

Mindy made three purchases for \$1.98, \$5.04 and \$9.89. What was her total, to the nearest dollar?

(A) \$10

(B) \$15

(C) \$16

(D) \$17

(E) \$18

**2006 AMC 8, Problem #1—**  
**“Round each amount to the nearest dollar.”**

**Solution (D)** Mindy’s total was approximately  $2 + 5 + 10 = \$17$ .

**Difficulty:** Easy

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

**Mathworld.com Classification:** Number Theory > Rounding

On the AMC 8 contest Billy answers 13 questions correctly, answers 7 questions incorrectly and doesn't answer the last 5. What is his score?

(A) 1

(B) 6

(C) 13

(D) 19

(E) 26

**2006 AMC 8, Problem #2—**

**“Review the score rule for AMC 8, a student’s score is the number of problems answered correctly.”**

**Solution (C)** On the AMC 8 a student’s score is the number of problems answered correctly. So Billy’s score is 13. Because there is no penalty for guessing, if he wants to increase his score, he probably should fill in the last five answers.

**Difficulty:** Easy

**NCTM Standard:** Problem Solving Standard for Grades 6–8: solve problems that arise in mathematics and in other contexts.

**Mathworld.com Classification:** Number Theory > Arithmetic > Addition and Subtraction

Elisa swims laps in the pool. When she first started, she completed 10 laps in 25 minutes. Now she can finish 12 laps in 24 minutes. By how many minutes has she improved her lap time?



(A)  $\frac{1}{2}$

(B)  $\frac{3}{4}$

(C) 1

(D) 2

(E) 3

**2006 AMC 8, Problem #3—**

**“Compare lap time in the unit minutes per lap.”**

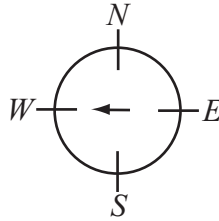
**Solution (A)** When Elisa started, she completed a lap in  $\frac{25}{10} = 2.5$  minutes. Now she can complete a lap in  $\frac{24}{12} = 2$  minutes. She has improved her lap time by  $2.5 - 2 = 0.5$  or  $\frac{1}{2}$  minute.

**Difficulty:** Medium

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

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

Initially, a spinner points west. Chenille moves it clockwise  $2\frac{1}{4}$  revolutions and then counterclockwise  $3\frac{3}{4}$  revolutions. In what direction does the spinner point after the two moves?



- (A) north                      (B) east                      (C) south                      (D) west                      (E) northwest

**2006 AMC 8, Problem #4—**  
**“Ignore the number of complete revolutions.”**

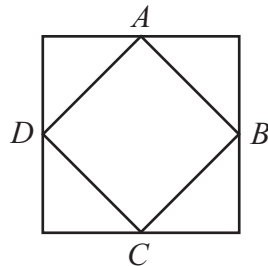
**Solution (B)** Ignore the number of complete revolutions because they do not affect direction. One-fourth of the distance around the circle clockwise from west is north. Three-fourths of the distance counterclockwise around the circle from north is east. Chenille’s spinner points east.

**Difficulty:** Medium-easy

**NCTM Standard:** Geometry Standard for Grades 6–8: analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships.

**Mathworld.com Classification:** Geometry > Transformations > Rotations

Points  $A$ ,  $B$ ,  $C$  and  $D$  are midpoints of the sides of the larger square. If the larger square has area 60, what is the area of the smaller square?



(A) 15

(B) 20

(C) 24

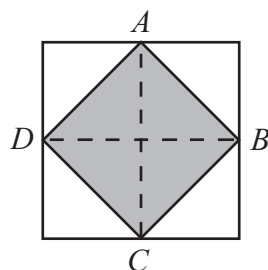
(D) 30

(E) 40

**2006 AMC 8, Problem #5—**

**“Divide the larger square into 8 congruent triangles.”**

**Solution (D)** Divide the larger square into 8 congruent triangles, as shown, 4 of which make up the smaller square.



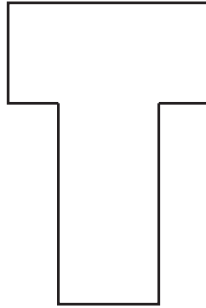
The area of the smaller square is  $\frac{4}{8}$  or  $\frac{1}{2}$  of the area of the larger square, so the area of the smaller square is equal to 30.

