Name: _____   Section: _____

The Scooter Games

Overview: For this activity, you and the members of your group will compete in speed trials for various events: Scooter Sprint (SS), Scooter Agility (SA), Scooter Distance (SD), and Scooter Relay (SR). Distance and time measurements will be gathered and used to help determine the speed of each participant for each event.

Materials:
- 1 gym scooter
- 5 cones/markers
- timer/smartphone with lap function
- writing utensil
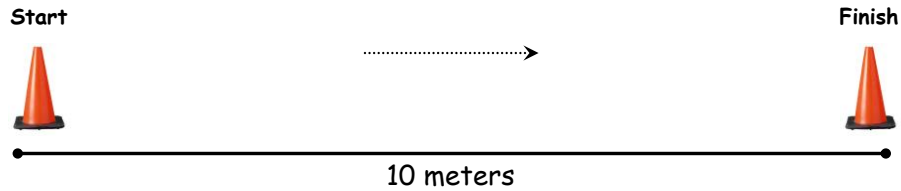- calculator

Procedures:
1. Set up the appropriate event course as detailed by specifications and the teacher.
2. Sit on the scooter. Have one of your partners record how long it takes you to complete the course.
3. Record the distance traveled and the amount of time taken to complete the event course in the appropriate data table.
4. Calculate the speed of each group member by dividing the distance traveled by the time and find the average speed for the group.
5. Repeat steps one through four with all members of the group, for each event course (SS, SA, SD, SR).
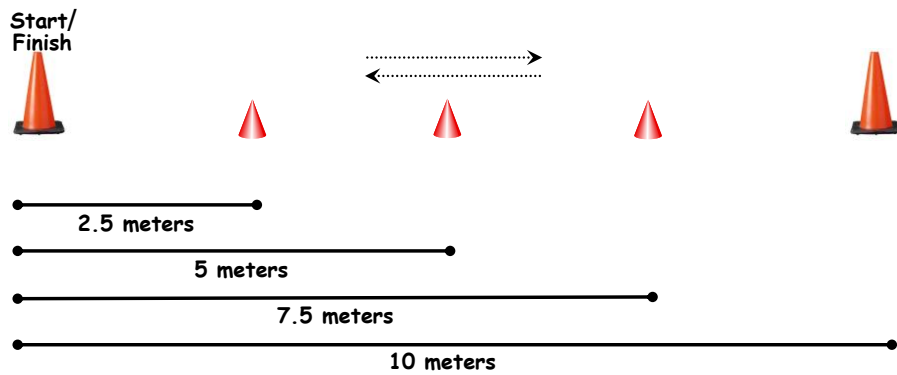
The Scooter Games – **Rules**

1. Competitors must be seated on the scooter.
2. Competitors will be provided with a brief period of time to familiarize themselves with the scooter prior to the official start.
3. Prior to the official start of a timed trial, the front edge of the scooter must sit behind the start line.
4. The student timer must stand next to the finish line in order to get an accurate time measurement. The timer should be stopped once the entire scooter passes the finish line.
5. Competitors are not allowed to put their hands on the ground. *Penalty – 10 seconds.*
6. Competitors must not touch/hit any cone. *Penalty – 5 seconds.*
7. Competitors must always be facing and moving forward during a timed trial. *Penalty – disqualification.*
8. Competitors must go around every cone during a timed trial, with the exception of SS. *Penalty – disqualification.*
9. Competitors must remain on the scooter at all times during a timed trial. *Penalty - disqualification.*
10. Competitors cannot interfere with other competitors during a timed trial. *Penalty - disqualification.*

Event Courses - **Specifications**

- **<u>Scooter Sprint</u>** (1x)

Start

Finish

10 meters

- **<u>Scooter Agility</u>** (1x)

Start/
Finish

2.5 meters

5 meters

7.5 meters

10 meters

- **<u>Scooter Distance</u>** (4x)

