2009

8 The length of a rectangle is increased by 10% and the width is decreased by 10%. What percent of the old area is the new area?

(A) 90 **(B)** 99 **(C)** 100 **(D)** 101 **(E)** 110

11 The Amaco Middle School bookstore sells pencils costing a whole number of cents. Some seventh graders each bought a pencil, paying a total of $\$1.43$. Some of the 30 sixth graders each bought a pencil, and they paid a total of $\$1.95$. How many more sixth graders than seventh graders bought a pencil?

(A) 1 **(B)** 2 **(C)** 3 **(D)** 4 **(E)** 5

13 A three-digit integer contains one of each of the digits 1, 3, and 5. What is the probability that the integer is divisible by 5?

(A) $\frac{1}{6}$ **(B)** $\frac{1}{3}$ **(C)** $\frac{1}{2}$ **(D)** $\frac{2}{3}$ **(E)** $\frac{5}{6}$

15 A recipe that makes 5 servings of hot chocolate requires 2 squares of chocolate, $\frac{1}{4}$ cup sugar, 1 cup water and 4 cups milk. Jordan has 5 squares of chocolate, 2 cups of sugar, lots of water and 7 cups of milk. If she maintains the same ratio of ingredients, what is the greatest number of servings of hot chocolate she can make?

(A) $5\frac{1}{8}$ **(B)** $6\frac{1}{4}$ **(C)** $7\frac{1}{2}$ **(D)** $8\frac{3}{4}$ **(E)** $9\frac{7}{8}$

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16 How many 3-digit positive integers have digits whose product equals 24?

(A) 12 **(B)** 15 **(C)** 18 **(D)** 21 **(E)** 24

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17 The positive integers x and y are the two smallest positive integers for which the product of 360 and x is a square and the product of 360 and y is a cube. What is the sum of x and y?

(A) 80 **(B)** 85 **(C)** 115 **(D)** 165 **(E)** 610

2010

5 Alice needs to replace a light bulb located 10 centimeters below the ceiling of her kitchen. The ceiling is 2.4 meters above the floor. Alice is 1.5 meters tall and can reach 46 centimeters above her head. Standing on a stool, she can just reach the light bulb. What is the height of the stool, in centimeters?

(A) 32 **(B)** 34 **(C)** 36 **(D)** 38 **(E)** 40

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7 Using only pennies, nickels, dimes, and quarters, what is the smallest number of coins Freddie would need so he could pay any amount of money less than one dollar?

(A) 6 **(B)** 10 **(C)** 15 **(D)** 25 **(E)** 99

8 As Emily is riding her bike on a long straight road, she spots Ermenson skating in the same direction $1/2$ mile in front of her. After she passes him, she can see him in her rear mirror until he is $1/2$ mile behind her. Emily rides at a constant rate of 12 miles per hour. Ermenson skates at a constant rate of 8 miles per hour. For how many minutes can Emily see Ermenson?

(A) 6 **(B)** 8 **(C)** 12 **(D)** 15 **(E)** 16

12 Of the 500 balls in a large bag, 80% are red and the rest are blue. How many of the red balls must be removed so that 75% of the remaining balls are red?

(A) 25 **(B)** 50 **(C)** 75 **(D)** 100 **(E)** 150

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13 The lengths of the sides of a triangle in inches are three consecutive integers. The length of the shorter side is 30% of the perimeter. What is the length of the longest side?

(A) 7 **(B)** 8 **(C)** 9 **(D)** 10 **(E)** 11

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14 What is the sum of the prime factors of 2010?

(A) 67 **(B)** 75 **(C)** 77 **(D)** 201 **(E)** 210

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15 A jar contains 5 different colors of gumdrops. 30% are blue, 20% are brown, 15% red, 10% yellow, and the other 30 gumdrops are green. If half of the blue gumdrops are replaced with brown gumdrops, how many gumdrops will be brown?

(A) 35 **(B)** 36 **(C)** 42 **(D)** 48 **(E)** 64

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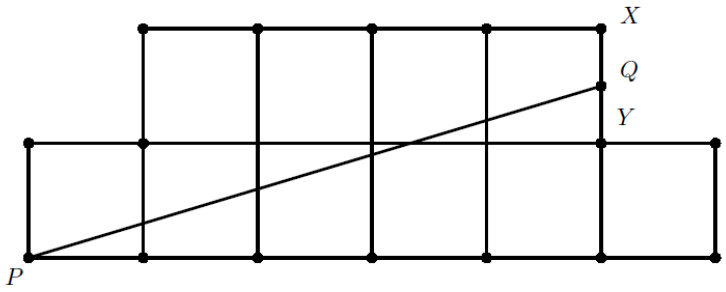
16 A square and a circle have the same area. What is the ratio of the side length of the square to the radius of the circle?

