

2026 AMC 8 Solutions

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1. What is the value of the following expression?

$$1 + 2 - 3 + 4 + 5 - 6 + \\ 7 + 8 - 9 + 10 + 11 - 12$$

A 18

B 21

C 24

D 27

E 30

Solution:

Group the expression as $(1 + 2 - 3) + (4 + 5 - 6) + (7 + 8 - 9) + (10 + 11 - 12)$.
These group sums are 0, 3, 6, 9, respectively, so the total is $0 + 3 + 6 + 9 = 18$.

2. In the array shown below, three 3s are surrounded by 2s, which are in turn surrounded by a border of 1s. What is the sum of the numbers in the array?

1	1	1	1	1	1	1
1	2	2	2	2	2	1
1	2	3	3	3	2	1
1	2	2	2	2	2	1
1	1	1	1	1	1	1

- A 49
- B 51
- C 53**
- D 55
- E 57

Solution:

There are 20 border entries equal to 1, 12 entries equal to 2, and 3 entries equal to 3.
The sum is $20 \cdot 1 + 12 \cdot 2 + 3 \cdot 3 = 20 + 24 + 9 = 53$.

3. Haruki has a piece of wire that is 24 centimeters long. He wants to bend it to form each of the following shapes, one at a time.

A regular hexagon with side length 5 cm.

A square of area 36 cm².

A right triangle whose legs are 6 and 8 cm long.

Which of the shapes can Haruki make?

- ☐ A Triangle only
- ☐ B Hexagon and square only
- ☐ C Hexagon and triangle only
- ☒ D Square and triangle only
- ☐ E Hexagon, triangle, and square

Solution:

The regular hexagon would have perimeter $6 \cdot 5 = 30$, too long for the wire. The square has side length 6, so its perimeter is 24. The right triangle has hypotenuse 10, so its perimeter is $6 + 8 + 10 = 24$. Haruki can make the square and the triangle only.

4. Brynn's savings decreased by 20% in July, then increased by 50% in August. Brynn's savings are now what percent of the original amount?

- ☐ A 80
- ☐ B 90
- ☐ C 100
- ☐ D 110
- ☒ E 120

Solution:

If the original amount is 100, then after a 20% decrease Brynn has 80. Increasing by 50% gives $80 \cdot 1.5 = 120$, so the savings are 120% of the original amount.

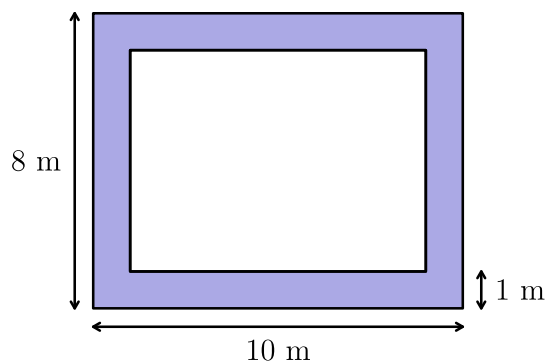
5. Casey went on a road trip that covered 100 miles, stopping only for a lunch break along the way. The trip took 3 hours in total and her average speed while driving was 40 miles per hour. In minutes, how long was the lunch break?

- ☐ A 15
- ☒ B 30
- ☐ C 40
- ☐ D 45
- ☐ E 60

Solution:

Driving 100 miles at 40 miles per hour takes $\frac{100}{40} = 2.5$ hours. The whole trip took 3 hours, so the lunch break lasted 0.5 hours, which is 30 minutes.

6. Peter lives near a rectangular field that is filled with blackberry bushes. The field is 10 meters long and 8 meters wide, and Peter can reach any blackberries that are within 1 meter of an edge of the field. The portion of the field he can reach is shaded in the figure below. What fraction of the area of the field can Peter reach?



- A $\frac{1}{6}$
- B $\frac{1}{4}$
- C $\frac{1}{3}$
- D $\frac{3}{8}$
- E $\frac{2}{5}$**

Solution:

The whole field has area $10 \cdot 8 = 80$. The unreachable inner rectangle is 8 meters by 6 meters, with area 48. Thus the reachable area is $80 - 48 = 32$, and the fraction is $\frac{32}{80} = \frac{2}{5}$.

7. Mika would like to estimate how far she can ride a new model of electric bike on a fully charged battery. She completed two trips totaling 40 miles. The first trip used $\frac{1}{2}$ of the total battery power, while the second trip used $\frac{3}{10}$ of the total battery power. How many miles can this electric bike go on a fully charged battery?

