1993 AJHSME Problems

Problem 1

Which pair of numbers does NOT have a product equal to 36?

$(\mathrm{A})\ \{-4,-9\} \qquad (\mathrm{B})\ \{-3,-12\} \qquad (\mathrm{C})\ \left\{\frac{1}{2},-72\right\} \qquad (\mathrm{D})\ \{1,36\} \qquad (\mathrm{E})\ \left\{\frac{3}{2},24\right\}$

Solution

Problem 2

When the fraction $\frac{49}{84}$ is expressed in simplest form, then the sum of the numerator and the denominator will be

$(\mathrm{A})\ 11 \qquad (\mathrm{B})\ 17 \qquad (\mathrm{C})\ 19 \qquad (\mathrm{D})\ 33 \qquad (\mathrm{E})\ 133$

Solution

Problem 3

Which of the following numbers has the largest prime factor?

$(\mathrm{A})\ 39 \qquad (\mathrm{B})\ 51 \qquad (\mathrm{C})\ 77 \qquad (\mathrm{D})\ 91 \qquad (\mathrm{E})\ 121$

Solution

Problem 4

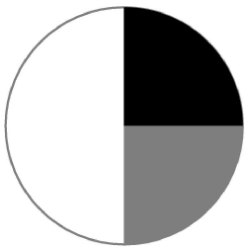
$1000 \times 1993 \times 0.1993 \times 10 =$

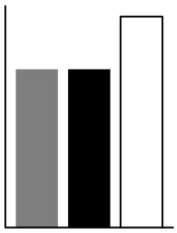
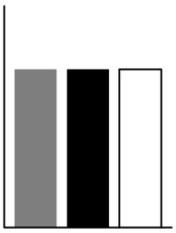
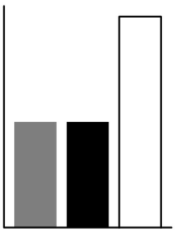
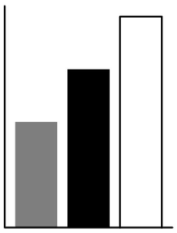
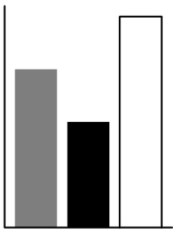
$(\mathrm{A})\ 1.993 \times 10^3 \qquad (\mathrm{B})\ 1993.1993 \qquad (\mathrm{C})\ (199.3)^2 \qquad (\mathrm{D})\ 1,993,001.993 \qquad (\mathrm{E})\ (1993)^2$

Solution

Problem 5

Which one of the following bar graphs could represent the data from the circle graph?



(A) 
(B) 
(C) 
(D) 
(E) 

Solution

Problem 6

A can of soup can feed 3 adults or 5 children. If there are 5 cans of soup and 15 children are fed, then how many adults would the remaining soup feed?

(A) 5 (B) 6 (C) 7 (D) 8 (E) 25

Solution

Problem 7

$3^3 + 3^3 + 3^3 =$

(A) 3^4 (B) 9^3 (C) 3^9 (D) 27^3 (E) 3^{27}

Solution

Problem 8

To control her blood pressure, Jill's grandmother takes one half of a pill every other day. If one supply of medicine contains 60 pills, then the supply of medicine would last approximately

(A) 1 month (B) 4 months (C) 6 months (D) 8 months (E) 1 year

Solution

Problem 9

Consider the operation $*$ defined by the following table:

$*$	1	2	3	4
1	1	2	3	4
2	2	4	1	3
3	3	1	4	2
4	4	3	2	1

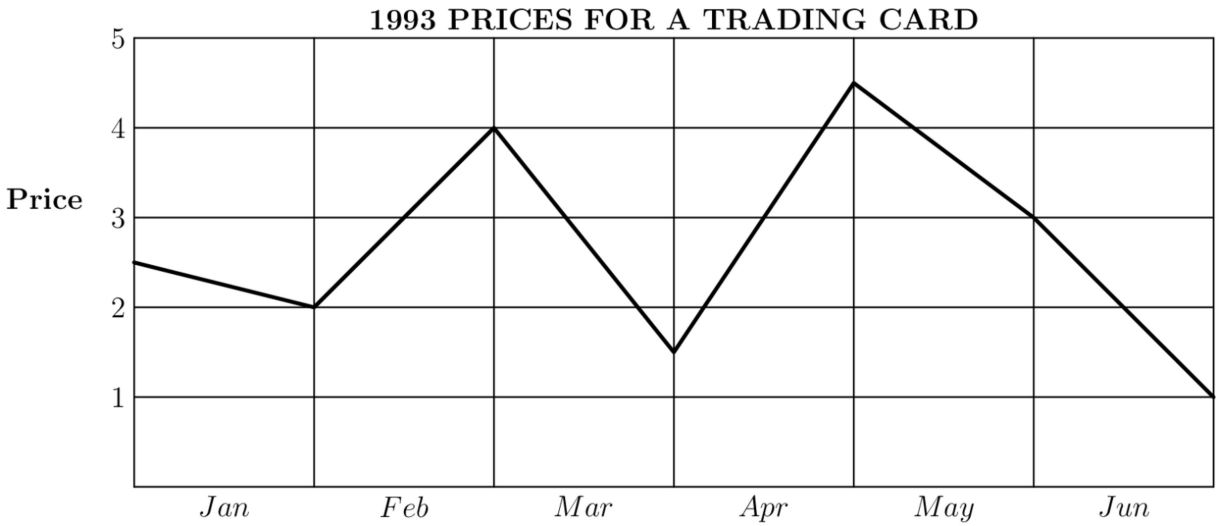
For example, $3 * 2 = 1$. Then $(2 * 4) * (1 * 3) =$

