



# The Ivy Education Center

LEAGUE

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## MOCK EXAMINATION

### AMC 10

American Mathematics Contest 10

## Test Sample

**Make time to take the practice test.**

It's one of the best ways to get ready for the AMC.



# MAA100

MATHEMATICAL ASSOCIATION OF AMERICA  
CELEBRATING A CENTURY OF ADVANCING MATHEMATICS

American Mathematics Competitions

## MOCK EXAMINATION

# AMC 10

American Mathematics Contest 10

### INSTRUCTIONS

1. DO NOT OPEN THIS BOOKLET UNTIL YOUR PROCTOR TELLS YOU.
  2. This is a 25-question multiple-choice test. Each question is followed by answers marked A, B, C, D, and E. Only one of these is correct.
  3. Mark your answer to each problem on the AMC 10 Answer Form with a #2 pencil. Check the blackened circles for accuracy and erase errors and stray marks completely. Only answers properly marked on the answer form will be graded. **No copies.**
  4. SCORING: You will receive 6 points for each correct answer, 1.5 points for each problem left unanswered, and 0 points for each incorrect answer.
  5. No aids are permitted other than scratch paper, graph paper, rulers, compass, protractors, and erasers. No calculators, smartwatches, or computing devices are allowed. No problems on the test will require the use of a calculator.
  6. Figures are not necessarily drawn to scale.
  7. Before beginning the test, your proctor will ask you to record certain information on the answer form.
  8. When your proctor gives the signal, begin working on the problems. You will have **75 minutes** to complete the test.
  9. When you finish the exam, *sign your name* in the space provided on the Answer Form.
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## AMC 10 Mock Test Problems

### Problem 1

Several three-legged tables and four-legged tables have a total of 23 legs. If there is more than one table of each type, what is the number of three-legged tables?

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

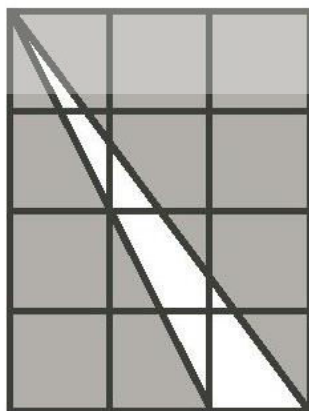
### Problem 2

A bicycle travels at a constant speed of 9 miles per hour. A car starts 200 miles behind the bicycle and catches up to the bicycle in 4 hours. What is the average speed of the car in miles per hour?

- (A) 40      (B) 50      (C) 59      (D) 60      (E) 65

### Problem 3

Twelve 1 by 1 squares form a rectangle, as shown. What is the total area of the shaded regions?



- (A) 6      (B) 7      (C) 8      (D) 9      (E) 10

**Problem 4**

The values of  $a, b, c,$  and  $d$  are 2, 3, 4, and 5, but not necessarily in that order. What is the maximum possible value of  $a \cdot b + b \cdot c + d \cdot b$ ?

- (A) 24      (B) 33      (C) 40      (D) 45      (E) 49

**Problem 5**

There are 400 students at Einstein High School, where the ratio of boys to girls is 3 : 2. There are 600 students at Edison High School, where the ratio of boys to girls is 2 : 3. When considering all the students from both schools, what is the ratio of boys to girls?

- (A) 2 : 3      (B) 12 : 13      (C) 1 : 1      (D) 6 : 5      (E) 3 : 2

**Problem 6**

The price of each item at the Gauss Gadget Store has been reduced by 20% from its original price. A printer has a sale price of \$112. What would the same printer sell for if it was on sale for 30% off of its original price?

- (A) \$78.40      (B) \$89.60      (C) \$98.00      (D) \$100.80      (E) \$168.00

**Problem 7**

How many ordered pairs  $(x, y)$  of positive integers satisfy  $x^2 + y^2 = 50$ ?

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

**Problem 8**

How many different ordered pairs  $(a, b)$  can be formed using numbers from the set of integers  $\{1, 2, \dots, 30\}$  such that  $a < b$  and  $a + b$  is even?

- (A) 105                      (B) 210                      (C) 315                      (D) 420                      (E) 900

**Problem 9**

A sequence consists of 2018 terms. Each term after the first is 1 greater than the previous term. The sum of the 2018 terms is 5311. What is the sum of all odd-numbered terms in the sequence?

