Differentiating Math Instruction K-8

Marian Small
April 2009
Four Corners

The best way to differentiate instruction is to:

Corner 1: teach to the group, but differentiate practice

Corner 2: teach different things to different groups, depending on readiness

Corner 3: provide individual work as much as possible

Corner 4: use heterogeneous groups so the stronger students help the weaker ones
Current Knowledge

• Why people care about DI
• The big guru- Tomlinson (content, process, product)
• Different sorts of DI
• Accepted principles:
  - Focus on key concepts
  - Choice
  - Prior assessment
Strategies For Differentiating Consolidation

• Menus
• Tiered lessons (based on any of complexity, resources, product, process, outcome)
• Tic Tac Toe (think Tac Toe)
• Cubing
• RAFT
• Stations
Sample Menu

- **Main Dish:** You divide a number by 8. The quotient is 16, R 3. What is the number?
- **Side Dishes (choose 2)**
  - Replace the boxes with the digits 2, 3, 4, and 5 to result in the greatest quotient: [[]][] ÷ [ ]. What is the quotient?
  - Create a story problem solved by calculating 516 ÷ 3. Solve it.
Sample Menu

• Desserts (optional)
  - You divide a 3-digit number by 3 and the remainder is 1. You divide the same number by 4 and the remainder is 3. If the number is about 350, what might it be?
<could include text or other exercises as part of the menu>
Sample Tiers/Lesson on Areas of Triangles

• Calculate areas of right triangles with whole number sides.
• Calculate areas of acute triangles
• Calculate areas when either measurements must be converted or heights determined.
## Sample Tic Tac Toe

<table>
<thead>
<tr>
<th>Complete question # .... on page .... in your text.</th>
<th>Choose the pro or con side and make your argument: The best way to add mixed numbers is to make them into equivalent improper fractions.</th>
<th>Think of a situation where you would add fractions in your everyday life.</th>
</tr>
</thead>
</table>
| Make up a jingle that would help someone remember the steps for subtracting mixed numbers. | Someone asks you why you have to get a common denominator when you add and subtract fractions but not when you multiply. What would you say? | Create a subtraction of fractions question where the difference is 3/5.  
- Neither denominator you use can be 5.  
- Describe your strategy. |
| Replace the blanks with the digits 1, 2, 3, 4, 5, and 6 and add these fractions: []/[] + []/[] + []/[] | Draw a picture to show how to add 3/5 and 4/6. | Find or create three fraction “word problems”. Solve them and show your work. |
Sample Cube: Multiplication Facts

• Face 1: What is 3 x 4?
• Face 2: How much more is 3 x 4 than 3 x 2?
• Face 3: Every 2\textsuperscript{nd} student in a line gets a square. Every 3\textsuperscript{rd} student in line gets a triangle. Which students get both shapes?
Sample Cube: Multiplication Facts

• Face 4: How can you use doubling to figure out 6 x 8?
• Face 5: Draw two pictures—one where you would count by multiplying and one where you would not.
• Face 6: Some people say that multiplication is a short way to add. Do you agree? Explain.
# Sample RAFT

<table>
<thead>
<tr>
<th>ROLE</th>
<th>AUDIENCE</th>
<th>FORMAT</th>
<th>TOPIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number line</td>
<td>A group of kids, each wearing a number tag</td>
<td>Poster</td>
<td>Get organized. I can help.</td>
</tr>
<tr>
<td>A set of base ten blocks</td>
<td>Principal in a school</td>
<td>Advertisement</td>
<td>Why you should buy us for your students</td>
</tr>
<tr>
<td>Square</td>
<td>A Grade 2 student</td>
<td>Instruction manual</td>
<td>How to draw me</td>
</tr>
<tr>
<td>Bar graph</td>
<td>Journalist</td>
<td>Email</td>
<td>Why you need me in your article</td>
</tr>
</tbody>
</table>
Sample Stations: Representing Numbers to 100

- Station 1: Match 2-digit numbers with base ten block representations <simple values with different digits, e.g. 37, 45 and 80>
- Station 2: Match 2-digit numbers with base ten block representations < more interesting choices, e.g. 45 and 54>
Sample Stations: Representing Numbers to 100

• Station 3: Selecting several numbers and representing each with base ten blocks
• Station 4: Selecting several numbers and representing each several ways (a variety of materials are provided)
Underlying Principles

- There should be a “big idea” that can be addressed at different developmental levels using these strategies.
- There should be choice in how a student proceeds.
Focusing on Instruction
Rather than Follow-up
The Difference

• In open tasks, you pose a single question that evokes a broad range of responses at many levels.