Start/
Finish
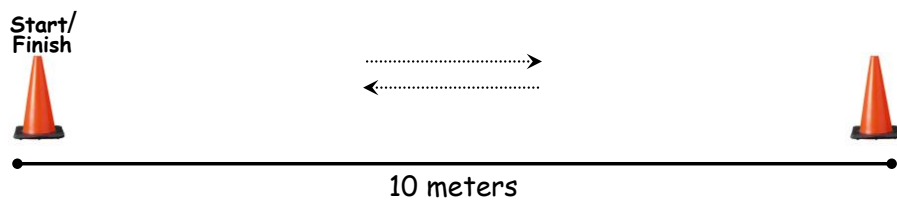
10 meters

- **<u>Scooter Relay</u>** (4 Competitors/Teammates – 1x each)

Start/
Finish
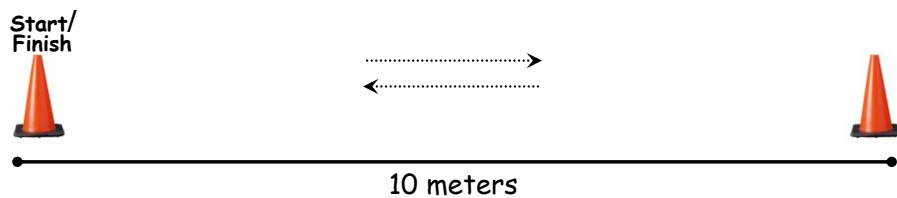
10 meters

Data:

Table 1 – *Scooter Sprint (SS)*

Member	Distance (meter)	Time (second)	Speed Calculations (distance ÷ time)	Speed (meter/second)
Average Speed =				

Table 2 – *Scooter Agility (SA)*

Member	Distance (meter)	Time (second)	Speed Calculations (distance ÷ time)	Speed (meter/second)
Average Speed =				

Table 3 – *Scooter Distance (SD)*

Member	Distance (meter)	Time (second)	Speed Calculations (distance ÷ time)	Speed (meter/second)
Average Speed =				

Table 4 – *Scooter Relay (SR)*

Leg	Distance (meter)	Time (second)	Speed Calculations (distance ÷ time)	Speed (meter/second)
1				
2				
3				
4				
Combined Legs (1-4)				
Average Leg Speed =				

General Questions (Group):

1. In what event did **your group** have the fastest average speed? What could have accounted for this? How does **your** speed compare to the **group's** average speed for this event?

2. In what event did **your group** have the slowest average speed? What could have accounted for this? How does **your** speed compare to the **group's** average for this event?

Scooter Games – *Event Finals – Winner's Data*

Scooter Sprint			
Distance (meter)	Time (second)	Speed Calculations (distance ÷ time)	Speed (meter/second)

Scooter Agility			
Distance (meter)	Time (second)	Speed Calculations (distance ÷ time)	Speed (meter/second)

Scooter Distance			
Distance (meter)	Time (second)	Speed Calculations (distance ÷ time)	Speed (meter/second)

Scooter Relay				
Leg	Distance (meter)	Time (second)	Speed Calculations (distance ÷ time)	Speed (meter/second)
1				
2				
3				
4				
Combined Legs (1-4)				
Average Leg Speed =				

General Questions (Overall):

1. Using the SR data (from <u>your group</u> and the **overall winning group**), create a multiple line graph with time on the x-axis and distance on the y-axis. This is known as a distance-time graph. It will be necessary for you to graph the cumulative data for time and distance at 20 meter intervals. A table has been provided to help you organize your data.

