



# 2002 AMC 10B

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**Question 1**

Not yet answered

Points out of 5

The ratio  $\frac{2^{2001} \cdot 3^{2003}}{6^{2002}}$  is:

- (A)  $\frac{1}{6}$       (B)  $\frac{1}{3}$       (C)  $\frac{1}{2}$       (D)  $\frac{2}{3}$       (E)  $\frac{3}{2}$

Select one:

- A  
 B  
 C  
 D  
 E

**Question 2**

Not yet answered

Points out of 5

For the nonzero numbers  $a$ ,  $b$ , and  $c$ , define

$$(a, b, c) = \frac{abc}{a + b + c}$$

Find  $(2, 4, 6)$ .

- (A) 1      (B) 2      (C) 4      (D) 6      (E) 24

Select one:

- A  
 B  
 C  
 D  
 E

**Question 3**

Not yet answered

Points out of 5

The arithmetic mean of the nine numbers in the set  $\{9, 99, 999, 9999, \dots, 999999999\}$  is a 9-digit number  $M$ , all of whose digits are distinct. The number  $M$  does not contain the digit

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

Select one:

- A  
 B  
 C  
 D  
 E

**Question 4**

Not yet answered

Points out of 5

What is the value of  $(3x - 2)(4x + 1) - (3x - 2)4x + 1$  when  $x = 4$ ?

(A) 0    (B) 1    (C) 10    (D) 11    (E) 12

Select one:

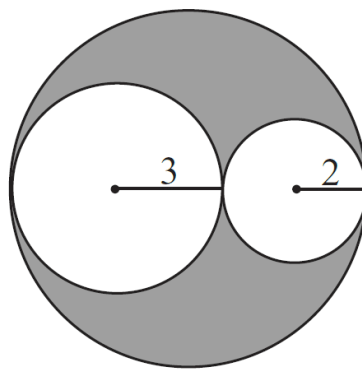
- A
- B
- C
- D
- E

**Question 5**

Not yet answered

Points out of 5

Circles of radius 2 and 3 are externally tangent and are circumscribed by a third circle, as shown in the figure.



Find the area of the shaded region.

(A)  $3\pi$     (B)  $4\pi$     (C)  $6\pi$     (D)  $9\pi$     (E)  $12\pi$ 

Select one:

- A
- B
- C
- D
- E

**Question 6**

Not yet answered

Points out of 5

For how many positive integers  $n$  is  $n^2 - 3n + 2$  a prime number?

- (A) none
- (B) one
- (C) two
- (D) more than two, but finitely many
- (E) infinitely many

Select one:

- A
- B
- C
- D
- E

**Question 7**

Not yet answered

Points out of 5

Let  $n$  be a positive integer such that  $\frac{1}{2} + \frac{1}{3} + \frac{1}{7} + \frac{1}{n}$  is an integer. Which of the following statements is **not** true:

- (A) 2 divides  $n$
- (B) 3 divides  $n$
- (C) 6 divides  $n$
- (D) 7 divides  $n$
- (E)  $n > 84$

Select one:

- A
- B
- C
- D
- E

**Question 8**

Not yet answered

Points out of 5

Suppose July of year  $N$  has five Mondays. Which of the following must occur five times in the August of year  $N$ ? (Note: Both months have 31 days.)

- (A) Monday
- (B) Tuesday
- (C) Wednesday
- (D) Thursday
- (E) Friday

Select one:

- A
- B
- C
- D
- E

**Question 9**

Not yet answered

Points out of 5

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

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

Select one:

- A  
 B  
 C  
 D  
 E

**Question 10**

Not yet answered

Points out of 5

Suppose that  $a$  and  $b$  are nonzero real numbers, and that the equation  $x^2 + ax + b = 0$  has solutions  $a$  and  $b$ . Then the pair  $(a, b)$  is

- (A)  $(-2, 1)$       (B)  $(-1, 2)$       (C)  $(1, -2)$       (D)  $(2, -1)$       (E)  $(4, 4)$

Select one:

- A  
 B  
 C  
 D  
 E

**Question 11**

Not yet answered

Points out of 5

The product of three consecutive positive integers is 8 times their sum. What is the sum of their squares?

- (A) 50      (B) 77      (C) 110      (D) 149      (E) 194

Select one:

- A  
 B  
 C  
 D  
 E

**Question 12**

Not yet answered

Points out of 5

For which of the following values of  $k$  does the equation  $\frac{x-1}{x-2} = \frac{x-k}{x-6}$  have no solution for  $x$ ?

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

Select one:

- A  
 B  
 C  
 D  
 E

**Question 13**

Not yet answered

Points out of 5

Find the value(s) of  $x$  such that  $8xy - 12y + 2x - 3 = 0$  is true for all values of  $y$ .