• For parallel tasks, you pose two different questions at different levels but tied in terms of the big idea to which they relate and their context.
Open Tasks
Samples for Grades K-2

• Represent 7 as many ways as you can.

Choose a number for the second mark on the number line.

Mark a third point on the line. Tell what number name it should have and why.
Samples for Grades K-2

- Make up an addition question where there is a 2, a 3, and a 4 somewhere.

How are these shapes alike?
How are they different?
Samples for Grades K-2

• Draw a design made up of 3 smaller shapes. It should show symmetry.
• Two shapes are the same size. What could they be if they’re not exactly the same?
• How many baby steps are there in a giant step?
Samples for Grades 3-5

• One number is a lot more than another one. They are both greater than 100. What could they be?
• Use 16 base ten blocks to represent a number. What could it be?
Samples for Grades 3-5

A shape is made with linking cubes. When you look at it from one side, it looks like this:

What might the structure look like?
Samples for Grades 3-5

Sort the numbers from 1 to 20 by using two sorting rules so that there are four numbers that are in the overlap (that is, they fall in both categories).
And..

You start with the triangle shown here:

You flip the triangle by using a transparent mirror. It moved a little, but not a lot. Where was your flip line?
Samples for Grades 6-8

• The square root of a number is easy to figure out. What might the number be?
• Choose a fraction and a percent. Tell which is greater and how you know.
You create the **net** of a 3-D figure and calculate its area. Then you fold the shape into the 3-D figure and calculate its volume.

For example, for this net, the area is 16 square units and the volume is 4 cubic units.

* Which is usually greater—the number for the area or the number for the volume? (This time the number for the area is greater.)
A shape has the same area as this one. What could its dimensions be?
Samples for Grades 6-8

• Create a set of data where the mean is greater than the median.
Some Real Samples
How Numbers Are Alike

Gr. 2

1. Some ways 8 and 2 are the same is 8 and 2 are numbers, and they are between 10 and 10.

2. Some ways 8 and 2 are different is 2 is the second number in the number line and 8 is the 8th number in the number line.
How Numbers Are Alike

1. They are the same because they both are numbers. They are also the same because they both are used for counting.

2. They are different because they both are different numbers. They also are different because it is a double digit number.

8 @ 10

Eight and ten

Grade 2
How Numbers Are Alike

Gr. 3 Feb 19/09 # 7 and 9

1. Both odd numbers
2. Both shaped like a letter of the alphabet
   7V 9 b
3. Both high numbers out of 10
4. Both beside number 8
5. Both beside even numbers

Different
1. Nine is two more than Seven
2. Nine is beside number ten beside number 6
3. 9 has 4 letters 7 has 5 letters
4. 7 has no curve 9 does
   side
5. 9 is the 9th letter of the alphabet 7 is 7th in the alphabet.
How Five Is Special

 números

 5

 five

 1 5 10 xxxxx

 5 55555

 12 8 5

 o o o o o

 I have five dolls

 4 + 1 = 5

 Delta Delta

 I love five pencils

 0 0 0 0 0

 A B C D E

 Paige

 B E E E E

 P P P P
How Five Is Special

The number five is special because it is the first number that can be counted using all five fingers on one hand.

\[
\begin{align*}
\text{five} & \quad \text{one} \\
\text{can count} & \\
\text{five fingers} & \quad \text{up to five}
\end{align*}
\]
How Five Is Special

Ko Le
5 has 5 kohrs
5 has 2 lips
5 has 1 env
5 has 1 start and 1 end
How Five Is Special

A pentagon has 5 sides.
You have 5 toes.
You tally with the number 5. We are at school 5 days a week.
The Answer Is...