Leg	Your Group				Winning Group			
	Time (s)	Plotted Time (s)	Distance (m)	Plotted Distance (m)	Time (s)	Plotted Time (s)	Distance (m)	Plotted Distance (m)
1								
2								
3								
4								
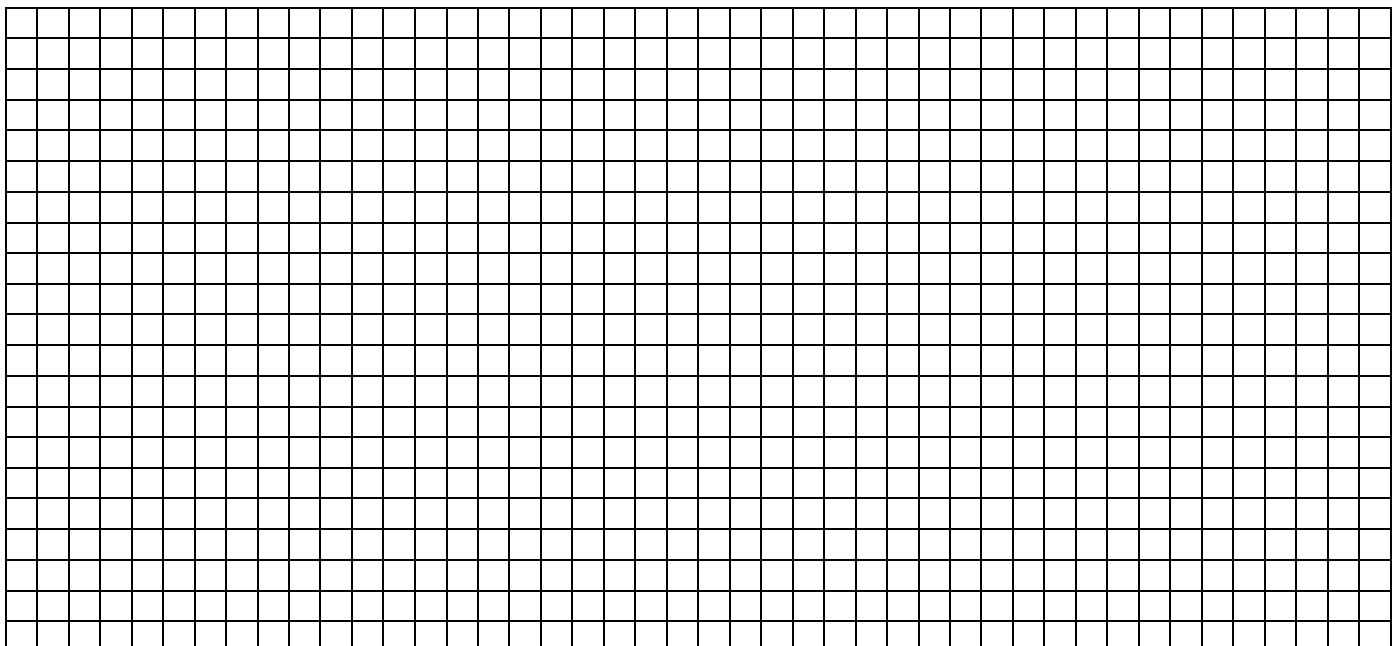
2. Compare and contrast the line representing <u>your group's relay speeds</u> with the **overall winning group's relay speeds**.

3. What would the presence of a straight line on a distance-time graph indicate?

4. What would the presence of a positively sloped line on a distance-time graph indicate? A negatively sloped line?

5. What factors could have impacted the accuracy of the calculated speeds for this activity?

6. It is possible for an <u>individual or group's preliminary speed(s)</u> to be faster than the **overall winner's speed**. What could account for this?

Using the Speed Formula:

SHOW YOUR WORK!

1. Consider your group's average speed for the SS and the **overall winner's speed**.

    a. How long would it take your group to travel a distance of 35 meters?

    b. How long would it take the **overall winner** to travel a distance of 35 meters?

2. Consider your group's average speed for the SA and the **overall winner's speed**.

    a. How far would your group travel if you moved on the scooter for 50 seconds?

    b. How far would the **overall winner** travel if they moved on the scooter for 50 seconds?