A 45

B 48

C 50

D 52

E 55

Solution:

The two trips used $\frac{1}{2} + \frac{3}{10} = \frac{4}{5}$ of a full battery. Since $\frac{4}{5}$ of the range is 40 miles, a full charge gives $40 \div \frac{4}{5} = 50$ miles.

8. A poll asked a number of people if they liked solving mathematics problems. Exactly 74% answered “yes.” What is the fewest possible number of people who could have been asked the question?

- ☐ A 10
- ☐ B 20
- ☐ C 25
- ☒ D 50
- ☐ E 100

Solution:

Exactly $74\% = \frac{74}{100} = \frac{37}{50}$ of the people answered yes. The total number of people must therefore be a multiple of 50, and 50 people is possible.

9. What is the value of this expression?

$$\frac{\sqrt{16\sqrt{81}}}{\sqrt{81\sqrt{16}}}$$

A $\frac{4}{9}$

B $\frac{2}{3}$

C 1

D $\frac{3}{2}$

E $\frac{9}{4}$

Solution:

The numerator is $\sqrt{16\sqrt{81}} = \sqrt{16 \cdot 9} = \sqrt{144} = 12$. The denominator is $\sqrt{81\sqrt{16}} = \sqrt{81 \cdot 4} = \sqrt{324} = 18$. The value is $\frac{12}{18} = \frac{2}{3}$.

10. Five runners completed the grueling Xmarathon: Luke, Melina, Nico, Olympia, and Pedro.

- Nico finished **11** minutes behind Pedro.
- Olympia finished **2** minutes ahead of Melina, but **3** minutes behind Pedro.
- Olympia finished **6** minutes ahead of Luke.

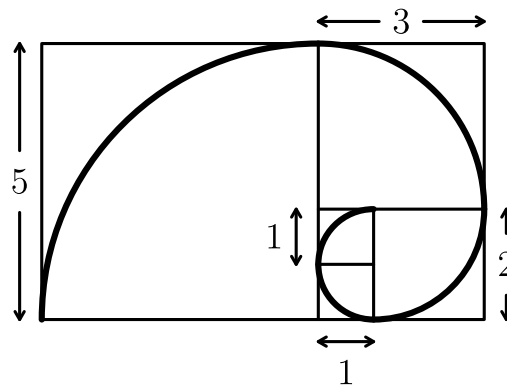
Which runner finished fourth?

- ☒ **A** Luke
- ☐ **B** Melina
- ☐ **C** Nico
- ☐ **D** Olympia
- ☐ **E** Pedro

Solution:

Measure finish times in minutes after Pedro. Then Pedro is at **0**, Olympia is at **3**, Melina is at **5**, Luke is at **9**, and Nico is at **11**. The fourth finisher is Luke.

11. Squares of side length 1, 1, 2, 3, and 5 are arranged to form the rectangle shown below. A curve is drawn by inscribing a quarter circle in each square and joining the quarter circles in order, from shortest to longest. What is the length of the curve?

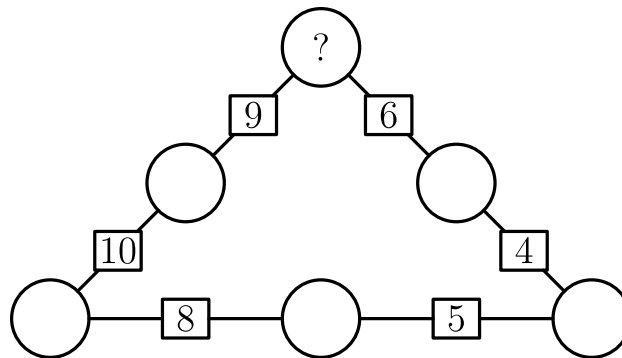


- A 4π
- B 6π**
- C $\frac{13}{2}\pi$
- D 8π
- E 13π

Solution:

Each piece of the curve is a quarter circle. The radii are 1, 1, 2, 3, 5, so the total length is $\frac{1}{4} \cdot 2\pi(1 + 1 + 2 + 3 + 5) = \frac{\pi}{2} \cdot 12 = 6\pi$.

12. In the figure below, each circle will be filled with a digit from 1 to 6. Each digit must appear exactly once. The sum of the digits in neighboring circles is shown in the box between them. What digit must be placed in the top circle?

