1985 AJHSME Problems

Problem 1

$$\frac{3 \times 5}{9 \times 11} \times \frac{7 \times 9 \times 11}{3 \times 5 \times 7} =$$

(A) 1   (B) 0   (C) 49   (D) $\frac{1}{49}$ (E) 50

Solution

Problem 2

$$90 + 91 + 92 + 93 + 94 + 95 + 96 + 97 + 98 + 99 =$$

(A) 845   (B) 945   (C) 1005   (D) 1025   (E) 1045
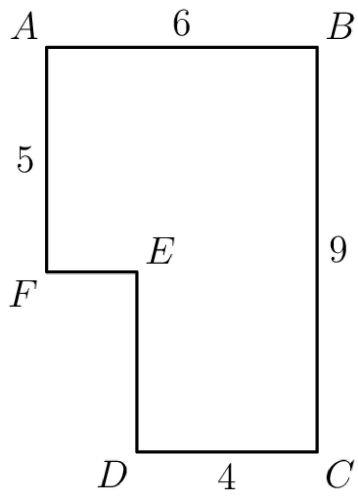
Solution

Problem 3

$$\frac{10^7}{5 \times 10^4} =$$

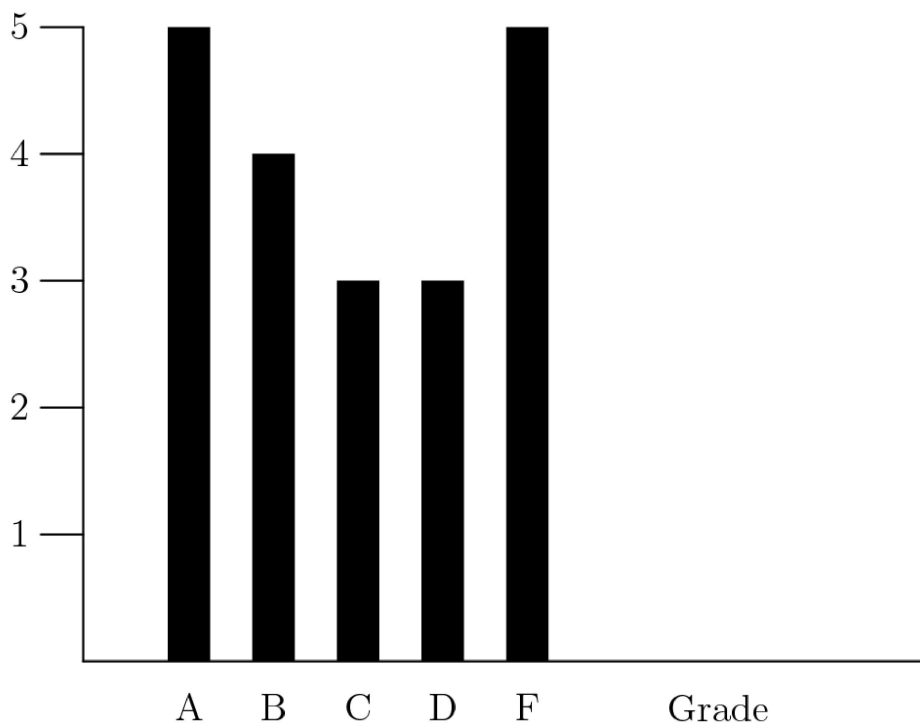(A) .002   (B) .2   (C) 20   (D) 200   (E) 2000

Solution

Problem 4

The area of polygon $ABCDEF$, in square units, is

(A) 24   (B) 30   (C) 46   (D) 66   (E) 74

Problem 5

The bar graph shows the grades in a mathematics class for the last grading period. If A, B, C, and D are satisfactory grades, what fraction of the grades shown in the graph are satisfactory?

(A) $\dfrac{1}{2}$ (B) $\dfrac{2}{3}$ (C) $\dfrac{3}{4}$ (D) $\dfrac{4}{5}$ (E) $\dfrac{9}{10}$
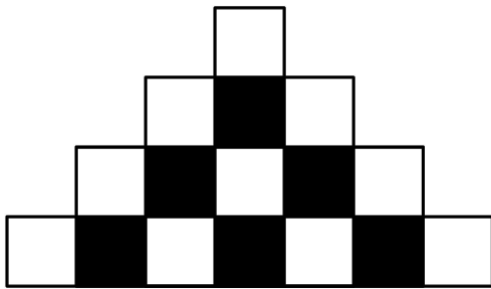
Problem 6

A stack of paper containing 500 sheets is 5 cm thick. Approximately how many sheets of this type of paper would there be in a stack 7.5 cm high?

