

2022 AMC8 Answers and Solutions

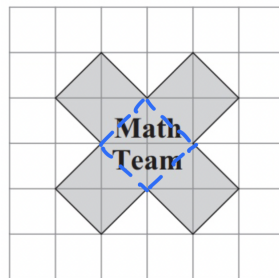
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1.

Answer: A

Solution:

Divide the shaded part into 5 identical squares. The area of each square is $S = 2 \times 2 \div 2 = 2$. The total area of the shaded part is $2 \times 5 = 10$



2.

Answer: D

Solution:

$$\begin{aligned} & (5 \star 3) \star 6 \\ &= (5^2 - 3^2) \star 6 \\ &= 16 \star 6 \\ &= (16 - 6)^2 \\ &= 10^2 \\ &= 100 \end{aligned}$$

3.

Answer: E

Solution:

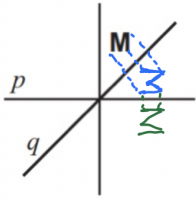
$$\begin{aligned} 100 &= 2^2 \times 5 \\ 100 &= 1 \times 2 \times 50 \\ &= 1 \times 4 \times 25 \\ &= 1 \times 5 \times 20 \\ &= 2 \times 5 \times 10 \end{aligned}$$

In total there are 4 ways.

4.

Answer: E

Solution:



5.

Answer: C

Solution:

Five years ago:

Bella: 6 years old

Kitten: 0 year old

Five years later (now):

Bella: 11 years old

Kitten: 0 + 5 years old

Anna: 30 - 11 - 5 = 14 years old

$$14 - 11 = 3$$

6.

Answer: C

Solution:

Assuming the smallest number being a , and the largest number being b . We can conclude that:

$$15 - a = b - 15, \text{ therefore, } a + b = 30$$

It's also given that $b = 4a$, we can therefore derive such linear system:

$$\begin{cases} a + b = 30 \\ b = 4a \end{cases}$$

. We get

$$\begin{cases} a = 6 \\ b = 24 \end{cases}$$

after solving the linear system.

7.

Answer: B

Solution:

$$T = (4.2 \cdot 8000) \div 56 = 600s = 10 \text{ min}$$

8.

Answer: B

Solution:

$$\begin{aligned} & \frac{1}{3} \times \frac{2}{4} \times \frac{3}{5} \dots \frac{18}{20} \times \frac{19}{21} \times \frac{20}{22} \\ &= \left(\frac{1}{3} \times \frac{3}{5} \times \frac{5}{7} \times \dots \times \frac{19}{21} \right) \times \left(\frac{2}{4} \times \frac{4}{6} \times \frac{6}{8} \times \dots \times \frac{20}{22} \right) \\ &= \frac{1}{21} \times \frac{2}{22} \\ &= \frac{1}{231} \end{aligned}$$

9.

Answer: B

Solution:

Initial temperature difference: $212 - 68 = 144^{\circ}F$

How many times the temperature halved: $15 \div 5 = 3$

After 15 minutes: $144 \div 2^3 = 18^{\circ}F$

Therefore, $68 \div 18 = 86^{\circ}F$

10.

Answer: E

Solution:

Ling arrived at 10 A.M.. Therefore, she traveled $2 \times 45 = 90$ miles, which is the distance from her home to the mountain.

Therefore, we can conclude that B, C, D are incorrect.

After Ling's hike, Ling traveled 60 miles per hour to get home, which would take her $90 \div 60 = 1.5h$ to get home. Therefore, we can eliminate A, and E would be the correct answer.

11.

Answer: D

Solution:

If he has ten pieces of pasta in the end, he needs to take 9 bites. And for each time, he eats 3 inches of pasta, so for 9 bites, he eats $9 \times 3 = 27$ inches. So the length of the origin pasta is $17 + 27 = 44$ inches.

12.

Answer: B

Solution:

There are only two perfect squares that meet the requirements of the question: 64, 81.

Number of all possible cases: $4 \times 4 = 16$. So the probability is: $\frac{2}{16} = \frac{1}{8}$

13.

