

1998 AJHSME Problems

Problem 1

For $x = 7$, which of the following is the smallest?

- (A) $\frac{6}{x}$ (B) $\frac{6}{x+1}$ (C) $\frac{6}{x-1}$ (D) $\frac{x}{6}$ (E) $\frac{x+1}{6}$

Problem 2

If $\frac{a}{c} \mid \frac{b}{d} = a \cdot d - b \cdot c$, what is the value of $\frac{3}{1} \mid \frac{4}{2}$?

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

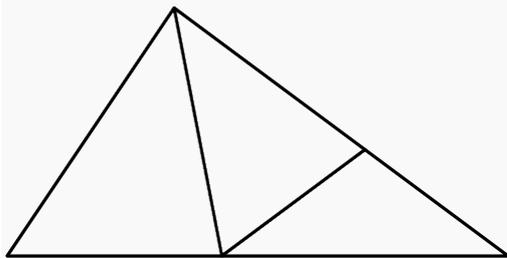
Problem 3

$$\frac{\frac{3}{8} + \frac{7}{8}}{\frac{4}{5}} =$$

- (A) 1 (B) $\frac{25}{16}$ (C) 2 (D) $\frac{43}{20}$ (E) $\frac{47}{16}$

Problem 4

How many triangles are in this figure? (Some triangles may overlap other triangles.)



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

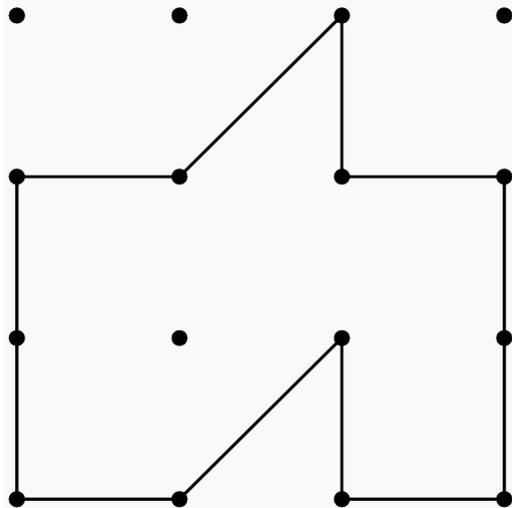
Problem 5

Which of the following numbers is largest?

- (A) 9.12344 (B) $9.12\overline{34}$ (C) $9.1\overline{234}$ (D) $9.\overline{1234}$ (E) $9.\overline{1234}$

Problem 6

Dots are spaced one unit apart, horizontally and vertically. The number of square units enclosed by the polygon is



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

Problem 7

$$100 \times 19.98 \times 1.998 \times 1000 =$$

- (A) $(1.998)^2$ (B) $(19.98)^2$ (C) $(199.8)^2$ (D) $(1998)^2$ (E) $(19980)^2$

Problem 8

A child's wading pool contains 200 gallons of water. If water evaporates at the rate of 0.5 gallons per day and no other water is added or removed, how many gallons of water will be in the pool after 30 days?

- (A) 140 (B) 170 (C) 185 (D) 198.5 (E) 199.85

Problem 9

For a sale, a store owner reduces the price of a \$10 scarf by 20%. Later the price is lowered again, this time by one-half the reduced price. The price is now

- (A) 2.00 dollars (B) 3.75 dollars (C) 4.00 dollars (D) 4.90 dollars (E) 6.40 dollars

Problem 10

Each of the letters W , X , Y , and Z represents a different integer in the set

$\{1, 2, 3, 4\}$, but not necessarily in that order. If $\frac{W}{X} - \frac{Y}{Z} = 1$, then the sum of W and Y is

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

Problem 11

Harry has 3 sisters and 5 brothers. His sister Harriet has S sisters and B brothers. What is the product of S and B ?

