# XVI. AMC 8 Practice Questions
## 08-01

Susan had $\$50$ to spend at the carnival. She spent $\$12$ on food and twice as much on rides. How many dollars did she have left to spend?

**(A)** $12$ **(B)** $14$ **(C)** $26$ **(D)** $38$ **(E)** $50$

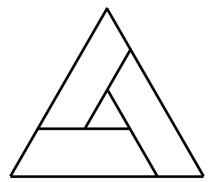
**2008 AMC 8, Problem #1—**
**"Susan spent $2 \times 12 = \$24$ on rides."**

**Solution**

**Answer (B):** Susan spent $2 \times 12 = \$24$ on rides, so she had $50 - 12 - 24 = \$14$ to spend.

**Difficulty:** Easy
**NCTM Standard:** Number and Operations Standard for Grades 6–8: compute fluently and make reasonable estimates.
**Mathworld.com Classification:** Number Theory > Arithmetic > General Arithmetic > Arithmetic

In the figure, the outer equilateral triangle has area 16, the inner equilateral triangle has area 1, and the three trapezoids are congruent. What is the area of one of the trapezoids?



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

**2008 AMC 8, Problem #4—**
**"The area of the outer triangle with the inner triangle removed is the total area of the three congruent trapezoids."**

**Solution**

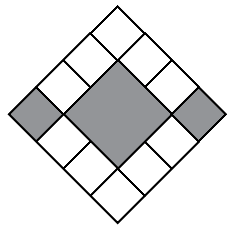
**Answer (C):** The area of the outer triangle with the inner triangle removed is $16-1=15$, the total area of the three congruent trapezoids. Each trapezoid has area $\frac{15}{3}=5$.

**Difficulty:** Medium-easy

**NCTM Standard:** Geometry Standard for Grades 6–8: understand relationships among the angles, side lengths, perimeters, areas, and volumes of similar objects.

**Mathworld.com Classification:** Geometry > Plane Geometry > Geometric Similarity > Congruent

In the figure, what is the ratio of the area of the gray squares to the area of the white squares?

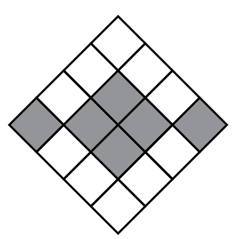


**(A)** $3:10$ **(B)** $3:8$ **(C)** $3:7$ **(D)** $3:5$ **(E)** $1:1$

**2008 AMC 8, Problem #6—**
**"Subdividing the central gray square into unit squares."**

**Solution**

**Answer (D):** After subdividing the central gray square as shown, 6 of the 16 congruent squares are gray and 10 are white. Therefore, the ratio of the area of the gray squares to the area of the white squares is $6:10$ or $3:5$.



**Difficulty:** Medium
**NCTM Standard:** Geometry Standard for Grades 6–8: precisely describe, classify, and understand relationships among types of two- and three-dimensional objects using their defining properties.
**Mathworld.com Classification:** Geometry > Plane Geometry > Squares > Square

If $\dfrac{3}{5} = \dfrac{M}{45} = \dfrac{60}{N}$, what is $M + N$?

**(A)** $27$ **(B)** $29$ **(C)** $45$ **(D)** $105$ **(E)** $127$

## 2008 AMC 8, Problem #7—

**"$M = \frac{3}{5} \cdot 45$ and $N = 60 \cdot \frac{5}{3}$."**

### Solution

**Answer (E):** Note that $\frac{M}{45} = \frac{3}{5} = \frac{3\cdot 9}{5\cdot 9} = \frac{27}{45}$, so $M = 27$. Similarly, $\frac{60}{N} = \frac{3}{5} = \frac{3\cdot 20}{5\cdot 20} = \frac{60}{100}$, so $N = 100$. The sum $M + N = 27 + 100 = 127$.

OR

Note that $\frac{M}{45} = \frac{3}{5}$, so $M = \frac{3}{5}\cdot 45 = 27$. Also $\frac{60}{N} = \frac{3}{5}$, so $\frac{N}{60} = \frac{5}{3}$, and $N = \frac{5}{3}\cdot 60 = 100$. The sum $M + N = 27 + 100 = 127$.

**Difficulty:** Medium-easy

**NCTM Standard:** Number and Operations Standard for Grades 6–8: work flexibly with fractions, decimals, and percents to solve problems.

**Mathworld.com Classification:** Number Theory > Arithmetic > Fractions > Ratio

In 2005 Tycoon Tammy invested $\$100$ for two years. During the first year her investment suffered a 15% loss, but during the second year the remaining investment showed a 20% gain. Over the two-year period, what was the change in Tammy's investment?

**(A)** 5% loss **(B)** 2% loss **(C)** 1% gain **(D)** 2% gain **(E)** 5% gain

## 2008 AMC 8, Problem #9—

**"At the end of the first year, Tammy's investment was 85% of the original amount, or $85."**

### Solution

**Answer (D):** At the end of the first year, Tammy's investment was 85% of the original amount, or $\$85$. At the end of the second year, she had 120% of her first year's final amount, or 120% of $\$85 = 1.2(\$85) = \$102$. Over the two-year period, Tammy's investment changed from $\$100$ to $\$102$, so she gained 2%.

