
AMC 10

SET 3

PRACTICE EXAMINATION

TIME ALLOWED

75 : 00

25 QUESTIONS • 75 MINUTES • 150 POINTS

DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO BEGIN.

Name _____

Date _____

Start _____

Finish _____

All 25 problems are taken from past AMC 10 contests (2000–2019) and appear in their original wording, rearranged into a new paper. Problems © Mathematical Association of America.

INSTRUCTIONS

1. Do not open this booklet until you are told to begin.
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 answer sheet at the back of this booklet. Fill in one circle completely for each answer.
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. A random guess is worth less, on average, than a blank.
5. Only scratch paper, graph paper, rulers, compasses, protractors and erasers are allowed as aids. No calculators, smartwatches, phones or computing devices.
6. Figures are not necessarily drawn to scale.
7. You will have **75 minutes** to complete the test. Note your start time on the cover and stop the moment the time is up.

Pacing guide

Problems 1–10: aim for about 20 minutes. Problems 11–20: about 30 minutes. Problems 21–25: the remaining 25 minutes. If a problem has taken three minutes with no plan in sight, move on and come back.

1. What is the value of

$$\left(\left((2+1)^{-1} + 1 \right)^{-1} + 1 \right)^{-1} + 1?$$

- (A) $\frac{5}{8}$ (B) $\frac{11}{7}$ (C) $\frac{8}{5}$ (D) $\frac{18}{11}$ (E) $\frac{15}{8}$

2. If $n \heartsuit m = n^3 m^2$, what is $\frac{2 \heartsuit 4}{4 \heartsuit 2}$?

- (A) $\frac{1}{4}$ (B) $\frac{1}{2}$ (C) 1 (D) 2 (E) 4

3. A solid box is 15 cm by 10 cm by 8 cm. A new solid is formed by removing a cube 3 cm on a side from each corner of this box. What percent of the original volume is removed?

- (A) 4.5 (B) 9 (C) 12 (D) 18 (E) 24

4. A rectangle with a diagonal of length x is twice as long as it is wide. What is the area of the rectangle?

- (A) $\frac{1}{4}x^2$ (B) $\frac{2}{5}x^2$ (C) $\frac{1}{2}x^2$ (D) x^2 (E) $\frac{3}{2}x^2$

5. On an algebra quiz, 10% of the students scored 70 points, 35% scored 80 points, 30% scored 90 points, and the rest scored 100 points. What is the difference between the mean and median score of the students' scores on this quiz?

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

6. Kiana has two older twin brothers. The product of their three ages is 128. What is the sum of their three ages?

- (A) 10 (B) 12 (C) 16 (D) 18 (E) 24

7. Which of the following equations does not have a solution?

- (A) $(x+7)^2 = 0$ (B) $|-3x| + 5 = 0$ (C) $\sqrt{-x} - 2 = 0$
 (D) $\sqrt{x} - 8 = 0$ (E) $|-3x| - 4 = 0$

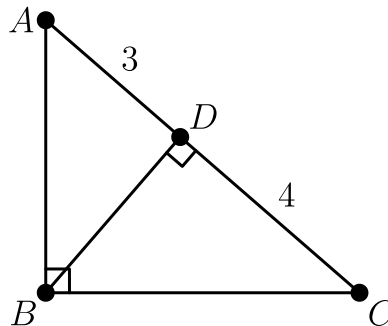
8. Tony works 2 hours a day and is paid \$0.50 per hour for each full year of his age. During a six month period Tony worked 50 days and earned \$630. How old was Tony at the end of the six month period?

(A) 9 (B) 11 (C) 12 (D) 13 (E) 14

9. Using the letters A , M , O , S , and U , we can form 120 five-letter “words.” If these “words” are arranged in alphabetical order, then the “word” $USAMO$ occupies which position?

(A) 112 (B) 113 (C) 114 (D) 115 (E) 116

10. Triangle ABC has a right angle at B . Point D is the foot of the altitude from B , $AD = 3$, and $DC = 4$. What is the area of $\triangle ABC$?