(A) 250 (B) 550 (C) 667 (D) 750 (E) 1250

Problem 7

A "stair-step" figure is made of alternating black and white squares in each row. Rows 1 through 4 are shown. All rows begin and end with a white square. The number of black squares in the 37th row is

(A) 34 (B) 35 (C) 36 (D) 37 (E) 38

Problem 8

If $a = -2$, the largest number in the set $-3a, 4a, \dfrac{24}{a}, a^2, 1$ is

(A) $-3a$ (B) $4a$ (C) $\dfrac{24}{a}$ (D) a^2 (E) 1
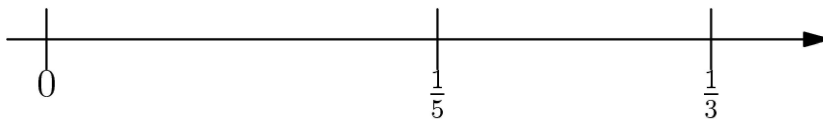
Problem 9

The product of the 9 factors $\left(1 - \dfrac{1}{2}\right)\left(1 - \dfrac{1}{3}\right)\left(1 - \dfrac{1}{4}\right) \cdots \left(1 - \dfrac{1}{10}\right) =$

(A) $\dfrac{1}{10}$ (B) $\dfrac{1}{9}$ (C) $\dfrac{1}{2}$ (D) $\dfrac{10}{11}$ (E) $\dfrac{11}{2}$

Problem 10

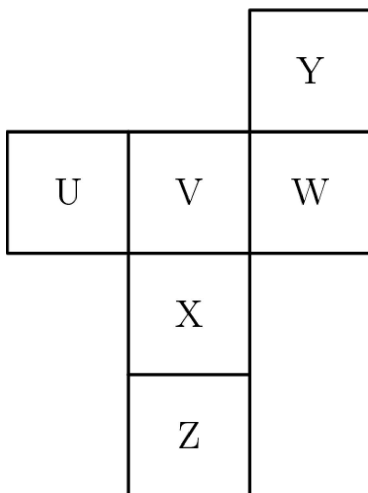The fraction halfway between $\dfrac{1}{5}$ and $\dfrac{1}{3}$ (on the number line) is

(A) $\dfrac{1}{4}$ **(B)** $\dfrac{2}{15}$ **(C)** $\dfrac{4}{15}$ **(D)** $\dfrac{53}{200}$ **(E)** $\dfrac{8}{15}$

Problem 11

A piece of paper containing six joined squares labeled as shown in the diagram is folded along the edges of the squares to form a cube. The label of the face opposite the face labeled X is

(A) Z **(B)** U **(C)** V **(D)** W **(E)** Y

Problem 12

A square and a triangle have equal perimeters. The lengths of the three sides of the triangle are 6.2 cm, 8.3 cm and 9.5 cm. The area of the square is

(A) 24 cm^2 **(B)** 36 cm^2 **(C)** 48 cm^2 **(D)** 64 cm^2 **(E)** 144 cm^2

Problem 13

If you walk for 45 minutes at a rate of 4 mph and then run for 30 minutes at a rate of 10 mph, how many miles will you have gone at the end of one hour and 15 minutes?

$\textbf{(A)}\ 3.5 \text{ miles}$ $\textbf{(B)}\ 8 \text{ miles}$ $\textbf{(C)}\ 9 \text{ miles}$ $\textbf{(D)}\ 25\dfrac{1}{3} \text{ miles}$ $\textbf{(E)}\ 480 \text{ miles}$

Problem 14

The difference between a 6.5% sales tax and a 6% sales tax on an item priced at $\$20$ before tax is

$\textbf{(A)}\ \$.01$

$\textbf{(B)}\ \$.10$

$\textbf{(C)}\ \$.50$

$\textbf{(D)}\ \$1$

$\textbf{(E)}\ \$10$

Problem 15

How many whole numbers between 100 and 400 contain the digit 2?

