XVI. AMC 8 Practice Questions
07-01

Theresa's parents have agreed to buy her tickets to see her favorite band if she spends an average of 10 hours per week helping around the house for 6 weeks. For the first 5 weeks she helps around the house for 8, 11, 7, 12 and 10 hours. How many hours must she work during the final week to earn the tickets?

(A) 9 **(B)** 10 **(C)** 11 **(D)** 12 **(E)** 13

2007 AMC 8, Problem #1—
"Theresa needs to help around the house for a total of $10 \times 6 = 60$ hours."

Solution (D) The first 5 weeks Theresa works a total of $8 + 11 + 7 + 12 + 10 = 48$ hours. She has promised to work $6 \times 10 = 60$ hours. She must work $60 - 48 = 12$ hours during the final week.

Difficulty: Easy

NCTM Standard: Algebra Standard for Grades 6–8: use mathematical models to represent and understand quantitative relationships.

Mathworld.com Classification: Number Theory > Arithmetic > General Arithmetic > Arithmetic

A haunted house has six windows. In how many ways can Georgie the Ghost enter the house by one window and leave by a different window?

(A) 12 **(B)** 15 **(C)** 18 **(D)** 30 **(E)** 36

2007 AMC 8, Problem #4—
"After Georgie picks the first window, how many choices does he have for picking the second window?"

Solution (D) Georgie has 6 choices for the window in which to enter. After entering, Georgie has 5 choices for the window from which to exit. So altogether there are $6 \times 5 = 30$ different ways for Georgie to enter one window and exit another.

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 > General Combinatorics > Counting Generalized Principle

The average cost of a long-distance call in the USA in 1985 was 41 cents per minute, and the average cost of a long-distance call in the USA in 2005 was 7 cents per minute. Find the approximate percent decrease in the cost per minute of a long-distance call.

(A) 7 **(B)** 17 **(C)** 34 **(D)** 41 **(E)** 80

2007 AMC 8, Problem #6—
"Percentage decreased $= \frac{\text{price difference}}{\text{old price}}$."

Solution (E) The difference in the cost of a long-distance call per minute from 1985 to 2005 was $41 - 7 = 34$ cents. The percent decrease is $100 \times \dfrac{34}{41} \approx 100 \times \dfrac{32}{40} = 100 \times \dfrac{8}{10} = 80\%$.

Difficulty: Medium-hard
NCTM Standard: Number and Operations for Grades 6–8: work flexibly with fractions, decimals, and percents to solve problems.
Mathworld.com Classification: Number Theory > Arithmetic > Fractions > Percent

The average age of 5 people in a room is 30 years. An 18-year-old person leaves the room. What is the average age of the four remaining people?

(A) 25 **(B)** 26 **(C)** 29 **(D)** 33 **(E)** 36

2007 AMC 8, Problem #7—
"What is the sum of the ages of the people in the room originally?"

Solution (D) Originally the sum of the ages of the people in the room is $5 \times 30 = 150$. After the 18-year-old leaves, the sum of the ages of the remaining people is $150 - 18 = 132$. So the average age of the four remaining people is $\frac{132}{4} = 33$ years.

OR

The 18-year-old is 12 years younger than 30, so the four remaining people are an average of $\frac{12}{4} = 3$ years older than 30.

Difficulty: Medium
NCTM Standard: Number and Operations for Grades 6–8: understand numbers, ways of representing numbers, relationships among numbers, and number systems.
Mathworld.com Classification: Calculus and Analysis > Special Functions > Means > Arithmetic Mean

AMC 8 Practice Questions Continued
07-09

To complete the grid below, each of the digits 1 through 4 must occur once in each row and once in each column. What number will occupy the lower right-hand square?

1		2	
2	3		
			4

(A) 1 **(B)** 2 **(C)** 3 **(D)** 4 **(E)** cannot be determined

2007 AMC 8, Problem #9—
"The number in the last column of the second row must be 1."

Solution (B) The number in the last column of the second row must be 1 because there are already a 2 and a 3 in the second row and a 4 in the last column. By similar reasoning, the number above the 1 must be 3. So the number in the lower right-hand square must be 2. This is not the only way to find the solution.

1		2	3
2	3		1
			4
			2

The completed square is

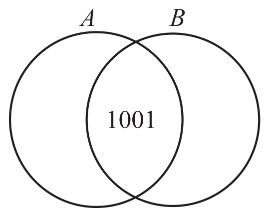
1	4	2	3
2	3	4	1
3	2	1	4
4	1	3	2

Difficulty: Medium-easy

NCTM Standard: Number and Operations for Grades 6–8: understand numbers, ways of representing numbers, relationships among numbers, and number systems.

