

Round 1

1.1 If 20% of $\frac{1}{6}$ of 30% of x is 10, what is x ?

1.2 How many two-digit integers contain at least one 9?

1.3 Joe departs on a straight road traveling at a constant speed of 10 miles per hour. 2 hours later, Bob departs on the same road traveling at a constant speed of 15 miles per hour. How many miles has Bob traveled when he passes Joe?

Round 2

2.1 If the measure of the supplement an angle is 5 times the measure of its complement, what is the measure of the angle? Express your answer in degrees as a decimal to the nearest tenth.

2.2 How many 4 inch by 6 inch tiles are needed to cover a surface measuring 4 feet by 3 feet?

2.3 If the integer 420M6N9 is divisible by 11, where M and N are digits, how many possible values are there for M?

Round 3

3.1 All of the odd numbers from 1 to 99 that are not multiples of 5 are multiplied together. What is the units digit of the product?

3.2 Triangle ABC has area 16, and M and N are the midpoints of AC and BC, respectively. What is the area of AMN?

3.3 An ant starts at (0,0). It goes up a units, right $2a - b$ units, up $2b - a$ units, right $2a - 3b$ units, and down b units. It ends at the point (3,8). What is $a+b$?

Round 4

4.1. Billy's annual salary is \$100. It is increased by $x\%$, then decreased by $x\%$. After these changes, his salary is \$96. Determine the value of x .

4.2 For how many positive integers n are $\frac{n}{4}$ and $n + 4$ both two-digit positive integers?

4.3 Let $f^1(x) = \frac{x}{x+1}$ and $f^n(x) = f^1(f^{n-1}(x))$. Evaluate $f^5\left(\frac{1}{5}\right)$

Round 5

5.1 Two angles of an isosceles triangle measure 50° and x° . What is the sum of all the possible values of x ?

5.2 A $4 \times 4 \times 4$ cube is painted on all of its faces. It is then cut into 64 $1 \times 1 \times 1$ cubes. How many of these cubes have paint on them?

5.3 What is the remainder when 2^{222} is divided by 7?

Round 6

6.1 A geometric series has first three terms a , b , and $a - b$, where a and b are positive numbers. What is the value of $\frac{a}{b}$?

6.2 Equilateral triangle ABC has area 16. Let M be the midpoint of AB, and let N be on segment BC such that MN is perpendicular to BC. What is the area of triangle BMN?

6.3 ABCD is a parallelogram with area 84. Let M be the point on segment AC such that $AM:MC=2:1$, and let N be the midpoint of BM. What is the area of ABND?

Round 7

7.1 How many factors of $8!$ are divisible by a perfect square other than 1?

7.2 Alex, Bob, and Claire each have a certain amount of money. First, Alex splits all of his money evenly between Bob and Claire. Then, Bob splits all of the money he now has evenly between Alex and Claire. Finally, Claire splits all of her money evenly between Alex and Bob. Alex now has twice the amount of money he started with. If Bob started with 55 cents, how many cents did Alex start with?

7.3 What is the probability that a triangle randomly selected from the set of noncongruent, nondegenerate triangles with perimeter 10 (that is, the triangles with side lengths 3, 3, 4 and 3, 4, 3 are not considered distinct) and integer side lengths is isosceles?

Answers:

1. 1000

2. 18

3. 60

4. 67.5

5. 72

6. 2

7. 1

8. 4

9. 8

10.20

11.14

12.1/10

13.195

14.56

15.1

16. $\frac{1+\sqrt{5}}{2}$

17.2

18.49

19.80

20.30

21.1