1986 AJHSME Problems

Problem 1

In July 1861, 366 inches of rain fell in Cherrapunji, India. What was the average rainfall in inches per hour during that month?

(A) $\dfrac{366}{31 \times 24}$
(B) $\dfrac{366 \times 31}{24}$
(C) $\dfrac{366 \times 24}{31}$
(D) $\dfrac{31 \times 24}{366}$
(E) $366 \times 31 \times 24$

Problem 2

Which of the following numbers has the largest reciprocal?

(A) $\dfrac{1}{3}$
(B) $\dfrac{2}{5}$
(C) 1
(D) 5
(E) 1986

Problem 3

The smallest sum one could get by adding three different numbers from the set $\{7, 25, -1, 12, -3\}$ is

(A) -3
(B) -1
(C) 3
(D) 5
(E) 21

Problem 4

The product $(1.8)(40.3 + .07)$ is closest to

(A) 7
(B) 42
(C) 74
(D) 84
(E) 737

Problem 5

A contest began at noon one day and ended 1000 minutes later. At what time did the contest end?

(A) 10:00 p.m.
(B) midnight
(C) 2:30 a.m.
(D) 4:40 a.m.
(E) 6:40 a.m.

Problem 6

$$\frac{2}{1 - \frac{2}{3}} =$$

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

Problem 7

How many whole numbers are between $\sqrt{8}$ and $\sqrt{80}$?

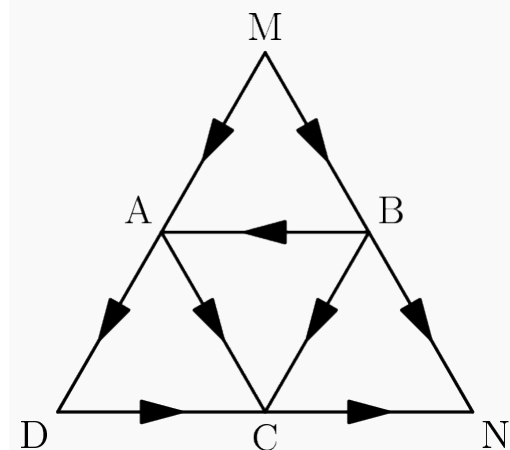(A) 5 (B) 6 (C) 7 (D) 8 (E) 9

Problem 8

In the product shown, B is a digit. The value of B is

$$
\begin{array}{r}
B2 \\
\times \quad 7B \\
\hline
6396
\end{array}
$$

(A) 3 (B) 5 (C) 6 (D) 7 (E) 8

Problem 9

Using only the paths and the directions shown, how many different routes are there from M to N?

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

Problem 10

A picture 3 feet across is hung in the center of a wall that is 19 feet wide. How many feet from the end of the wall is the nearest edge of the picture?

(A) $1\frac{1}{2}$ (B) 8 (C) $9\frac{1}{2}$ (D) 16 (E) 22

Problem 11

If $A * B$ means $\dfrac{A+B}{2}$, then $(3 * 5) * 8$ is

(A) 6 (B) 8 (C) 12 (D) 16 (E) 30

Problem 12

The table below displays the grade distribution of the 30 students in a mathematics class on the last two tests. For example, exactly one student received a 'D' on Test 1 and a 'C' on Test 2 (see circled entry). What percent of the students received the same grade on both tests?

Test 1 \ Test 2	A	B	C	D	F
A	2	2	1	0	0
B	1	4	3	0	0
C	1	3	5	2	0
D	0	0	①1	1	1
F	0	0	2	1	0