• You provide an answer, for example, the number 42 and ask students to create questions with that answer.
• The diversity of responses is interesting and informative.
It Might Be…

<table>
<thead>
<tr>
<th>Problem</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 + 41</td>
<td>12</td>
</tr>
<tr>
<td>15 + 27</td>
<td>42</td>
</tr>
<tr>
<td>29 + 13</td>
<td></td>
</tr>
<tr>
<td>3 + 40</td>
<td>43</td>
</tr>
<tr>
<td>10 + 26</td>
<td>36</td>
</tr>
<tr>
<td>30 + 12</td>
<td></td>
</tr>
<tr>
<td>3 + 39</td>
<td>42</td>
</tr>
<tr>
<td>17 + 15</td>
<td>32</td>
</tr>
<tr>
<td>36 + 11</td>
<td></td>
</tr>
<tr>
<td>4 + 38</td>
<td>42</td>
</tr>
<tr>
<td>18 + 34</td>
<td>52</td>
</tr>
<tr>
<td>32 + 10</td>
<td></td>
</tr>
<tr>
<td>5 + 37</td>
<td>42</td>
</tr>
<tr>
<td>19 + 23</td>
<td>42</td>
</tr>
<tr>
<td>33 + 9</td>
<td></td>
</tr>
<tr>
<td>6 + 36</td>
<td>42</td>
</tr>
<tr>
<td>20 + 16</td>
<td>36</td>
</tr>
<tr>
<td>34 + 8</td>
<td></td>
</tr>
<tr>
<td>7 + 35</td>
<td>42</td>
</tr>
<tr>
<td>21 + 14</td>
<td>35</td>
</tr>
<tr>
<td>35 + 7</td>
<td></td>
</tr>
<tr>
<td>8 + 34</td>
<td>42</td>
</tr>
<tr>
<td>22 + 20</td>
<td>42</td>
</tr>
<tr>
<td>36 + 6</td>
<td></td>
</tr>
<tr>
<td>9 + 33</td>
<td>42</td>
</tr>
<tr>
<td>23 + 17</td>
<td>40</td>
</tr>
<tr>
<td>37 + 5</td>
<td></td>
</tr>
<tr>
<td>10 + 32</td>
<td>42</td>
</tr>
<tr>
<td>24 + 18</td>
<td>42</td>
</tr>
<tr>
<td>38 + 4</td>
<td></td>
</tr>
<tr>
<td>11 + 31</td>
<td>42</td>
</tr>
<tr>
<td>25 + 17</td>
<td>42</td>
</tr>
<tr>
<td>37 + 3</td>
<td></td>
</tr>
<tr>
<td>14 + 30</td>
<td>42</td>
</tr>
<tr>
<td>26 + 16</td>
<td>42</td>
</tr>
<tr>
<td>40 + 2</td>
<td></td>
</tr>
<tr>
<td>13 + 29</td>
<td>42</td>
</tr>
<tr>
<td>27 + 15</td>
<td>42</td>
</tr>
<tr>
<td>41 + 1</td>
<td></td>
</tr>
<tr>
<td>14 + 28</td>
<td>42</td>
</tr>
<tr>
<td>28 + 14</td>
<td>42</td>
</tr>
<tr>
<td>42 + 0</td>
<td></td>
</tr>
</tbody>
</table>

How I figured it out is I started at one number less than 42. The number before the plus sign goes up. The number after the plus sign goes down. ALL of these questions equal up to 42.
Or...

A. The answer is 42. What is the question?

- 12 people watching 12 TV channels:
  - \( x + 2 \) =
  - \( 4 + 1 \) =
  - \( 40 + 2 \) =
  - \( 2 \times 2 \) =

- 42 light bulbs:
  - 24 hexagons + 12 octagons + 12 rhombuses

- The minute hand is two ticks past the eight:
  - 21 pairs of socks =

- The amount of coins in an
  - 25 loop of books = 2
Or..

