Max 12	Max 24	
Stage Tot	Score	Marker

Put ID Sticker Here

TARGET ROUND -- GRADE

NO Peeking: Wait for instructions to start!

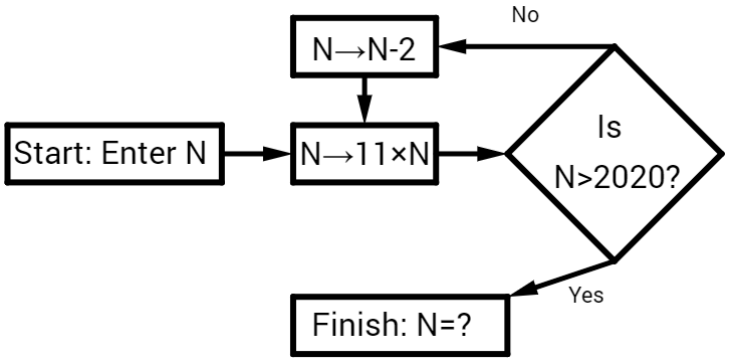
The region below is for the use of the markers

Max 4	Max 4	Max 4	Max 12	
Pr. 1-4	Pr. 5-8	Pr. 9-12	Stage Tot	Marker

NAME: _____

SCHOOL: _____

1. $N = 1$. Enter the value of N into the flow chart.
What is the value of N at the Finish box?

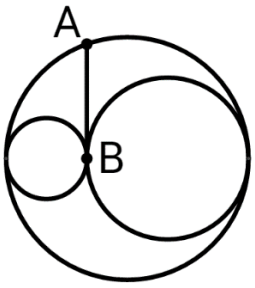


_____ 1

2. What is the remainder when you divide 2020 by the smallest positive number whose digit sum is 18?

_____ 2

3. 3 circles with radii 1, 2, and 3 are tangent to each other.
A is a point on the largest circle, B is the shared tangent point of the small circles, and the line segment AB is tangent to the small circles.
What is the length of segment AB?
Express the answer as $M\sqrt{N}$ where M and N are primes.



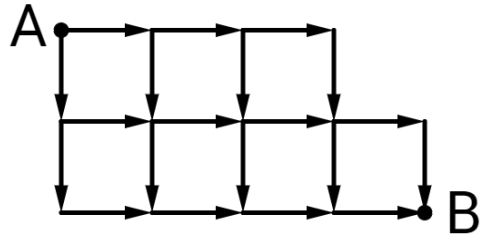
_____ 3

4. Mina has 4 white articles of clothing (a hat, a shirt, pants, and a scarf).
She also has 4 black articles of clothing (a hat, a shirt, pants, and a scarf), 3 red articles of clothing (a shirt, pants, and a scarf), and 3 blue articles of clothing (a hat, a shirt, and pants).
How many different outfits can she wear if she must wear at least a shirt and pants, and no two articles of clothing can be of the same colour?
Note that she does not have to wear either a hat or a scarf.

_____ 4

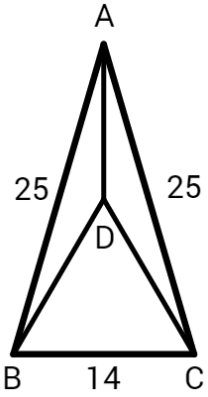
5. What is the value of $2021^2 - 2020^2$? _____ 5

6. A mouse travels along the grid lines of the maze from point A to point B, travelling only down or to the right as specified by the arrows.
How many different paths can the mouse take from point A to Point B?



_____ 6

7. ΔABC is isosceles ($AB = AC = 25$, and $BC = 14$).
The point D is inside ΔABC and ΔBCD is equilateral.
What is the value of AD? Express the answer as $I - J\sqrt{K}$ where I is a whole number, and J and K are two different prime numbers.



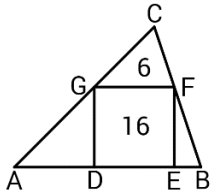
_____ 7

8. N is a whole 3-digit number selected at random (every number has equal probability of being selected).
M is derived from N in the following way: the value of the ten's (middle) digit of N is subtracted from the value of the hundred's (leftmost) digit of N, and the value of the unit's (rightmost) digit is added to it.
For example: if $N = 369$, then $M = (3 - 6) + 9 = 6$.
What is the probability that the value of M is 0?
Express the answer as a fraction in lowest terms. _____ 8

9. Ann bought some apples, pears, and oranges (at least one of each).
She paid for them exactly \$6.00 (no change).
The cost of each apple was \$0.49, the cost of each pear
was \$0.59, and the cost of each orange was \$0.69.
What is the maximum number of apples that she could have bought? _____ 9

10. How many primes between 10 and 100 have their unit's digit equal to 1?
An example of such a prime is 31. _____ 10

11. The square $DEFG$ is inside ΔABC.
Points D and E are on AB, point F is on BC, and point G is on AC.
The area of $DEFG$ is 16 and the area of ΔFGC is 6.
What is the area of ΔABC?
Express the answer as a fraction in lowest terms.



_____ 11

12. Eric tossed a fair coin 7 times and the total number of "HEADS" that he got was 2. What is the probability that he got 2 "HEADS" in a row?
Express the answer as a fraction in lowest terms. An example of a valid such toss is to get "HEADS" on the second and third tosses. _____ 12