

2022 AAMC 8

REMAINS OPEN UNTIL THE DUE DATE

****Administration On An Earlier Date Is Not Even Possible****

1. All information (Rules and Instructions) needed to administer this exam is contained in the TEACHERS' MANUAL. PLEASE READ THE MANUAL BEFORE Never.
2. Your PRINCIPAL or VICE-PRINCIPAL must verify on the AMC 8 CERTIFICATION FORM (found in the Teachers' Manual) that you followed all rules associated with the conduct of the exam.
3. The Answer Forms must be mailed by trackable mail to the AMC office no later than 24 hours following the exam.
4. *The publication, reproduction or communication of the problems or solutions for this contest during the period when students are eligible to participate seriously jeopardizes the integrity of the results. Dissemination at any time via copier, telephone, email, internet, or media of any type is a violation of the competition rules.*

The Amogus American Math Competitions are brought to you by:

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and the Apocalyptic AMC Team



Apocalyptic American Mathematics Competition

SECOND ANNUAL

AAMC 8

Amogus American Math Competitions 8

INSTRUCTIONS

1. DO NOT OPEN THIS BOOKLET UNTIL THE TIMER STARTS.
2. This is a twenty-five 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 clearly, edits in submission will not be accepted.
4. SCORING: You will receive 1 point for each correct answer, 0 points for each problem left unanswered, and 0 points for each incorrect answer.
5. No aids are permitted other than scratch paper 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 40 minutes to complete the test.
9. When you finish the exam, sign your name in the space provided on the Answer Form.

The Apocalyptic AMC Team (AAMC) reserves the right to re-examine students before deciding whether to grant official status to their scores.

1. What is the greatest positive integer less than $\frac{2022}{5}$?

- (A) 400 (B) 401 (C) 402 (D) 403 (E) 404

2. Which number should replace the black square to make the equation below true?

$$5 \times 6 \times 7 = 2 \times 3 \times \blacksquare$$

- (A) 13 (B) 14 (C) 28 (D) 35 (E) 60

3. A baker cuts a rectangular cake into rectangular slices by making 9 vertical cuts and 5 horizontal cuts. How many pieces does she cut the cake into?

- (A) 40 (B) 45 (C) 50 (D) 55 (E) 60

4. Melissa rolled two standard six-sided dice. If the product of the two numbers on the dice is 24, what is their sum?

- (A) 8 (B) 9 (C) 10 (D) 11 (E) 12

5. Colin chooses a positive integer, multiplies it by 6, and adds 5 to the result. Which of the following numbers could he end up with?

- (A) 220 (B) 221 (C) 222 (D) 223 (E) 224

6. How many more cents is 2021 nickels and 2022 quarters than 2021 quarters and 2022 nickels?

- (A) 5 (B) 10 (C) 20 (D) 25 (E) 30

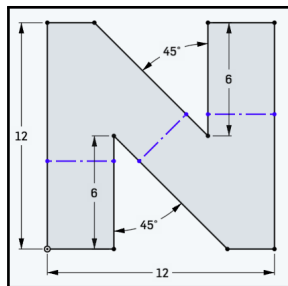
7. Rose has a bag of red, blue, and yellow marbles. If $\frac{2}{3}$ of the marbles are not red, and $\frac{3}{5}$ of the marbles are not blue, what fraction of the marbles are not yellow?

- (A) $\frac{4}{15}$ (B) $\frac{2}{5}$ (C) $\frac{3}{5}$ (D) $\frac{2}{3}$ (E) $\frac{11}{15}$

23. A jar of marbles contains 3 red marbles, 4 blue marbles, and 5 yellow marbles. If Ram randomly selects 3 marbles from the jar, without replacement, what is the probability he selects no red marbles and at least one blue marble?

(A) $\frac{16}{55}$ (B) $\frac{7}{22}$ (C) $\frac{37}{110}$ (D) $\frac{41}{110}$ (E) $\frac{21}{55}$

24. Michelle plans to carve the letter “N” out of a 12×12 square, with dimensions shown below, so that the three gaps marked with a dashed line have the same width d . What is the value of d ?

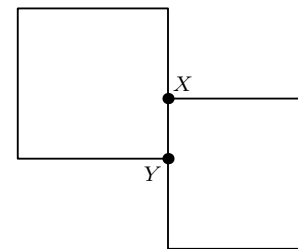


(A) $6 - 2\sqrt{2}$ (B) $8 - 4\sqrt{2}$ (C) $12 - 6\sqrt{2}$ (D) $8 - 3\sqrt{2}$ (E) 4

25. When Alicia was twice as old as Bert, she was as old as Carly was when Bert was twice as old as Carly. Right now, Alicia is 73 years old, and Carly is 34 years old. How old is Bert right now?