**Difficulty:** Medium

**NCTM Standard:** Geometry Standard for Grades 6–8: apply transformations and use symmetry to analyze mathematical situations.

**Mathworld.com Classification:** Geometry > Plane Geometry > Squares

The letter T is formed by placing two  $2\text{ inch} \times 4\text{ inch}$  rectangles next to each other, as shown. What is the perimeter of the T, in inches?



(A) 12

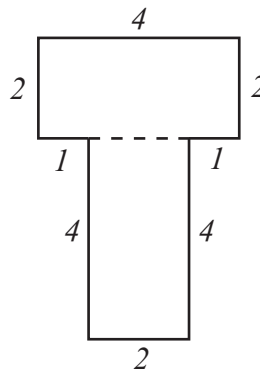
(B) 16

(C) 20

(D) 22

(E) 24

**2006 AMC 8, Problem #6—**  
**“Mark each side and add them all.”**



**Solution (C)**

The perimeter is  $4 + 2 + 1 + 4 + 2 + 4 + 1 + 2 = 20$  inches.

OR

Each rectangle has perimeter  $= 2l + 2w = 2(4) + 2(2) = 8 + 4 = 12$  inches. When the two rectangles are positioned to form the T, a two-inch segment of each rectangle is inside the T and is not on the perimeter of the T. So the perimeter of the T is  $2(12) - 2(2) = 24 - 4 = 20$  inches.

**Difficulty:** Medium

**NCTM Standard:** Geometry Standard for Grades 6–8: analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships.

**Mathworld.com Classification:** Geometry > Plane Geometry > Rectangles

Circle  $X$  has a radius of  $\pi$ . Circle  $Y$  has a circumference of  $8\pi$ . Circle  $Z$  has an area of  $9\pi$ . List the circles in order from smallest to largest radius.

- (A)  $X, Y, Z$       (B)  $Z, X, Y$       (C)  $Y, X, Z$       (D)  $Z, Y, X$       (E)  $X, Z, Y$

**2006 AMC 8, Problem #7—**  
**“Find the radius of each circle.”**

**Solution (B)** Because circumference  $C = 2\pi r$  and circle  $Y$  has circumference  $8\pi$ , its radius is  $\frac{8\pi}{2\pi} = 4$ . Because area  $A = \pi r^2$  and circle  $Z$  has area  $9\pi$ , its radius is  $\sqrt{9} = 3$ . Ordering the radii gives  $3 < \pi < 4$ , so the circles in ascending order of radii length are  $Z$ ,  $X$  and  $Y$ .

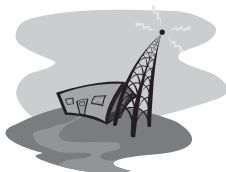
**Difficulty:** Medium-hard

**NCTM Standard:** Geometry Standard for Grades 6–8: analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships.

**Mathworld.com Classification:** Geometry > Plane Geometry > Circles > Circumference  
Geometry > Plane Geometry > Circles

The table shows some of the results of a survey by radio station KAMC. What percentage of the males surveyed listen to the station?

	Listen	Don't Listen	Total
Male	?	26	?
Female	58	?	96
Total	136	64	200



(A) 39

(B) 48

(C) 52

(D) 55

(E) 75

**2006 AMC 8, Problem #8—**  
**“Fill in the missing entries on the table.”**

**Solution (E)** Because  $200 - 96 = 104$  of those surveyed were male,  $104 - 26 = 78$  of those surveyed are male listeners.

	Listen	Don't Listen	Total
Male	78	26	104
Female	58	38	96
Total	136	64	200

The percentage of males surveyed who listen to KAMC is  $\frac{78}{104} \times 100\% = 75\%$ .

**Difficulty:** Medium

**NCTM Standard:** Problem Solving Standard for Grades 6–8: apply and adapt a variety of appropriate strategies to solve problems.

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



What is the product of  $\frac{3}{2} \times \frac{4}{3} \times \frac{5}{4} \dots \times \frac{2006}{2005}$ ?

