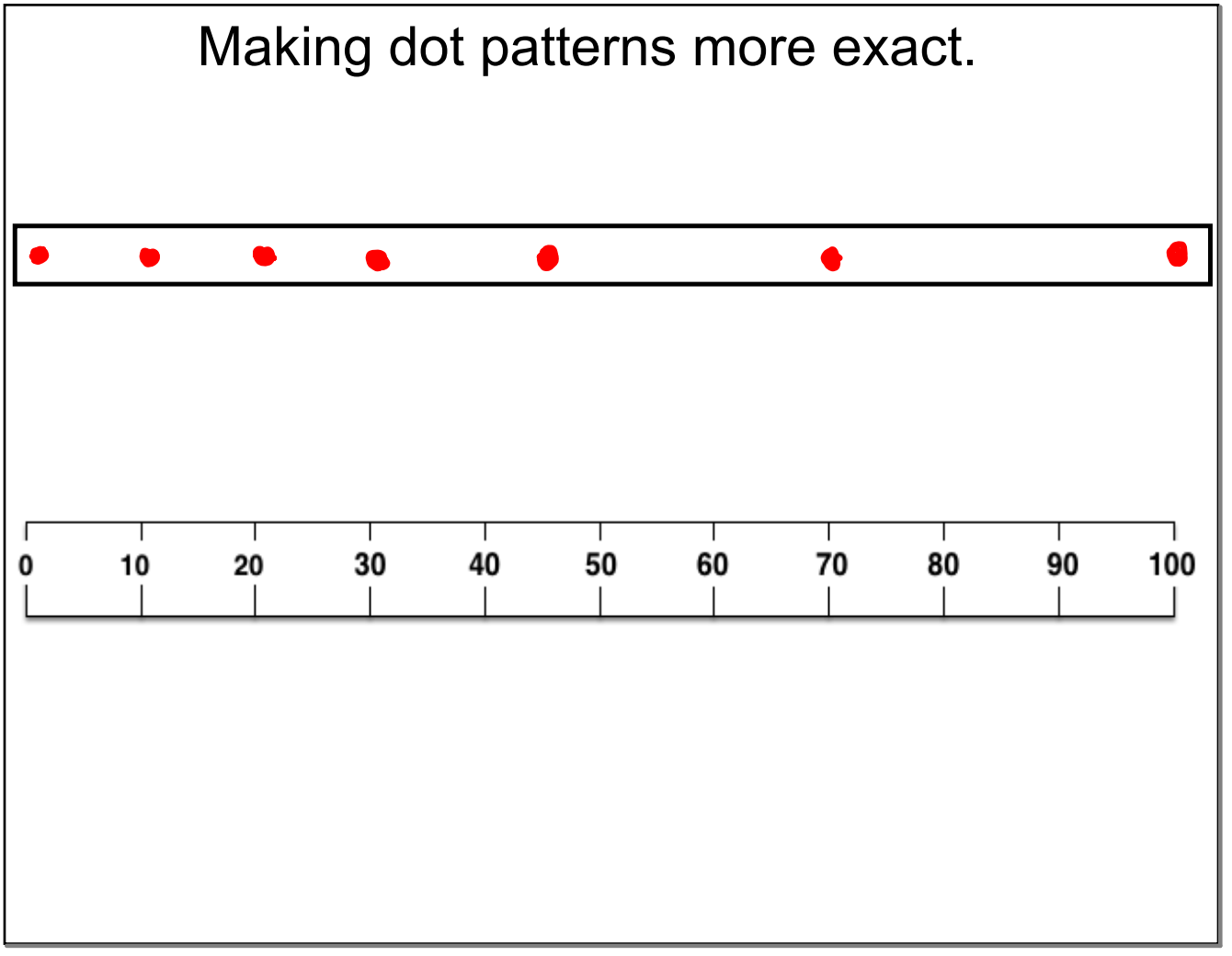
Making dot patterns more exact.
0
10
20
30
40
50
60
70
80
90
100

Beijing 2008

t (s)	x (m)	v (m/s)
0	0	
1	4	
2	11	
3	20	
4	30	
5	42	
6	54	
7	67	
8	79	
9	91	
10	101	

estimates based on speedendurance.com data

average speed

10.3 m/s

?????

Beijing 2008

t (s)	x (m)	v (m/s)
0	0	4 m/s
1	4	7 m/s
2	11	9 m/s
3	20	10 m/s
4	30	12 m/s
5	42	12 m/s
6	54	13 m/s
7	67	12 m/s
8	79	12 m/s
9	91	10 m/s
10	101	

estimates based on speedendurance.com data

average speed

10.3 m/s

?????

The smaller you can make the time jumps, the more accurately you know the velocities during the motion. (You wouldn't miss things like turn-arounds and accelerations.)

Instantaneous velocity = the ideal limit when the time jumps are infinitesimally small. You would know the velocity at every moment in time.