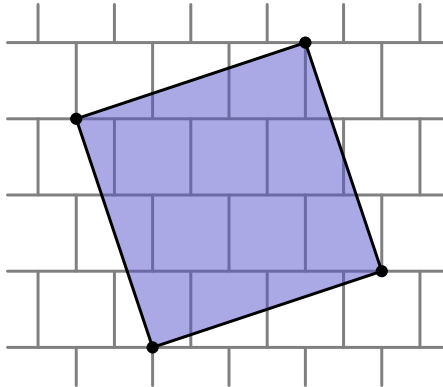


- A 2
- B 3
- C 4
- D 5**
- E it is impossible to fill the circles

Solution:

Let the top digit be x . Moving clockwise from the top, the other digits are $9 - x$, $x - 2$, $7 - x$, $x + 1$, and $6 - x$. For these six values to be exactly 1, 2, 3, 4, 5, 6, the value $x = 5$ works and gives the set 5, 4, 3, 2, 6, 1. Thus the top digit is 5.

13. The figure below shows a tiling of 1×1 unit squares. Each row of unit squares is shifted horizontally by half a unit relative to the row above it. A shaded square is drawn on top of the tiling. Each vertex of the shaded square is a vertex of one of the unit squares. In square units, what is the area of the shaded square?



- A 10
- B $\frac{21}{2}$
- C $\frac{32}{3}$
- D 11
- E $\frac{34}{3}$

Solution:

One side of the shaded square goes 3 unit widths horizontally and 1 unit vertically in the grid. Its length squared is therefore $3^2 + 1^2 = 10$. The area of a square equals its side length squared, so the shaded area is 10.

14. Jami picked three equally spaced integer numbers on the number line. The sum of the first and the second numbers is 40, while the sum of the second and third numbers is 60. What is the sum of all three numbers?

A 70

B 75

C 80

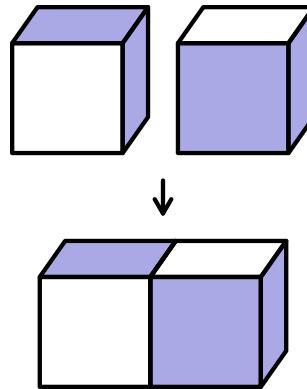
D 85

E 90

Solution:

Let the three equally spaced numbers be $a - d$, a , and $a + d$. The given sums are $2a - d = 40$ and $2a + d = 60$. Adding gives $4a = 100$, so $a = 25$. The total of the three numbers is $3a = 75$.

15. Elijah has a large collection of identical wooden cubes which are plain on 4 faces and shaded on 2 faces that share an edge. He glues some cubes together face-to-face. The figure below shows 2 cubes being glued together, leaving 3 shaded faces visible. What is the fewest number of cubes that he could glue together to ensure that no shaded faces are visible, no matter how he rotates the figure?



- A 4
- B 6
- C 8
- D 9
- E 27

Solution:

For no shaded face to be visible, each cube must have both of its shaded faces glued to neighboring cubes, so each cube needs two face-neighbors. With only three cubes, the face-adjacency graph is a path, so an end cube has only one face-neighbor. Four cubes arranged as a 2×2 square can each be oriented with its two shaded faces pointing inward, so 4 cubes suffice.

16. Consider all positive four-digit integers consisting of only even digits. What fraction of these integers are divisible by 4?

A $\frac{1}{4}$

B $\frac{2}{5}$

C $\frac{1}{2}$

D $\frac{3}{5}$

E $\frac{3}{4}$

Solution:

There are 4 choices for the thousands digit and 5 choices for each other digit.

Divisibility by 4 depends only on the last two digits. Among the 25 even digit endings, for each tens digit 0, 2, 4, 6, 8, the ones digit can be 0, 4, 8, so 15 endings work. The desired fraction is $\frac{15}{25} = \frac{3}{5}$.

17. Four students are seated in a row. They chat with the people sitting next to them, then rearrange themselves so that they are no longer seated next to any of the same people. How many rearrangements are possible?

- ☒ A 2
- ☐ B 4
- ☐ C 9
- ☐ D 12
- ☐ E 24

Solution:

Name the original order A, B, C, D . The forbidden neighboring pairs are AB, BC , and CD , so the only allowed pairs are AC, AD , and BD . To seat all four students in a row, the three row-adjacencies must be exactly these three edges, giving C, A, D, B or its reverse. There are 2 rearrangements.