Answer: D

Solution:

Assume one positive integer is a , the other is b . We have $a = 2b + x$. Since $a + b = 28$, we can have $2b + x + b = 28$

$$3b + x = 28$$

$28 \div 3 R1$, thus $x \div 3 R1$. And $x < 28$, so x can only be: 1, 4, 7, 10, 13, 16, 19, 22, 25. In total, we have 9 possible positive integers.

14.

Answer: D

Solution:

The place of E can only be:

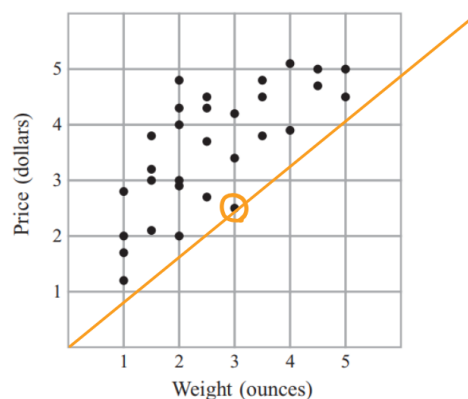
$E \square E \square E \square E \square E$

B, K, P, R can be put in the " $\square$ ". In total, we have $4P_4 = 24$.

15.

Answer: C

Solution:



The lowest unit price corresponds to the smallest slope passing through the origin.

The weight of pepper with the lowest unit price is (as the figure shown above): 3 ounces.

16.

Answer: B

Solution: Let the four numbers be a, b, c, d , respectively. Then we have the following four equations: $a + b = 42, b + c = 52, c + d = 60$. Adding the first and third equation, and subtract the second equation, we get

$a + d = (a + b) + (c + d) - (b + c) = 42 + 60 - 52 = 50$. Therefore, the average of a and d is $50 \div 2 = 25$.

17.

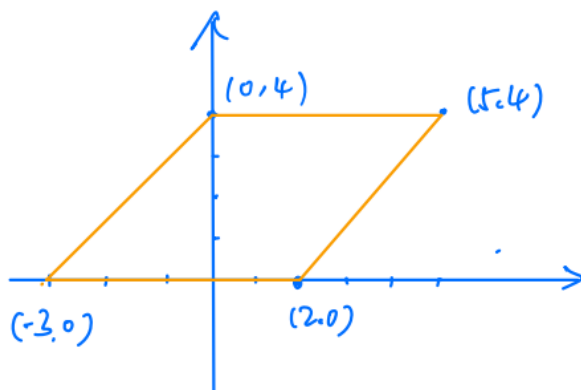
Answer: B

Solution: When $n \geq 10$, $n!! = 2 \times 4 \times 6 \times 8 \times 10 \times 12 \times \dots$, and the unit digit must be 0. Therefore, we only need to consider the unit digit of $2!! + 4!! + 6!! + 8!!$, which is equal to $2 + 8 + 48 + 384 = 442$. So the unit digit of the expression is 2.

18.

Answer: C

Solution: We construct the figure below and notice that it is a parallelogram. Assume its area is A , then $A = 5 \times 4 = 20$. The area of the parallelogram is half of the area of the desired rectangle. Therefore, the area of the rectangle is $20 \times 2 = 40$.



19.

Answer: C

Solution:

In order to make the median equal to 85, then we must assure that there are at least 10 students have scores of 85 or above after changing the score. So far, there are only 7 students have a score of 85 or above. Therefore, we need to change the score of at least 3 students above 85. We can only add 5 points to each student. If we change 3 of those who got 80 to 85, then the median is not 85. Therefore, we must change at least 4 of the scores.

20.

Answer: D

Solution:

The sum of each row or column is 12, and we can use x to represent other numbers.

-2	9	5
14-x	x-1	-1
x	4-x	8

In order to make x as the largest number among the four numbers, then we have $x > 14 - x$, so $x > 7$. Therefore, the minimum value of x is 8.

21.

Answer: C

Solution:

Let A denote Candace's scores in the first half and B denote the scores in the second half.

The percentage of the first and second half is then $\frac{A}{12}$ and $\frac{B}{18}$, respectively. From the question we obtain the following inequalities:

$$\frac{A}{12} < \frac{15}{20}$$
$$\frac{B}{18} < \frac{10}{10}$$

Solve these inequalities and we get $A < 9$ and $B < 18$. We also know that their overall percentages are the same, so $\frac{A+B}{12+18} = \frac{15+10}{20+10}$, $A + B = 25$. Therefore, the only solutions for A and B are 8 and 17. The difference between A and B is 9.