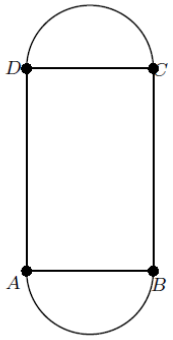
(A) $\frac{\sqrt{\pi}}{2}$ **(B)** $\sqrt{\pi}$ **(C)** π **(D)** 2π **(E)** π^2

17 The diagram shows an octagon consisting of 10 unit squares. The portion below $\overline{PQ}$ is a unit square and a triangle with base 5. If $\overline{PQ}$ bisects the area of the octagon, what is the ratio $\frac{XQ}{QY}$?



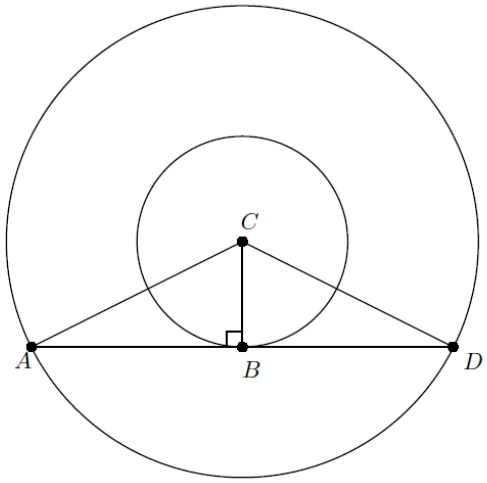
(A) $\frac{2}{5}$ **(B)** $\frac{1}{2}$ **(C)** $\frac{3}{5}$ **(D)** $\frac{2}{3}$ **(E)** $\frac{3}{4}$

18 A decorative window is made up of a rectangle with semicircles at either end. The ratio of AD to AB is $3:2$. And AB is 30 inches. What is the ratio of the area of the rectangle to the combined area of the semicircle.



(A) $2:3$ **(B)** $3:2$ **(C)** $6:\pi$ **(D)** $9:\pi$ **(E)** $30:\pi$

19 The two circles pictured have the same center C. Chord $\overline{AD}$ is tangent to the inner circle at B, AC is 10, and chord $\overline{AD}$ has length 16. What is the area between the two circles?



(A) 36π **(B)** 49π **(C)** 64π **(D)** 81π **(E)** 100π

2011

4 Here is a list of the numbers of fish that Tyler caught in nine outings last summer:

$$2, 0, 1, 3, 0, 3, 3, 1, 2.$$

Which statement about the mean, median, and mode is true?

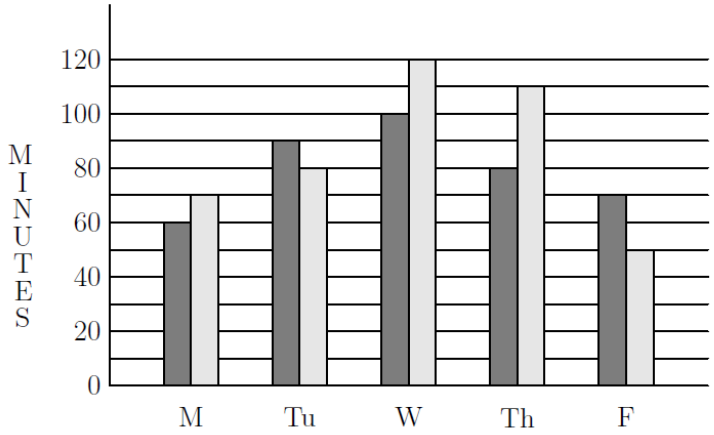
(A) median $<$ mean $<$ mode **(B)** mean $<$ mode $<$ median

(C) mean $<$ median $<$ mode **(D)** median $<$ mode $<$ mean

8 Bag A has three chips labeled 1, 3, and 5. Bag B has three chips labeled 2, 4, and 6. If one chip is drawn from each bag, how many different values are possible for the sum of the two numbers on the chips?

(A) 4 **(B)** 5 **(C)** 6 **(D)** 7 **(E)** 9

11 The graph shows the number of minutes studied by both Asha (black bar) and Sasha (grey bar) in one week. On the average, how many more minutes per day did Sasha study than Asha?



