PHY 181: Summer 2023
Worksheet 1

Name: _____ Date: _____

1 Difference operator

Expand the following difference operators.

$\Delta x =$ _____

$\Delta p =$ _____

$\Delta v =$ _____

$\Delta s =$ _____

$\Delta t =$ _____

2 Vectors and Scalars

Circle the vectors in the table below.

5	10m West	15s	-8
9kg	$4\vec{x}$	15m/s	-5m West
12s	10 left	4m	9s
7mi right	8m	18 ft left	10

3 Speed

Fill in the table below. These are Usain Bolt's times in the 2009 World Championships.

Segment (m)	time (s)	speed (m/s)
0-10	1.85	
10-20	1.02	
20-30	0.91	
30-40	0.87	
40-50	0.85	
50-60	0.82	
60-70	0.82	
70-80	0.82	
80-90	0.83	
90-100	0.90	

Compute the average speed: _____

Fill in the missing values in the table below.

distance (m)	time (s)	speed (m/s)
10	2	
20		5
	5	20
12		4
18	6	
	5	10

4 Relative Velocity

If you are traveling at 40mph North relative to the ground and another car is driving towards you at 50 mph South relative to the ground, what is the car's velocity relative to you?

If a car is traveling at 100 mph South relative to you and you are traveling at 60 mph North relative to the ground, how fast is the car traveling relative to the ground?

If a car is traveling in the same direction as you at 80 mph North relative to the ground and is passing you at 20 mph North relative to you, how fast are you traveling relative to the ground?

5 Acceleration

Suppose that Usain Bolt started the race from rest. Assume that the average speed of each segment that was found in a prior table is the instantaneous speed at the end of each segment. Suppose that the track is straight and is pointed Northward. Fill in the table below to find his acceleration for each segment of the track.

Segment (m)	initial velocity (m/s North)	final velocity (m/s North)	acceleration (m/s^2 North)
0-10	0		
10-20			
20-30			
30-40			
40-50			
50-60			
60-70			
70-80			
80-90			
90-100			