18. In how many ways can 60 be written as the sum of two or more consecutive odd positive integers that are arranged in increasing order?

A 1

B 2

C 3

D 4

E 5

Solution:

Suppose there are $k \geq 2$ terms, starting with odd positive integer a . The sum is $a + (a + 2) + \cdots + (a + 2k - 2) = k(a + k - 1) = 60$. Testing divisors k of 60, the positive odd starts occur for $k = 2$, giving $29 + 31$, and for $k = 6$, giving $5 + 7 + 9 + 11 + 13 + 15$. Thus there are 2 ways.

19. Miguel is walking with his dog, Luna. When they reach the entrance to a park, Miguel throws a ball straight ahead and continues to walk at a steady pace. Luna sprints toward the ball, which stops by a tree. As soon as the dog reaches the ball, she brings it back to Miguel. Luna runs 5 times faster than Miguel walks. What fraction of the distance between the entrance and the tree does Miguel cover by the time Luna brings him the ball?

A $\frac{1}{6}$

B $\frac{1}{5}$

C $\frac{1}{4}$

D $\frac{1}{3}$

E $\frac{2}{5}$

Solution:

Let the entrance-to-tree distance be D , and let Miguel's speed be 1. Luna's speed is 5. Luna reaches the tree in time $\frac{D}{5}$, during which Miguel walks $\frac{D}{5}$. The remaining distance between Luna and Miguel is $\frac{4D}{5}$, and they close it at combined speed 6, taking time $\frac{2D}{15}$. Miguel walks a total distance $\frac{D}{5} + \frac{2D}{15} = \frac{D}{3}$, which is $\frac{1}{3}$ of the entrance-to-tree distance.

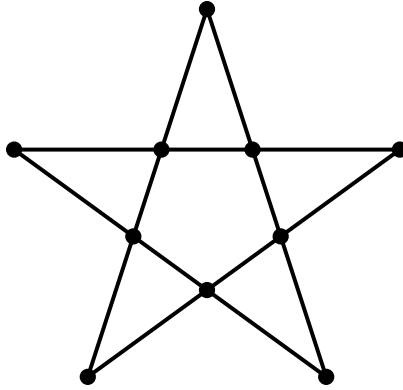
20. The land of Catania uses gold coins and silver coins. Gold coins are 1 mm thick and silver coins are 3 mm thick. In how many ways can Taylor make a stack of coins that is 8 mm tall using any arrangement of gold and silver coins, assuming order matters?

- A 3
- B 7
- C 10
- D 13**
- E 16

Solution:

Count by the number of silver coins. With no silver coins, there is 1 stack. With one silver coin, there are 5 gold coins and 1 silver coin, so 6 arrangements. With two silver coins, there are 2 gold coins and 2 silver coins, so $\binom{4}{2} = 6$ arrangements. More silver coins are too thick. The total is $1 + 6 + 6 = 13$.

21. Charlotte the spider is walking along a web shaped like a 5-pointed star, shown in the figure below. The web has 5 outer points and 5 inner points. Each time Charlotte reaches a point, she randomly chooses a neighboring point and moves to that point. Charlotte starts at one of the outer points and makes 3 moves (re-visiting points is allowed). What is the probability she is now at one of the outer points of the star?



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

Solution:

From an outer point, Charlotte must move to an inner point. From an inner point, 2 of the 4 neighboring points are outer, so the probability of moving to an outer point is $\frac{1}{2}$. After one move she is inner. After two moves she is outer with probability $\frac{1}{2}$ and inner with probability $\frac{1}{2}$. After the third move, only the inner case can move to outer, with probability $\frac{1}{2}$, so the final probability is $\frac{1}{2} \cdot \frac{1}{2} = \frac{1}{4}$.

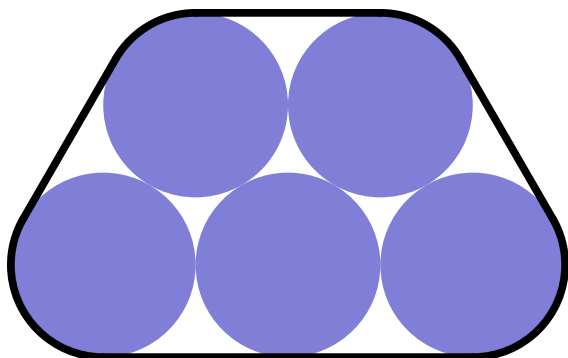
22. The integers from 1 through 25 are arbitrarily separated into five groups of 5 numbers each. The median of each group is identified. Let M equal the median of the five medians. What is the least possible value of M ?