(A) 1

(B) 1002

(C) 1003

(D) 2005

(E) 2006

**2006 AMC 8, Problem #9—**

**“In each fraction, the numerator is the same as the denominator in the next fraction.”**

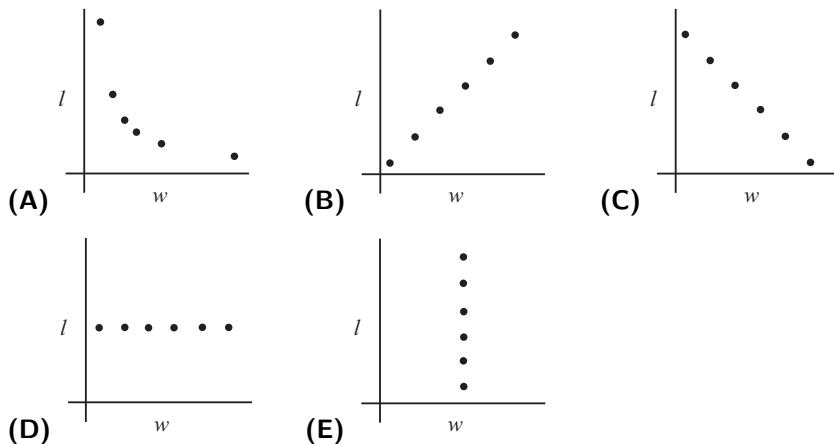
**Solution (C)** Note that in each fraction, the numerator is the same as the denominator in the next fraction, so they divide. The product of  $\frac{\cancel{3}}{2} \times \frac{\cancel{4}}{\cancel{3}} \times \frac{\cancel{5}}{\cancel{4}} \times \dots \times \frac{2006}{\cancel{2005}} = \frac{2006}{2} = 1003$ .

**Difficulty:** Medium-hard

**NCTM Standard:** Algebra Standard for Grades 6–8: understand patterns, relations, and functions.

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

Jorge's teacher asks him to plot all the ordered pairs  $(w, l)$  of positive integers for which  $w$  is the width and  $l$  is the length of a rectangle with area 12. What should his graph look like?



**2006 AMC 8, Problem #10—**

**“The factors of 12 are the possible lengths of the sides.”**

**Solution (A)** When the area of a rectangle is 12 square units and the sides are integers, the factors of 12 are the possible lengths of the sides. In point form, the side lengths could be  $(1, 12)$ ,  $(2, 6)$ ,  $(3, 4)$ ,  $(4, 3)$ ,  $(6, 2)$  and  $(12, 1)$ . Only graph A fits these points.

**Difficulty:** Medium-hard

**NCTM Standard:** Number and Operations Standard for Grades 6–8: use factors, multiples, prime factorization, and relatively prime numbers to solve problems.

**Mathworld.com Classification:** Geometry > Plane Geometry > Rectangles  
Number Theory > Prime Numbers > Prime Factorization > Factoring

How many two-digit numbers have digits whose sum is a perfect square?

(A) 13

(B) 16

(C) 17

(D) 18

(E) 19

**2006 AMC 8, Problem #11—**

**“The only possible perfect square sums are 1, 4, 9 and 16.”**

**Solution (C)** The sum of the digits of a two-digit number is at most  $9 + 9 = 18$ . This means the only possible perfect square sums are 1, 4, 9 and 16. Each square has the following two-digit possibilities:

1 : 10

4 : 40, 31, 22, 13

9 : 90, 81, 72, 63, 54, 45, 36, 27, 18

16 : 97, 88, 79

There are 17 two-digit numbers in all.

**Difficulty:** Hard

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

**Mathworld.com Classification:** Number Theory > Special Numbers > Figurate Numbers > Square Numbers

Antonette gets 70% on a 10-problem test, 80% on a 20-problem test and 90% on a 30-problem test. If the three tests are combined into one 60-problem test, which percent is closest to her overall score?

(A) 40

(B) 77

(C) 80

(D) 83

(E) 87

**2006 AMC 8, Problem #12—**

**“Find the number of correct problems on each test.”**

**Solution (D)** Note that 70% of 10 is 7, 80% of 20 is 16 and 90% of 30 is 27. Antonette answers  $7 + 16 + 27 = 50$  problems correctly out of 60 problems in all. Her overall score is  $\frac{50}{60}$  or  $83.\bar{3}\%$ .

**Difficulty:** Medium

**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 > Percent

Cassie leaves Escanaba at 8:30 AM heading for Marquette on her bike. She bikes at a uniform rate of 12 miles per hour. Brian leaves Marquette at 9:00 AM heading for Escanaba on his bike. He bikes at a uniform rate of 16 miles per hour. They both bike on the same 62-mile route between Escanaba and Marquette. At what time in the morning do they meet?