(A) 6 **(B)** 8 **(C)** 9 **(D)** 10 **(E)** 12

12 Angie, Bridget, Carlos, and Diego are seated at random around a square table, one person to a side. What is the probability that Angie and Carlos are seated opposite each other?

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

16 Let A be the area of the triangle with sides of length $25, 25$, and 30. Let B be the area of the triangle with sides of length $25, 25$, and 40. What is the relationship between A and B?

(A) $A = \frac{9}{16}B$ **(B)** $A = \frac{3}{4}B$ **(C)** $A = B$ **(D)** $A = \frac{4}{3}B$ **(E)** $A = \frac{16}{9}B$

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17 Let w, x, y, and z be whole numbers. If $2^w \cdot 3^x \cdot 5^y \cdot 7^z = 588$, then what does $2w + 3x + 5y + 7z$ equal?

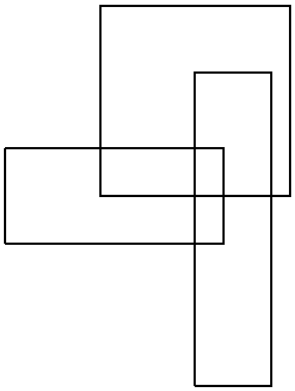
(A) 21 **(B)** 25 **(C)** 27 **(D)** 35 **(E)** 56

---

18 A fair 6-sided die is rolled twice. What is the probability that the first number that comes up is greater than or equal to the second number?

(A) $\frac{1}{6}$ **(B)** $\frac{5}{12}$ **(C)** $\frac{1}{2}$ **(D)** $\frac{7}{12}$ **(E)** $\frac{5}{6}$

19 How many rectangles are in this figure?



(A) 8 **(B)** 9 **(C)** 10 **(D)** 11 **(E)** 12

2012

10 How many 4-digit numbers greater than 1000 are there that use the four digits of 2012?

(A) 6 **(B)** 7 **(C)** 8 **(D)** 9 **(E)** 12

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17 A square with integer side length is cut into 10 squares, all of which have integer side length and at least 8 of which have area 1. What is the smallest possible value of the length of the side of the original square?

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

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18 What is the smallest positive integer that is neither prime nor square and that has no prime factor less than 50?

(A) 3127 **(B)** 3133 **(C)** 3137 **(D)** 3139 **(E)** 3149

2013

8 A fair coin is tossed 3 times. What is the probability of at least two consecutive heads?

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

13 When Clara totaled her scores, she inadvertently reversed the units digit and the tens digit of one score. By which of the following might her incorrect sum have differed from the correct one?

(A) 45 **(B)** 46 **(C)** 47 **(D)** 48 **(E)** 49

15 If $3^p + 3^4 = 90$, $2^r + 44 = 76$, and $5^3 + 6^s = 1421$, what is the product of p, r, and s?

(A) 27 **(B)** 40 **(C)** 50 **(D)** 70 **(E)** 90

---

19 Bridget, Cassie, and Hannah are discussing the results of their last math test. Hannah shows Bridget and Cassie her test, but Bridget and Cassie don't show theirs to anyone. Cassie says, "I didn't get the lowest score in our class," and Bridget adds, "I didn't get the highest score." What is the ranking of the three girls from highest to lowest?

(A) Hannah, Cassie, Bridget **(B)** Hannah, Bridget, Cassie
(C) Cassie, Bridget, Hannah **(D)** Cassie, Hannah, Bridget
(E) Bridget, Cassie, Hannah

2014

10 The first AMC 8 was given in 1985 and it has been given annually since that time. Samantha turned 12 years old the year that she took the seventh AMC 8. In what year was Samantha born?

(A) 1979 **(B)** 1980 **(C)** 1981 **(D)** 1982 **(E)** 1983

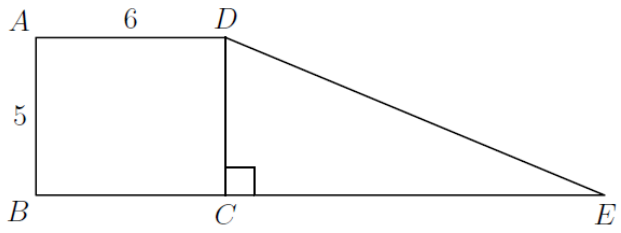
11 Jack wants to bike from his house to Jill's house, which is located three blocks east and two blocks north of Jack's house. After biking each block, Jack can continue either east or north, but he needs to avoid a dangerous intersection one block east and one block north of his house. In how many ways can he reach Jill's house by biking a total of five blocks?

