

TEACHER KEY

The Story of Hip Hop

Marty's frog Hip Hop jumped for several seconds. After measuring the time and distance, Marty wrote this equation: $d = 5.4t$. Using this equation, help Marty complete the table below.

<u>Time in seconds</u>	<u>Distance in centimeters</u>
10	54
15	81
18	97.2
30	162
50	270

1. Explain how the rate of 5.4 centimeters per second can be found using the data in the table.

ANSWERS VARY: divide the distance by the time; for example, $54/10 = 5.4\text{cm/sec}$

2. Explain how the table demonstrates that the graph of this relationship would be a straight line.

ANSWERS VARY: when the time in seconds tripled, so did the distance; d/t is always 5.4.

The Story of Frogger

Gisella's frog Frogger jumped for 20 seconds and reached a distance of 140 cm. Gisella created a table of values using Frogger's average jumping rate. Help her complete the table below.

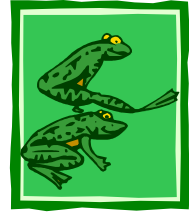
<u>Time in seconds</u>	<u>Distance in centimeters</u>
20	140
40	280
50	350
55	385
60	420

3. What is Frogger's jumping rate in centimeters per second? Show the work done to determine this rate.

Frogger has a rate of 7 cm per second. Divide the distance by the time.

4. What equation would Gisella write for Frogger ? **$d = 7t$**

More Frog Tales



KEY

Part One: Patrick's frog Jumper was able to hop at an average rate of 4 centimeters per second. Create a table, equation, and graph for Patrick's frog. Show all the work done to answer the five questions below. Be prepared to explain your reasoning.

Time in seconds	Distance in centimeters
0	0
10	40
20	80
30	120
40	160
50	200
60	240

equation: $d = 4t$

1. If Jumper could continue at this rate, how far could Jumper travel in an hour?

240 cm in a minute x 60 minutes = 14,400 centimeters

How far would this distance be in meters? **100cm/1m = 14400 cm/144m; 144m**

2. How long would it take Jumper to travel 300 centimeters?

300 = 4t; 300/4 = 75; 75 seconds or 1 minute and 15 seconds (students could also use the graph to try to find the point where d is 300)

3. Patrick decided to change Jumper's equation so that t represents time in minutes and d represented distance in meters. What equation did Patrick write?

240 cm = 2.4 meters; Jumper travels 2.4 meters in one minute.

The new equation is $d = 2.4t$

4. Using Patrick's new equation, how long would it take Jumper to travel 12 meters?

12 = 2.4t; 12/2.4 = 5; it would take 5 minutes which can be verified by a Table.

5. Verify whether or not the relationship shown in the table is proportional.

Answers vary: students could show that all the ratios of d/t are equal.

Part Two: Dana's frog Cutie averaged 2 centimeters per second. Create a table, equation, and graph for Dana's frog. Graph Cutie's results on the same grid used for Jumper.

Time in seconds	Distance in centimeters
0	0
10	20
20	40
30	60
40	80
50	100
60	120

equation: $d = 2t$

Patrick realized that Dana's frog Cutie was never going to beat Jumper in a race. He wanted to give Cutie a head start to make the race more exciting. He decided to give Cutie a 50 cm head start. Create a new table, equation, and graph for Cutie with the head start.

Time in seconds	Distance in centimeters
0	50
10	70
20	90
30	110
40	130
50	150
60	170

equation: $d = 2t + 50$

6. If the race lasts one minute, who will win? Prove your conclusion in at least two ways. **Jumper will win. Looking at the table, Cutie's distance is 170 cm in one minute and Jumper's distance is 240 cm. Also, looking at the graphs, Jumper's distance at one minute is greater than Cutie's.**

7. Did any graphs intersect? **yes** If so, what was the point of intersection and what did it mean? **(25,100) It means that at 25 seconds, the two frogs traveled the same distance. They would be side by side.**

8. Which of the equations for Cutie was NOT proportional? $d = 2t + 50$
 Explain why it does not form a proportional relationship. **answers vary: d/t ratios are not equal; for example 150/50 is not equal to 90/20.**