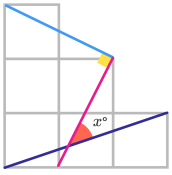
Name:

Grade 9

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

1. Suppose $\frac{2x}{3} - \frac{x}{6}$ is an integer, what is true about x?
    a. It is negative
    b. It is even, but not necessarily a multiple of 3
    c. It is a multiple of 3 but not necessarily even
    d. It is a multiple of 6 but not necessarily a multiple of 12
    e. It is a multiple of 12
2. What fraction of the star is the section in the middle?

    a. $\frac{1}{2}$
    b. $\frac{2}{5}$
    c. $\frac{3}{5}$
    d. $\frac{7}{15}$
    e. $\frac{8}{15}$
3. Which of the following describes the graph of the equation $(x+y)^2 = x^2 + y^2$?
    a. The empty set
    b. One point
    c. Two lines
    d. A circle
    e. The entire plane
4. What is the measure of angle x?

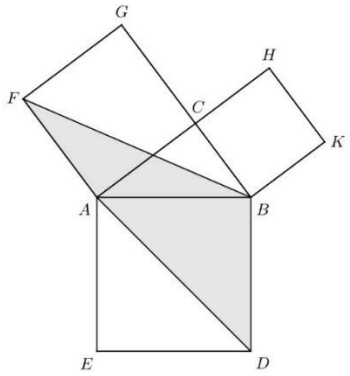


    a. 25
    b. 30
    c. 45
    d. 50
    e. 55

5. One pipe can fill a pool 1.25 times faster than a second pipe. When both pipes are opened, they fill the pool in four hours. How long would it take to fill the pool if only the slower pipe is used?
    a. Four hours
    b. Eight hours
    c. Nine hours
    d. Ten hours
    e. Twelve hours
6. A circle with a radius of five is inscribed in a right triangle with hypotenuse 20. What is the area of the triangle?
    a. $50 + 9\pi$
    b. $50 + 25\pi$
    c. 100
    d. 112.5
    e. 125
7. What's the value of x if |x - 1| = |x - 2|?
    a. $-\frac{1}{2}$
    b. $\frac{1}{2}$
    c. 1
    d. $\frac{3}{2}$
    e. 2
8. For how many real values is $\sqrt{120 - \sqrt{x}}$ an integer?
    a. 3
    b. 6
    c. 9
    d. 10
    e. 11
9. Two cars are racing at a constant speed around a circular racetrack. Car A requires 15 seconds to travel once around the racetrack, and car B requires 25 seconds to travel once around the racetrack. If car A passes car B, how many seconds will elapse before car A once again passes car B?
    a. 22.5
    b. 25
    c. 32.5
    d. 37.5
    e. 45
10. How many whole numbers between 99 and 999 contain exactly one 0?
    a. 72
    b. 90
    c. 144
    d. 162
    e. 180

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. The Fibonacci sequence 1, 1, 2, 3, 5, 8, 13, 21, … starts with two 1s, and each term afterwards is the sum of its two predecessors. Which one of the ten digits will be the last to appear in the units' position of a number in the sequence?
    a. 9
    b. 6
    c. 0
    d. 7
    e. 4
14. For how many integers m is there at least one positive integer n such that $mn \leq m + n$?
    a. 4
    b. 6
    c. 9
    d. 12
    e. Infinitely many
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?
    a. $\frac{29}{128}$
    b. $\frac{23}{128}$
    c. $\frac{1}{4}$
    d. $\frac{35}{128}$
    e. $\frac{1}{2}$

16. For how many positive integers n is $n^2 - 3n + 2$ a prime number?
    a. Infinitely many
    b. None
    c. More than two, but finite
    d. 2
    e. 1
17. In the picture below, area of square ABDE, CAFG and BCHK are 25, 16 and 9, respectively. Find the area of the shaded region (in units^2).



    a. 20.5
    b. 25
    c. 18
    d. 22.5
    e. 20
18. The ratio $\frac{10^{2000}+10^{2002}}{10^{2001}+10^{2001}}$ is closest to which of the following?
    a. 5
    b. 1
    c. 0.2
    d. 0.1
    e. 10
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?
    a. 17
    b. 18
    c. 25
    d. 26
    e. Cannot be determined
20. In the year N, the 300th day of the year is a Tuesday. In year N+1, the 200th day is also a Tuesday. On what day of the week did the 100th day of the year N-1 occur?
    a. Friday
    b. Thursday
    c. Wednesday
    d. Tuesday
    e. None of the above