

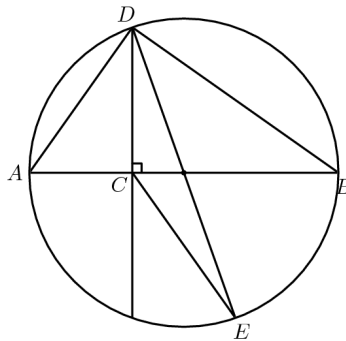
Name:

Grade 12

Answer the questions you are confident in. Guess at your own risk.

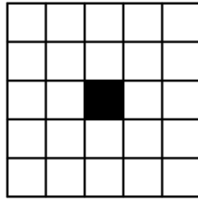
- Suppose $\frac{2x}{3} - \frac{x}{6}$ is an integer, what is true about x ?
 - It is negative
 - It is even, but not necessarily a multiple of 3
 - It is a multiple of 3 but not necessarily even
 - It is a multiple of 6 but not necessarily a multiple of 12
 - It is a multiple of 12
- A solid cube of side length 1 is removed from each corner of a solid cube of side length 3. How many edges does the remaining solid have?
 - 108
 - 84
 - 72
 - 60
 - 36
- Which of the following describes the graph of the equation $(x + y)^2 = x^2 + y^2$?
 - The empty set
 - One point
 - Two lines
 - A circle
 - The entire plane
- How many integers satisfy the following condition:
$$(130n)^{50} > n^{100} > 2^{200}$$
 - 0
 - 12
 - 125
 - 16
 - 250
- Let $\angle ABC = 24^\circ$ and $\angle ABD = 20^\circ$. What is the smallest possible degree measure for angle CBD?
 - 0
 - 2
 - 4
 - 6
 - 12

6. The sums of three whole numbers taken in pairs are 12, 17, and 19. What is the middle number?
- 5
 - 6
 - 7
 - 8
 - 9
7. What's the value of x if $|x - 1| = |x - 2|$?
- $-\frac{1}{2}$
 - $\frac{1}{2}$
 - 1
 - $\frac{3}{2}$
 - 2
8. For how many real values is $\sqrt{120 - \sqrt{x}}$ an integer?
- 3
 - 6
 - 9
 - 10
 - 11
9. Let AB be the diameter of a circle and C be a point on AB with $2AC = BC$. Let D and E be points on the circle such that $DC \perp AB$ and DE is a second diameter. What is the ratio of the area of triangle DCE to the area of triangle ABD ?



- $\frac{1}{8}$
- $\frac{1}{6}$
- $\frac{1}{4}$
- $\frac{3}{4}$
- $\frac{1}{2}$

10. The 5x5 grid shown contains a collection of squares with varying sizes from 1x1 to 5x5. How many squares contain the black center square?



- a. 12
 b. 15
 c. 17
 d. 19
 e. 20
11. Six distinct integers are randomly chosen from 1 to 2019, inclusive. What is the probability that some pair of these integers has a difference that is a multiple of 5?
- a. $\frac{1}{2}$
 b. $\frac{3}{5}$
 c. $\frac{2}{3}$
 d. $\frac{4}{5}$
 e. 1
12. At a party, each man danced with exactly three women and each woman danced with exactly two men. Twelve men attended the party. How many women attended the party?
- a. 8
 b. 12
 c. 16
 d. 18
 e. 24
13. How many three-digit numbers are not divisible by 5, have digits that sum to less than 20, and have the first digit equal to the third digit?
- a. 52
 b. 60
 c. 66
 d. 68
 e. 70
14. All the sides of the pentagon ABCDE are of equal length and $\angle A = \angle B = 90^\circ$. What is the degree measure of $\angle E$?
- a. 90
 b. 108
 c. 120
 d. 144
 e. 150

15. Coin A is flipped three times and coin B is flipped four times. What is the probability that the number of heads from flipping, the two fair coins, is the same?
- $\frac{29}{128}$
 - $\frac{23}{128}$
 - $\frac{1}{4}$
 - $\frac{35}{128}$
 - $\frac{1}{2}$
16. The sum of the zeros, the product of the zeros, and the sum of the coefficients of the function $f(x) = ax^2 + bx + c$ are equal. Their common value must also be which of the following?
- The y-intercept of the graph of $y = f(x)$
 - One of the x-intercepts of the graph of $y = f(x)$
 - The mean of the x-intercepts of the graph $y = f(x)$
 - The coefficient x
 - The coefficient of x^2
17. For a particular pair of dice the probability of rolling a 1, 2, 3, 4, 5, and 6 on each die are in the ratio $1 : 2 : 3 : 4 : 5 : 6$. What is the probability of rolling a sum of 7 on the two dice?
- $\frac{8}{63}$
 - $\frac{4}{83}$
 - $\frac{7}{2}$
 - $\frac{1}{6}$
 - $\frac{1}{8}$
18. $e^{-i\pi} + 1 =$
- 0
 - 1
 - 1
 - 2
 - 2
19. In the eight-term sequence A, B, C, D, E, F, G, H, the value C is 5 and any three consecutive terms is 30. What is $A + H$?
- 17
 - 18
 - 25
 - 26
 - Cannot be determined

20. Suppose that $\sin a + \sin b = \sqrt{\frac{5}{3}}$ and $\cos a + \cos b = 1$. What is $\cos(a - b)$?

- a. $\sqrt{\frac{5}{3}} - 1$
- b. $\frac{1}{3}$
- c. $\frac{1}{2}$
- d. $\frac{2}{3}$
- e. 1