The Murray family is planning a six-day vacation in Utah. Rafael, who loves to calculate the best travel deals, searched the Web to find car rental rates. Here are the options he is considering:

- Car A: $199 per week, unlimited mileage.*
- Car B: $172 per week, 15 cents per mile for each mile over 300 miles *
- Car C: $30 per day, 8 cents per mile

* Partial week charged at full week’s price.

They haven’t yet decided how many miles they expect to drive, but Rafael wants to be ready to pick a car as soon as they do decide. How many miles would they need to drive in order for Car A to be the best choice? How about Car B? Or Car C?

**Extra:** Is there anything else you think he should take into consideration?

**MATH STANDARDS ALIGNMENT**

**CCSS.MATH.CONTENT.6.RP.A.1:**
Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.

**CCSS.MATH.CONTENT.6.RP.A.3**
Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.

**METHOD 1: COMPARING CARS**

I noticed that their vacation will be six days. This means that Car C will be $180, plus mileage. First I noticed that Car C is $19 cheaper than Car A, so I wondered how many miles you could drive, for 8 cents a mile, before Car C would cost as much as Car A.

\[
\frac{19}{0.08} = 237
\]

So once you drive Car C more than 237 miles, Car C will cost more than $199, so Car A then becomes the cheaper choice.

But then I noticed that Car B is only $172 dollars up to 300 miles, so it will be cheaper than Car C that whole time (since Car C starts at $180 before mileage).
I wondered when Car A would be cheaper than Car B. Car B is $27 less. At 15 cents a mile, those $27 will get you 180 miles. That is on top of the 300 miles you don’t have to pay for. So if you drive Car B 480 miles, it will cost the same as Car A, and if you drive further than that, Car A will be cheaper.

So Car B will be best up to 480 miles, then Car A will be the best choice. Car C won’t ever be the best choice.

**METHOD 2 : MAKE A TABLE**
I can figure this out by seeing how much the trip cost then, and then increasing that by 215%.

First I’ll figure out how many gallons it takes. To go 390 miles when the car gets 30 miles per gallon, I know it will take $390/30 = 13$ gallons.

Since each gallon cost $0.86 then, I know it will cost $13 \times 0.86 = $11.18.

To find how much it would be if that increased by 215%, that is the same as finding 315% of it (since the 215% gets added on to the whole thing, which is 100%). So I know that $11.18 \times 3.15 = $35.22.

It will cost $35.22 to make the same trip now.

**METHOD 3**
I decided to make a table to help me figure this out. I know that Car A is $199 no matter how far they drive, so that was easy.

For Car B, I just put $172 until it got to 300 miles. Then, since that car costs 15 cents a mile after 300 miles, I used the formula

$$172 + 0.15 \times (\text{miles} - 300)$$

For Car C, I know that the vacation will be six days long, so that will be $180 (since it is $30 per day). I used the formula

$$180 + 0.08 \times \text{miles}$$

I made a big table since I did it in a spreadsheet. I was curious what happened when the miles got pretty high.
In my table, I first noticed that Car C is never the cheapest, even if they were not going to drive very far. So I didn’t worry about that one any more. (Though I did notice that some time between 750 miles and 800 miles, it becomes cheaper than Car B.)

I also noticed that Car B is the cheapest until somewhere between 450 and 500 miles. I decided to try to figure out exactly where that was going to happen by picking some other distances and calculating the cost for Car B (remember that the cost for Car A never changes). I decided to start with 475 miles.

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199 + 0.15(475 - 300) = 199 + 0.15(175) = 199 + 26.25 = 225.25
\]

At 475 miles, Car B is still cheaper, but only by 75 cents. That 75 cents will be made up by 5 miles (15 \cdot 5 is 75), so they will be the same at 480 miles. After that, Car A will be cheaper since the cost for Car B will keep going up.