Day 6: The Wizard's Workshop

Your Mission

A golden envelope arrives sealed with a wax in the shape of a crescent moon. Inside:

"*The Head Wizard is away at a conference of Arcane Mathematicians. Five apprentices are minding the Workshop, but the potions are mixed wrong! Each apprentice needs help with a recipe that involves exact ratios or rates. Solve all five, and you'll earn the Golden Ladle and the title of Master Potion Mixer.*"

You step through the workshop door. Cauldrons bubble. Something smells like burnt cinnamon and...possibility.



Warm-Up: Your Tools for Today

You've collected many tools over the past five weeks. Today's new tools are about comparison:

- **Ratio**: compares two amounts. For every 2 drops of dragon tears, use 3 drops of phoenix saliva. We write 2:3 in math.
- **Rate**: compares amounts with different units, usually something compared with time. The potion brews at 5 liters per minute, or 5 L/min.
- **Unit Rate**: a rate for exactly 1 unit. If 6 hens eat 8 cups in 3 days, that's $\frac{4}{9}$ cups per hen per day.

Quick Check: If a recipe says 2 cups of flour for every 3 cups of sugar, and you use 6 cups of sugar, how much flour do you need?



Write your answer: _____

Challenge 1: The Ice Cream Elixir

The first apprentice, Sweet Kathy, is stirring a pink cauldron that smells of strawberry. "*When I mix 2 bowls of ice cream, Betty mixes 3 bowls. Together we made 10 bowls. How many bowls did I make?*"

(A) 3 (B) 4 (C) 5 (D) 6 (E) 7

Hint: The ratio is 2:3. That means for every 5 bowls (2 + 3), Kathy makes 2 and Betty makes 3. If they made 10 bowls (twice of 5), how many did Kathy make?



Challenge 2: The Grain Potion

The second apprentice, Farmer Giles, is measuring grain into a wooden trough. He asks: "*6 hens eat 8 cups of grain in 3 days. How many cups will 3 hens eat in 9 days?*"

(A) 10 (B) 12 (C) 14 (D) 16 (E) 9

Hint: First find how much 3 hens eat in 3 days. Then triple the time to 9 days.



Challenge 3: The Magical Dance Floor

The third apprentice, Dance Master Dmitri, is brewing a potion that makes people dance. "*I started with 25 boys and 19 girls. Every week, 2 more boys and 3 more girls join the dance. After how many weeks will the number of boys and girls be equal?*"

(A) 6 (B) 5 (C) 4 (D) 3 (E) 2

Hint: The difference starts at 25 – 19 = 6. Each week, the difference decreases by 1 (3 girls join, 2 boys join). How many weeks until the difference is 0?

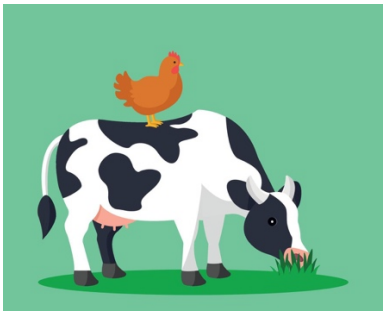


Challenge 4: The Animal Farm Formula

The fourth apprentice, Farm Keeper Fred, is mixing a potion that balances animal legs. "*A farmer has 30 cows, some chickens, and no other animals. The total number of chicken legs equals the total number of cow legs. How many animals does the farmer have altogether?*"

(A) 60 (B) 90 (C) 120 (D) 180 (E) 240

Hint: Each cow has 4 legs. 30 cows have 120 legs. So the chickens also have 120 legs. Each chicken has 2 legs. How many chickens? Then add cows + chickens.



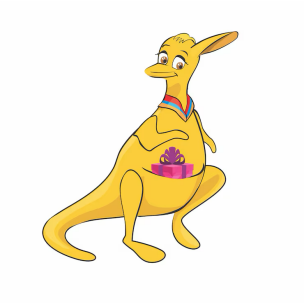
Challenge 5: The Kangaroo Weight Elixir

The fifth apprentice, Kanga the Kangaroo, needs a weight-changing elixir. She asked: "*Each winter I gain 5 kilograms. Each summer I lose 4 kilograms. During spring and fall, my weight doesn't change. In the spring of 2008, I weighed 100 kilograms. How much did I weigh in the fall of 2004?*"

(A) 92 kg (B) 93 kg (C) 94 kg (D) 96 kg (E) 98 kg

Hint: Work backwards from spring 2008 to fall 2004. Count the seasons:

- Spring 2008 → Winter 2008 (gain 5) → Fall 2007 (no change) → Summer 2007 (lose 4) → Spring 2007 (no change) → ...
- Going backwards: subtract 5 for each winter, add 4 for each summer.
- Example: Spring 2008 = 100. Winter 2008 = 95. Fall 2007 = 95. Summer 2007 = 99. Spring 2007 = 99. Continue back to Fall 2004.



The Master Code

You've solved all five potion problems! The Golden Ladle is almost yours. Fill in the secret code to complete your assistance.

Word Bank: RATIO, RATE, UNIT, PROPORTION, CHECK

1. A _____ compares two amounts, like 2 cups of flour to 3 cups of sugar.
2. A _____ compares amounts with different units (usually time), like 5 liters per minute.
3. A _____ rate is a rate for exactly 1 unit.
4. When two ratios are equal, they form a _____.
5. Always _____ your work by substituting your answer back into the original problem.

Mission Complete!

The Golden Ladle glows in your hands. The apprentices cheer. You've mastered the art of ratios, rates, and proportions. As you leave, the Head Wizard's voice echoes from a hovering crystal ball: "*Remember, the best potions are made with careful measurement and a dash of curiosity.*"