A. The answer is 42. What is the question?

50 - 8 = 42  41 + 1 = 42
51 - 9 = 42  42 - 2 = 42
52 - 11 = 42  30 + 12 = 42
53 - 11 = 42  40 + 12
54 - 12 = 42  41 + 12
55 - 13 = 42  76 / 42

How many days in a year:
6 x 7 = 42
take away 360 take away 28 = 42

40 fish and 2 cats = 42
10 x 10 + 10 - 2 = 42

1 x 10 + 50 - 40 - 20 + 20 x 2 = 42

2 x 2 - 2 = 42
21 x 2 = 42  21 + 21 = 42

50 - 50 = 100 - 30 - 8 = 42

How many words (including the like) are on the mapping vocabulary?

How many students are in your class today?
then take away 2 students = 42

How many characters (lots) are we here at the front of the room dabled = 42
Or...

A. The answer is 42. What is the question?

- 42 \div 42
- 42 \times 42
- 30 + 12 = 42
- 10 \times 12 = 42
- 50 \times 10 = 42
- 4x + 50 - 50 + 2 = 42
- 25 \times 25 - 10 + 2 = 42
- 1 \times 50 - 10 + 4 = 42
- 32 + 40 = 42
- 5 \times 7 + 2 = 42

- A girl had 40 dolls and she found 15 more dolls at the last fair. How many dolls does she have now?
- It was Sally's birthday. She invited 100 people. Only 10 came. What day did Sally give her a present to her 10 people who came to her present?
- 15 - 8 = 42
- 10 \times 2 + 6 \times 4 = 42

A boy had 1 dream.
- There were 100 teachers in the school. 58 teachers were absent.
Or Even...

A. The answer is 42. What is the question?

41 + 1 = 42

It is 42.
All About Percent

Make this true as many ways as you can:
• 72 is ___ % of ____.
Some Ideas You Might Have

I expected:

- 10% of 720
- 100% of 72
- 72% of 100

Or

- 200% of 36
- 50% of 144…
Or...

- 72 is 72% of 100
- 72 is 36% of 50
- 72 is 18% of 25
- 72 is 100% of 72
- 72 is 200% of 36
- 72 is 400% of 18
- 72 is 800% of 9
- 72 is 1600% of 4.5
- 72 is 2000% of 3.6
- 72 is 4000% of 1.8
- 72 is 8000% of 0.9
- 72 is 16000% of 0.45
- 72 is 20000% of 0.36
- 72 is 40000% of 0.18
- 72 is 80000% of 0.09
- 72 is 160000% of 0.045
- 72 is 10% of 7200
- 72 is 200000% of 0.036

etc.
Alike and Different

• You can get a lot of varied responses by asking students how two items (e.g. two numbers) are alike and different.
350 and 550

- If I asked you how these numbers were alike and different, what would you suggest?
For Example...

- Both are multiples of 50.
- Both are multiples of 10.
- Both are even.
- Both have 3 digits.
- Both are between 100 and 1000.
For Example...

• One is more than 400 and one is less.
• One is more than 500 and one is less.
• One has two 5s in it and the other doesn’t.
• One needs 10 base ten blocks to show it and the other does not.
350 and 550

they both have 50 at the end. they start with different numbers.
350 and 550

Alike
- They both have 50 in them
- They both have 3 digits
- They both have 5 in the 1st digit
- They both have 0 in the 2nd digit
- They both are even numbers
- Turned around they are both odd numbers
- They both are not degrees on longitude and latitude
- They both round up in 10.5

Differences
- 550 rounds up in hundreds. 350 does not. The first digit is different.
Tangram House

- Use any four tangram pieces to build a shape that looks like a house. Use geometry words to describe your house.
A Range of Responses
A Range of Responses

- Used 4 Δs
- 6 right angles
- 5 triangles
- 1 square
- 8 45° angles
- House shape

4 Tangram pieces
Measuring a Pumpkin

• How many different ways can you think of for measuring a pumpkin?
• It is delightful to see how creative students can be. This is only possible with an open question.
One Response

How many ways can you think of for measuring a pumpkin?

