

**Table 1**

Few-shot prompts for revising reasoning steps in Stage 1 (continued in Table 2).

**Question:** Natalia sold clips to 48 of her friends in April, and then she sold half as many clips in May. How many clips did Natalia sell altogether in April and May?

**Explanation:** 1. We first need to find out how many clips Natalia sold in May. We know that she sold half as many clips in May as she did in April, so we can divide the number of clips sold in April (48) by 2. The arithmetic expression for this step is: #0=divide(48,2). 2. Next, we need to find the total number of clips sold by adding the number of clips sold in April (48) to the number of clips sold in May (#0). The arithmetic expression for this step is: #0=divide(48,2); #1=add(48,#0).

**Arithmetic expression:** #0=divide(48,2); #1=add(48,#0)

**Question:** Lisa is looking to attempt a World Record. She has decided to try and match Joey Chestnut's record of eating 75 full hotdogs, buns included, in 10 minutes. Halfway through the time Lisa has eaten 20 hotdogs. How many hotdogs will she have to eat per minute to at least tie Joey Chestnut's record?

**Explanation:** 1. Since Lisa has eaten 20 hotdogs halfway through the 10-minute time limit, we know that there are only 5 minutes left for her to eat the remaining hotdogs. To find out the number of minutes Lisa has left to eat hotdogs, we divide the total time limit of 10 minutes by 2, which gives us 5 minutes. The arithmetic expression for this step is: #0=divide(10,2). 2. Next, we need to calculate how many hotdogs Lisa still needs to eat to at least tie Joey Chestnut's record. We do this by subtracting the number of hotdogs Lisa has already eaten (20) from Joey Chestnut's record of 75. The arithmetic expression for this step is: #1=subtract(75,20). 3. Finally, we can find out how many hotdogs Lisa needs to eat per minute during the remaining 5 minutes to at least tie Joey Chestnut's record. We divide the number of hotdogs that Lisa still needs to eat (#1) by the number of minutes left for her to eat them (#0). The arithmetic expression for this step is: #2=divide(#0,#1).

**Arithmetic expression:** #0=divide(10,2); #1=subtract(75,20); #2=divide(#0,#1)

**Question:** Brandon sold 86 geckos last year. He sold twice that many the year before. How many geckos has Brandon sold in the last two years?

**Explanation:** 1. We first need to find out how many geckos Brandon sold the year before. We do this by multiplying the number he sold last year (86) by 2. The arithmetic expression for this step is: #0=multiply(86,2). 2. Next, we can find the total number of geckos sold in the last two years by adding the number he sold the year before (#0) to the number he sold last year (86). The arithmetic expression for this step is: #1=add(86,#0).

**Arithmetic expression:** #0=multiply(86,2); #1=add(86, #0)

**Question:** In preparation for the upcoming Olympics, Rita's swimming coach requires her to swim a total of 1,500 hours. Rita has already completed 50 hours of backstroke, 9 hours of breaststroke, and 121 hours of butterfly, but she is unhappy with her inconsistency. She has therefore decided to dedicate 220 hours every month practicing freestyle and sidestroke. How many months does Rita have to fulfill her coach's requirements?

**Explanation:** 1. First, we need to find out how many hours Rita has already completed. We can do this by adding up the number of hours she has completed for each stroke: 50 hours of backstroke + 9 hours of breaststroke + 121 hours of butterfly by: #0=add(50, 9); #1=add(#0, 121). 2. Next, we need to find out how many hours Rita still needs to complete. We can do this by subtracting the hours she has completed (#1) from the total number of hours required by her coach (1,500 hours): #2=subtract(1500,#1). 3. We now need to determine how many months it will take Rita to complete the remaining hours. We can do this by dividing the remaining hours (#2) by the number of hours Rita will be practicing every month (220): #3=divide(#2,220).

**Arithmetic expression:** #0=add(50,9); #1=add(#0,121); #2=subtract(1500,#1); #3=divide(#2,220).

## 1. Full Prompts

### 1.1. Prompts in Stage 1

Prompts are shown in Table 1 and Table 2.

### 1.2. Prompts in Stage 2

Prompts are shown in Table 3 and Table 4.

**Table 2**

Few-shot prompts for revising reasoning steps in Stage 1 (continued from Table 1).

**Question:** On Blacks, Martha goes to the mall to buy clothes on sale. For every 2 jackets she buys, she gets 1 free jacket. For every 3 t-shirts she buys, she gets 1 free t-shirt. Martha decides to buy 4 jackets and 9 t-shirts. How many clothes will she take home?

