Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Prd:\_\_\_\_\_ Date:\_\_\_\_\_\_\_\_\_\_

Partner:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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OBJECTIVE: Calculate, Graph, and Analyze a rollie chair racing team’s velocity and acceleration for 25meters at 5 meter intervals.

PROCEDURE:

**1**. Select a

**2**. On the whistle, roll to the finish line.

**3**. Timers will record the time it takes for you and your partner to pass each distance.

**4**. Immediately after reaching the finish line, unfasten your legs, and record the times for each distance in the, “Student Distance and Time Raw Data Table,” below**.**

**5.** After recording your time data, help time others prepare, and take times.

**6** Complete Parts Two and Three and Four after all teams have completed the race. This will be homework if you do not complete during class.

**STUDENT DISTANCE AND TIME**

**RAW DATA TABLE**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Distance**  **(meters)** | **0m** | **5m** | **10m** | **15m** | **20m** | **25m**  **(finish)** |
| **Time in (S)** | **0** |  |  |  |  |  |

PART TWO: Calculating Velocity at Each Distance:

DIRECTIONS:

**1**. Use the equation, Velocity = Distance ÷ Time

to calculate the velocity at each of the 5 distances for each trial. Show your work in the calculations boxes and record the velocities.

**2.** Once you have shown your work and completed all calculations, transfer the velocities you’ve calculated into the “Velocity” boxes in the Acceleration Calculation Chart on Part 3, and in the Final Data Chart on Part 4.

**Velocity Calculations**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Distance**  **5m** | **Time:** | **Distance**  **10m** | **Time:** | **Distance**  **15m** | **Time:** | **Distance**  **20m** | **Time:** | **Distance**  **25m** | **Time:** |
| Calculate velocity here. Show work | | Calculate velocity here. Show work | | Calculate velocity here. Show work | | Calculate velocity here. Show work | | Calculate velocity here. Show work | |
| Write Velocity Answer Here | | Write Velocity Answer Here | | Write Velocity Answer Here | | Write Velocity Answer Here | | Write Velocity Answer Here | |

PART THREE: Calculating Your Acceleration:

DIRECTIONS:

**1**. Use the equation, **Acceleration = Final Velocity - Initial Velocity**

**Final Time – Initial Time**

to calculate the acceleration after all 5 distances. Show your work in the calculations boxes and record the acceleration in the Table below. Be sure to include proper units!

**2**. Remember you are calculating your acceleration between each distance. Your Initial V and T will be the velocity and time for the first distance you are considering in the acceleration problems. For example, if you were calculating the acceleration between 20 and 25 meters, you would use the time and velocity at 20 meters for your initial velocity and time in the acceleration equation.

**3**. Once you have shown your work and completed all calculations, transfer your velocity data to the Acceleration Calculation Charts on page 3, and the Final Data Chart on Page 4.

**ROLLIE CHAIR RACERS’ ACCELERATIONS**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| **5m** | Time | Velocity | **10m** | Time | Velocity | **15m** | Time | Velocity | **20m** | Time | Velocity | **25m** | Time | Velocity |
| 0-5m acceleration calculations, show work | | | 5-10m acceleration calculations, show work | | | 10-15 acceleration calculations, show work | | | 15-20 acceleration calculations n, show work | | | 20-25 acceleration calculations, show work | | |
| Acceleration Answer Here | | | Acceleration Answer Here | | | Acceleration Answer Here | | | Acceleration Answer Here | | | Acceleration Answer Here | | |

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PART 4: Final Data Table Chart

DIRECTIONS:

1. Copy all of the data you’ve collected and calculated into this Final Data Table.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| . | **DISTANCE (m)** | **TIME (s)** | **VELOCITY (m/s)** | **ACCELERATION**  **(m/s2)** |
| **TRIAL 1** | 0 |  |  |  |
|  | 5 |  |  |  |
|  | 10 |  |  |  |
|  | 15 |  |  |  |
|  | 20 |  |  |  |
|  | 25 |  |  |  |

C:\Users\Andrea\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\W46618EA\MC900239327[1].wmfPART FIVE (A): Velocity Graph

DIRECTIONS: Use the grid below to create a graph of your average velocity in each trial. Place the distance (m) on the Y-axis, and the Time (s) on the X-axis. The slope of the line at any give point represents your velocity. Remember to include a key for each trial, a title, and labels for each axis.

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PART FIVE (B): Acceleration Graph

DIRECTIONS: Use the grid below to graph the racers’ acceleration. Place the velocity (m/s) on the Y-axis, and the Time (s) on the X-axis. The slope of the line between any given points represents your acceleration. Remember to include a title, and labels for each axis.

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PART SIX: Analysis questions

**DIRECTIONS**: Answer each question in complete sentences, and show calculations when appropriate.

1. Between which two distance intervals was your velocity the fastest? Explain how you know this from your graph.

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2. What was your velocity at 2 seconds during your roll? (Use your graph to determine the distance at 2 seconds and then calculate your velocity) Show your calculations on the lines below.

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3. What was the average velocity from 5meters to 20meters? Show your work below.

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4. If you were to continue rolling for an additional 3 seconds at the average velocity calculated in question 3, how much more distance would you cover? Show your work below (Hint: Rearrange the Velocity Equation for D)

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5. Between which two distances was your acceleration the greatest? How do you know this from your graph?

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6. Why do you think your acceleration was greatest at this place/these places?

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7. What was your average acceleration for the entire 25 meter race? Show your work. (From Start to Finish)

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1. If you could continue accelerating at the rate in question 7, what would your **velocity** be after 4 more seconds?

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