3. Consider <u>your group's average speed</u> for the SD and the **overall winner's speed**.

   a. How much longer would it take <u>your group</u> to travel a distance of 120 meters compared to the overall winner?

   b. How much further would the **overall winner** travel in 5 minutes compared to your group?

<u>Using the Acceleration Formula</u>:

Although you never specified a direction with your calculated speeds for the Scooter Games, the speeds should be used when velocity is called for in all problems that follow.

SHOW YOUR WORK!

1. Consider <u>your group members' individual SS data</u> and the **overall winner's SS data**.

   a. Calculate each <u>group member's acceleration</u>.

   b. Calculate the **overall winner's acceleration**.

c. Compare and contrast each of <u>your group member's acceleration</u> to one another.

d. Compare and contrast each of <u>your group member's acceleration</u> to the **overall winner's acceleration**.

2. Consider <u>your group's SR data</u> and the **overall winning group's SR data**.

    a. What is <u>your group's</u> acceleration for each leg (1-4) of the race? Approach this as if there was never an exchange of the scooter between members of the group, and it was just a straight, 80m race. The information below will help guide you.

Show your work!

      i.   <u>*Leg 1*</u>
- $V_i = 0$
- V_f = average velocity for leg 1
- T = time to complete leg 1

      ii.   <u>*Leg 2*</u>
- V_i = average velocity for leg 1
- V_f = average velocity for leg 2
- T = time to complete leg 2

      iii.   <u>*Leg 3*</u>
- V_i = average velocity for leg 2
- V_f = average velocity for leg 3
- T = time to complete leg 3

      iv.   <u>*Leg 4*</u>
- V_i = average velocity for leg 3
- V_f = average velocity for leg 4
- T = time to complete leg 4

b. What is the **overall winning group's** acceleration for each leg (1-4) of the race? Approach this as if there was never an exchange of the scooter between members of the group, and it was just a straight, 80m race.

Show your work!

    i.   **_Leg 1_**
- $V_i = 0$
- V_f = average velocity for leg 1
- T = time to complete leg 1

    ii.   **_Leg 2_**
- V_i = average velocity for leg 1
- V_f = average velocity for leg 2
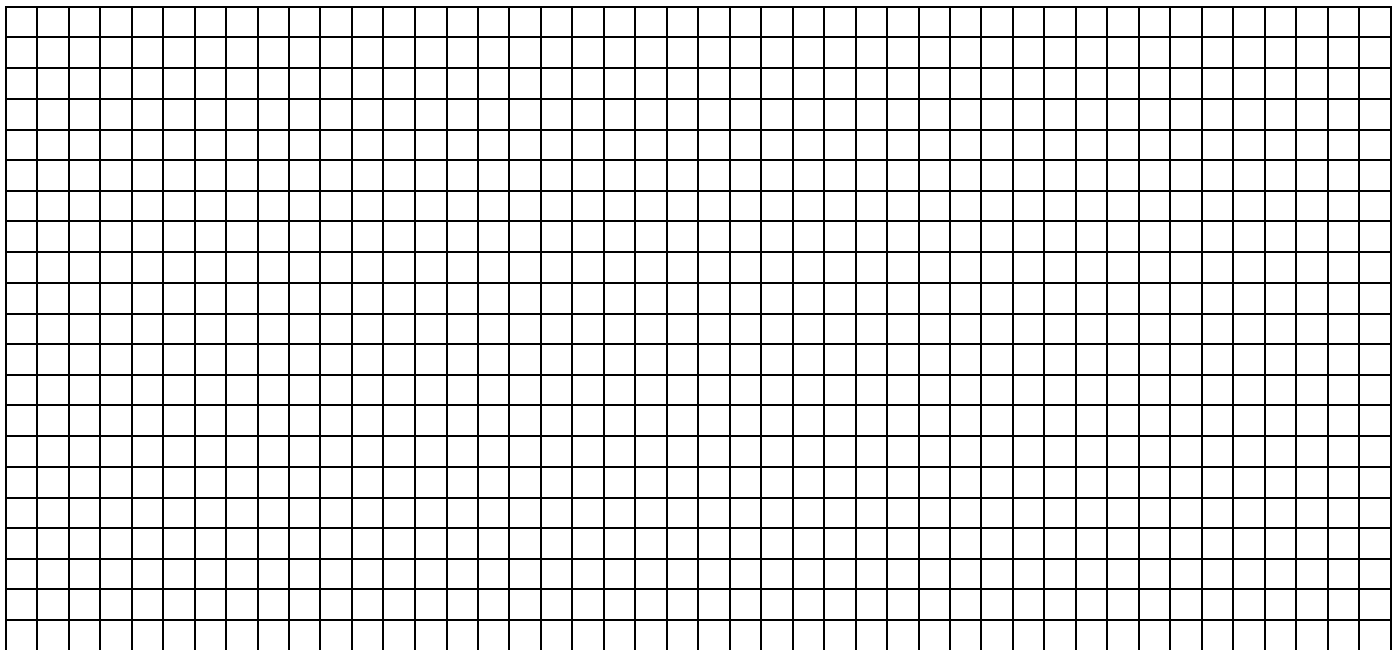- T = time to complete leg 2

