I live downtown and my grandmother lives in the suburbs. I made plans to meet her for lunch and I am trying to decide how to get to her house. My grandmother lives 12.5 miles from my house. I can think of three ways to go:

- A city bus and will cost me $2.25, not matter how far I travel.
- A taxi, there is a $2.70 flat fee to start and then it costs $0.23 per mile beyond that.
- A train is priced by zone, it is $4.75 for the first two zones, then $1.00 more for the 3rd zone, $0.75 more for the 4th zone and $2.50 more if I want to cross the state lines. My grandmother lives 3 zones away.

For each transportation option, pick the sketched graph below that you think best illustrates the cost of getting to my grandmother's house. For each graph you choose, explain why you think it's the best fit and include the units that you would put on each axis.
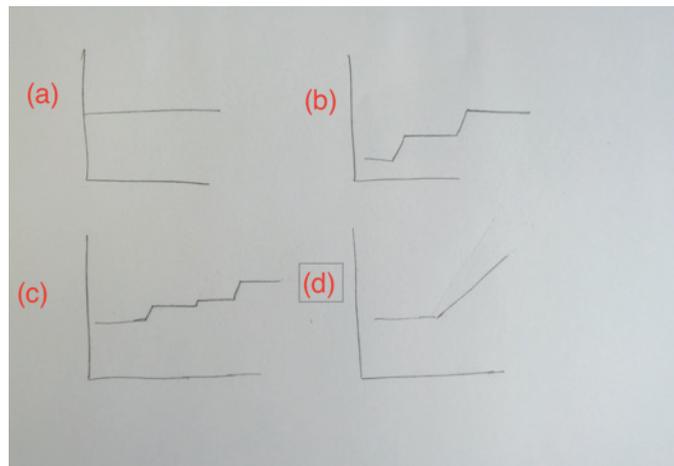
Extra: Which option is the most cost effective? What other factors might your consider when choosing your travel? Explain your thinking.

MATH STANDARDS ALIGNMENT
CCSS.MATH.CONTENT.HSA.SSE.A.1
Interpret expressions that represent a quantity in terms of its context.

CCSS.MATH.CONTENT.8.F.A.2
Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).

Personal Finance Big Ideas:
Cost/Benefit Analysis; What is Money
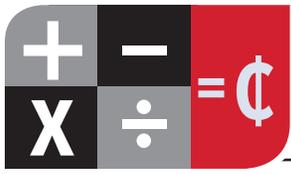
METHOD 1: LOGICAL REASONING

The cost of the bus is $2.25 no matter how I travel. Graph (a), with distance on the horizontal axis and cost on the vertical, illustrates the bus since the cost stays the same no matter what distance is traveled.

The taxi starts out at $2.70 and then increases by 23 cents for each mile traveled after we start moving. Graph (b), with distance on the horizontal axis and cost on the vertical, illustrates the taxi since the cost steps up in increments as distance increases. In other words, the taxi can't cost $2.75, since it jumps directly from $2.70 to $2.93 for the first mile, then to $2.3.16 for the next mile, and so on. Any distance between 0 miles and 1 mile will cost $2.70, so there is a flat segment at $2.70. Any distance between 1 mile and 2 miles will cost $2.93, so the graph jumps up to $2.93 at a distance of 1 mile and stays flat at $2.93 until the next 23 cent increment at a distance of 2 miles.

The cost of train starts at $4.75 for one or two zone travel. The it increased at different increments at each zone. So to travel 3 zones, it would cost $5.75, a $1.00 increase and to travel 4 zones, it would cost $6.50, a $0.75 increase. To travel outside of the state, it would be another $2.50 or $8 total. Looking at the graphs, with distance on the horizontal axis and cost on the vertical, this reminds me of the taxi because it has a starting price, and then it's flat until the next increase, but the increases are not the same each time, so the height might be different. I think Graph (c) matches the train travel best.

Extra

The bus is clearly the least expensive at $2.75. The taxi will cost $2.70 + 12 (0.23) which is equal to $5.36 (what an inexpensive taxi!!), but still pricier than the bus. And the train will cost $6.50. One factor I would consider would be price. Even though the train is the most expensive, if there is traffic or an accident and my cab has to go another route and travel more miles, I will have to pay more – so the taxi cost could be variable. The bus is clearly the least expensive, but it can be really slow – it stops at every corner! The train is more expensive, but it's consistently on time and I love reading on the train or napping! I think I would choose the train because I sometimes get carsick, so I don't want to take the taxi and I might want to have an nice nap and I can sleep on the train and not on the bus. Also, grandma might give me a ride home in her car, so I wouldn't have to pay for it both ways!
the cost will be the same at 4:10 pm.