1. you can measure its circumference
2. you could measure its mass in grams or kilograms
3. you could also measure its height (cm, mm, m)
4. For the pulp, you could measure how much there is in
   to a certain size
5. you could also measure how long it takes to grow it
Another

- Height
- Width
- Length
- Perimeter
- Weight/mass
Or...

1. Circumference

2. How old it is (elapsed time)

3. How much it weighs (mass)

4. Width and length
Or..

I think I can measure a pumpkin in 3 different units...

1. mm because it might be a small pumpkin.
2. cm because it might be a bigger pumpkin.
3. dm because it might be a very big pumpkin.
Many Squares

• Show how to put together squares to create shapes with 8 sides.
One Response

First you make a plus sign out of squares.
Example: +
Once you have finished that, you overlap the parts of the plus sign.

Example:

- The 2nd stage
- The 1st stage

After this step you have made an octagon!
Regular Octagon

My Octagon
Continuing a Pattern

• A pattern begins like this: 2, 5, ...
• How could it continue?
Responses

Choice 1...
One of the ways this pattern can continue is counting by 5's, so it would end up looking like this: 2, 5, 8, 11, 14, etc.

Choice 2...
The second way the pattern can continue is saying a number that always has 2 and 5, example: 2, 5, 12, 15, etc.
Or...

By 3 and cep on skipping 3
Or....

How could it continue?

It could continue doing this because it is going like two, three, two, three. So it will go like this: two is to make a two, the three is to make a five and a two to make a seven, that's why I think it is 2, 5, 7, 10, 12.
Or...

How could it continue?

It could end: 8, 11, 14, ... count by 3. I think this because I learned in my life.

I could also think it ends 25, 15, 23, 5, ... repeating it like this pattern.

I've learnt this in every mathematical workstation or book.

I think this also because subjects I've experienced a lot of patterning from kindergarden to this year.
4 and 10

- An expression involving the variable $k$ has the value of 10 when $k = 4$. What could the expression be?
\[ k + 6 = 10 \]
\[ k + 8 - 2 = 10 \]
\[ k + 20 - 14 = 10 \]
\[ k + 3 + 3 = 10 \]
But Another...

The expression is $6 + 1k$. I know this because, $10 - k$ ($k=4$) is 6. Since the value of the expression is 10 I took 4 away to get the other number to complete the expression.
Open Questions from Math Focus

• We systematically created open question explorations, but there are many other examples of open questions.
• Here are a few.
Act It Out

To Solve the Problem

Put 6 blue cubes and 2 red cubes on one side. Put 2 colours of cubes on the other side. Make the sides balance. Show different ways.
Sam read the book *Eating Fractions* by Bruce McMillan. The book shows fractions in food. Sam thought about how he could see fractions in his classroom, at home, and all around him.

What fractions do you see and use in your everyday life?

These shelves have 6 equal sections. $\frac{2}{6}$ of the sections are full of books.
Create two cards like the cards shown below. You can choose any number of colours and make up any probability rules for your cards. Then design and test two spinners for each of your cards.

How do you know that your spinners match your rules?

- **2 colours**: One colour is more likely than the other colour.
- **3 colours**: Two colours are equally likely. Another colour is less likely.
- **3 colours**: Blue is very likely. Red is impossible.
- **4 colours**: All colours are equally likely.
- **1 colour**: Yellow is certain.
EXPLORE the Math

Nayana and Jacob are creating fraction patterns. This is the start of Nayana’s pattern.

\[
\begin{align*}
1 + & \quad \frac{1}{2} + \quad \frac{1}{3} + \quad \frac{1}{4} + \quad \frac{1}{5} + \\
\frac{3}{2} & \quad \frac{5}{6} & \quad \frac{7}{12}
\end{align*}
\]

This is the start of Jacob’s pattern.

