

**LessonTitle: If You Hopped Like a Frog** **Pre 4.3c**

**Utah State Core Standard and Indicators**

**Summary**

After hearing or reading the book If You Hopped Like a Frog by David Schwartz, students create posters to represent the proportions involved in the example they have chosen.

**Enduring Understanding**

Proportions are everywhere in the world

**Essential Questions**

What are proportions? How do we use them to make predictions?

**Skill Focus**

Proportional reasoning, ratio

**Vocabulary Focus**

**Assessment**

**Materials:** “If You Hopped Like a Frog” book, poster paper, fact cards

**Launch**

**Explore**

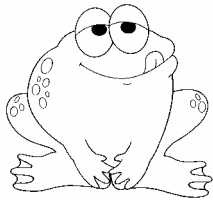
**Summarize**

**Apply**

**Directions:**

Before reading the story, “If You Hopped Like a Frog,” organize your students into teams of three or four each. After reading the story provide students with an 18” by 24” piece of art paper or Post-it poster paper and an interesting fact about an animal, insect, or creature of some kind. The students are to take the data and create their own “If you could” poster with a proportional representation of the data, and “if you” statement. Have each team come up and present their poster. For homework have each student research a creature and do their own “If you could” story on an 8 ½” by 11” piece of paper, with another interesting fact about their representation on the back. Create a class “If you could” book, and read some of the more interesting entries.

Student samples are provided below.



## *If you Hopped Like a Frog*

Read the story “If You Hopped Like a Frog” by David Schwartz. Then pick your own example below. Create your own “If you could” poster. Be sure to include the following:

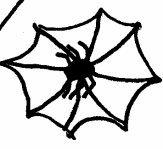
- The “if” statement
- Proportional representation of the mathematics in your “if” statement.

1. A dolphin’s brain is 7 times larger than the human brain (average human brain is 140 mm wide and 167 mm long). Make a visual representation of a human brain and a dolphin brain on paper	2. A snake can open its jaws to 5 times its normal size to eat. Show with a visual representation what the jaws would look like if humans could do the same thing.
3. Cockroaches move 50 body lengths per second. If humans moved at the same rate, how fast would we move? How would you demonstrate that speed?	4. A giraffe’s neck is almost half its total height. If the human neck was in the same proportion, how long would it be? Create a visual model to represent that relationship.
5. The orangutan’s reach (arm span) from finger-tip to finger-tip is 10 times the size of its hand. If humans had the same proportions, what would their arm span be? Create a model to visually represent that arm span.	6. A moth eats 86,000 times its own body weight in its first 56 days of life. If human babies did the same, how much baby food (in ___ ounce jars) would a 7 pound human baby eat in 56 days?
7. At birth a kangaroo baby is only a sixtieth the size of its mother in length. If a human baby were in the same proportion to its mother, how long would the baby be? Make a visual representation to show this relationship.	8. A pygmy shrew eats its own body weight in food every three hours. How much food would a human with the same characteristic eat in 24 hours? Using a food item found in the room, how much of that item would we eat?
9. A kiwi bird lays an egg that is three-fourths its size. If a human had the same characteristics, how big would the egg be? Create a visual representation to show what the egg would look like.	10. A flea can jump 100 times its height. If a human could do the same thing, how high could it jump? Show that in a visual representation.

<p>11. The scarab beetle can lift 850 times its own weight. If a human could do the same thing, how much could a human lift? Using an item in the room, create a concrete representation of this relationship.</p>	<p>12. Cows produce one-eighth of their weight in saliva every day. If humans did the same thing, how much saliva would they produce? Using an item in the room, create a concrete representation, or a visual representation of this relationship.</p>
<p>13. A red deer's antlers are as wide as <math>\frac{3}{5}</math> of its body length. If a human had antlers in the same proportion, how wide would they be? Show this relationship visually or with concrete objects in the room.</p>	<p>14. An African elephant's ears are half of its height. If a human's ear were in the same proportion, how big would they be? Show this visually or with concrete materials.</p>
<p>15. A baby crocodile grows to be 4000 times its weight at birth. How much would a 7-pound human baby weigh as an adult? Show your representation visually or with concrete materials.</p>	<p>16. A bee can pull 300 times its weight. If a person could pull a load in this same proportion, how many pounds could a 200-pound man pull? Show visually or with concrete materials.</p>
<p>17. The sperm whale's head is <math>\frac{1}{3}</math> of its body. If the human's head were in the same proportion, how big would it be? Show this representation visually.</p>	<p>18. A polar bear can eat 10 percent of its body weight in 30 minutes. If a human could do the same, how much would it eat in 30 minutes? Show a visual or concrete representation of this relationship.</p>
<p>19. An octopus' arms are seven-tenths of its length. If human's arms were in the same proportions, how long would they be? Show this representation visually or concretely by using an item or items in the room.</p>	<p>20. A proboscis monkey's nose is approximately one-seventh of the monkey's length. If a human nose were in the same proportion, how long would it be? Show this representation visually.</p>

