Task Specific Rubric: GEARS!

Level	Understanding	Strategies, Reasoning, & Procedures	Communication
Novice	✓ There are no solutions or the solutions have no relationship to the task. ✓ The student does not understand enough about the concept of multiples, least common multiples (LCM) or ratios to arrive at a solution to the task.	✓ The student cannot start the task or s/he has started the task using manipulatives or representations but cannot complete the task. ✓ **Sample Strategies:** The student does not understand the task and resorts to adding number 12 + 20 = 32 to determine the number of teeth in Gear A.	✓ There is little or no communication, the student did not label the work and their thinking is difficult to follow. ✓ The student uses little or no math terms/symbols in his/her explanation of calculating the number of teeth and the number of rotations needed for Gears A, B or C. ✓ The student has no system for tracking the rotation of each of the gears.
Apprentice	✓ The student demonstrates a beginning understanding about the concept of multiples and LCM to calculate a common multiple for Gears B and C, but does not arrive at a correct solution to the task. ✓ The student does not consider the number of rotations needed for Gears A, B or C.	✓ The student uses an appropriate strategy to determine how to calculate the LCM of Gears B and C, but does not achieve a correct solution. ✓ **Sample Strategies:** The student multiplies 12 x 20 = 240 to find a common multiple for Gear A, but does not find the LCM, which is 60 teeth in Gear A.	✓ The student has attempted to communicate their findings by labeling their work, but does not attempt to summarize their work by stating their final answer. ✓ The student uses some math terms/symbols to explain how s/he calculated the number of teeth and the number of rotations needed for Gears A, B or C. ✓ The student has established a system (chart, graph, T-table) for tracking the gears, the gear rotations, and the number of teeth in each gear.

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Practitioner	✓ The student demonstrates an understanding of calculating multiples and LCM to determine the total number of teeth for Gear A. ✓ The student can make a connection between the number of teeth in each gear and the number of times each gear will rotate, but cannot establish a gear ratio.	✓ The student uses an accurate and appropriate strategy to calculate the number of teeth for each gear, the number of rotations for each gear and the LCM for Gears A, B and C. ✓ **Sample Strategies:** The student calculates LCM by listing out the multiples of Gears B and C to determine the number of teeth in Gear A (60) and states the number of times each gear rotates. **For Example:** Gear B: 12 24 36 48 60 72 84 96 108 120 Gear C: 20 40 60 80 100 120 140 LCM = 60 Gear A has 60 teeth and will rotate once, Gear B has 12 teeth and will rotate 5 times for every one rotation of Gear A. Gear C has 20 teeth and will rotate 3 times for every one rotation of Gear A	✓ The student represents his/her work in a clear, organized manner, and uses appropriate math terms/symbols in his/her explanation of how s/he calculated the number of teeth and the number of rotations needed for Gears A, B and C. ✓ The student has created an efficient system (chart, graph, T-table) for tracking the gears, the gear rotations, and the number of teeth in each gear. ✓ The student can defend his/her final decision by identifying and explaining the LCM of 12 and 20; and establishing the number of rotations each gear must make. **For Example:** The LCM of Gear B and C is 60, So Gear A has 60 teeth and will rotate once, Gear B has 12 teeth and will rotate 5 times, and Gear C has 20 teeth and will rotate 3 times.
Expert	✓ The student demonstrates an understanding of calculating multiples and LCM to determine the total number of teeth for Gear A and can determine the gear ratio. ✓ The student can make a rule/generalization about the connection between the number of teeth for each gear and how it effects its rotation.	✓ The student uses an accurate and appropriate strategy to calculate the number of teeth for each gear; the number of rotations for each gear; the LCM for Gears A, B and C; and the gear ratios. ✓ **Sample Strategies:** The student calculates LCM by listing out the multiples of Gears B and C to determine the number of teeth in Gear A (60), states the number of times each gear rotates, and defines the gear ratios for Gears A:B (1:5) and A:C (1:3). **For Example:** Gear A has 60 teeth, Gear B has 12 teeth, the ratio is 1:5 because every time Gear A rotates once, Gear B must rotate 5 times because it has less teeth.	✓ The student represents his/her work in a clear, organized manner, and uses appropriate math terms/symbols in his her explanation of how s/he calculated the number of teeth, and the number of rotations needed for Gears A, B and C. ✓ The student includes a statement or generalization about the connection between the number of teeth in each gear, the gear rotations and the ratios for the gear rotations. **For Example:** The gear ratio for Gear A to Gear B is 1: 5, meaning every time Gear A rotates once, Gear B will have rotated 5 times.