(A) 10:00

(B) 10:15

(C) 10:30

(D) 11:00

(E) 11:30

**2006 AMC 8, Problem #13—**  
**“How far does Cassie travel from 8:30-9:00?”**

**Solution (D)** Between 8:30 and 9:00 AM Cassie travels 6 miles. At 9:00 Cassie and Brian are only 56 miles apart. After 9:00, because they are both biking towards each other, the distance between them decreases at the rate of  $12 + 16 = 28$  miles per hour. At that rate, it will take them  $\frac{56}{28} = 2$  hours to meet. So they will meet at 11:00 AM.

**Difficulty:** Medium-hard

**NCTM Standard:** Problem Solving Standard for Grades 6–8: build new mathematical knowledge through problem solving.

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

Problems 14, 15 and 16 involve Mrs. Reed's English assignment.

### A Novel Assignment

The students in Mrs. Reed's English class are reading the same 760-page novel. Three friends, Alice, Bob and Chandra, are in the class. Alice reads a page in 20 seconds, Bob reads a page in 45 seconds and Chandra reads a page in 30 seconds.



If Bob and Chandra both read the whole book, Bob will spend how many more seconds reading than Chandra?

- (A) 7,600                      (B) 11,400                      (C) 12,500                      (D) 15,200                      (E) 22,800

**2006 AMC 8, Problem #14—**

**“Bob takes 15 more seconds per page than Chandra, and the total number of pages is 760”**

**Solution (B)** Bob takes  $45 - 30 = 15$  more seconds per page than Chandra. So the difference in their total reading times is  $760 \cdot 15 = 11,400$  seconds. Bob will spend 11,400 more seconds reading than Chandra.

**Difficulty:** Easy

**NCTM Standard:** Problem Solving Standard for Grades 6–8: apply and adapt a variety of appropriate strategies to solve problems.

**Mathworld.com Classification:** Number Theory > Arithmetic > Multiplication and Division

Chandra and Bob, who each have a copy of the book, decide that they can save time by “team reading” the novel. In this scheme, Chandra will read from page 1 to a certain page and Bob will read from the next page through page 760, finishing the book. When they are through they will tell each other about the part they read. What is the last page that Chandra should read so that she and Bob spend the same amount of time reading the novel?

(A) 425

(B) 444

(C) 456

(D) 484

(E) 506

**2006 AMC 8, Problem #15—**

**“Bob should read  $\frac{2}{3}$  of the number of pages that Chandra reads.”**

**Solution (C)** The ratio of time it takes Bob to read a page to the time it takes Chandra to read a page is 45:30 or 3:2, so Bob should read  $\frac{2}{3}$  of the number of pages that Chandra reads. Divide the book into 5 parts, each with  $\frac{760}{5} = 152$  pages. Chandra will read the first  $3 \cdot 152 = 456$  pages, while Bob reads the last  $2 \cdot 152 = 304$  pages.

OR

If Chandra reads  $x$  pages, she will read for  $30x$  seconds. Bob has to read  $760 - x$  pages, and this takes him  $45(760 - x)$  seconds. Because Chandra and Bob read the same amount of time,  $30x = 45(760 - x)$ .

Solving for  $x$ ,

$$30x = 45 \cdot 760 - 45x,$$

$$75x = 45 \cdot 760,$$

$$x = \frac{45 \cdot 760}{75} = 456.$$

So Chandra will read the first 456 pages.

**Difficulty:** Medium

**NCTM Standard:** Problem Solving Standard for Grades 6–8: apply and adapt a variety of appropriate strategies to solve problems.

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

Before Chandra and Bob start reading, Alice says she would like to team read with them. If they divide the book into three sections so that each reads for the same length of time, how many seconds will each have to read?

(A) 6400

(B) 6600

(C) 6800

(D) 7000

(E) 7200

**2006 AMC 8, Problem #16—**  
**“Find the LCM of 20, 45 and 30.”**

**Solution (E)** The least common multiple of 20, 45 and 30 is  $2^2 \cdot 3^2 \cdot 5 = 180$ . Using the LCM, in 180 seconds Alice reads  $\frac{180}{20} = 9$  pages, Chandra reads  $\frac{180}{30} = 6$  pages and Bob reads  $\frac{180}{45} = 4$  pages. Together they read a total of 19 pages in 180 seconds. The total number of seconds each reads is  $\frac{760}{19} \cdot 180 = 7200$ .

