**Lower Elementary:**

*Question:* Jack is sitting in a swivel chair facing north. He spins a half turn clockwise, then a quarter turn counterclockwise, then a full turn clockwise, and finally a three-quarter turn counterclockwise. In which direction is Jack facing now?

**Upper Elementary:**

*Question:* Grace is buying a new charger for her phone and wants to know which one has the longer cord: a black charger with a 70-inch cord or a white charger with a 180-centimeter cord. An inch is 2.54 centimeters. Which cord is longer? By how much? Give your answer in centimeters.



**Middle School:**

*Question:* The number of ants in Karen’s ant farm doubles every day. On Sunday, there are 12,288 ants in the farm. When was the last day when there were fewer than 1,000 ants?

**Algebra and Up:**

*Question:* Will has four boxes of candles. One box is full, and each consecutive box has one fewer candle than the last. If Will has 450 candles in total, how many are in the full box?

**Lower Elementary:**

*Question:* Jack is sitting in a swivel chair facing north. He spins a half turn clockwise, then a quarter turn counterclockwise, then a full turn clockwise, and finally a three-quarter turn counterclockwise. In which direction is Jack facing now?

*Answer:* Jack is facing south.

*Solution:* If Jack starts facing north and spins a half turn clockwise, he will face south. Then, a quarter turn counterclockwise will cause him to face east. Next, a full turn (in either direction) will cause him to face east again. Finally, a three-quarter turn counterclockwise will cause him to face south.

**Upper Elementary:**

*Question:* Grace is buying a new charger for her phone and wants to know which one has the longer cord: a black charger with a 70-inch cord or a white charger with a 180-centimeter cord. An inch is 2.54 centimeters. Which cord is longer? By how much? Give your answer in centimeters.

*Answer:* The white cord is 2.2 centimeters longer.

*Solution:* Since an inch is 2.54 centimeters, that means that 70 inches is 70 × 2.54 = 177.8 centimeters. The white cord is 180 centimeters long, which is 180 – 177.8 = 2.2 centimeters longer.



**Middle School:**

*Question:* The number of ants in Karen’s ant farm doubles every day. On Sunday, there are 12,288 ants in the farm. When was the last day when there were fewer than 1,000 ants?

*Answer:* There were fewer than 1,000 ants on Wednesday.

*Solution:* If the number of ants doubles every day, then there were half as many each day before. So, there were 12,288 ÷ 2 = 6,144 ants on Saturday. On Friday, there were 3,072 ants. On Thursday, there were 1,536 ants. On Wednesday, there were 768 ants. Wednesday was the last day when there were fewer than 1,000 ants.

**Algebra and Up:**

*Question:* Will has four boxes of candles. One box is full, and each consecutive box has one fewer candle than the last. If Will has 450 candles in total, how many are in the full box?

*Answer:* The full box contains 114 candles.

*Solution:* The number of candles in the boxes will be four numbers whose average is 450 ÷ 4 = 112.5. Since the numbers are each one apart, we can reason that they are the two whole numbers before and after 112.5. So, there are 111, 112, 113, and 114 candles in the boxes. The full box therefore has 114 candles.