    iii.   **_Leg 3_**
- V_i = average velocity for leg 2
- V_f = average velocity for leg 3
- T = time to complete leg 3

    iv.   **_Leg 4_**
- V_i = average velocity for leg 3
- V_f = average velocity for leg 4
- T = time to complete leg 4

3. Using the SR data (from <u>your group</u> and the **overall winning group**), create a multiple line graph with time on the x-axis and velocity on the y-axis. This is known as a velocity-time graph. It will be necessary for you to graph the cumulative data for the time. For example, if Leg 1 takes 10 seconds and Leg 2 takes 15 seconds, the second plotted time would be 25 seconds (10 seconds + 15 seconds). A table has been provided to help you organize your data.

Leg	Your Group			Winning Group		
	Time (s)	Plotted Time (s)	Velocity (m/s)	Time (s)	Plotted Time (s)	Velocity (m/s)
1						
2						
3						
4						

4. Compare and contrast the line representing <u>your group's acceleration</u> with the one representing the **overall winning group's acceleration**.

5. What would the presence of a straight line on a velocity-time graph indicate?

6. What would the presence of a positively sloped line on a velocity-time graph indicate? A negatively sloped line?

7. What factors could have impacted the accuracy of the calculated accelerations for this activity?

8. It is possible for an <u>individual or group's preliminary acceleration(s)</u> to be greater than the **overall winner's acceleration(s)**. What could account for this?

9. Does a greater, positive, acceleration in the beginning of the race always result in a win? Explain your reasoning.

Using the Momentum Formula:

Complete the tables below with the mass of your group's member and the mass of the overall event winners.

Group Member	Mass (kg)

Event Winner		Mass (kg)
Scooter Sprint		
Scooter Agility		
Scooter Distance		
Scooter Relay		
	Leg 1 Racer	
	Leg 2 Racer	
	Leg 3 Racer	
	Leg 4 Racer	

SHOW YOUR WORK!

1. Consider <u>your group members' individual SA data</u> and the **overall winner's SA data**.

   a. Calculate each <u>group member's momentum</u>.

   b. Calculate the **overall winner's momentum**.

c. Compare and contrast each of <u>your group member's momentum</u> to one another.

d. Compare and contrast each of <u>your group member's momentum</u> to the **overall winner's momentum**.

2. Consider <u>your group member</u> with the greatest momentum and your group member with the least momentum. Relative to each other, how did they fare during the SA race?

3. Consider the **overall winner** of the SA race. How does the **overall winner's momentum** compare to <u>your group member with the greatest momentum</u> and <u>your group member with the least momentum</u>?

4. Do you think it is beneficial to have more or less momentum when competing in the SA race? Explain your reasoning