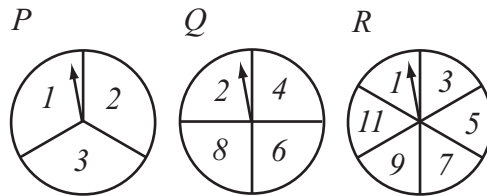
**Difficulty:** Medium-hard

**NCTM Standard:** Problem Solving Standard for Grades 6–8: apply and adapt a variety of appropriate strategies to solve problems.

**Mathworld.com Classification:** Number Theory > Number Theoretic Functions > Least Common Multiple



Jeff rotates spinners P, Q and R and adds the resulting numbers. What is the probability that his sum is an odd number?



(A)  $\frac{1}{4}$

(B)  $\frac{1}{3}$

(C)  $\frac{1}{2}$

(D)  $\frac{2}{3}$

(E)  $\frac{3}{4}$

**2006 AMC 8, Problem #17—**

**“The sum of a number from spinner Q and a number from spinner R is always odd.”**

**Solution (B)** Because the sum of a number from spinner Q and a number from spinner R is always odd, the sum of the numbers on the three spinners will be odd exactly when the number from spinner P is even. Because 2 is the only even number on spinner P, the probability of getting an odd sum is  $\frac{1}{3}$ .

**Difficulty:** Medium-hard

**NCTM Standard:** Data Analysis and Probability Standard for Grades 6–8: understand and apply basic concepts of probability.

**Mathworld.com Classification:** Number Theory > Integers > Odd Number  
Probability and Statistics > Probability

A cube with 3-inch edges is made using 27 cubes with 1-inch edges. Nineteen of the smaller cubes are white and eight are black. If the eight black cubes are placed at the corners of the larger cube, what fraction of the surface area of the larger cube is white?

(A)  $\frac{1}{9}$

(B)  $\frac{1}{4}$

(C)  $\frac{4}{9}$

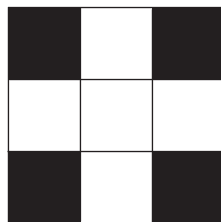
(D)  $\frac{5}{9}$

(E)  $\frac{19}{27}$

**2006 AMC 8, Problem #18—**

**“Four black and five white squares are visible on each of the six faces of the cube.”**

**Solution (D)** Four black and five white squares are visible on each of the six faces of the cube. So  $\frac{5}{9}$  of the surface will be white.

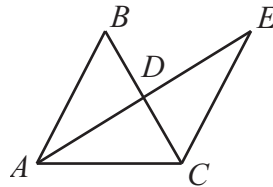


**Difficulty:** Medium-hard

**NCTM Standard:** Geometry Standard for Grades 6–8: apply transformations and use symmetry to analyze mathematical situations.

**Mathworld.com Classification:** Geometry > Solid Geometry > Polyhedra > Cubes

Triangle  $ABC$  is an isosceles triangle with  $AB = BC$ . Point  $D$  is the midpoint of both  $\overline{BC}$  and  $\overline{AE}$ , and  $\overline{CE}$  is 11 units long. Triangle  $ABD$  is congruent to triangle  $ECD$ . What is the length of  $\overline{BD}$ ?



- (A) 4                      (B) 4.5                      (C) 5                      (D) 5.5                      (E) 6

**2006 AMC 8, Problem #19—**  
“ $EC = AB = BC = 11.$ ”

**Solution (D)** Because triangles  $ABD$  and  $ECD$  are congruent and triangle  $ABC$  is isosceles,  $EC = AB = BC = 11$ . That means  $BD = \frac{11}{2}$  or 5.5.

**Difficulty:** Medium

**NCTM Standard:** Geometry Standard for Grades 6–8: analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships.

**Mathworld.com Classification:** Geometry > Plane Geometry > Triangles > Special Triangles > Other Triangles

A singles tournament had six players. Each player played every other player only once, with no ties. If Helen won 4 games, Ines won 3 games, Janet won 2 games, Kendra won 2 games and Lara won 2 games, how many games did Monica win?

(A) 0

(B) 1

(C) 2

(D) 3

(E) 4

**2006 AMC 8, Problem #20—**

**“Each of the six players played 5 games, and each game involved two players.”**

**Solution (C)** Each of the six players played 5 games, and each game involved two players. So there were  $\frac{6 \cdot 5}{2} = 15$  games. Helen, Ines, Janet, Kendra and Lara won a total of  $4 + 3 + 2 + 2 + 2 = 13$  games, so Monica won  $15 - 13 = 2$  games.