**Difficulty:** Medium-hard

**NCTM Standard:** Number and Operations Standard for Grades 6–8: compute fluently and make reasonable estimates.

**Mathworld.com Classification:** Number Theory > Arithmetic > Fractions > Percent

# AMC 8 Practice Questions Continued
## 08-13

Mr. Harman needs to know the combined weight in pounds of three boxes he wants to mail. However, the only available scale is not accurate for weights less than 100 pounds or more than 150 pounds. So the boxes are weighed in pairs in every possible way. The results are 122, 125 and 127 pounds. What is the combined weight in pounds of the three boxes?

**(A)** $160$ **(B)** $170$ **(C)** $187$ **(D)** $195$ **(E)** $354$

**2008 AMC 8, Problem #13—**
**"Each box is weighed two times, once with each of the other two boxes."**

**Solution**

**Answer (C):** Because each box is weighed two times, once with each of the other two boxes, the total $122 + 125 + 127 = 374$ pounds is twice the combined weight of the three boxes. The combined weight is $\frac{374}{2} = 187$ pounds.

**Difficulty:** Medium
**NCTM Standard:** Algebra Standard for Grades 6–8: use mathematical models to represent and understand quantitative relationships.
**Mathworld.com Classification:** Discrete Mathematics > Combinatorics > Weighing > Weighing

Ms. Osborne asks each student in her class to draw a rectangle with integer side lengths and a perimeter of 50 units. All of her students calculate the area of the rectangle they draw. What is the difference between the largest and smallest possible areas of the rectangles?

**(A)** 76 **(B)** 120 **(C)** 128 **(D)** 132 **(E)** 136

**2008 AMC 8, Problem #17—**
**"Make a table with all possible combination of lengths and widths."**

**Solution**

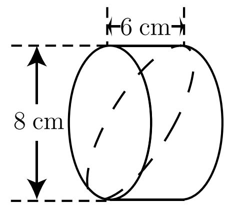
**Answer (D):** The formula for the perimeter of a rectangle is $2l + 2w$, so $2l + 2w = 50$, and $l + w = 25$. Make a chart of the possible widths, lengths, and areas, assuming all the widths are shorter than all the lengths.

| Width | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Length | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 |
| Area | 24 | 46 | 66 | 84 | 100 | 114 | 126 | 136 | 144 | 150 | 154 | 156 |

The largest possible area is $13 \times 12 = 156$ and the smallest is $1 \times 24 = 24$, for a difference of $156 - 24 = 132$ square units.
Note: The product of two numbers with a fixed sum increases as the numbers get closer together. That means, given the same perimeter, the square has a larger area than any rectangle, and a rectangle with a shape closest to a square will have a larger area than other rectangles with equal perimeters.

**Difficulty:** Medium-hard
**NCTM Standard:** Geometry Standard for Grades 6–8: precisely describe, classify, and understand relationships among types of two- and three-dimensional objects using their defining properties.
**Mathworld.com Classification:** Geometry > Plane Geometry > Rectangles > Rectangle

Jerry cuts a wedge from a 6-cm cylinder of bologna as shown by the dashed curve. Which answer choice is closest to the volume of his wedge in cubic centimeters?




**(A)** 48 **(B)** 75 **(C)** 151 **(D)** 192 **(E)** 603

**2008 AMC 8, Problem #21—**
**"The formula for the volume of a cylinder is $V = \pi r^2 h$."**

**Solution**

**Answer (C):** Using the formula for the volume of a cylinder, the bologna has volume $\pi r^2 h = \pi \times 4^2 \times 6 = 96\pi$. The cut divides the bologna in half. The half-cylinder will have volume $\frac{96\pi}{2} = 48\pi \approx 151$ cm$^3$.
Note: The value of $\pi$ is slightly greater than 3, so to estimate the volume multiply $48(3) = 144$ cm$^3$. The product is slightly less than and closer to answer C than any other answer.

**Difficulty:** Medium-hard

**NCTM Standard:** Geometry Standard for Grades 6–8: precisely describe, classify, and understand relationships among types of two- and three-dimensional objects using their defining properties.

**Mathworld.com Classification:** Geometry > Solid Geometry > Cylinders > Cylinder

For how many positive integer values of $n$ are both $\frac{n}{3}$ and $3n$ three-digit whole numbers?

**(A)** $12$ **(B)** $21$ **(C)** $27$ **(D)** $33$ **(E)** $34$

**2008 AMC 8, Problem #22—**
**"Since $\frac{n}{3}$ and $3n$ are three-digit numbers, $n \in [300, 333]$ ."**

**Solution**

**Answer (A):** Because $\frac{n}{3}$ is at least 100 and is an integer, $n$ is at least 300 and is a multiple of 3. Because $3n$ is at most 999, $n$ is at most 333. The possible values of $n$ are $300$, $303$, $306$, $\ldots$, $333 = 3 \cdot 100$, $3 \cdot 101$, $3 \cdot 102$, $\ldots$, $3 \cdot 111$, so the number of possible values is $111 - 100 + 1 = 12$.

**Difficulty:** Medium-hard

**NCTM Standard:** Algebra Standard for Grades 6–8: represent and analyze mathematical situations and structures using algebraic symbols.

**Mathworld.com Classification:** Number Theory > Integers > Whole Number