

## LESSON PLAN

**Subject:** Grade 7 Science

**Lesson:** Springtide Sports

**Standard Addressed:** Understand motion, the effects of forces on motion and the graphical representations of motion. (NC.7.P.1)

**Objectives:**

- Students will be able to illustrate the motion of an object using a graph to show a change in position over a period of time.
- Students will be able to explain the effects of balanced and unbalanced forces acting on an object (including friction and gravity).
- Students will be able to make predictions about the motion of an object over time.

**Materials Needed:**

- A device for watching the “Springtide Sports” video
- The “Springtide Sports” activity sheet
- Pen or pencil, ruler

**Outline:**

- Prior to this lesson, students should have experience graphing time: distance ratios.
- Students will watch the 6 ½ minute “Springtide Sports” video. <https://youtu.be/NtXiD63ucxA>
- Teacher may pause video at intervals to discuss the effects of forces on motion exemplified.
- Review Activity 1 prompt with class. Discuss reasonable estimations.
- Students complete the activity sheet individually or in pairs.

**Take It Further:** Ask students to review the [National Air and Space Museum's](#) web page on the four forces of flight. Have students draw a diagram of a plane mid-flight and briefly describe each of the four forces using their own words. <http://howthingsfly.si.edu/forces-flight/four-forces>

**Cross-Curriculum Connection:** Various works of art were highlighted in the video. Using these works as a primary source, have the students study the art to find similarities and differences through time. Make assumptions about the way the clothing styles would affect the motion needed for game play. Explore other works of art depicting people playing games.

Artwork highlighted in the video:

- Mosaic of a child playing with hoops (trochos), Great Palace of Constantinople, Great Palace Mosaic Museum, Istanbul. Byzantine, 6th century AD
- “Courtesan Striking a Shuttlecock with a Battledore,” by Okumura Masanobu, Allen Memorial Art Museum, 1710
- “Afonso” by Johann Moritz Rugendas, 1846
- “Reifspiel auf der Terrasse” by Adolph von Menzel, 1851
- “Girl with a Hoop” by Pierre-Auguste Renoir, 1885
- “Le Jeu des Graces” by Paquin, 1913

# SPRINGTIDE SPORTS: Keep Moving Forward

Grade 7 Science

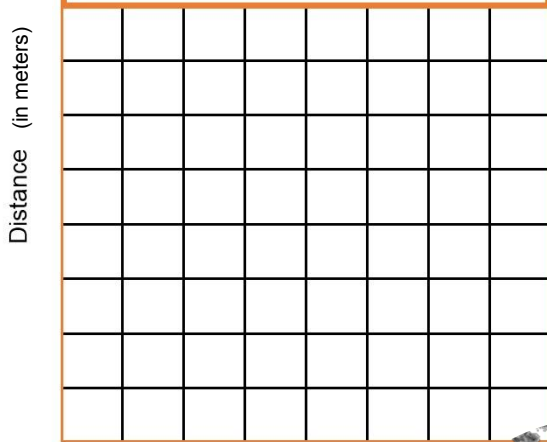


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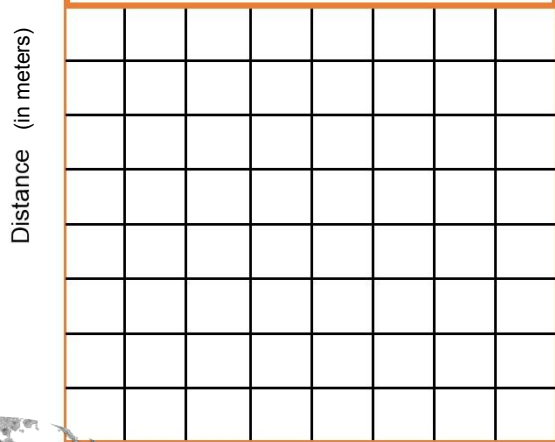
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**Activity 1:** Read the following scenarios and think about what the motion of Pauline's hoop would be like in each case. Using estimated distances and times (that make sense), graph each scenario.