- A 9
- B 10
- C 12
- D 13
- E 14

Solution:

If a group has median at most 8, then at least 3 numbers in that group are at most 8. For the median of the five medians to be at most 8, at least 3 groups would need such medians, requiring at least 9 numbers at most 8, impossible. Thus $M \geq 9$. This is attainable, for example with group medians 5, 8, 9, 12, 17: use groups $\{3, 4, 5, 20, 21\}$, $\{6, 7, 8, 22, 23\}$, $\{1, 2, 9, 24, 25\}$, $\{10, 11, 12, 13, 14\}$, and $\{15, 16, 17, 18, 19\}$. Hence the least possible value is 9.

23. Lakshmi has 5 round coins of diameter 4 centimeters. She arranges the coins in 2 rows on a table top, as shown below, and wraps an elastic band tightly around them. In centimeters, what will be the length of the band?



A $2\pi + 20$

B $\frac{5}{2}\pi + 20$

C $4\pi + 20$

D $\frac{9}{2}\pi + 20$

E $5\pi + 20$

Solution:

Trace the path of the centers of the coins. Their convex hull is a trapezoid with bottom side 8, top side 4, and two slanted sides of length 4, so its perimeter is 20. Wrapping the band around coins of radius 2 adds one full circumference, $2\pi \cdot 2 = 4\pi$. The band length is $20 + 4\pi$.

24. The notation $n!$ (read “ n factorial”) is defined as the product of the first n positive integers. (For example, $3! = 1 \cdot 2 \cdot 3 = 6$.) Define the *superfactorial* of a positive integer, denoted by $n^!$, to be the product of the factorials of the first n integers. (For example, $3^! = 1! \cdot 2! \cdot 3! = 12$.) How many factors of 7 appear in the prime factorization of $51^!$, the superfactorial of 51?

A 147

B 150

C 156

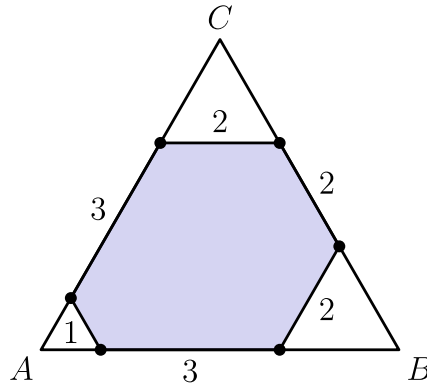
D 168

E 171

Solution:

For each $n!$, the number of factors of 7 is $\lfloor \frac{n}{7} \rfloor + \lfloor \frac{n}{49} \rfloor$. Therefore the exponent of 7 in $51^!$ is $\sum_{n=1}^{51} \lfloor \frac{n}{7} \rfloor + \sum_{n=1}^{51} \lfloor \frac{n}{49} \rfloor$. The first sum is $7(1 + 2 + 3 + 4 + 5 + 6) + 3 \cdot 7 = 168$, and the second sum is 3. The total is 171.

25. In an equiangular hexagon, all interior angles measure 120° . An example of such a hexagon with side lengths of 2, 3, 1, 3, 2, and 2 is shown below, inscribed in equilateral triangle ABC . Consider all equiangular hexagons with positive integer side lengths that can be inscribed in $\triangle ABC$, with all six vertices on the sides of the triangle. What is the total number of such hexagons? Hexagons that differ only by a rotation or a reflection are considered the same.



- A 4
- B 5
- C 6
- D 7
- E 8

Solution:

The example shows that each side of $\triangle ABC$ has length 6. Let x, y, z be the small corner lengths cut off at A, B, C , respectively. Then the other three side lengths of the hexagon are $6 - x - y, 6 - y - z$, and $6 - z - x$. All six side lengths are positive integers exactly when x, y, z are positive integers and each pair sum is less than 6. Up to rotation and reflection, this means counting unordered triples $x \leq y \leq z$ with $y + z < 6$: $(1, 1, 1), (1, 1, 2), (1, 1, 3), (1, 1, 4), (1, 2, 2), (1, 2, 3), (2, 2, 2)$, and $(2, 2, 3)$. There are 8 such hexagons.

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