**Difficulty:** Medium-hard

**NCTM Standard:** Problem Solving Standard for Grades 6–8: solve problems that arise in mathematics and in other contexts.

**Mathworld.com Classification:** Discrete Mathematics > Graph Theory > Directed Graphs > Tournament

An aquarium has a rectangular base that measures 100 cm by 40 cm and has a height of 50 cm. The aquarium is filled with water to a depth of 37 cm. A rock with volume  $1000 \text{ cm}^3$  is then placed in the aquarium and completely submerged. By how many centimeters does the water level rise?

(A) 0.25

(B) 0.5

(C) 1

(D) 1.25

(E) 2.5

**2006 AMC 8, Problem #21—**

**“The additional volume of water occupied in the aquarium is equal to the volume of the rock.”**

**Solution (A)** Using the volume formula  $lwh = V$ , the volume of water in the aquarium is  $100 \times 40 \times 37 = 148,000 \text{ cm}^3$ . When the rock is put in, the water and the rock will occupy a box-shaped region with volume  $148,000 + 1000 = 149,000 \text{ cm}^3$ . The volume of the water and the rock is  $100 \times 40 \times h$ , where  $h$  is the new height of the water. The new volume =  $4000h = 149,000 \text{ cm}^3$ , so the new height is

$$h = \frac{149000}{4000} = 37.25 \text{ cm.}$$

After adding the rock, the water rises  $37.25 - 37 = 0.25 \text{ cm}$ .

OR

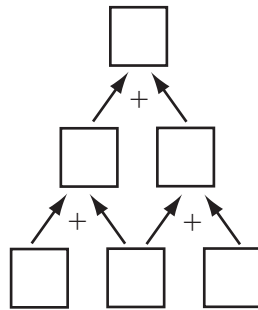
Because the shape of the rock is irrelevant, we may assume that the rock is shaped like a rectangular box with base measuring  $100 \text{ cm} \times 40 \text{ cm}$  and height  $h \text{ cm}$ . Using the volume formula,  $100 \times 40 \times h = 1000$ , so  $h = \frac{1000}{100 \times 40} = 0.25 \text{ cm}$ . When the rock is put into the aquarium, the water level will rise by  $0.25 \text{ cm}$ .

**Difficulty:** Hard

**NCTM Standard:** Geometry Standard for Grades 6–8: analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships.

**Mathworld.com Classification:** Geometry > Solid Geometry > Volume

Three different one-digit positive integers are placed in the bottom row of cells. Numbers in adjacent cells are added and the sum is placed in the cell above them. In the second row, continue the same process to obtain a number in the top cell. What is the difference between the largest and smallest numbers possible in the top cell?



(A) 16

(B) 24

(C) 25

(D) 26

(E) 35

**2006 AMC 8, Problem #22—**

**“If the lower cells contain  $A$ ,  $B$  and  $C$ , then the second row will contain  $A+B$  and  $B+C$ , and the top cell will contain  $A+2B+C$ .”**

**Solution (D)** If the lower cells contain  $A$ ,  $B$  and  $C$ , then the second row will contain  $A+B$  and  $B+C$ , and the top cell will contain  $A+2B+C$ . To obtain the smallest sum, place 1 in the center cell and 2 and 3 in the outer ones. The top number will be 7. For the largest sum, place 9 in the center cell and 7 and 8 in the outer ones. This top number will be 33. The difference is  $33 - 7 = 26$ .

**Difficulty:** Hard

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

**Mathworld.com Classification:** Number Theory > Numbers > Small Numbers  
Number Theory > Arithmetic > Addition and Subtraction

A box contains gold coins. If the coins are equally divided among six people, four coins are left over. If the coins are equally divided among five people, three coins are left over. If the box holds the smallest number of coins that meets these two conditions, how many coins are left when equally divided among seven people?



- (A) 0                      (B) 1                      (C) 2                      (D) 3                      (E) 5

**2006 AMC 8, Problem #23—**

**“List the counting numbers that leave a remainder of 4 and 3.”**

**Solution (A)** The counting numbers that leave a remainder of 4 when divided by 6 are 4, 10, 16, 22, 28, 34, . . . . The counting numbers that leave a remainder of 3 when divided by 5 are 3, 8, 13, 18, 23, 28, 33, . . . . So 28 is the smallest possible number of coins that meets both conditions. Because  $4 \times 7 = 28$ , there are no coins left when they are divided among seven people.