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

Select one:

- A  
 B  
 C  
 D  
 E

**Question 14**

Not yet answered

Points out of 5

The number  $25^{64} \cdot 64^{25}$  is the square of a positive integer  $N$ . In decimal representation, the sum of the digits of  $N$  is

- (A) 7      (B) 14      (C) 21      (D) 28      (E) 35

Select one:

- A  
 B  
 C  
 D  
 E

**Question 15**

Not yet answered

Points out of 5

The positive integers  $A$ ,  $B$ ,  $A - B$ , and  $A + B$  are all prime numbers. The sum of these four primes is

- (A) even      (B) divisible by 3      (C) divisible by 5      (D) divisible by 7      (E) prime

Select one:

- A  
 B  
 C  
 D  
 E

**Question 16**

Not yet answered

Points out of 5

For how many integers  $n$  is  $\frac{n}{20 - n}$  the square of an integer?

- (A) 1      (B) 2      (C) 3      (D) 4      (E) 10

Select one:

- A  
 B  
 C  
 D  
 E

**Question 17**

Not yet answered

Points out of 5

A regular octagon  $ABCDEFGH$  has sides of length two. Find the area of  $\triangle ADG$ .

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

Select one:

- A  
 B  
 C  
 D  
 E

**Question 18**

Not yet answered

Points out of 5

Four distinct circles are drawn in a plane. What is the maximum number of points where at least two of the circles intersect?

- (A) 8    (B) 9    (C) 10    (D) 12    (E) 16

Select one:

- A  
 B  
 C  
 D  
 E

**Question 19**

Not yet answered

Points out of 5

Suppose that  $\{a_n\}$  is an arithmetic sequence with

$$a_1 + a_2 + \cdots + a_{100} = 100 \text{ and } a_{101} + a_{102} + \cdots + a_{200} = 200.$$

What is the value of  $a_2 - a_1$ ?

- (A) 0.0001    (B) 0.001    (C) 0.01    (D) 0.1    (E) 1

Select one:

- A  
 B  
 C  
 D  
 E

**Question 20**

Not yet answered

Points out of 5

Let  $a$ ,  $b$ , and  $c$  be real numbers such that  $a - 7b + 8c = 4$  and  $8a + 4b - c = 7$ . Then  $a^2 - b^2 + c^2$  is

- (A) 0    (B) 1    (C) 4    (D) 7    (E) 8

Select one:

- A  
 B  
 C  
 D  
 E



**Question 21**

Not yet answered

Points out of 5

Andy's lawn has twice as much area as Beth's lawn and three times as much area as Carlos' lawn. Carlos' lawn mower cuts half as fast as Beth's mower and one third as fast as Andy's mower. If they all start to mow their lawns at the same time, who will finish first?

- (A) Andy
- (B) Beth
- (C) Carlos
- (D) Andy and Carlos tie for first.
- (E) All three tie.

Select one:

- A
- B
- C
- D
- E

**Question 22**

Not yet answered

Points out of 1

Let  $\triangle XOY$  be a right-angled triangle with  $m\angle XOY = 90^\circ$ . Let  $M$  and  $N$  be the midpoints of the legs  $OX$  and  $OY$ , respectively. Given  $XN = 19$  and  $YM = 22$ , find  $XY$ .

- (A) 24    (B) 26    (C) 28    (D) 30    (E) 32

Select one:

- A
- B
- C
- D
- E

**Question 23**

Not yet answered

Points out of 5

Let  $\{a_k\}$  be a sequence of integers such that  $a_1 = 1$  and  $a_{m+n} = a_m + a_n + mn$ , for all positive integers  $m$  and  $n$ . Then  $a_{12}$  is

- (A) 45    (B) 56    (C) 67    (D) 78    (E) 89

Select one:

- A
- B
- C
- D
- E

**Question 24**

Not yet answered

Points out of 5

Riders on a Ferris wheel travel in a circle in a vertical plane. A particular wheel has radius 20 feet and revolves at the constant rate of one revolution per minute. How many seconds does it take a rider to travel from the bottom of the wheel to a point 10 vertical feet above the bottom?

- (A) 5      (B) 6      (C) 7.5      (D) 10      (E) 15

Select one:

- A  
 B  
 C  
 D  
 E

**Question 25**

Not yet answered

Points out of 5

When 15 is appended to a list of integers, the mean is increased by 2. When 1 is appended to the enlarged list, the mean of the enlarged list is decreased by 1. How many integers were in the original list?

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

Select one:

- A  
 B  
 C  
 D  
 E