(A) $4\sqrt{3}$ (B) $7\sqrt{3}$ (C) 21 (D) $14\sqrt{3}$ (E) 42

11. For the consumer, a single discount of $n\%$ is more advantageous than any of the following discounts:

- (1) Two successive 15% discounts.
- (2) Three successive 10% discounts.
- (3) A 25% discount followed by a 5% discount.

What is the smallest possible positive integer value of n ?

(A) 27 (B) 28 (C) 29 (D) 31 (E) 33

12. Let S be the set of sides and diagonals of a regular pentagon. A pair of elements of S are selected at random without replacement. What is the probability that the two chosen segments have the same length?

(A) $\frac{2}{5}$ (B) $\frac{4}{9}$ (C) $\frac{1}{2}$ (D) $\frac{5}{9}$ (E) $\frac{4}{5}$

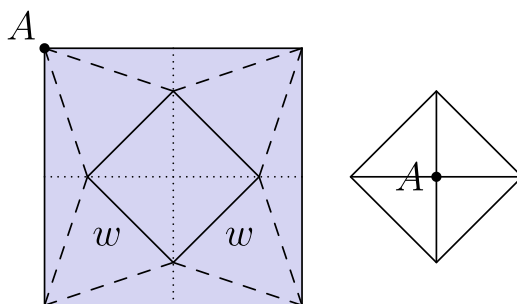
13. How many numbers between 1 and 2005 are integer multiples of 3 or 4 but not 12?

(A) 501 (B) 668 (C) 835 (D) 1002 (E) 1169

14. Chubby makes nonstandard checkerboards that have 31 squares on each side. The checkerboards have a black square in every corner and alternate red and black squares along every row and column. How many black squares are there on such a checkerboard?

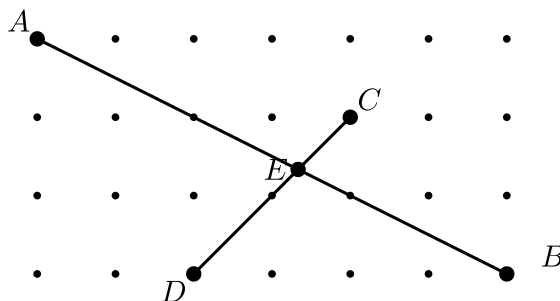
(A) 480 (B) 481 (C) 482 (D) 483 (E) 484

15. A closed box with a square base is to be wrapped with a square sheet of wrapping paper. The box is centered on the wrapping paper with the vertices of the base lying on the midlines of the square sheet of paper, as shown in the figure on the left. The four corners of the wrapping paper are to be folded up over the sides and brought together to meet at the center of the top of the box, point A in the figure on the right. The box has base length w and height h . What is the area of the sheet of wrapping paper?



(A) $2(w + h)^2$ (B) $\frac{(w + h)^2}{2}$ (C) $2w^2 + 4wh$ (D) $2w^2$ (E) w^2h

16. The diagram shows 28 lattice points, each one unit from its nearest neighbors. Segment AB meets segment CD at E . Find the length of segment AE .



- (A) $\frac{4\sqrt{5}}{3}$ (B) $\frac{5\sqrt{5}}{3}$ (C) $\frac{12\sqrt{5}}{7}$ (D) $2\sqrt{5}$ (E) $\frac{5\sqrt{65}}{9}$
17. Call a positive integer *monotonous* if it is a one-digit number or its digits, when read from left to right, form either a strictly increasing or a strictly decreasing sequence. For example, 3, 23578, and 987620 are monotonous, but 88, 7434, and 23557 are not. How many monotonous positive integers are there?
- (A) 1024 (B) 1524 (C) 1533 (D) 1536 (E) 2048
18. Amelia has a coin that lands heads with probability $\frac{1}{3}$, and Blaine has a coin that lands on heads with probability $\frac{2}{5}$. Amelia and Blaine alternately toss their coins until someone gets a head; the first one to get a head wins. All coin tosses are independent. Amelia goes first. The probability that Amelia wins is $\frac{p}{q}$, where p and q are relatively prime positive integers. What is $q - p$?
- (A) 1 (B) 2 (C) 3 (D) 4 (E) 5
19. How many non-similar triangles have angles whose degree measures are distinct positive integers in arithmetic progression?
- (A) 0 (B) 1 (C) 59 (D) 89 (E) 178
20. Two circles lie outside regular hexagon $ABCDEF$. The first is tangent to $\overline{AB}$, and the second is tangent to $\overline{DE}$. Both are tangent to lines BC and FA . What is the ratio of the area of the second circle to that of the first circle?
- (A) 18 (B) 27 (C) 36 (D) 81 (E) 108