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

Solution

Problem 10

This line graph represents the price of a trading card during the first 6 months of 1993.



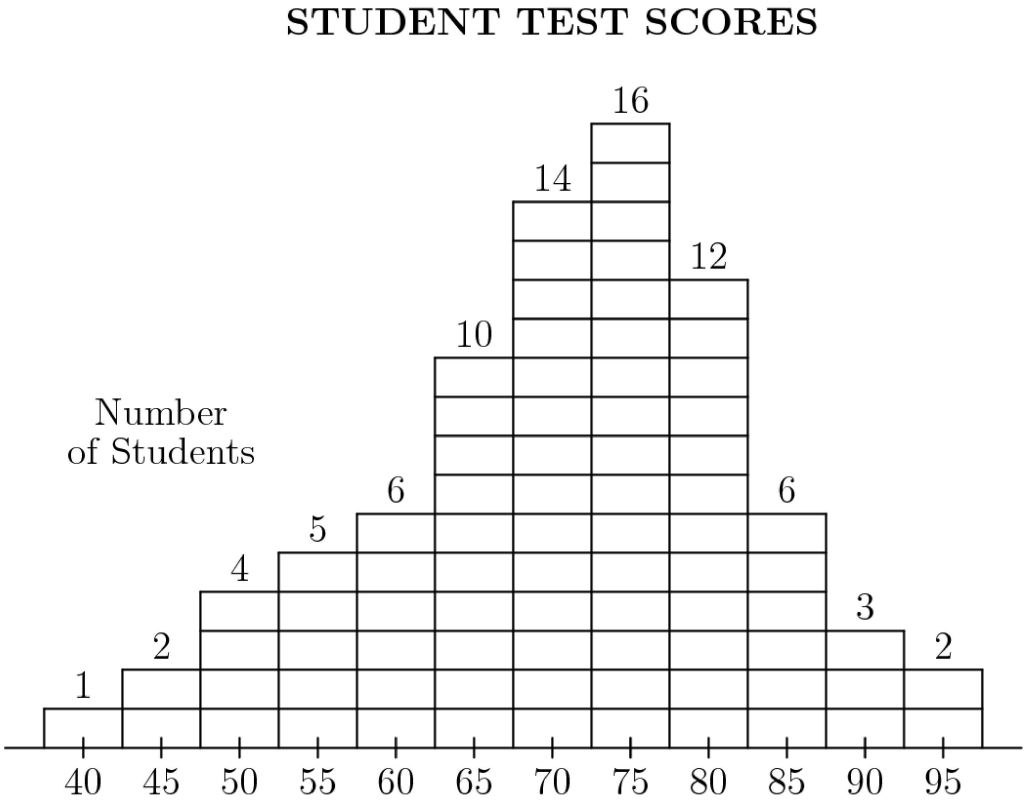
The greatest monthly drop in price occurred during

(A) January (B) March (C) April (D) May (E) June

Solution

Problem 11

Consider this histogram of the scores for 81 students taking a test:



The median is in the interval labeled

(A) 60 (B) 65 (C) 70 (D) 75 (E) 80

Solution

Problem 12

If each of the three operation signs, $+$, $-$, $\times$, is used exactly ONCE in one of the blanks in the expression

$5 \_\_ 4 \_\_ 6 \_\_ 3$

then the value of the result could equal

(A) 9 (B) 10 (C) 15 (D) 16 (E) 19

Solution

Problem 13

The word "**HELP**" in block letters is painted in black with strokes 1 unit wide on a 5 by 15 rectangular white sign with dimensions as shown. The area of the white portion of the sign, in square units, is

(A) 30 (B) 32 (C) 34 (D) 36 (E) 38

Solution

Problem 14

The nine squares in the table shown are to be filled so that every row and every column contains each of the numbers $1, 2, 3$. Then $A + B =$

1		
	2	A
		B

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

Solution

Problem 15

The arithmetic mean (average) of four numbers is 85. If the largest of these numbers is 97, then the mean of the remaining three numbers is

(A) 81.0 (B) 82.7 (C) 83.0 (D) 84.0 (E) 84.3

Solution

Problem 16

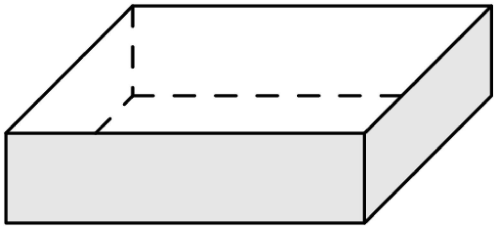
$$\frac{1}{1+\frac{1}{2+\frac{1}{3}}} =$$

