2021 Chapter & Chapter Invitational Competitions – February 7, 2022

Problems & Solutions

With the 2022 Chapter Competition coming up next week, here are some problems from the 2021 Chapter and Chapter Invitational Competitions for extra practice! (Note: The structure of the 2021 Competition Series was changed due to the COVID-19 pandemic. The Chapter Invitational level was only part of the 2021 program year. Moving forward, including in this 2022 program year, the levels will be the same as they have always been – School, Chapter, State, National.)

2021 Chapter Competition, Sprint Round, #22

Griffin bakes a perfectly circular pizza with a diameter of 10 inches, and he sells it for $0.20 per square inch. What is the cost for the entire pizza? Express your answer to the nearest whole dollar.

*We need to find the area of the pizza that Griffin bakes with a diameter of 10 in, or radius 5 in. Using the formula for the area of a circle, πr^2, we see that the pizza has a total area of $\pi \times 5^2 = 25\pi$ in². At $0.20 per square inch, the cost of this pizza is 25 × 3.14 × 0.20 = 3.14 × 5 = $15.70, which is approximately $**16** or $**16.00**. (Because we were not allowed to use a calculator for this, we approximated π to be 3.14.)*

2021 Chapter Competition, Target Round, #1

If there are 0.624782 lugs in a pique, then how many piques are in 200 lugs? Express your answer to the nearest integer.

*We can set up the proportion 0.624782 lugs/1 pique = 200 lugs/x piques. Cross-multiplying and solving for x gives us 0.624782x = 200, so x = 200/0.624782 ≈ **320** piques.*

2021 Chapter Invitational Competition, Sprint Round, #17

Kody's alarm rings every 11 minutes, and his dad calls upstairs every 15 minutes to wake him up. But Kody will only wake up if his alarm rings and his dad calls him at the same time. If his alarm first rings at 7:00 a.m. and his dad first calls him at 7:05 a.m., at what time will Kody wake up?

*The alarm rings at 11m minutes after 7:00 for non-negative integers m; his dad calls at 5 + 15n minutes after 7:00 for non-negative integers n. We need the least non-negative integer values of m and n for which the two expressions are equal. Because times when his dad calls are at multiples of 5 min, m must be a multiple of 5. Because the coefficients of m [11] and n [15] have a least common multiple of 15 × 11 = 165, the time pattern repeats every 165 min, so the earliest overlap will satisfy 0 ≤ m < 15. Thus, m must be 0, 5 or 10. For m = 0, we need 5 + 15n = 0, which cannot be for integer n. For m = 5, we need 5 + 15n = 55, which cannot be for integer n. For m = 10, we need 5 + 15n = 110, for which we have a solution, n = 7. Therefore, the earliest overlap is 110 minutes after 7:00, so **8:50** a.m..*

Cindy has been given four chores to complete today: vacuum, mop, dust and laundry. Because Cindy finds doing laundry especially unpleasant, she wants to do that chore last. Given this, in how many different orders can Cindy complete her chores?

*The 1 chore of laundry is to be done fourth. Any of the other 3 chores can be done first. Either of the 2 remaining chores can be done second. Then the only 1 remaining chore is done third. Thus, there are 1 × 3 × 2 × 1 = **6** different orders.*

MATHCOUNTS® Problem of the Week Archive

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2021 Chapter Invitational Competition, Target Round, #3

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