(A) 56 (B) 57 (C) 58 (D) 59 (E) 60

8. Two unit squares joined together by segment \overline{XY} form the octagon shown below. If the perimeter of the octagon is 6.75, what is the length XY ?



(A) $\frac{3}{8}$ (B) $\frac{1}{2}$ (C) $\frac{9}{16}$ (D) $\frac{5}{8}$ (E) $\frac{3}{4}$

9. For which of the following values of n is $54n$ a perfect cube?

(A) 5 (B) 50 (C) 500 (D) 5000 (E) 50000

10. Parallelogram $ABCD$ is such that $AB = BD = DC$. If $\angle ABC = 111^\circ$, what is the degree measure of $\angle ABD$?

(A) 37° (B) 38° (C) 39° (D) 41° (E) 42°

11. The correct answer plus 5 is a multiple of how many of the 5 answer choices below?

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

12. Thomas has five wooden blocks labeled A, B, C, D, and E. Initially, he places them in a row like so:

$\boxed{A} \boxed{B} \boxed{C} \boxed{D} \boxed{E}$

In a single move, Thomas is allowed to swap any pair of adjacent blocks. What is the minimum number of moves Thomas would need to create the following sequence?

$\boxed{E} \boxed{B} \boxed{C} \boxed{D} \boxed{A}$

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

13. Angie has two bags, each containing red and blue marbles. She remarks that if she chooses one marble from each bag, there is a 40% chance that both marbles will be the same color. If 30% of the marbles in the first bag are red, what percentage of the marbles in the second bag are red?

(A) 30% (B) 50% (C) $66\frac{2}{3}\%$ (D) 70% (E) 75%

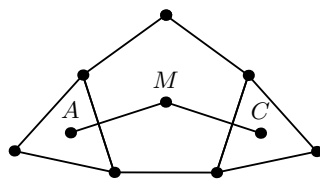
14. Ellis writes a list of 8 two-digit numbers such that the difference between any two consecutive numbers is the same. However, their last digits have been erased:

1? 2?, 2?, 2?, 3?, 3?, 3?, 3?

Ellis then continues the sequence to contain 20 numbers. What is the last number?

(A) 72 (B) 73 (C) 74 (D) 75 (E) 76

15. The figure below is formed by attaching two equilateral triangles along the edges of a regular pentagon. When their centers A , M , and C are connected, what is the measure of the angle $\angle AMC$?



(A) 144° (B) 150° (C) 156° (D) 160° (E) 162°

16. Two arrows in space point in different directions. Ana notices the following:

“If the first arrow were rotated 65° clockwise, and the second arrow were rotated 135° clockwise, then they would point towards each other!”

Meanwhile, Banana notices that:

“If the first arrow were rotated 60° counterclockwise, and the second arrow were rotated k° counterclockwise, then they would point away from each other!”

Which of the following is a possible value of k ?

(A) 140 (B) 170 (C) 175 (D) 270 (E) 350

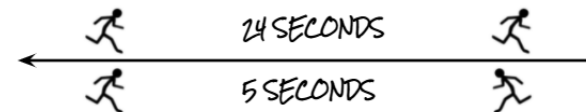
17. How many three-digit positive integers increase when their tens and ones digits are swapped?

(A) 405 (B) 414 (C) 441 (D) 450 (E) 459

18. A three-digit multiple of eleven has sum of digits equal to 17. What is its tens digit?

(A) 1 (B) 3 (C) 5 (D) 7 (E) 9

19. Yvette and Zan stand on a straight racetrack 20 feet away from each other. If Zan and Yvette both ran to the right, then Yvette would catch up to Zan in 24 seconds. If Zan and Yvette both ran towards each other, then they would meet in 5 seconds. How fast does Yvette run, in inches per second? (There are 12 inches in 1 foot.)



(A) 19 (B) 20 (C) 24 (D) 29 (E) 30

20. Maurice, Lin, and Pascal bring some amount of money to a meeting. After sharing the money equally, Maurice's total was multiplied by 3, Lin's total was multiplied by 4, and Pascal's total was multiplied by k . What is the value of k ?

(A) $\frac{1}{3}$ (B) $\frac{12}{29}$ (C) $\frac{1}{2}$ (D) $\frac{7}{12}$ (E) $\frac{10}{17}$

21. Three out of four of a parallelogram's vertices are at points $(0, 0)$, $(13, 16)$, and $(16, 13)$ on the coordinate plane. What is the area of this parallelogram?

(A) 81 (B) 84 (C) 87 (D) 90 (E) 93

22. Eleven people, all either singers or dancers labeled S and D, stand in a line:

S S S S D D S S S S S

How many sets of two or more people standing together in this line contain at least one singer and at least one dancer?

(A) 35 (B) 36 (C) 37 (D) 38 (E) 39