**Explanation:** 1. We first need to calculate how many free jackets Martha will get for buying 4 jackets. Since for every 2 jackets bought, she gets 1 free jacket, we can divide the number of jackets (4) she bought by 2 to get the number of free jackets. The arithmetic expression for this step is:  $\#0=\text{divide}(4,2)$ . 2. Using the result from  $\#0$ , we can now add the number of free jackets ( $\#0$ ) to the number of jackets (4) Martha bought to get the total number of jackets she will take home. The arithmetic expression for this step is:  $\#0=\text{divide}(4,2); \#1=\text{add}(\#0,4)$ . 3. Next, we need to calculate how many free t-shirts Martha will get for buying 9 t-shirts. Since for every 3 t-shirts bought, she gets 1 free t-shirt, we can divide the number of t-shirts (9) she bought by 3 to get the number of free t-shirts. The arithmetic expression for this step is:  $\#2=\text{divide}(9,3)$ . 4. Using the result from  $\#2$ , we can now add the number of free t-shirts ( $\#2$ ) to the number of t-shirts (9) Martha bought to get the total number of t-shirts she will take home. The arithmetic expression for this step is:  $\#3=\text{add}(\#2,9)$ . 5. Finally, we can add the total number of jackets and t-shirts Martha will take home to get the total number of clothes she will take home. The arithmetic expression for this step is:  $\#4=\text{add}(\#1,\#3)$ .

**Arithmetic expression:**  $\#0=\text{divide}(4,2); \#1=\text{add}(\#0,4); \#2=\text{divide}(9,3); \#3=\text{add}(\#2,9); \#4=\text{add}(\#1,\#3)$ .

**Question:** Kate's hair is half as long as Emily's hair. Emily's hair is 6 inches longer than Logan's hair. If Logan hair is 20 inches, how many inches is Kate's hair?

**Explanation:** 1. We first need to find out the length of Emily's hair by adding 6 inches to Logan's hair length (20). The arithmetic expression for this step is:  $\#0=\text{add}(20,6)$ . 2. Next, we need to find out how long Kate's hair is by dividing the length of Emily's hair ( $\#0$ ) by 2 because Kate's hair is half as long as Emily's hair. The arithmetic expression for this step is:  $\#1=\text{divide}(\#0,2)$ .

**Arithmetic expression:**  $\#0=\text{subtract}(20,6); \#1=\text{divide}(\#0,2)$ .

**Question:** Ron ate pizza with his friends the other day. If they ordered a 12-slice pizza and each of them ate 4 slices, how many friends were there with Ron?

**Explanation:** 1. We start with the total number of slices in the pizza (12) and divide it by the number of slices each person ate (4) to find the total number of people who ate pizza. The arithmetic expression for this step is:  $\#0=\text{divide}(12,4)$ . 2. But the question asks for the number of friends with Ron, so we need to subtract Ron himself from the total number of people who ate pizza. We can subtract 1 from the total we got in  $\#0$ . The final arithmetic expression is:  $\#1=\text{subtract}(\#0,1)$ .

**Arithmetic expression:**  $\#0=\text{divide}(12,4); \#1=\text{subtract}(\#0,1)$ .

**Question:** Jerry's two daughters play softball on different teams. They each have 8 games this season. Each team practices 4 hours for every game they play. If each game lasts for 2 hours, how many hours will Jerry spend at the field watching his daughters play and practice altogether?

**Explanation:** 1. We first need to find out the total number of practice hours for one of Jerry's daughters by multiplying the number of games each team has (8) by the practice hours per game (4). The arithmetic expression for this step is:  $\#0=\text{multiply}(8,4)$ . 2. Then, we can find out the total number of game hours for one of Jerry's daughters by multiplying the number of games each team has (8) by the game hours per game (2). The arithmetic expression for this step is:  $\#1=\text{multiply}(8,2)$ . 3. Then, we can get the total number of hours Jerry will spend watching one of his daughters by adding the total practice and game hours together. The arithmetic expression for this step is:  $\#2=\text{add}(\#0,\#1)$ . 4. Finally, we note that Jerry has two (2) daughters play softball on different teams, so we need multiply the result from last step ( $\#2$ ) with 2:  $\#3=\text{multiply}(\#2,2)$  to get the final result.

**Arithmetic expression:**  $\#0=\text{multiply}(8,4); \#1=\text{multiply}(8,2); \#2=\text{add}(\#0,\#1); \#3=\text{multiply}(\#2,2)$ .

**Question:** {{QUESTION}}

**Explanation:**

**Table 3**

Few-shot prompts for reducing question complexity in Stage 2 (Continued in Table 4).

