

SCIENCE·3D

THE BLACK PANTHER

In this packet, sample student answers are provided in **red** and notes to teacher are in **blue**.

In this **STEM Project**, students will enhance their math and data collection skills by measuring the distance between their steps when they walk at different speeds. They will use what they learn to understand how scientists study animals using their tracks.



Objective: Explore how scientists use math to measure and identify foot prints to learn about animal behaviors.

Sometimes scientists need to study animals that are difficult to observe. For example, leopards are very shy, so it is hard for scientists to get close to them. But, scientists can learn a lot about animals even if they can't see them. Remember, Shaaz used the footprints of leopards, called pugmarks. Scientists can tell the animal that was there based on their footprints. They use math to figure it out! Let's see how it works.

Equipment:

Measuring tape, ruler, notebook, pencil/pen, and tape or flags to mark steps.

Activity 1

1. Form groups. (Recommended group size: 4 people)
2. Have each member of your group make a footprint by stepping on a piece of paper. Keep your shoes on!
3. Measure the length and width of your footprint (in cm).
4. Record the data in the table below.
5. Measure the height of the person who made each footprint (in cm).
6. Record the data in the table below.

Name	Footprint length (cm)	Footprint width (cm)	Height (cm)
Student 1	12 cm	7 cm	130 cm
Student 2			
Student 3			
Student 4			

7. Put dots on the graph below to show the relationship between height and footprint length.

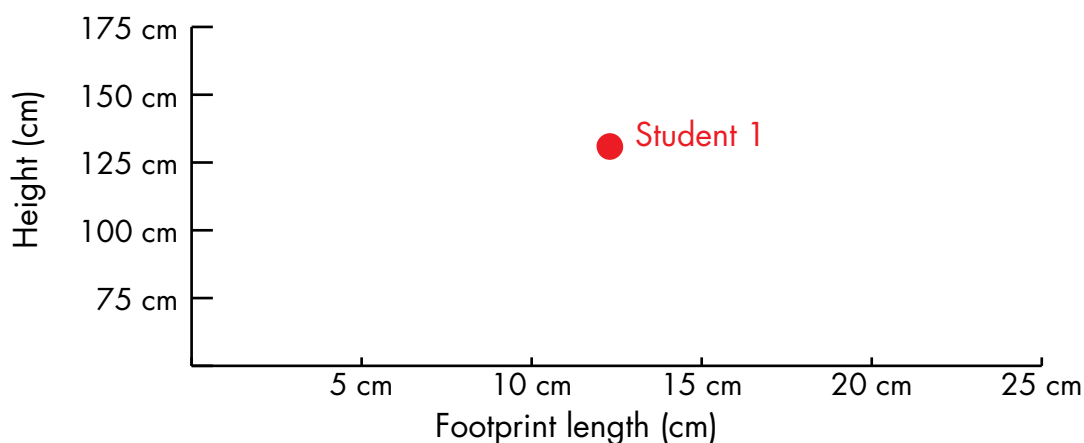


Figure 1. Relationship between height and footprint length

8. Describe any patterns in height and print length that your group observed.

Any answers that accurately describe the data should be accepted. Answers will likely include that taller students have larger feet.

Extend the Lesson: Have each group present their results and compare and contrast what they found. You could also have students do a graph of print width and height and compare and contrast the results for the relationship between a student's height and these two measures of their "pugmark" (footprint length and width).

Now, let's try something different! Be sure to read all the directions one time before you start!

Activity 2

1. Divide the team into the following jobs:

- a. Walker
- b. Footstep marker
- c. Measurer
- d. Data Recorder

2. Conduct your experiment in an area where you can leave track marks.

Choose a location where students can leave and observe "tracks." Areas with dirt or grass would be suitable. It is also possible to use chalk dust on the bottom of shoes to leave footprints on hard surfaces. Another alternative is to have more students in a group and have two footstep markers so each student only has to mark one location.

3. The **walker** should *walk slowly* and take four total steps: two steps with the left foot and two steps with the right foot. Left, right, left, right! Take normal steps.

4. The **footstep marker** should mark where the back of the left foot landed each time.

5. The **measurer** should use the tape measure or ruler to measure the distance between the marks of where the left foot landed each time. Make your measurement in centimeters.

6. The **data recorder** should record the data on the table on the next page.

7. The same **walker** should *walk very quickly* over the same area.
8. The **footstep marker** should mark where the back of the left foot landed on two strides in a row.
9. The **measurer** should use the tape measure or ruler to measure the distance between the marks of where the left foot landed on two steps in a row. Make your measurement in centimeters.
10. The **data recorder** should record the data in the table below.
11. The same **walker** should *run* over the same area.
12. The **footstep marker** should mark where the back of the left foot landed on two strides in a row.
13. The **measurer** should use the tape measure or ruler to measure the distance between the marks of where the left foot landed on two steps in a row. Make your measurement in centimeters.
14. The **data recorder** should record the data in the table below.
15. Switch jobs and repeat steps 3-15 until everybody has had a chance to complete the exercise.

Name	Stride length, slow walk (cm)	Stride length, fast walk (cm)	Stride length, run (cm)
Student 1			
Student 2			
Student 3			
Student 4			

Extend the Lesson: Have students create a bar graph of the stride length of each student at different speeds (slow walk, fast walk, run). Have students compare their graphs with one another.

16. Describe what happens to the distance between footprints when somebody moves faster.

When somebody moves faster the distance between footprints increases.

17. Describe how you think scientists might use tracks to learn about the animals they study.

I think scientists could use the size of tracks to learn about how big the animal is that left them. They can use the spacing between prints to learn how fast an animal was moving.