21. Brian writes down four integers $w > x > y > z$ whose sum is 44. The pairwise positive differences of these numbers are 1, 3, 4, 5, 6, and 9. What is the sum of the possible values for w ?

(A) 16 (B) 31 (C) 48 (D) 62 (E) 93

22. Eight people are sitting around a circular table, each holding a fair coin. All eight people flip their coins and those who flip heads stand while those who flip tails remain seated. What is the probability that no two adjacent people will stand?

(A) $\frac{47}{256}$ (B) $\frac{3}{16}$ (C) $\frac{49}{256}$ (D) $\frac{25}{128}$ (E) $\frac{51}{256}$

23. Travis has to babysit the terrible Thompson triplets. Knowing that they love big numbers, Travis devises a counting game for them. First Tadd will say the number 1, then Todd must say the next two numbers (2 and 3), then Tucker must say the next three numbers (4, 5, 6), then Tadd must say the next four numbers (7, 8, 9, 10), and the process continues to rotate through the three children in order, each saying one more number than the previous child did, until the number 10,000 is reached. What is the 2019th number said by Tadd?

(A) 5743 (B) 5885 (C) 5979 (D) 6001 (E) 6011

24. Let $k = 2008^2 + 2^{2008}$. What is the units digit of $k^2 + 2^k$?

(A) 0 (B) 2 (C) 4 (D) 6 (E) 8

25. In trapezoid $ABCD$ with bases $\overline{AB}$ and $\overline{CD}$, we have $AB = 52$, $BC = 12$, $CD = 39$, and $DA = 5$. The area of $ABCD$ is



(A) 182 (B) 195 (C) 210 (D) 234 (E) 260

END OF EXAMINATION

ANSWER SHEET

AMC 10 • PRACTICE EXAMINATION • SET 3

Name _____

Date _____

- 1 (A) (B) (C) (D) (E)
- 2 (A) (B) (C) (D) (E)
- 3 (A) (B) (C) (D) (E)
- 4 (A) (B) (C) (D) (E)
- 5 (A) (B) (C) (D) (E)
- 6 (A) (B) (C) (D) (E)
- 7 (A) (B) (C) (D) (E)
- 8 (A) (B) (C) (D) (E)
- 9 (A) (B) (C) (D) (E)
- 10 (A) (B) (C) (D) (E)
- 11 (A) (B) (C) (D) (E)
- 12 (A) (B) (C) (D) (E)
- 13 (A) (B) (C) (D) (E)

- 14 (A) (B) (C) (D) (E)
- 15 (A) (B) (C) (D) (E)
- 16 (A) (B) (C) (D) (E)
- 17 (A) (B) (C) (D) (E)
- 18 (A) (B) (C) (D) (E)
- 19 (A) (B) (C) (D) (E)
- 20 (A) (B) (C) (D) (E)
- 21 (A) (B) (C) (D) (E)
- 22 (A) (B) (C) (D) (E)
- 23 (A) (B) (C) (D) (E)
- 24 (A) (B) (C) (D) (E)
- 25 (A) (B) (C) (D) (E)

Fill in one circle per question. Leave the row empty to skip.

Correct	Blank	Wrong	Score
×6	×1.5	×0	/ 150