- (A) 8 (B) 10 (C) 12 (D) 15 (E) 18

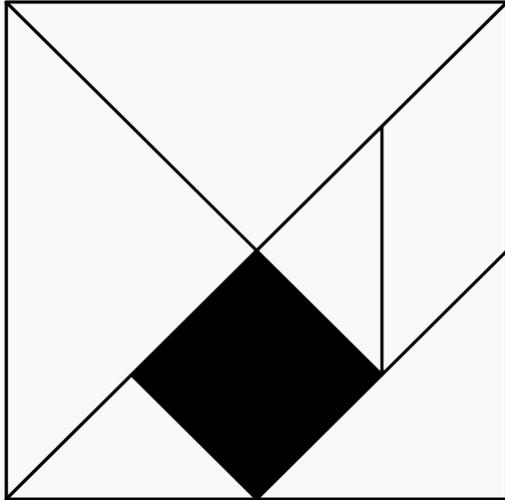
Problem 12

$$2 \left(1 - \frac{1}{2}\right) + 3 \left(1 - \frac{1}{3}\right) + 4 \left(1 - \frac{1}{4}\right) + \cdots + 10 \left(1 - \frac{1}{10}\right) =$$

- (A) 45 (B) 49 (C) 50 (D) 54 (E) 55

Problem 13

What is the ratio of the area of the shaded square to the area of the large square? (The figure is drawn to scale)



- (A) $\frac{1}{6}$ (B) $\frac{1}{7}$ (C) $\frac{1}{8}$ (D) $\frac{1}{12}$ (E) $\frac{1}{16}$

Problem 14

At Annville Junior High School, 30% of the students in the Math Club are in the Science Club, and 80% of the students in the Science Club are in the Math Club. There are 15 students in the Science Club. How many students are in the Math Club?

- (A) 12 (B) 15 (C) 30 (D) 36 (E) 40

Don't Crowd the Isles

Problems 15, 16, and 17 all refer to the following:

In the very center of the Irenic Sea lie the beautiful Nisos Isles. In 1998 the number of people on these islands is only 200, but the population triples every 25 years. Queen Irene has decreed that there must be at least 1.5 square miles for every person living in the Isles. The total area of the Nisos Isles is 24,900 square miles.

Problem 15

Estimate the population of Nisos in the year 2050.

- (A) 600 (B) 800 (C) 1000 (D) 2000 (E) 3000

Problem 16

Estimate the year in which the population of Nisos will be approximately 6,000.

- (A) 2050 (B) 2075 (C) 2100 (D) 2125 (E) 2150

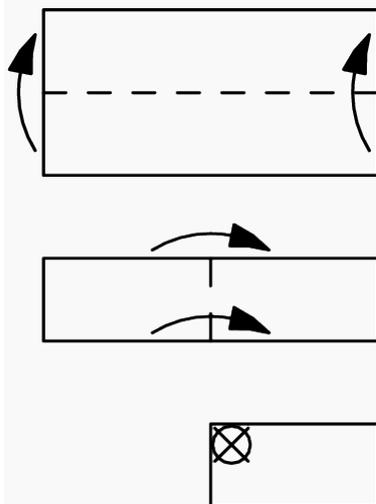
Problem 17

In how many years, approximately, from 1998 will the population of Nisos be as much as Queen Irene has proclaimed that the islands can support?

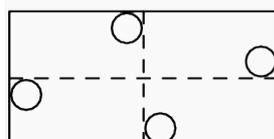
- (A) 50 yrs. (B) 75 yrs. (C) 100 yrs. (D) 125 yrs. (E) 150 yrs.

Problem 18

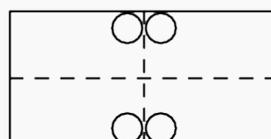
As indicated by the diagram below, a rectangular piece of paper is folded bottom to top, then left to right, and finally, a hole is punched at X. What does the paper look like when unfolded?



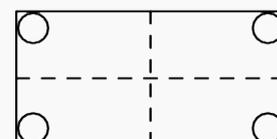
(A)



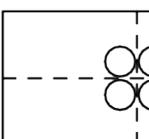
(B)



(C)



(D)