\[
\begin{align*}
\frac{1}{3} - & \quad \frac{1}{9} - \quad \frac{1}{27} - \quad \frac{1}{81} \\
\frac{2}{9} & \quad \frac{2}{27} & \quad \frac{2}{81}
\end{align*}
\]

What patterns can you create using addition or subtraction of fractions?
You Try

• Use the resources you teach from to create at least three open questions.
• Consider working from the answer, looking for similarities and differences, or leaving numbers out if you wish (e.g. add 2/5 to any fraction you wish—what is the sum?)
Why Open Questions

• Expose student thinking to know what to do next
• Make students feel like their contributions actually make a difference
• Enrich and broaden everyone’s learning
They Work Best If...

- they are focused on a big idea (so lots can happen).
Parallel Tasks
What Are Parallel Tasks?

• These are two or more tasks that focus on the same big idea at different developmental levels but which are quite similar.

• They are designed to suit the needs of different students, but so that the whole range of students can participate in a discussion about them.
An Important Aspect of Parallel Tasks

- There must be a set of questions you can ask that pertain equally to both tasks.
Examples for Grades K-2

**Option 1:** Make a pattern using blue and green snap cubes.

**Option 2:** Make a pattern using blue and green snap cubes. There must be more blue cubes than green ones.
Examples for Grades K-2

What is the weight of each cylinder if the scales are balanced?

Option 1:

Option 2:
Examples for Grades K-2

Use a **pan balance** to make a modeling clay ball with the same mass as a toy car.

**Option 1:** Now make a clay ball with the mass of four toy cars.

**Option 2:** Now make a small clay ball so that four of them, altogether, have the mass of the toy car.
Examples for Grades K-2

**Option 1:** How many students chose each flavor?

**Option 2:** How many students does this graph describe?

<table>
<thead>
<tr>
<th>Favorite Flavor</th>
<th>Number of students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vanilla</td>
<td></td>
</tr>
<tr>
<td>Chocolate</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
</tr>
</tbody>
</table>
Examples for Grades K-2

What number on the number line does the dot represent?

**Option 1:**

\[
\begin{array}{c}
0 \\
\bullet \\
10
\end{array}
\]

**Option 2:**

\[
\begin{array}{c}
0 \\
\bullet \\
100
\end{array}
\]
Examples for Grades K-2

**Option 1:** Choose a number between 1 and 10. Show that number in as many ways as you can.

**Option 2:** Choose a number between 20 and 30. Show that number in as many ways as you can.
Examples for Grades 3-5

Option 1: Create three different patterns, each including the number 40 as the fourth, fifth, or sixth number in the pattern.

Option 2: Create three different increasing patterns, each including the number 40 as the fourth, fifth, or sixth number in the pattern.
Examples for Grades 3-5

Choose an animal type and a square grid size. Write the letters of that animal’s name one at a time in the squares of the grid, going left to right, from top to bottom. For example:

<table>
<thead>
<tr>
<th>M</th>
<th>O</th>
<th>N</th>
<th>K</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>Y</td>
<td>M</td>
<td>O</td>
</tr>
<tr>
<td>N</td>
<td>K</td>
<td>E</td>
<td>Y</td>
</tr>
<tr>
<td>M</td>
<td>O</td>
<td>N</td>
<td>K</td>
</tr>
</tbody>
</table>

**Option 1:** Predict what the last letter you write will be if the grid is a 6 by 6 grid. Test your prediction. Explain how you can predict.

**Option 2:** What size grid would you need to use to make sure that the first letter in the animal’s name is the last one you write?
Examples for Grades 3-5

Option 1: List 10 equations this picture might be describing.

Option 2: List 5 equations this picture might be describing.
Examples for Grades 3-5

Insert each of the digits 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9 in the right spot. Each digit may be used only once.