Mathworld.com Classification: Recreational Mathematics > Mathematical Records > Latin Square

Sets A and B, shown in the Venn diagram, have the same number of elements. Their union has 2007 elements and their intersection has 1001 elements. Find the number of elements in A.



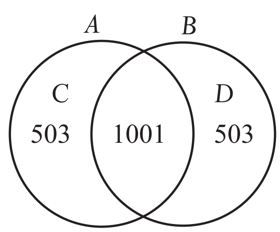
(A) 503 **(B)** 1006 **(C)** 1504 **(D)** 1507 **(E)** 1510

2007 AMC 8, Problem #13—
"The sum of elements in A and B is $2007 + 1001 = 3008$."

Solution (C) Let C denote the set of elements that are in A but not in B. Let D denote the set of elements that are in B but not in A. Because sets A and B have the same number of elements, the number of elements in C is the same as the number of elements in D. This number is half the number of elements in the union of A and B minus the intersection of A and B. That is, the number of elements in each of C and D is

$$\frac{1}{2}(2007 - 1001) = \frac{1}{2} \cdot 1006 = 503.$$

Adding the number of elements in A and B to the number in A but not in B gives $1001 + 503 = 1504$ elements in A.



OR

Let x be the number of elements each in A and B. Then $2x - 1001 = 2007$, $2x = 3008$ and $x = 1504$.

Difficulty: Hard

NCTM Standard: Number and Operations for Grades 6–8: understand numbers, ways of representing numbers, relationships among numbers, and number systems.

Mathworld.com Classification: Foundations of Mathematics > Logic > General Logic > Venn Diagram

A mixture of 30 liters of paint is 25% red tint, 30% yellow tint and 45% water. Five liters of yellow tint are added to the original mixture. What is the percent of yellow tint in the new mixture?

(A) 25 **(B)** 35 **(C)** 40 **(D)** 45 **(E)** 50

2007 AMC 8, Problem #17—
"There are $0.30(30) = 9$ liters of yellow tint in the original 30-liter mixture."

Solution (C) There are $0.30(30) = 9$ liters of yellow tint in the original 30-liter mixture. After adding 5 liters of yellow tint, 14 of the 35 liters of the new mixture are yellow tint. The percent of yellow tint in the new mixture is $100 \times \dfrac{14}{35} = 100 \times \dfrac{2}{5}$ or 40%.

Difficulty: Medium-hard

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

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

AMC 8 Practice Questions Continued

07-21

Two cards are dealt from a deck of four red cards labeled A, B, C, D and four green cards labeled A, B, C, D. A winning pair is two of the same color or two of the same letter. What is the probability of drawing a winning pair?

(A) $\frac{2}{7}$ **(B)** $\frac{3}{8}$ **(C)** $\frac{1}{2}$ **(D)** $\frac{4}{7}$ **(E)** $\frac{5}{8}$

2007 AMC 8, Problem #21—
"After the first card is dealt, there are seven left. How many of the remaining cards are winners?"

Solution (D) After the first card is dealt, there are seven left. The three cards with the same color as the initial card are winners and so is the card with the same letter but a different color. That means four of the remaining seven cards form winning pairs with the first card, so the probability of winning is $\frac{4}{7}$.

Difficulty: Hard
NCTM Standard: Probability for Grades 6–8: understand and apply basic concepts of probability.
Mathworld.com Classification: Probability and Statistics > Probability > Probability

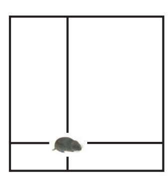
AMC 8 Practice Questions Continued
07-22

A lemming sits at a corner of a square with side length 10 meters. The lemming runs 6.2 meters along a diagonal toward the opposite corner. It stops, makes a $90°$ right turn and runs 2 more meters.
A scientist measures the shortest distance between the lemming and each side of the square. What is the average of these four distances in meters?

(A) 2 **(B)** 4.5 **(C)** 5 **(D)** 6.2 **(E)** 7

2007 AMC 8, Problem #22—
"Wherever the lemming is inside the square, the sum of the distances to the two horizontal sides is 10 meters and the sum of the distances to the two vertical sides is 10 meters."

Solution (C) Wherever the lemming is inside the square, the sum of the distances to the two horizontal sides is 10 meters and the sum of the distances to the two vertical sides is 10 meters. Therefore the sum of all four distances is 20 meters, and the average of the four distances is $\frac{20}{4} = 5$ meters.



Difficulty: Medium-hard
NCTM Standard: Geometry for Grades 6–8: use visualization, spatial reasoning, and geometric modeling to solve problems.
Mathworld.com Classification: Geometry > Plane Geometry > Squares > Square