- (A) 2155      (B) 2153      (C) 2151      (D) 2149      (E) 2147

**Problem 10**

To shovel all of the snow on his driveway, Alex needs 12 hours. Individually, Bob needs 8 hours to shovel all of Alex's snow, Carl needs 6 hours to shovel all of Alex's snow, and Allison needs 4 hours to shovel all of Alex's snow. If Alex, Bob, Carl, and Dick all work together, how many minutes do they need to shovel all of Alex's snow?

- (A) 120      (B) 108      (C) 96      (D) 90      (E) 84

**Problem 11**

If  $a$  and  $b$  are positive integers with  $a + b = 31$ , then the largest possible value of  $ab$  is

- (A) 238      (B) 240      (C) 242      (D) 248      (E) 255

**Problem 12**

A square has side length 5. In how many different locations can point  $P$  be placed so that the distances from  $P$  to the four sides of the square are 1, 2, 3, and 4?

- (A) 0      (B) 4      (C) 8      (D) 12      (E) 16

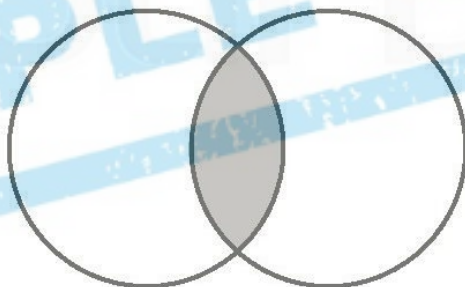
**Problem 13**

Michael wants to fill his swimming pool using two hoses, each of which sprays water at a constant rate. Hose X fills the pool in  $x$  hours when used by itself, where  $x$  is a positive integer. Hose Y fills the pool in  $y$  hours when used by itself, where  $y$  is a positive integer. When used together, Hose X and Hose Y fill the pool in 10 hours. How many different possible values are there for  $y$ ?

- (A) 3      (B) 6      (C) 7      (D) 8      (E) 9

**Problem 14**

Two circles each with radius 2 overlap so that each contains exactly 25% of the other's circumference, as shown. The area of the shaded region is



- (A)  $\pi - 2$       (B)  $2\pi - 4$       (C)  $\pi$       (D)  $2\pi - 3$       (E)  $2\pi - 2$

**Problem 15**

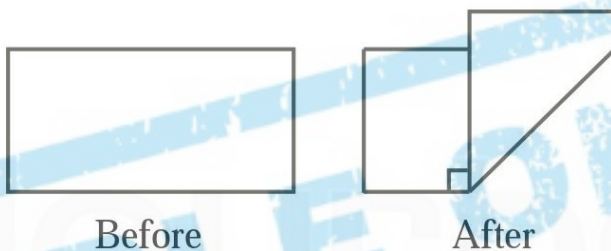
Each of the five boxes is to contain a number, as shown below. Each number in a shaded box must be the average of the number in the box to the left of it and the number in the box to the right of it. What is the value of  $x$ ?

$x$	26			8
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- (A) 28      (B) 30      (C) 31      (D) 32      (E) 34

### Problem 16

A rectangular piece of paper measures 17 inches by 8 inches. It is folded so that a right angle is formed between the two segments of the original bottom edge, as shown. What is the area in square inches of the new figure?



- (A) 64      (B) 72      (C) 81      (D) 104      (E) 168

### Problem 17

In a sequence of 10 terms, the first term is 1, the second term is  $x$ , and each term after the second is the sum of the previous two terms. For example, if  $x = 11$ , the sequence would be 1, 11, 12, 23, 35, 58, 93, 151, 244, 395. For some values of  $x$ , the number 63 appears in the sequence. If  $x$  is a positive integer, what is the number of all the possible values of  $x$  for which 63 appears in the sequence?

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

**Problem 18**

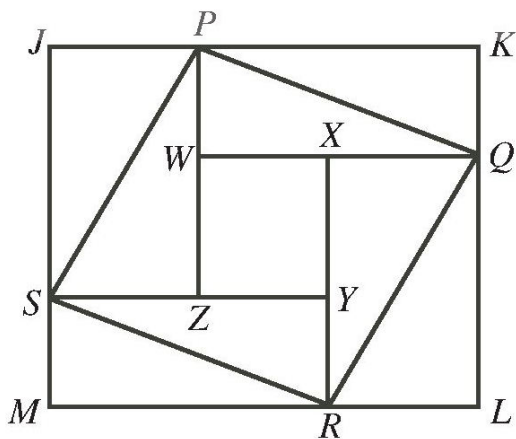
Michelle assigns every letter of the alphabet a different positive integer value. She finds the value of a word by multiplying the values of its letters together. For example, if  $D$  has a value of 5, and  $A$  has a value of 11, then the word  $DAD$  has a value of  $5 \times 11 \times 5 = 275$ . The table shows the value of some words. What is the value of the word  $MATH$ ?