22.

Answer: A

Solution:

Suppose the line shown in the graph is a number line, and let the initial position of the bus is 0, which implies that Zia is at 3. After the first 5 minutes, Zia is now at 4 and the bus just arrived at 2. After another 5 minutes, Zia is now at 5, and the bus is on the way to 4. After another 5 minutes, Zia is now at 6, and the bus is leaving 5 and heading to 6. Therefore, Zia will board the bus at position 6, so the total time is $3 \times 5 + 2 = 17$

23.

Answer: D

Solution:

We first know that three triangles must be in the same row/column, and three circles must be in the same row/column. Hence we only consider the number of combinations when three triangles are in a row and three circles are in a row, then multiply the number by 2. Now there is only one row left to fill in triangles or circles.

Case 1: The figures in this row are also identical

If this row only has triangles, then there are two rows with triangles and one row with circles, and thus 3 configurations. Similarly, there are 3 configurations when this row only contains circles. Therefore, there are 6 configurations in Case 1.

Case 2: The figures in this row are different.

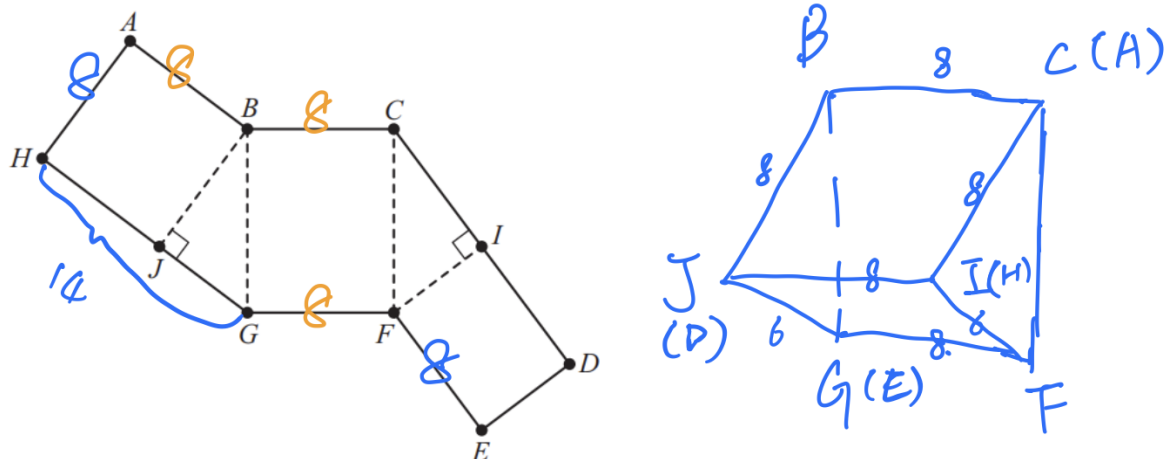
We either have two triangles and one circle, or one triangle and two circles. If there are two triangles and one circle in this row, then there are 3 different ways to place the figures in this row. Therefore, there are $3P_2 \times (3 + 3) \times 2 = 36$.

Combining the results, there are $2 \times (6 + 36) = 84$ configurations.

24.

Answer: C

Solution:



As the figure shown above, the polygon can be folded into a triangular prism, where $HJ = AB = BC = GF + FE = 8$, $JG = 14 - 8 = 6$.

Therefore, $V = A_{BJG} \times h = \frac{8 \times 6}{2} \times 8 = 192$.

25.

Answer: E

Solution:

Let P_n denote the probability of arriving at A after n hops. Therefore, $P_1 = 0$, $P_2 = \frac{1}{3}$,

$$P_n = \frac{1}{3}(1 - P_{n-1}).$$

$$\text{Therefore, } P_3 = \frac{1}{3}\left(1 - \frac{1}{3}\right) = \frac{2}{9}. P_4 = \frac{1}{3}\left(1 - \frac{2}{9}\right) = \frac{7}{27}.$$



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