Scytode Spider - spit a distance of 10x body

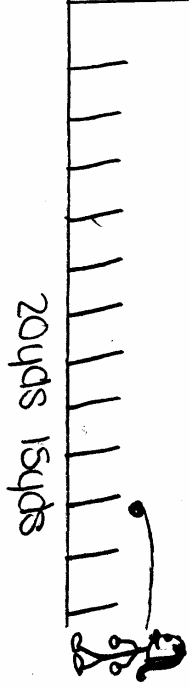
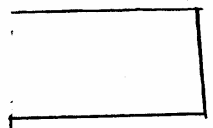
6cm = 60cm



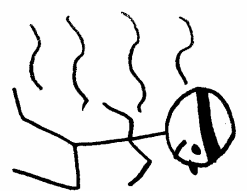
If you  
ran as  
fast as a  
Tiger Beetle



A beetle that is  
only  $\frac{3}{4}$  in long can  
run 5.5 mph



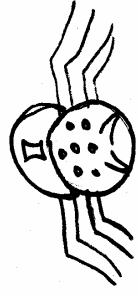
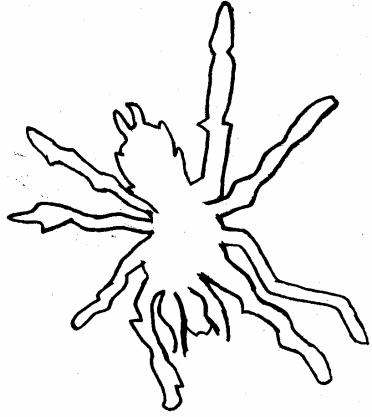
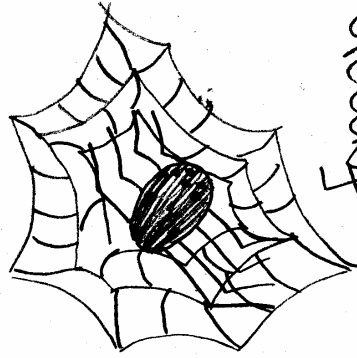
If I could spit like a  
scytode spider I



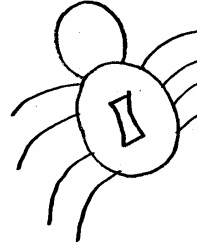
A 6ft tall person running @ the  
same rate would need to run 605mph  
At that speed you could run to Las Vegas  
+ back on your lunch hour.

Australian Tiger Beetle - runs 170x body length / sec.

If you weighed as much as a female orb spider, you would weigh about 170,000 lbs.



Female orb spiders weigh as much as 1,000 times more than their mate.



# IF YOU COULD...



-----	TIGER BEETLE
Length/Height	$\frac{3}{4}$ inch
Speed	5.5 miles per hour

-----	RHONDA RACER
Length/Height	6 feet 1 inch
Speed	???



The work below shows how I determined how fast Rhonda would run if her height and the speed she ran were proportional to the Tiger Beetle.

*Conversion of her height to inches*

$$6 \text{ feet } 1 \text{ inch} = 6 \text{ feet} \cdot \frac{12 \text{ inches}}{1 \text{ foot}} + 1 \text{ inch} = 73 \text{ inches}$$

Solving for how fast she would run

$$(Tiger) \frac{\text{height}}{\text{speed}} = \frac{\text{height}}{\text{speed}} \quad (Vince)$$

$$\frac{.75 \text{ inch}}{5.5 \text{ mph}} = \frac{73 \text{ inches}}{s}$$

$$s \cdot .75 = 5.5 \cdot 73$$

$$\frac{s \cdot .75}{.75} = \frac{401.5}{.75}$$

$$s = 535.3 \text{ mph}$$

If Rhonda ran as fast as a Tiger Beetle, then she could run 535.5 mph. At that speed she could run to St. George and back during her lunch hour.

From Rhonda's home to St. George is approximately 293 miles. I used the formula  $d = rt$ , where  $d$  is distance,  $r$  is rate, and  $t$  is time to determine how long it would take her to get to St. George.

Solving for how long it would take her to run to St. George

$$293 \text{ miles} = 535.5 \text{ mph} \cdot t$$

$$\frac{293}{535.5} = \frac{535.5 \cdot t}{535.5}$$

$$t = .55 \text{ hour}$$

Conversion of hours to minutes

$$.55 \text{ hour} \cdot \frac{60 \text{ minutes}}{1 \text{ hour}} = 33 \text{ minutes}$$

Total time to St. George and back home

$$\text{Total time} = 33 + 33 = 66 \text{ minutes}$$