Why Ask Why?
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“I suggest there are only two good reasons to ask questions in class: to cause thinking and to provide information to the teacher about what to do next.” (Dylan William)
Cell Phone Line Up

- Take out your cell phone.
- Think of your last two digits of your cell phone number.
- Line up from Least (Right)- to the Greatest (Left)
- Now share a picture with your shoulder partner.
Daily Learning Intentions

*Today, participants will leave with...*

…an understanding of how to develop questions using the

- sorting activity when introducing a new concept.
- task anticipation guide along with the depth and complexity icons or the question matrix when assigning a task.
Glance over the 6th and 7th grade standards provided to you

On separate sticky notes or cards, script some typical questions you might ask about when working in ratio and proportional reasoning.

How we use this…
Now, use the horizontal continuum on the chart paper. This horizontal axis will represent generativity, that is, how likely will the question generate conceptual understanding among students. As a group, discuss and place each question on the continuum.
Question Sort

Use the vertical continuum intersecting the horizontal axis on the chart paper. This line represents how genuine, that is, how much will the students care about investigating the question. As a group, discuss and place each question by moving the post-it note up or down the continuum.
Coordinate Plane

How could you use this strategy in collaborative planning?
Popcorn Anyone?

- Today in school students will learn about popcorn.
- Write down two questions you might ask your students to get them to begin thinking about popcorn.
Depth and Complexity Icons
When Mr. Short is measured in paper clips, he is 6 paper clips tall. When he is measured in buttons, he is 4 buttons tall.

Mr. Short has a friend named Mr. Tall. When Mr. Tall is measured in buttons, he is 6 buttons tall.

• How many paper clips tall is Mr. Tall?
Anticipation Guide

Solve in as many ways as possible.
Where will students show success?
Where will students struggle?
Examples

(a)

I went 6 + 2 because
with the matchsticks
Mr. Short is 4 and Mr. Tall
is 6. So I
added 2.

Answer:

8

(b)
Examples

4 matchsticks \xrightarrow{\times 1.5} 6 paper clips

6 matchsticks \xrightarrow{?} paper clips

\times 1.5
Examples
Examples

(a) \[ \frac{1}{2} \]

(b) \[
\begin{array}{c}
6 \\
\times 4 \\
\hline
24
\end{array}
\]

(c) \[ b - a = 2 \]

(c) \[ b \times 2 = 12 \]
Depth and Complexity
Icons Revisited
Pruning Trees Task

It takes Keith 45 minutes to prune a tree. It takes Richard 70 minutes to prune a tree. They form a company and agree to prune 92 trees.

• If they both work at the same time and at constant rates, how long will it take them to prune all 92 trees?

• How many trees will each have pruned?
Anticipation Guide

Solve in as many ways as possible.
Where will students show success?
Where will students struggle?
Examples

In 630 minutes:
Keith pruned 19 trees
Richard pruned 9 trees

In 42 hours:
Keith pruned 56 trees
Richard pruned 36 trees

In 2520 minutes:
Keith pruned 56 trees
and Richard pruned 36 trees.
Examples

<table>
<thead>
<tr>
<th>Keith</th>
<th>Richard</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 tree</td>
<td>45 min</td>
</tr>
<tr>
<td>2 trees</td>
<td>90 min</td>
</tr>
<tr>
<td>3 trees</td>
<td>135 min</td>
</tr>
<tr>
<td>4 trees</td>
<td>180 min</td>
</tr>
<tr>
<td>5 trees</td>
<td>225 min</td>
</tr>
<tr>
<td>6 trees</td>
<td>270 min</td>
</tr>
<tr>
<td>7 trees</td>
<td>315 min</td>
</tr>
<tr>
<td>8 trees</td>
<td>360 min</td>
</tr>
<tr>
<td>9 trees</td>
<td>405 min</td>
</tr>
<tr>
<td>10 trees</td>
<td>450 min</td>
</tr>
<tr>
<td>11 trees</td>
<td>495 min</td>
</tr>
<tr>
<td>12 trees</td>
<td>540 min</td>
</tr>
<tr>
<td>13 trees</td>
<td>585 min</td>
</tr>
<tr>
<td>14 trees</td>
<td>630 min</td>
</tr>
</tbody>
</table>
Examples

Keith will prune 14 trees in 630 min.
Richard will prune 9 trees in 630 min.
23 total trees in 630 min.
Keith will do 36 trees in 630 min.
Richard will prune 36 trees in 630 min.
Richard can cut $60/70$ or $6/7$ of a tree in an hour.  
Keith can cut $60/45$ or $4/3$ trees in an hour.  
Together, they can prune $6/7 + 4/3$ trees in an hour.  
By using common denominators, they can cut $18/21 + 28/21$ which equals $46/21$ trees per hour.  
In order to cut 92 trees it will take them 92 divided by $46/21$.  

$$92/1 \times 21/26 = 1932/46$$ or 42 hours to 
prune all trees  
Then Keith prunes $4/3$ trees/hour $\times$ 42 hours or $168/3$ trees which is 56 trees.  
And, Richard prunes $6/7$ trees/hour $\times$ 42 hours or $252/7$ which is 36 trees.
Examples

<table>
<thead>
<tr>
<th>Hours</th>
<th>Keith</th>
<th>Richard</th>
<th>Running Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>10h</td>
<td>13.5T</td>
<td>8.4T</td>
<td>21.9 Trees</td>
</tr>
<tr>
<td>10h</td>
<td>13.5T</td>
<td>8.4T</td>
<td>21.9 Trees</td>
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<tr>
<td>10h</td>
<td>13.5T</td>
<td>8.4T</td>
<td>21.9 Trees</td>
</tr>
<tr>
<td>2h</td>
<td>2.3T</td>
<td>1.5T</td>
<td>41.4T</td>
</tr>
<tr>
<td>1/2h</td>
<td>0.6T</td>
<td>0.4T</td>
<td>92.3T</td>
</tr>
</tbody>
</table>

42 1/2 hrs

35.5T

56.9T

30 ÷ 45 = 0.6 - Keith
30 ÷ 70 = 0.4 - Richard
120 ÷ 70 = 1.5 - Richard

K = 45 mins = 3 of an hr
K = 70 mins = 1 1/6 hr 10 mins

10 hrs x 60 mins = 600 mins
600 ÷ 45 = 13.5 - Keith
2hrs x 60 = 120
120 ÷ 45 = 2.7 - Keith.
<table>
<thead>
<tr>
<th></th>
<th>Event</th>
<th>Situation</th>
<th>Choice</th>
<th>Person</th>
<th>Reason</th>
<th>Means</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present</td>
<td>What is?</td>
<td>Where is?</td>
<td>Which did?</td>
<td>Who is?</td>
<td>Why is?</td>
<td>How is?</td>
</tr>
<tr>
<td>Possibility</td>
<td>What can?</td>
<td>Where can?</td>
<td>Which can?</td>
<td>Who can?</td>
<td>Why can?</td>
<td>How can?</td>
</tr>
<tr>
<td>Prediction</td>
<td>What will?</td>
<td>Where will?</td>
<td>Which will?</td>
<td>Who will?</td>
<td>Why will?</td>
<td>How will?</td>
</tr>
</tbody>
</table>
Leave us a note and record ONE word that best illustrates your learning from today.
Also if you have a question please post here.

https://padlet.com/smotsco/nctm2018