Motion Basics Review

1. Simply based on acceleration and velocity, how can you determine if…

   a. An object is moving at a constant velocity.
      (Fill in numbers for velocity and acceleration that would match with this description)

   > v = **Any non-zero number**
   > a = **0**

   b. An object is speeding up.
      (Fill in numbers for velocity and acceleration that would match with this description)

   > v = **Any positive (+) number**   **OR**   v = **Any negative (-) number**
   > a = **Any positive (+) number**   a = **Any negative (-) number**

   > **If the sign is the same for velocity and acceleration, the object will speed up!**

   c. An object is slowing down.
      (Fill in numbers for velocity and acceleration that would match with this description)

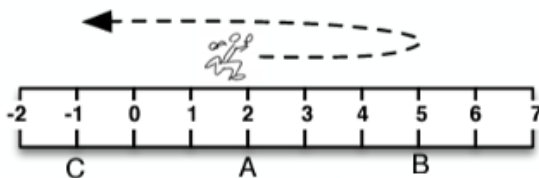   > v = **Any positive (+) number**   **OR**   v = **Any negative (-) number**
   > a = **Any negative (-) number**   a = **Any positive (+) number**

   > **If the sign is the opposite for velocity and acceleration, the object will slow down!**

2. The person runs from point A **(x = 2 m)** to point B **(x = 5 m)** in 4 seconds, then doubles back and ends up at point C **(x = -1 m)** in another 2 seconds.
a. Calculate the average speed from A to C.
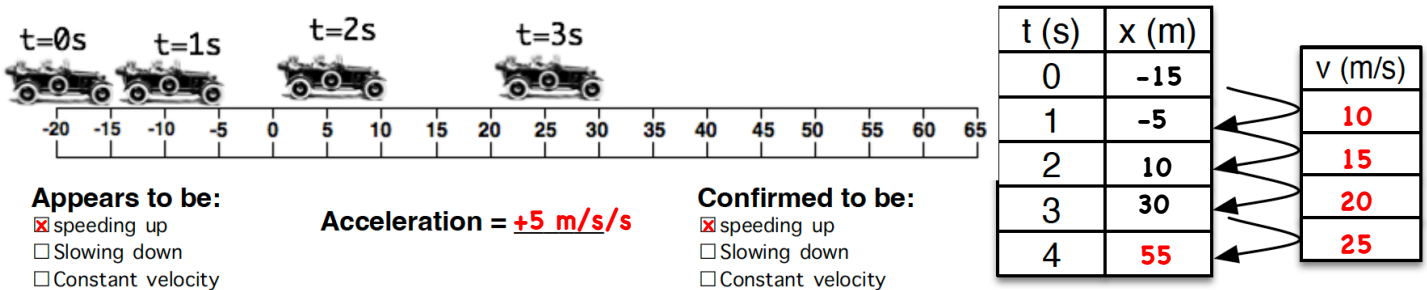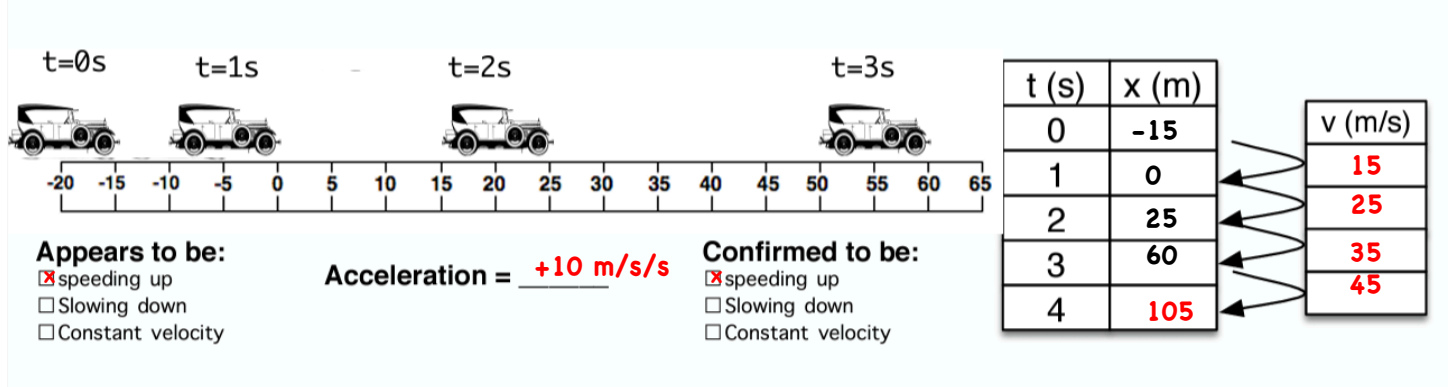
$$\frac{distance\ traveled}{elapsed\ time} = \frac{[3+6]}{[4+2]} = \frac{[9]}{[6]} = \boxed{\frac{3}{2}\ m/s}$$

b. Calculate the average velocity from A to C.

$$\frac{change\ in\ position}{elapsed\ time} = \frac{[-1-2]}{[6]} = \frac{[-3]}{[6]} = \boxed{-\frac{1}{2}\ m/s}$$

Motion Basics Review

For each situation, track the FRONT of the car and fill in the boxes, the acceleration, and the table.

t=0s   t=1s   t=2s   t=3s

-20 -15 -10 -5 0 5 10 15 20 25 30 35 40 45 50 55 60 65

Appears to be:
☒ speeding up
☐ Slowing down
☐ Constant velocity

Acceleration = +10 m/s/s

Confirmed to be:
☒ speeding up
☐ Slowing down
☐ Constant velocity

t (s)	x (m)
0	-15
1	0
2	25
3	60
4	105

v (m/s)
15
25
35
45

t=0s   t=1s   t=2s   t=3s

-20 -15 -10 -5 0 5 10 15 20 25 30 35 40 45 50 55 60 65

Appears to be:
☒ speeding up
☐ Slowing down
☐ Constant velocity

Acceleration = +5 m/s/s

Confirmed to be:
☒ speeding up
☐ Slowing down
☐ Constant velocity

t (s)	x (m)
0	-15
1	-5
2	10
3	30
4	55

v (m/s)
10
15
20
25

For each situation, track the FRONT of the person's foot. Fill in the boxes based on the clues given about the person's motion.

t=3s

-4 -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10 11 12 13

Acceleration = 3 m/s/s

t (s)	x (m)
0	0
1	1
2	5
3	12

v (m/s)
1
4
7

t=2s   t=3s

-4 -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10 11 12 13

Acceleration = 2 m/s/s

t (s)	x (m)
0	0
1	2
2	6
3	12

v (m/s)
2
4
6