(A) 12% (B) 25% (C) $33\frac{1}{3}\%$ (D) 40% (E) 50%

Problem 13

The perimeter of the polygon shown is

$$8$$

$$6$$
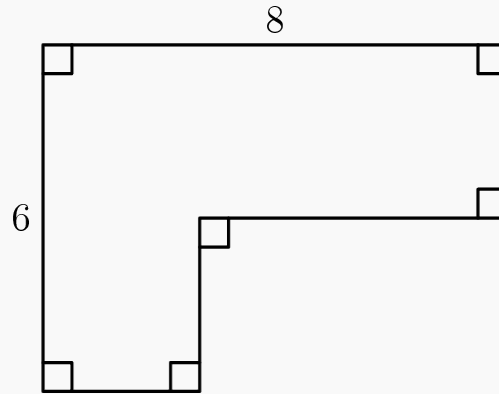
(A) 14   (B) 20   (C) 28   (D) 48

(E) cannot be determined from the information given

Problem 14

If $200 \leq a \leq 400$ and $600 \leq b \leq 1200$, then the largest value of the quotient $\dfrac{b}{a}$ is

(A) $\dfrac{3}{2}$ (B) 3 (C) 6 (D) 300 (E) 600
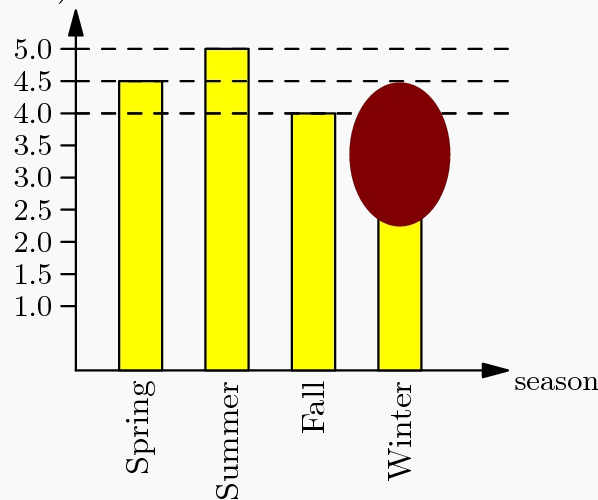
Problem 15

Sale prices at the Ajax Outlet Store are 50% below original prices. On Saturdays an additional discount of 20% off the sale price is given. What is the Saturday price of a coat whose original price is $\$180$?

(A) $\$54$

(B) $\$72$

(C) $\$90$

(D) $\$108$

(D) $\$110$

Problem 16

A bar graph shows the number of hamburgers sold by a fast food chain each season. However, the bar indicating the number sold during the winter is covered by a smudge. If exactly 25% of the chain's hamburgers are sold in the fall, how many million hamburgers are sold in the winter?

(A) 2.5 (B) 3 (C) 3.5 (D) 4 (E) 4.5

Problem 17

Let o be an odd whole number and let n be any whole number. Which of the following statements about the whole number $\left(o^2 + no\right)$ is always true?

(A) it is always odd   (B) it is always even

(C) it is even only if n is even   (D) it is odd only if n is odd

(E) it is odd only if n is even

Problem 18

A rectangular grazing area is to be fenced off on three sides using part of a 100 meter rock wall as the fourth side. Fence posts are to be placed every 12 meters along the fence including the two posts where the fence meets the rock wall. What is the fewest number of posts required to fence an area 36 m by 60 m?

WALL
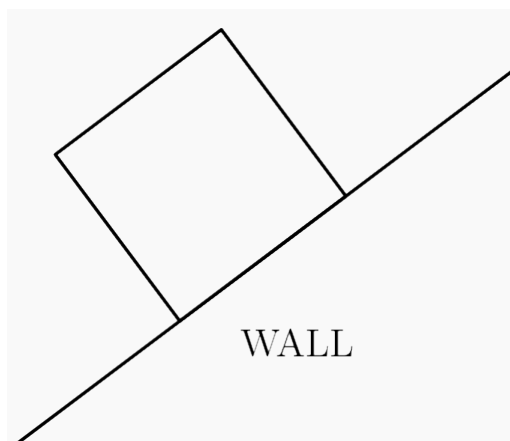
(A) 11　　(B) 12　　(C) 13　　(D) 14　　(E) 16