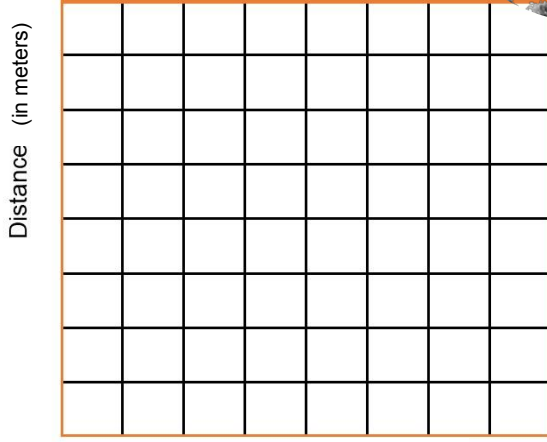
**The hoop is laying on the ground.**



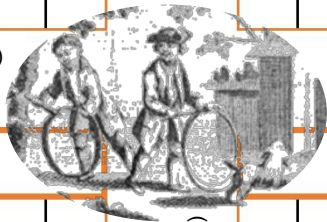
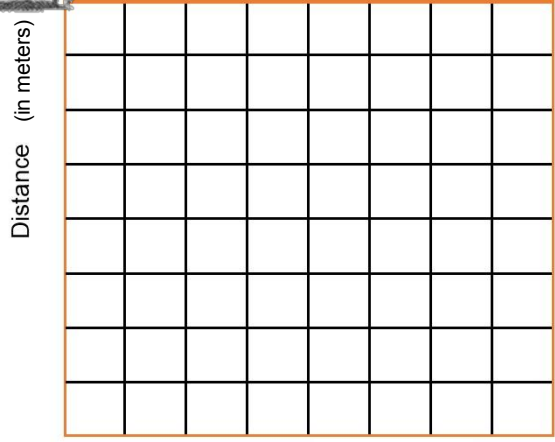
**The hoop rolls at a constant speed.**



**The hoop is rolling faster.**



**The hoop is slowing down.**





## SPRINGTIDE SPORTS: Keep Moving Forward

**Activity 2:** Various forces are at work in the hoop and stick game. Answer the following questions about these forces.

1. What force is responsible for starting the hoop's motion? \_\_\_\_\_
  
2. What forces are responsible for slowing the hoop down? \_\_\_\_\_  
and \_\_\_\_\_
  
3. If the hoop were being rolled on a polished wooden floor instead of on grass, what force would be less likely to affect the speed of the hoop? \_\_\_\_\_
  