**Original complex question:** Olaf collects colorful toy cars. At first, his collection consisted of 150 cars. His family, knowing his hobby, decided to give him some toy cars. Grandpa gave Olaf twice as many toy cars as the uncle. Dad gave Olaf 10 toy cars, 5 less than Mum. Auntie gave Olaf 6 toy cars, 1 more than the uncle. How many toy cars does Olaf have in total, after receiving all these gifts?

**Rewrite original complex question into a simplified version:** Olaf collects colorful toy cars. At first, his collection included 150 cars. His family knew about his hobby and decided to give him some toy cars. Grandpa gave Olaf twice as many toy cars as his uncle. Uncle gave him 10 toy cars. After receiving all these gifts, how many toy cars does Olaf have in total?

**Original complex question:** Mr. Finnegan has 3 tanks with a capacity of 7000 gallons, 5000 gallons, and 3000 gallons, respectively. If he fills the first tank up to  $\frac{3}{4}$  full, the second tank with water up to  $\frac{4}{5}$  of its capacity, and the third tank up to half of its capacity, how many gallons in total are in the tanks?

**Rewrite original complex question into a simplified version:** Mr. Finnegan has 2 tanks with a capacity of 7000 gallons, 5000 gallons, respectively. If he fills the first tank up to  $\frac{3}{4}$  full, the second tank with water up to  $\frac{4}{5}$  of its capacity, how many gallons in total are in the tanks?

**Original complex question:** Denmark wants to order pizza. For toppings, he has 3 cheese, 4 meat and 5 vegetable options, one of which is peppers. He can have only one selection from each topping category (one cheese, one meat and one vegetable). However, if he chooses to have pepperoni, he cannot have peppers. How many topping combinations does he have total?

**Rewrite original complex question into a simplified version:** Denmark wants to order pizza. For toppings, he has 3 cheese, 4 meat and 5 vegetable options. He can have only one selection from each topping category (one cheese, one meat and one vegetable). How many topping combinations does he have total?

**Original complex question:** 8 years ago James was twice Janet's age. In 15 years James will turn 37. Susan was born when Janet turned 3. How old will Susan turn in 5 years?

**Rewrite original complex question into a simplified version:** 8 years ago James was twice Janet's age. In 15 years James will turn 37. How old is Janet?

**Original complex question:** There are three trees in the town square. The tallest tree is 150 feet tall. The middle height tree is  $\frac{2}{3}$  the height of the tallest tree. The shortest tree is half the size of the middle tree. How tall is the shortest tree?

**Rewrite original complex question into a simplified version:** There are three trees in the town square. The tallest tree is 150 feet tall. The middle height tree is 20 feet shorter than the tallest tree. The shortest tree is half the size of the middle tree. How tall is the shortest tree?

**Original complex question:** It's Meghan's turn to pick up her team's coffee order. She needs 2 drip coffees that are \$2.25 each and one double shot espresso that's \$3.50. She needs 2 lattes that are \$4.00 and needs to add vanilla syrup to one of those for an additional \$0.50. She also needs 2 cold brew coffees that are \$2.50 each and 1 cappuccino for \$3.50. How much is the coffee order?

**Rewrite original complex question into a simplified version:** It's Meghan's turn to pick up her team's coffee order. She needs 2 drip coffees that are \$2.25 each and one double shot espresso that's \$3.50. She needs 2 lattes that are \$4.00 each. How much is the coffee order?

**Table 4**

Few-shot prompts for reducing question complexity in Stage 2 (Continued from Table 3).

**Original complex question:** The tallest building in the world is 100 feet tall. If the second tallest is half that tall, and the third tallest is half as tall as the second, and the fourth is one-fifth as tall as the third, how tall are all 4 buildings put together?

**Rewrite original complex question into a simplified version:** The tallest building in the world is 100 feet tall. If the second tallest is 20 feet lower than tall. how tall are both 2 buildings put together?

**Original complex question:** A factory decides to stop making cars and start making motorcycles instead. When it made cars, per month, it cost \$100 for materials, they could make 4 cars, and they sold each car for \$50. Now that they make motorcycles it costs \$250 for materials, but they sell 8 of them for \$50 each. How much more profit do they make per month selling motorcycles instead of cars?

**Rewrite original complex question into a simplified version:** A factory decides to start making motorcycles. Now they make motorcycles it costs \$250 for materials, but they sell 8 of them for \$50 each. How much more profit do they make per month selling motorcycles instead of cars?

**Original complex question:** {{QUESTION}}

**Rewrite original complex question into a simplified version:**