

Ordering Rates of Change

Define, evaluate, and compare functions.

- 8.F.2. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.*

Use functions to model relationships between quantities.

- 8.F.4. Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.

Procedure:

1. Have the students do the pre-assessment task, in class or for homework a day or two before the lesson. This will give you an opportunity to assess the work, and to find out the kinds of difficulties students have with it. You will be able to target your help more effectively in the follow-up lesson.
2. Give each student a copy and tell them to read through the questions and try to answer them as carefully as they can. It is important that students be able to answer the questions without your assistance, as far as possible. Students should not worry too much if they cannot understand or do everything. The work in the task will engage them in a similar task.
3. Collect student responses and make notes on their current level of understanding. It is suggested that you not score the student work- this will encourage students to share their scores and distract their attention away from improving their response.

On the day of the lesson:

4. Put students in pairs or groups of three. Distribute the cards to the students and instruct them to order the cards from the least rate of change to the greatest rate of change.
5. Circulate among groups- noting student strategies to approaching the problem. Try not to guide students to a particular approach, rather ask questions to help students clarify their thinking.
6. When students have completed as much work as they can, employ one or more of the strategies:
 - a. Create an expert to share an insight with the class.
 - b. Allow one student from each group to visit the other groups. Group members doing the visiting should be asking questions of the other groups. Group members left at their seats, should answer the questions asked by visitors.
 - c. Ask each group to share the strategy they are using to complete the task. Allow students to have a discussion regarding the effectiveness of the various strategies. Allow students to return to their work.
7. Extension- Ask students to create three of their own cards and place them appropriately in their other cards. (You may choose to specify that they create one with a smaller rate of change than those given, one with a larger rate of change than those given, and one somewhere in the middle.)

Be sure to have a full class discussion, allow students to share key insights they had during the lesson.

Pre-assessment

Look at the advertisements below. Determine which plumber charges the smallest fee per hour and which charges the greatest fee per hour. Explain your reasoning.

Pete's Pipes:

Pete's Pipes- We'll fix 'em right!

Fee \$75 for a service call plus \$60 for each hour of work.

****Fully insured**

Sinks 'n Such

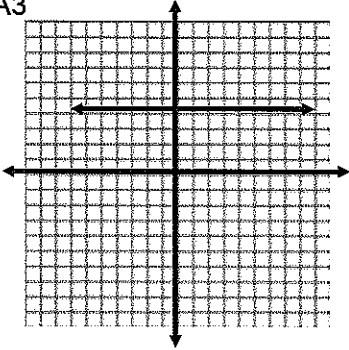
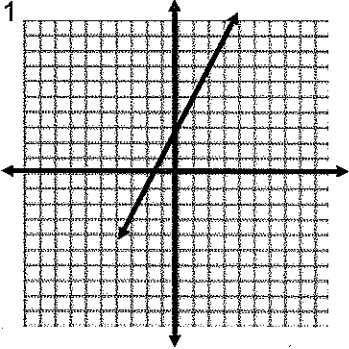
Sinks, toilets, drains and pipes- we service all!

See the table of fees below:

Hours	Total Cost of Labor
1	\$100
2	\$140
3	\$180
4	\$220
5	\$260

LICENSED PLUMBERS, INC.

<p>PROFESSIONAL SERVICE- QUICK!</p> <p>WE PROVIDE PROFESSIONAL SERVICE 24 HOURS A DAY!</p> <p>NO CHARGE FOR A SERVICE CALL!!!!!!</p> <p>FLAT RATE- \$100 PER HOUR</p>

<p>A1</p> <p>A student gets paid \$7 per hour to babysit her neighbor.</p>	<p>A2</p> <p>A boy purchases a ticket to a skating party for \$3.00. The fee to rent skates is \$1.75 per hour.</p>	<p>A3</p> 																				
<p>A4</p> <table border="1" data-bbox="266 711 461 1033"> <thead> <tr> <th>x</th> <th>y</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>5</td> </tr> <tr> <td>2</td> <td>8</td> </tr> <tr> <td>3</td> <td>11</td> </tr> <tr> <td>4</td> <td>14</td> </tr> </tbody> </table>	x	y	1	5	2	8	3	11	4	14	<p>A5</p> <table border="1" data-bbox="699 705 894 1029"> <thead> <tr> <th>x</th> <th>y</th> </tr> </thead> <tbody> <tr> <td>2</td> <td>3</td> </tr> <tr> <td>4</td> <td>13</td> </tr> <tr> <td>6</td> <td>23</td> </tr> <tr> <td>8</td> <td>33</td> </tr> </tbody> </table>	x	y	2	3	4	13	6	23	8	33	<p>A6</p>
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<p>A7</p> $8x - 2y = 10$	<p>A8</p> $y = (5/2)x + 4$	<p>A9</p>																				
<p>A10</p> <p>Line through the points (3,4) and (1,1).</p>	<p>A11</p> 	<p>A12</p>																				