4. If the hoop had ten times the mass, how would that affect the change in motion?

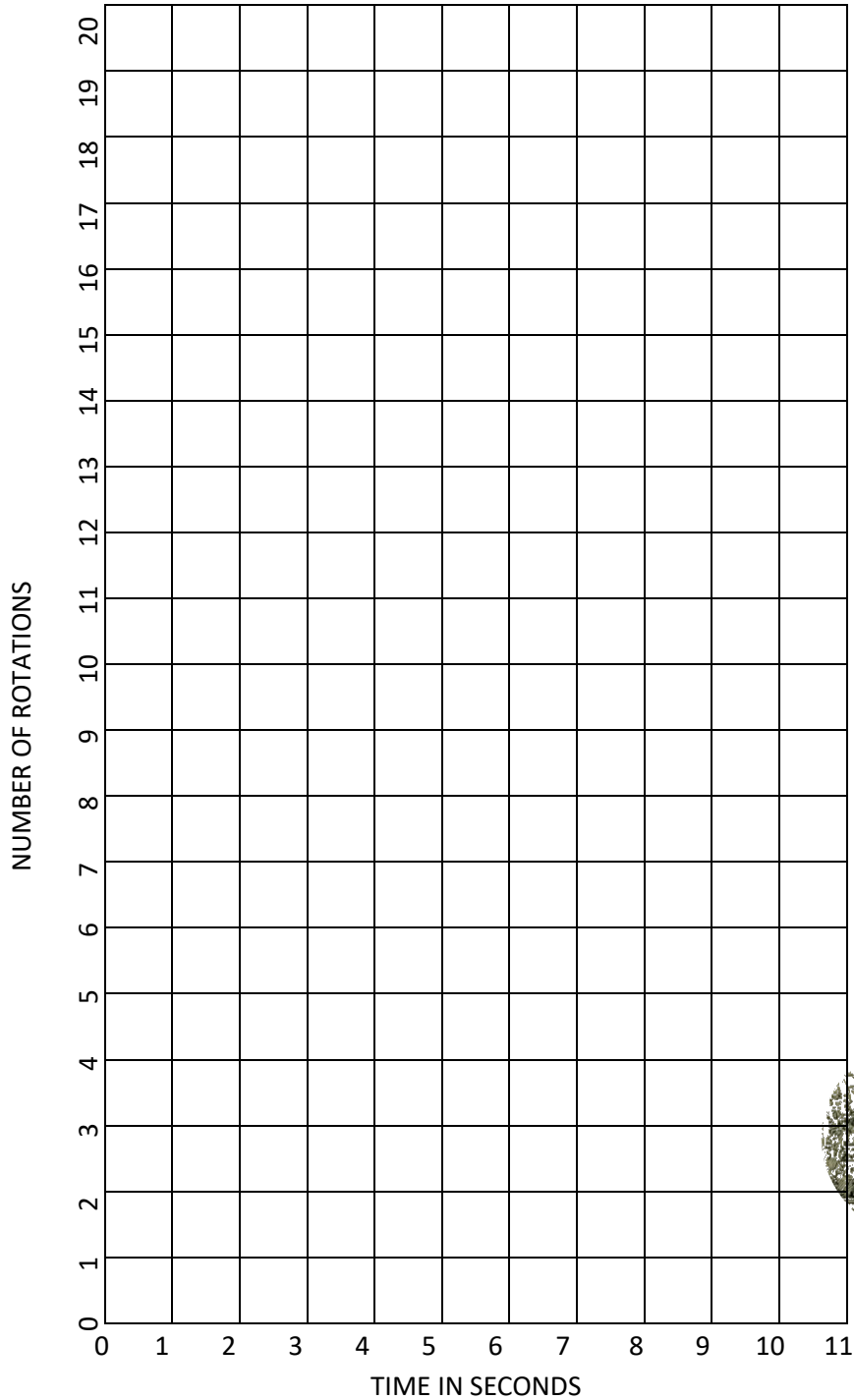
**Activity 3:** Review the chart below showing the number of rotations a hoop makes in a given period of time. Complete the chart, following the pattern established. Use the completed chart to graph distance verses time on the following page.

| Time (in seconds) | Number of Rotations |
|-------------------|---------------------|
| 1                 | 2                   |
| 2                 | 4                   |
| 3                 | 6                   |
| 4                 | 8                   |
| 5                 | 10                  |
| 6                 | 12                  |
| 7                 |                     |
| 8                 |                     |
| 9                 |                     |
| 10                |                     |