$\textbf{(A)}\ 100$ $\textbf{(B)}\ 120$ $\textbf{(C)}\ 138$ $\textbf{(D)}\ 140$ $\textbf{(E)}\ 148$

Problem 16

The ratio of boys to girls in Mr. Brown's math class is $2 : 3$. If there are 30 students in the class, how many more girls than boys are in the class?

$\textbf{(A)}\ 10$ $\textbf{(B)}\ 5$ $\textbf{(C)}\ 3$ $\textbf{(D)}\ 6$ $\textbf{(E)}\ 2$

Problem 17

If your average score on your first six mathematics tests was 84 and your average score on your first seven mathematics tests was $85,$ then your score on the seventh test was

(**A**) 86 (**B**) 88 (**C**) 90 (**D**) 91 (**E**) 92

Solution

Problem 18

Nine copies of a certain pamphlet cost less than $\$10.00$ while ten copies of the same pamphlet (at the same price) cost more than $\$11.00.$ How much does one copy of this pamphlet cost?

(**A**) $\$1.07$

(**B**) $\$1.08$

(**C**) $\$1.09$

(**D**) $\$1.10$

(**E**) $\$1.11$

Solution

Problem 19

If the length and width of a rectangle are each increased by $10\%,$ then the perimeter of the rectangle is increased by

(**A**) 1% (**B**) 10% (**C**) 20% (**D**) 21% (**E**) 40%

Solution

Problem 20

In a certain year, January had exactly four Tuesdays and four Saturdays. On what day did January 1 fall that year?

(**A**) Monday   (**B**) Tuesday   (**C**) Wednesday   (**D**) Friday   (**E**) Saturday

Solution

Problem 21

Mr. Green receives a 10% raise every year. His salary after four such raises has gone up by what percent?

(A) less than 40% **(B)** 40% **(C)** 44% **(D)** 45% **(E)** more than 45%

Problem 22

Assume every 7-digit whole number is a possible telephone number except those that begin with 0 or 1. What fraction of telephone numbers begin with 9 and end with 0?

(A) $\dfrac{1}{63}$ **(B)** $\dfrac{1}{80}$ **(C)** $\dfrac{1}{81}$ **(D)** $\dfrac{1}{90}$ **(E)** $\dfrac{1}{100}$

*Note: All telephone numbers are 7-digit whole numbers.*

Problem 23

King Middle School has 1200 students. Each pupil takes 5 classes a day. Each teacher teaches 4 classes. Each class has 30 students and 1 teacher. How many teachers are there at King Middle School?

(A) 30 **(B)** 32 **(C)** 40 **(D)** 45 **(E)** 50

Problem 24

In a magic triangle, each of the six whole numbers $10\text{--}15$ is placed in one of the circles so that the sum, S, of the three numbers on each side of the triangle is the same. The largest possible value for S is
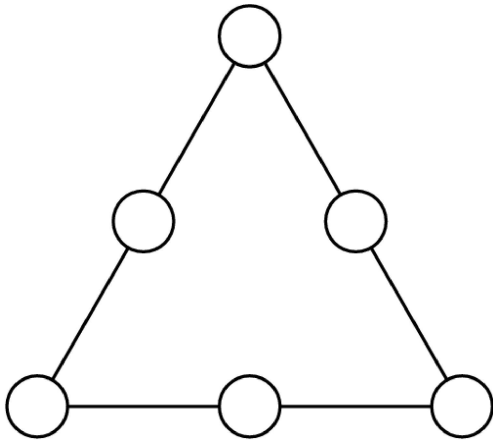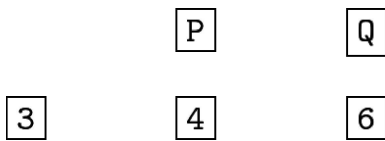
(A) 36   (B) 37   (C) 38   (D) 39   (E) 40

Solution

Problem 25

Five cards are lying on a table as shown.

P	Q

3	4	6

Each card has a letter on one side and a whole number on the other side. Jane said, "If a vowel is on one side of any card, then an even number is on the other side." Mary showed Jane was wrong by turning over one card. Which card did Mary turn over?

(A) 3   (B) 4   (C) 6   (D) P   (E) Q

Solution

1985 AJHSME Answer Key

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