

Ratios!

I. A Letter to Parents

Genny got \$10 a week allowance. Her baby sister Erica got 10 cents a week. One day, when her parents came home from work, her mom said, “Good news, dear! Both your dad and I got raises at work! And so, we’re going to raise Erica’s allowance to 20 cents a week. And we’re going to raise your allowance to... \$10.10 a week.”

“Wha? Huh! That’s not fair! No! Uhm! I should be getting \$20 a week!” sputtered Genny.

“Now, dear,” said her dad. “We’ve raised each allowance by the same amount—10 cents. Do you have a better suggestion? One reason your parents are valued at work is our ability to write clearly and persuade others in a reasonable manner. If you write a letter expressing why you think your allowance should go up by \$10, I’m sure we’ll give it careful consideration.”

- 1) Why does Genny think her allowance should go up by \$10 and not 10 cents like her sister’s?
- 2) Pretend to be Genny and write a persuasive letter arguing for \$20 a week. You might want to use the word ratio. Be eloquent and convincing!

II. Rectangles

Boring old squares all have the same shape. But rectangles can have an infinite variety of shapes. For example, the ratio of length to width could be 3:2.

- 3) Draw three rectangles of different sizes that all have the same length to width ratio. Work neatly, and label the lengths. What is the ratio of the length of your biggest rectangle to the length of your smallest one?

III. Gary the Gardener

Gary loves potatoes. In 2007 he grew them in a 6 ft. by 6 ft. garden plot. They tasted delicious, but he found he only had half as much as he needed. So he said to himself, “I’ll double my garden size!” In 2008 he grew them in a 12 ft. by 12 ft. plot. Delicious once again, but oh no! This time he had twice as many as he needed!

- 4) Where did Gary go wrong? What size plot should he use?

IV. Bicycles!

Richard used to take long trips on a “ten-speed” bicycle. He made sure he had a good range of high and low gears.

- 5) Why do some bikes have many gears? How are they helpful? What if they didn't?
- 6) If you have a bike with multiple gears, learn how to find your gear ratios by counting the teeth on the front sprockets (or chain wheels) and rear sprockets (or free wheels). What's your highest gears? Your lowest gear? What gear ratio do you use the most?

V. King Cuadro

King Cuadro loved squares! He had a square window in his room. He was also a busybody. He'd stand on a chair so he could be at the top of the window and look down onto his courtyard. He'd stand all the way to the right or left of the window to see what was happening to the left or right of him. And he'd put his eyes right near the bottom of the window to gaze at the stars. (Remember, those castles have thick walls!) Only one problem: the window let in much too much light! So King Cuadro went to Carl the Carpenter with an *apparently* impossible request: “Carl, I want you to change my window. It needs to be just as tall and just as wide as it is now, but I want it to have half the area. And it must still have the shape of a square! I want the job done this week. Get it done right, and I will reward you richly. But if you don't--!” (The king like to threaten his subjects with aposiopesis.)

- 7) Explain how Carl can fulfill the king's request! Is there a way he can do it by just installing a smaller square window, without Venetian blinds, duct tape, etc.?

(Hint: The story doesn't give the measurements of the original window. You might want to choose a number for that, and make a careful drawing, and think about areas, and about how to use your workshop to build a frame for the new, smaller square window...)

- 8) Have twice as much fun as you had on the last problem!