SPRINGTIDE SPORTS: Keep Moving Forward

Hoop Rotations over Time



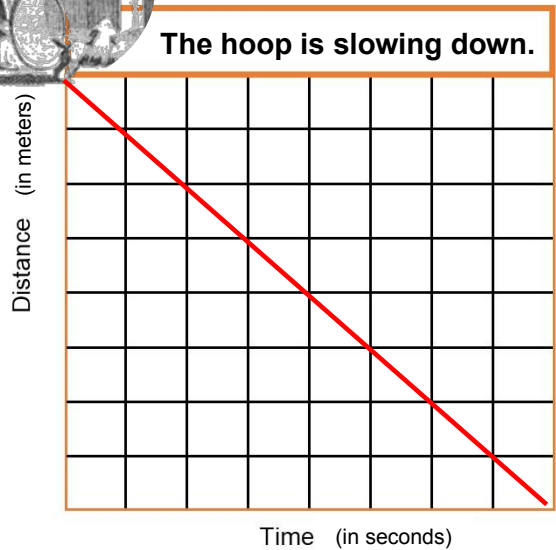
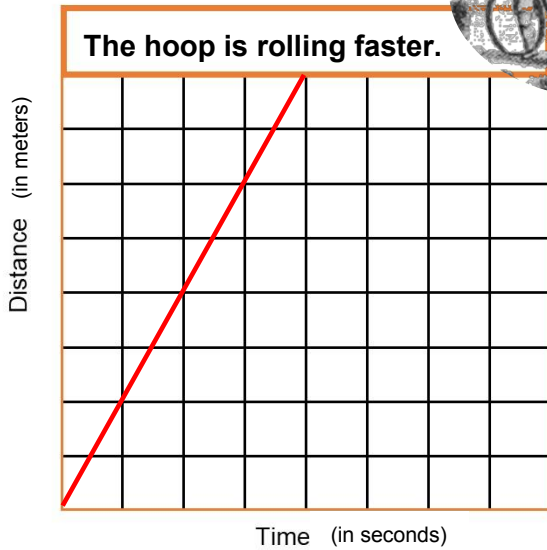
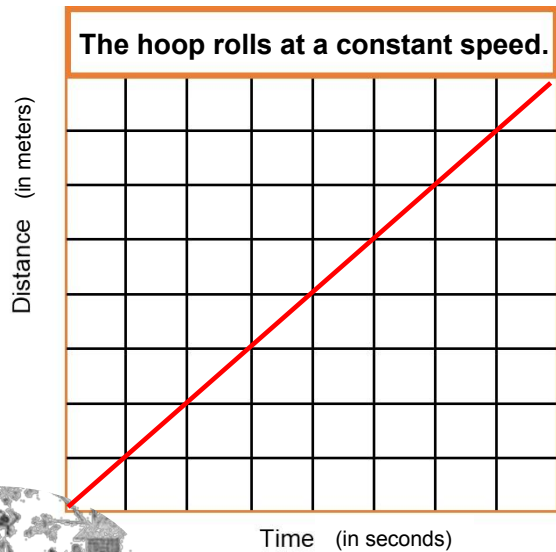
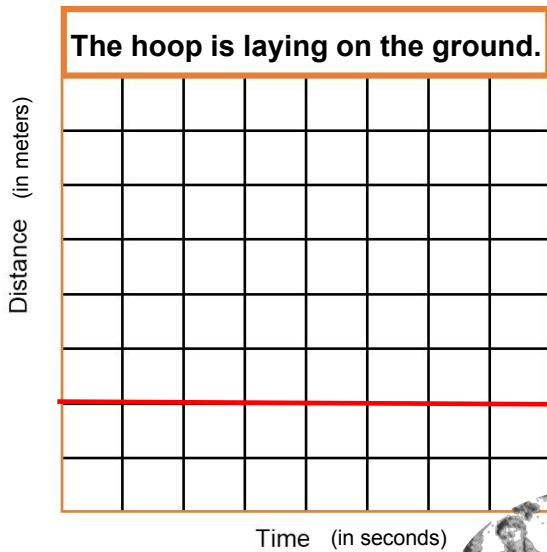
# SPRINGTIDE SPORTS: Keep Moving Forward

Grade 7 Science



## ANSWER KEY

**Activity 1:** Read the following scenarios and think about what the motion of Pauline's hoop would be like in each case. Using estimated distances and times (that make sense), graph each scenario.





# SPRINGTIDE SPORTS: Keep Moving Forward

**Activity 2:** Various forces are at work in the hoop and stick game. Answer the following questions about these forces.

1. What force is responsible for starting the hoop's motion? **PUSH OF THE STICK**
2. What forces are responsible for slowing the hoop down? **FRICTION** and **GRAVITY**
3. If the hoop were being rolled on a polished wooden floor instead of on grass, what force would be less likely to affect the speed of the hoop? **FRICTION**
4. If the hoop had ten times the mass, how would that affect the change in motion? **THE HOOP WOULD TAKE TEN TIMES AS LONG TO COVER THE SAME DISTANCE. (THE HOOP WOULD MOVE MORE SLOWLY.)**

**Activity 3:** Review the chart below showing the number of rotations a hoop makes in a given period of time. Complete the chart, following the pattern established. Use the completed chart to graph distance verses time on the following page.

| Time (in seconds) | Number of Rotations |
|-------------------|---------------------|
| 1                 | 2                   |
| 2                 | 4                   |
| 3                 | 6                   |
| 4                 | 8                   |
| 5                 | 10                  |
| 6                 | 12                  |
| 7                 | 14                  |
| 8                 | 16                  |
| 9                 | 18                  |
| 10                | 20                  |



## SPRINGTIDE SPORTS: Keep Moving Forward

**Hoop Rotations over Time**