OR

If there were two more coins in the box, the number of coins would be divisible by both 6 and 5. The smallest number that is divisible by 6 and 5 is 30, so the smallest possible number of coins in the box is 28.

**Difficulty:** Hard

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

**Mathworld.com Classification:** Number Theory > Arithmetic > Multiplication and Division > Remainder

In the multiplication problem below,  $A$ ,  $B$ ,  $C$  and  $D$  are different digits. What is  $A + B$ ?

$$\begin{array}{r} ABA \\ \times CD \\ \hline CD CD \end{array}$$

(A) 1

(B) 2

(C) 3

(D) 4

(E) 9

**2006 AMC 8, Problem #24—**

**“Decompose  $CD CD$  into  $CD \times 1 + 100 \times CD = CD(101)$ .”**

**Solution (A)** We can decompose  $CD CD$  into  $CD \times 100 + CD = CD(101)$ . That means that  $A = 1$  and  $B = 0$ . The sum is  $1 + 0 = 1$ .

**Difficulty:** Hard

**NCTM Standard:** Number and Operations Standard for Grades 6–8: understand meanings of operations and how they relate to one another.

**Mathworld.com Classification:** Recreational Mathematics > Cryptograms > Cryptarithmic



Barry wrote 6 different numbers, one on each side of 3 cards, and laid the cards on a table, as shown. The sums of the two numbers on each of the three cards are equal. The three numbers on the hidden sides are prime numbers. What is the average of the hidden prime numbers?



(A) 13

(B) 14

(C) 15

(D) 16

(E) 17

**2006 AMC 8, Problem #25—**

**“Because all primes other than 2 are odd and the sum of an even number and an odd number is odd, the common sum must be odd.”**

**Solution (B)** There are one odd and two even numbers showing. Because all primes other than 2 are odd and the sum of an even number and an odd number is odd, the common sum must be odd. That means 2 must be opposite 59 and the common sum is  $2 + 59 = 61$ . The other two hidden numbers are  $61 - 44 = 17$  and  $61 - 38 = 23$ . The average of 2, 17 and 23 is  $\frac{2+17+23}{3} = \frac{42}{3} = 14$ .

**Difficulty:** Hard

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

**Mathworld.com Classification:** Number Theory > Prime Numbers > Prime Number Properties

# ITEM DIFFICULTY

## Table 3

**Table of Problem Difficulty for the 2006 AMC 8  
Tabulation of responses by 147,210 Students**

Percent of Responses

<b>Q</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>	<b>OMITS</b>
1	0.29	0.75	3.72	93.95*	1.04	0.24
2	4.27	3.19	85.73*	1.86	4	0.94
3	46.39*	6.9	23.37	12.12	9.7	1.47
4	4.01	66.91*	12.38	10.93	5.23	0.49
5	9.25	4.25	5.17	63.37*	15.94	1.96
6	5.35	20.68	55.1*	7.37	10.8	0.68
7	38.54	20.87*	10.46	13.17	15.02	1.28
8	11.5	5.32	11.4	10.77	59.6*	1.25
9	25.91	14.71	36.92*	9.9	9.57	2.92
10	23.19*	32.47	23.28	10.66	8.61	1.74
11	20.01	32.54	17.51*	17.73	8.62	3.49
12	4.72	5.9	35.63	43.32*	9.12	1.25
13	8.1	16.72	28.65	26.59*	16.55	3.27
14	6.41	79.27*	4.52	4.95	3.36	1.44
15	19.94	10.27	43.67*	12.26	9.53	4.22
16	16.18	19.11	21.65	12.89	23.46*	6.63
17	7.94	26.89*	11.81	35.86	13.14	4.24
18	9.83	12.76	22.29*	22.81*	25.94	6.22
19	9.23*	14	12.5	52.37*	5.59	6.14
20	11.44	21.14	31.9*	16.6	11.17	7.61
21	19.59*	14.62	18.69	20.98	16.58	9.4
22	19.46	29.02	17.58	17.16*	6.92	9.7
23	20.76*	15.4	18.42	11.67	22.56	10.87
24	15.39*	16.15	16.01	17.68	12.09	12.55
25	15.48	12.58*	19.72	15.17	14.68	13.3

(\*) Correct Response