

STAIR MATH-TER

Shelley Fleming uses a formula to climb to the top of the stair-construction business!

Shelley Fleming never thought she would use math in her job. She didn't even like math when she was in school! "Now here I am in a business and that's what I need! My math teacher would be proud of me," Shelley told us.

Shelley and her husband, Keith, own a construction company in Delaware called Brandywine Balustrades. They build special circular staircases and stair parts. "There's math involved before we even make a single cut on the wood," Shelley said.

Shelley told us about building

perfect stairs. "There's a lot of research about how people go up and down stairs, what's comfortable, and what they're likely to trip on," explained Shelley.

The Stairway Manufacturing Association helped out by coming up with some guidelines. The height of each step, called the *rise*, must be 7.75 inches or less. The width of each step, called the *run*, must be 10 inches or greater. To make sure the rise and run fit together well, stair builders follow the formula at the top of the next column:



Sanding a handrail

$$2 \times \text{rise} + \text{run} \geq 23.625 \text{ inches and } 2 \times \text{rise} + \text{run} \leq 25.625 \text{ inches}$$

Every staircase is different. But as long as Shelley follows these guidelines, her stairs will be safe. Check out our questions to see if you can follow the "steps" to perfect stairs too!

—by Sarah Klein

STAIRCASE: COURTESY HARDWOOD DESIGN INC. (2); FLEMING: COURTESY SHELLEY FLEMING

1 Shelley has a piece of wood that is 9.5 inches wide. She wants to use it as the rise for a step. How many inches does she need to trim off so it will be the maximum rise size?

2 Shelley has another piece of wood that could've been the run, but it's only 8.125 inches wide. How much wider would it need to be to meet the minimum run size?

3a. For a set of stairs that Shelley is going to build, the rise is 4.375 inches and the run is 15.6 inches. Are these measurements within the height and width guidelines for rise and run?

b. What equation would you write to find out if the rise and run fit well together?

c. Solve the equation:

d. Is your answer from part **c** within the acceptable range?

4 The plans for another set of stairs propose a rise of 6.5 inches and a run of 11 inches. What is the answer when you use

these values in the formula? Is this within the given range?

5 The rise for another set of stairs is 5.75 inches. Which run measurement will correctly give an acceptable answer when used in the formula: 12 inches or 14 inches?



The wood is measured precisely.



Shelley makes parts for staircases like this.

GOING PRO

THE JOB: Carpenter

THE MONEY: \$30,000 to \$40,000 a year

NECESSARY SKILLS: Knowledge of math, science, and computers; good hand-eye coordination; physical fitness and sense of balance; ability to communicate well.

HOW TO GET STARTED: Take math, science, and business courses in high school and college. Then apply to a carpentry program at a trade school.

SHELLEY'S ADVICE: "Find somebody you know who does carpentry, and ask to help out. Even if it's just learning to sand things, it gives you a chance to get some hands-on experience!"



Shelley