(A) 4 **(B)** 5 **(C)** 6 **(D)** 8 **(E)** 10

12 A magazine printed photos of three celebrities along with three photos of the celebrities as babies. The baby pictures did not identify the celebrities. Readers were asked to match each celebrity with the correct baby pictures. What is the probability that a reader guessing at random will match all three correctly?

(A) $\frac{1}{9}$ **(B)** $\frac{1}{6}$ **(C)** $\frac{1}{4}$ **(D)** $\frac{1}{3}$ **(E)** $\frac{1}{2}$

14 Rectangle $ABCD$ and right triangle DCE have the same area. They are joined to form a trapezoid, as shown. What is DE?



(A) 12 **(B)** 13 **(C)** 14 **(D)** 15 **(E)** 16

16 The "Middle School Eight" basketball conference has 8 teams. Every season, each team plays every other conference team twice (home and away), and each team also plays 4 games against non-conference opponents. What is the total number of games in a season involving the "Middle School Eight" teams?

(A) 60 **(B)** 88 **(C)** 96 **(D)** 144 **(E)** 160

2015

1 How many square yards of carpet are required to cover a rectangular floor that is 12 feet long and 9 feet wide? (There are 3 feet in a yard.)

(A) 12 **(B)** 36 **(C)** 108 **(D)** 324 **(E)** 972

5 Billy's basketball team scored the following points over the course of the first 11 games of the season:

$$42, 47, 53, 53, 58, 58, 58, 61, 64, 65, 73$$

If his team scores 40 in the 12th game, which of the following statistics will show an increase?

(A) range **(B)** median **(C)** mean **(D)** mode **(E)** mid-range

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6 In $\triangle ABC$, $AB = BC = 29$, and $AC = 42$. What is the area of $\triangle ABC$?

(A) 100 **(B)** 420 **(C)** 500 **(D)** 609 **(E)** 701

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7 Each of two boxes contains three chips numbered 1, 2, 3. A chip is drawn randomly from each box and the numbers on the two chips are multiplied. What is the probability that their product is even?

(A) $\frac{1}{9}$ **(B)** $\frac{2}{9}$ **(C)** $\frac{4}{9}$ **(D)** $\frac{1}{2}$ **(E)** $\frac{5}{9}$

10 How many integers between 1000 and 9999 have four distinct digits?

(A) 3024 **(B)** 4536 **(C)** 5040 **(D)** 6480 **(E)** 6561

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11 In the small country of Mathland, all automobile license plates have four symbols. The first must be a vowel (A, E, I, O, or U), the second and third must be two different letters among the 21 non-vowels, and the fourth must be a digit (0 through 9). If the symbols are chosen at random subject to these conditions, what is the probability that the plate will read "AMC8"?

(A) $\frac{1}{22,050}$ **(B)** $\frac{1}{21,000}$ **(C)** $\frac{1}{10,500}$ **(D)** $\frac{1}{2,100}$ **(E)** $\frac{1}{1,050}$

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13 How many subsets of two elements can be removed from the set $\{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11\}$ so that the mean (average) of the remaining numbers is 6?

(A) 1 **(B)** 2 **(C)** 3 **(D)** 5 **(E)** 6

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14 Which of the following integers cannot be written as the sum of four consecutive odd integers?

(A) 16 **(B)** 40 **(C)** 72 **(D)** 100 **(E)** 200

17 Jeremy's father drives him to school in rush hour traffic in 20 minutes. One day there is no traffic, so his father can drive him 18 miles per hour faster and gets him to school in 12 minutes. How far in miles is it to school?

(A) 4 **(B)** 6 **(C)** 8 **(D)** 9 **(E)** 12

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18 An arithmetic sequence is a sequence in which each term after the first is obtained by adding a constant to the previous term. For example, $2, 5, 8, 11, 14$ is an arithmetic sequence with five terms, in which the first term is 2 and the constant added is 3. Each row and each column in this 5×5 array is an arithmetic sequence with five terms. What is the value of X?

(A) 21 **(B)** 31 **(C)** 36 **(D)** 40 **(E)** 42

1				25
		X		
17				81

---

19 A triangle with vertices as $A = (1, 3)$, $B = (5, 1)$, and $C = (4, 4)$ is plotted on a 6×5 grid. What fraction of the grid is covered by the triangle?

(A) $\frac{1}{6}$ **(B)** $\frac{1}{5}$ **(C)** $\frac{1}{4}$ **(D)** $\frac{1}{3}$ **(E)** $\frac{1}{2}$