(A) $\frac{1}{6}$ (B) $\frac{3}{10}$ (C) $\frac{7}{10}$ (D) $\frac{5}{6}$ (E) $\frac{10}{3}$

Solution

Problem 17

Square corners, 5 units on a side, are removed from a 20 unit by 30 unit rectangular sheet of cardboard. The sides are then folded to form an open box. The surface area, in square units, of the interior of the box is

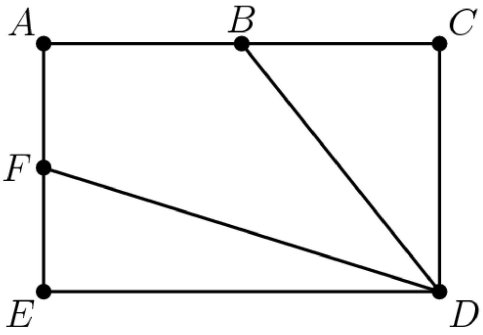


$\text{(A) } 300 \quad \text{(B) } 500 \quad \text{(C) } 550 \quad \text{(D) } 600 \quad \text{(E) } 1000$

Solution

Problem 18

The rectangle shown has length $AC = 32$, width $AE = 20$, and B and F are midpoints of $\overline{AC}$ and $\overline{AE}$, respectively. The area of quadrilateral $ABDF$ is



$\text{(A) } 320 \quad \text{(B) } 325 \quad \text{(C) } 330 \quad \text{(D) } 335 \quad \text{(E) } 340$

Solution

Problem 19

$$(1901 + 1902 + 1903 + \cdots + 1993) - (101 + 102 + 103 + \cdots + 193) =$$

$\text{(A) } 167,400 \quad \text{(B) } 172,050 \quad \text{(C) } 181,071 \quad \text{(D) } 199,300 \quad \text{(E) } 362,142$

Solution

Problem 20

When $10^{93} - 93$ is expressed as a single whole number, the sum of the digits is

$(\mathrm{A})\ 10 \qquad (\mathrm{B})\ 93 \qquad (\mathrm{C})\ 819 \qquad (\mathrm{D})\ 826 \qquad (\mathrm{E})\ 833$

Solution

Problem 21

If the length of a rectangle is increased by 20% and its width is increased by 50%, then the area is increased by

$(\mathrm{A})\ 10\% \qquad (\mathrm{B})\ 30\% \qquad (\mathrm{C})\ 70\% \qquad (\mathrm{D})\ 80\% \qquad (\mathrm{E})\ 100\%$

Solution

Problem 22

Pat Peano has plenty of 0's, 1's, 3's, 4's, 5's, 6's, 7's, 8's and 9's, but he has only twenty-two 2's. How far can he number the pages of his scrapbook with these digits?

$(\mathrm{A})\ 22 \qquad (\mathrm{B})\ 99 \qquad (\mathrm{C})\ 112 \qquad (\mathrm{D})\ 119 \qquad (\mathrm{E})\ 199$

Solution

Problem 23

Five runners, P, Q, R, S, T, have a race, and P beats Q, P beats R, Q beats S, and T finishes after P and before Q. Who could NOT have finished third in the race?

$(\mathrm{A})\ P \text{ and } Q \qquad (\mathrm{B})\ P \text{ and } R \qquad (\mathrm{C})\ P \text{ and } S \qquad (\mathrm{D})\ P \text{ and } T \qquad (\mathrm{E})\ P, S \text{ and } T$

Solution

Problem 24

What number is directly above 142 in this array of numbers?

$$\begin{array}{ccccc} & & 1 & & \\ & 2 & 3 & 4 & \\ 5 & 6 & 7 & 8 & 9 \\ 10 & 11 & 12 & \cdots & \end{array}$$

$(\mathrm{A})\ 99 \qquad (\mathrm{B})\ 119 \qquad (\mathrm{C})\ 120 \qquad (\mathrm{D})\ 121 \qquad (\mathrm{E})\ 122$

Solution

Problem 25

A checkerboard consists of one-inch squares. A square card, 1.5 inches on a side, is placed on the board so that it covers part or all of the area of each of n squares. The maximum possible value of n is

$\text{(A) } 4 \text{ or } 5 \qquad \text{(B) } 6 \text{ or } 7 \qquad \text{(C) } 8 \text{ or } 9 \qquad \text{(D) } 10 \text{ or } 11 \qquad \text{(E) } 12 \text{ or more}$

Solution

1993 AJHSME Answer Key

1. C
2. C
3. B
4. E
5. C
6. B
7. A
8. D
9. D
10. B
11. C
12. E
13. D
14. C
15. A
16. C
17. B
18. A
19. A
20. D
21. D
22. D
23. C
24. C
25. E