Word	Value
TOTE	18
TEAM	168
MOM	49
HOME	70
MATH	?

- (A) 19      (B) 190      (C) 420      (D) 84      (E) 840

**Problem 19**

Rhombus  $PQRS$  is inscribed in rectangle  $JKLM$ , as shown. Segments  $PZ$  and  $XR$  are parallel to  $JM$ . Segments  $QW$  and  $YS$  are parallel to  $JK$ . If  $JP = 39$ ,  $JS = 52$ , and  $KQ = 25$ , what is the perimeter of rectangle  $WXYZ$ ?





- (A) 48      (B) 58      (C) 84      (D) 96      (E) 108

**Problem 20**

Let

$$x_1, x_2, x_3, \dots, x_{2017},$$

be a sequence defined by

$$x_{k+1} = \frac{1 + \sqrt{3} \cdot x_k}{\sqrt{3} - x_k}$$

with  $x_1 = 1$ . What is the value of  $x_{2017}$ ?

- (A) 0      (B) 1      (C)  $\sqrt{3}$       (D) 2      (E)  $2\sqrt{3}$

**Problem 21**

The product of  $N$  consecutive four digit positive integers is divisible by  $2010^2$ . What is the smallest possible value of  $N$ ?

- (A) 5      (B) 6      (C) 7      (D) 10      (E) 12

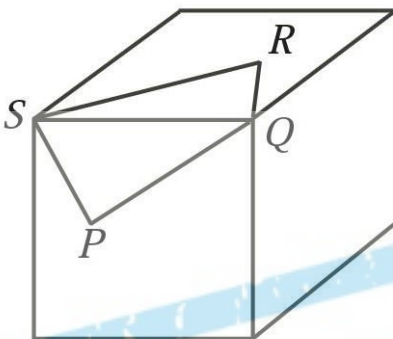
**Problem 22**

Six baseball teams are competing in a tournament in New York City. Every team is to play three games, each against a different team. (Note that not every pair of teams plays a game together.) Bob is in charge of pairing up the teams to create a schedule of games that will be played. Ignoring the order and times of the games, how many different schedules are possible?

- (A) 60      (B) 70      (C) 80      (D) 90      (E) 100

**Problem 23**

A rectangular piece of paper,  $PQRS$ , has  $PQ = 20$  and  $QR = 15$ . The piece of paper is glued at on the surface of a large cube so that  $Q$  and  $S$  are at vertices of the cube. (Note that  $\triangle QPS$  and  $\triangle QRS$  lie at on the front and top faces of the cube, respectively.) The shortest distance from  $P$  to  $R$ , as measured through the cube, is



- (A)  $\sqrt{193}$       (B)  $\sqrt{337}$       (C)  $\sqrt{351}$       (D)  $\sqrt{463}$       (E) 25

**Problem 24**

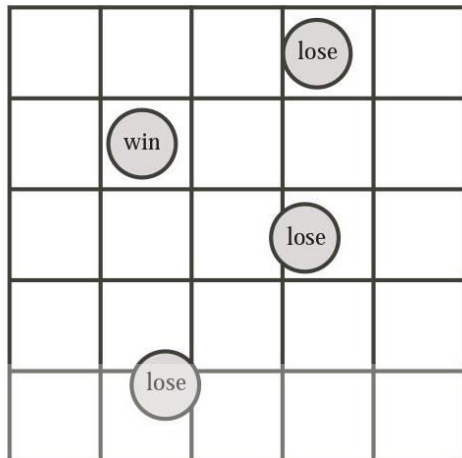
Alan has a number of gold bars, all of different weights. He gives the 24 lightest bars, which weigh 45% of the total weight, to Bob. He gives the 13 heaviest bars, which weigh 26% of the total weight, to Carl. She gives the rest of the bars to Dale. How many bars did Dale receive?

- (A) 19      (B) 18      (C) 17      (D) 16      (E) 15

**Problem 25**

A coin that is 8 units in diameter is tossed onto a 5 by 5 grid of squares each having side length 10 units. A coin is in a winning position if no part of it touches or crosses a grid line, otherwise it

is in a losing position. Given that the coin lands in a random position so that no part of it is off the grid, what is the probability that it is in a winning position?



- (A)  $\frac{1}{49}$       (B)  $\frac{5}{147}$       (C)  $\frac{1}{25}$       (D)  $\frac{25}{441}$       (E)  $\frac{4\pi}{25}$



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## Answer Key

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



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**SAMPLE ONLY**

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