Problem 19

At the beginning of a trip, the mileage odometer read $56,200$ miles. The driver filled the gas tank with 6 gallons of gasoline. During the trip, the driver filled his tank again with 12 gallons of gasoline when the odometer read $56,560$. At the end of the trip, the driver filled his tank again with 20 gallons of gasoline. The odometer read $57,060$. To the nearest tenth, what was the car's average miles-per-gallon for the entire trip?
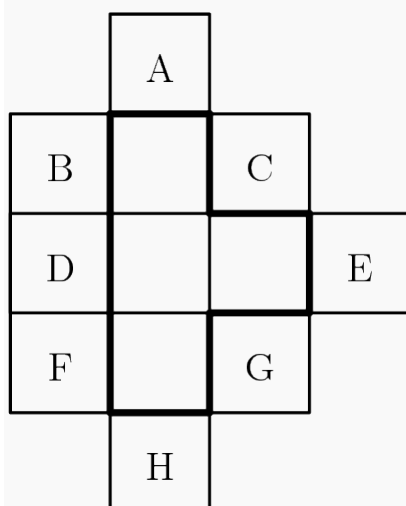
(A) 22.5　　(B) 22.6　　(C) 24.0　　(D) 26.9　　(E) 27.5

Problem 20

The value of the expression $\dfrac{(304)^5}{(29.7)(399)^4}$ is closest to

(A) $.003$　　(B) $.03$　　(C) $.3$　　(D) 3　　(E) 30

Problem 21

Suppose one of the eight lettered identical squares is included with the four squares in the T-shaped figure outlined. How many of the resulting figures can be folded into a topless cubical box?

	A		
B		C	
D			E
F		G	
	H		

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

Problem 22

Alan, Beth, Carlos, and Diana were discussing their possible grades in mathematics class this grading period. Alan said, "If I get an A, then Beth will get an A." Beth said, "If I get an A, then Carlos will get an A." Carlos said, "If I get an A, then Diana will get an A." All of these statements were true, but only two of the students received an A. Which two received A's?

(A) Alan, Beth   (B) Beth, Carlos   (C) Carlos, Diana

(D) Alan, Diana   (E) Beth, Diana

Problem 23

The large circle has diameter AC. The two small circles have their centers on AC and just touch at O, the center of the large circle. If each small circle has radius 1, what is the value of the ratio of the area of the shaded region to the area of one of the small circles?
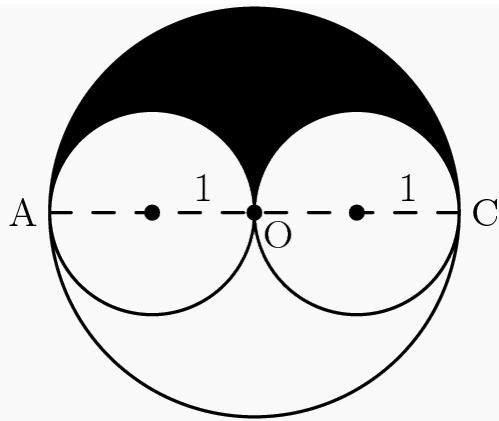
(A) between $\dfrac{1}{2}$ and 1   (B) 1   (C) between 1 and $\dfrac{3}{2}$

(D) between $\dfrac{3}{2}$ and 2   (E) cannot be determined from the information given

Problem 24

The 600 students at King Middle School are divided into three groups of equal size for lunch. Each group has lunch at a different time. A computer randomly assigns each student to one of three lunch groups. The probability that three friends, Al, Bob, and Carol, will be assigned to the same lunch group is approximately

(A) $\dfrac{1}{27}$ (B) $\dfrac{1}{9}$ (C) $\dfrac{1}{8}$ (D) $\dfrac{1}{6}$ (E) $\dfrac{1}{3}$

Problem 25

Which of the following sets of whole numbers has the largest average?

(A) multiples of 2 between 1 and 101   (B) multiples of 3 between 1 and 101

(C) multiples of 4 between 1 and 101   (D) multiples of 5 between 1 and 101

(E) multiples of 6 between 1 and 101