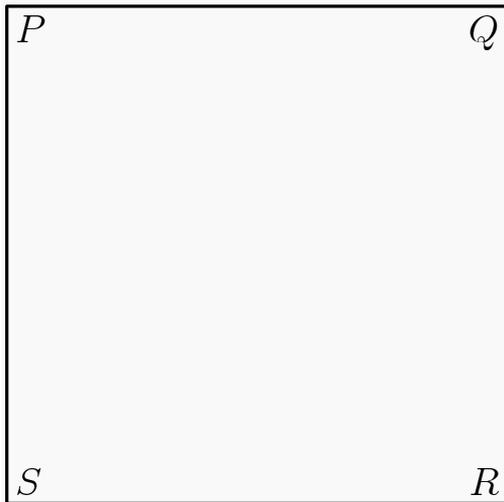
Problem 19

Tamika selects two different numbers at random from the set $\{8, 9, 10\}$ and adds them. Carlos takes two different numbers at random from the set $\{3, 5, 6\}$ and multiplies them. What is the probability that Tamika's result is greater than Carlos' result?

- (A) $\frac{4}{9}$ (B) $\frac{5}{9}$ (C) $\frac{1}{2}$ (D) $\frac{1}{3}$ (E) $\frac{2}{3}$

Problem 20

Let $PQRS$ be a square piece of paper. P is folded onto R and then Q is folded onto S . The area of the resulting figure is 9 square inches. Find the perimeter of square $PQRS$.



- (A) 9 (B) 16 (C) 18 (D) 24 (E) 36

Problem 21

A $4 \times 4 \times 4$ cubical box contains 64 identical small cubes that exactly fill the box. How many of these small cubes touch a side or the bottom of the box?

- (A) 48 (B) 52 (C) 60 (D) 64 (E) 80

Problem 22

Terri produces a sequence of positive integers by following three rules. She starts with a positive integer, then applies the appropriate rule to the result, and continues in this fashion.

Rule 1: If the integer is less than 10, multiply it by 9.

Rule 2: If the integer is even and greater than 9, divide it by 2.

Rule 3: If the integer is odd and greater than 9, subtract 5 from it.

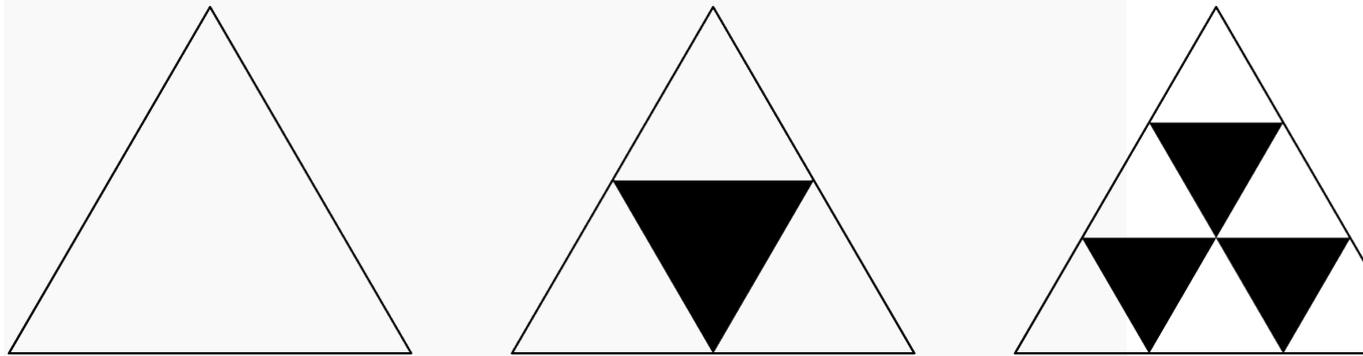
A sample sequence: 23, 18, 9, 81, 76,

Find the 98th term of the sequence that begins 98, 49,

- (A) 6 (B) 11 (C) 22 (D) 27 (E) 54

Problem 23

If the pattern in the diagram continues, what fraction of the interior would be shaded in the eighth triangle?



- (A) $\frac{3}{8}$ (B) $\frac{5}{27}$ (C) $\frac{7}{16}$ (D) $\frac{9}{16}$ (E) $\frac{11}{45}$

Problem 24

A rectangular board of 8 columns has squared numbered beginning in the upper left corner and moving left to right so row one is numbered 1 through 8, row two is 9 through 16, and so on. A student shades square 1, then skips one square and shades square 3, skips two squares and shades square 6, skips 3 squares and shades square 10, and continues in this way until there is at least one shaded square in each column. What is the number of the shaded square that first achieves this result?

