Put ID Sticker Here

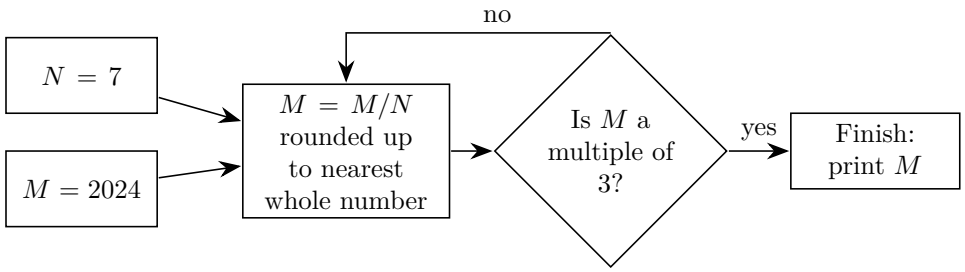
TARGET ROUND – GRADE 7

No Peeking: Wait for instructions to start!

This area is for the use of the markers only

Problems 1-4 (max 4)	Problems 5-8 (max 4)	Problems 9-12 (max 4)	Stage Tot. (max 12)	Re-marker Name

1. The initial values in the flow chart below are $N = 7$, and $M = 2024$. The value of M is changed according to the instructions in the boxes of the flow chart. What is the final value of M in the box on the right hand side?



_____ 1.

2. $400,000 < N^3 < 500,000$ is a 6-digit whole number. The units digit of N is 5. What is N?

_____ 2.

3. A box with whole number sides L, M, and N has volume $V = 3059$. Another box with the same volume has sides $L + 4$, $M - 4$ and N. What is the value of $L + M + N$?

_____ 3.

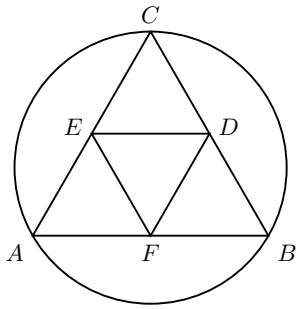
4. There are 10 lockers in a room, numbered from 1 to 10. They all start off locked. Turning the key in a locker either locks it (if it was already unlocked) or unlocks it (if it was already locked). At step 1, Ed turns the key in every second locker (lockers $2, 4, 6, 8$ and 10). At step 2, he turns the key in every third locker (lockers $3, 6$ and 9). At step 3, he turns the key in every 4^{th} locker (lockers 4 and 8), and so on, until the final step (step 9) where he only turns the key in the 10^{th} locker. What is the sum of the numbers of all of the *unlocked* lockers after step 9?

_____ 4.

5. $N = 9$. What is the remainder of $\dfrac{(8N+3)\times 3}{7}$? _____ 5.

6. How many pairs (N, M) are there such that $N > 0$, $M > 0$ are whole numbers and $3N + 7M = 100$? _____ 6.

7. All of the small line segments in the figure below are sides of equilateral triangles. $\triangle ABC$ is circumscribed in a circle with area 64π. Find the height of $\triangle ABC$.



_____ 7.

8. All of the internal angles of a regular polygon are the same. How many different regular polygons are there such that this angle is a whole number (when measured in degrees)? _____ 8.

9. What is the largest 9-digit number which is divisible by 9 and has a digit sum of 63? _____ 9.

10. Three fair dice are rolled. What is the probability that the sum of the dice is less than 8? Express the answer as a fraction in lowest terms. _____ 10.

11. A water tank at the Vancouver Aquarium has two taps. One tap fills it at a rate of 15 litres per minute, and the other fills at rate of 20 litres per minute. The tank was empty when both taps were turned on. Unfortunately, the drain was also open, so the tank was leaking at a rate of 6 litres per minute. After two hours, the leak was noticed and the drain was closed. The tank was finally full after 6 hours. What is the volume of the tank in m^3 (cubic metres)? Express the answer as a decimal correct to two decimal places (there are 1000 litres in a cubic meter). _____ (m^3) 11.

12. All of the edges of a rectangular box are prime numbers. The sum of the areas of its largest face and its smallest face is 1104. What is the maximum possible volume of the box? _____ 12.