<table>
<thead>
<tr>
<th>Option 1:</th>
<th>Option 2:</th>
</tr>
</thead>
<tbody>
<tr>
<td>$3 \times 5\square = 15\square$</td>
<td>$\square \times \square = 5\square$</td>
</tr>
<tr>
<td>$\square \times \square\square = \square0$</td>
<td>$4 \times \square = 3\square$</td>
</tr>
<tr>
<td>$6 \times 1\square = 6\square$</td>
<td>$\square \times \square = 2\square$</td>
</tr>
<tr>
<td>$\square \times 1\square = 105$</td>
<td>$8 \times \square = 4\square$</td>
</tr>
</tbody>
</table>
Examples for Grades 6-8

A student company charges a $5 flat fee plus $3 per window to wash windows.

Option 1: How much more would someone pay to have 35 windows washed than 24 windows?

Option 2: Might someone have to pay exactly $87 to have their windows washed? Explain.
Examples for Grades 6-8

Option 1: A number between 20 and 30 is 80% of another number. What could the second number be?

Option 2: A number between 20 and 30 is 150% of another number. What could the second number be?
Examples for Grades 6-8

**Option 1:** Draw a picture to show why $\frac{2}{3} \times \frac{5}{6} = \frac{5}{9}$.

**Option 2:** Draw a picture to show why $\frac{2}{3} \times \frac{7}{3} = \frac{14}{9}$. 
The Race

Option 1
• Twice as many people came in ahead of David’s dad in a race.
• There were 112 runners.
• What was David’s dad’s position?

Option 2
• Twice as many people came in ahead of David’s dad in a race.
• How many people might have been in the race?
What We Saw

Option 1: Davids Dad was in 3rd place
because if Davids Dad was in 2nd place and 2 people past him, he would be in 3rd.

David's dad is in 3rd place.

2. If there were 112 participants, what was David's dad's position?

Show your work. David's dad came in 75th place.

\[
\begin{align*}
112 & - 37 \\
75 & + 37 \\
112 & + 37 \\
159 & - 111 \\
48 & \times 3 \\
144 & \div 3 \\
48 & \\
\end{align*}
\]

Davids dad is in 3rd place as well.

Interact with him! 3 because 3 ways many.
Ordering Values

• Order the given values from least to greatest. Will your order be the same no matter what the value of \( n \) is?
Ordering Values

Option 1:
- \( n/2 \)
- \( 3n \)
- \( n^2 \)
- \( 3n + 1 \)
- \( 10 - n \)

Option 2:
- \( 4n \)
- \( 3n \)
- \( 10n \)
- \( 3n + 1 \)
- \( 5n + 2 \)
- \( -n \)
A sample response

No because it depends what the value of \( n \) is because if the number is above \( 10^{-n} \) then then it would no longer be least than you would have to change the order.
What is 10*12?

If

• 2*3 = 12
• 2*4 = 14
• 2*5 = 16
• 3*3 = 15
• 4*3 = 18

If

• 2*3 = 7
• 2*4 = 8
• 2*5 = 9
• 3*3 = 9
• 4*3 = 11
Some Choices

If these equations were true then 10x12 would = 126 because all the problems shown above say that 2x3=12 but 2x6=14 so if you add 6 to 12 it will equal 12 and same goes for everyone.

2x3=6+6=12
2x4=8+6=14
2x5=10+6=16
3x3=9+6=15
4x3=12+6=18.

I would be 126. I picked option 2. I know because if you continue the pattern I figured it out because option 2 has a pattern the first equation and 2nd is always the first more then the real answer. And the 3rd is always right.
What Real Life Situation...

• Might 10 000 describe.
• Might 1000 describe.
Responses

I have $10,000 in my bank account because I am saving up for college and my future life. I need $10,000 for college because each year it costs $2,500 per person for 4 years. For my future life I am investing in a lot of things. Like a basement full of games and a surround sound theatre. Maybe, even a big house. Or, owning my own business like my dad.

---

I had 100 people at my house for a party. Each person will eat 10 cookies. So, I have to make 1000 cookies.

1 = 10 people 0 = 10 cookies
A Division

• You divide two numbers and the quotient is 2.5. What two numbers might you have divided?

• You divide two fractions or decimals and the quotient is 2.5. What two numbers might you have divided?
Some Responses
Choice in Math Focus

Choice 1

Sage's grandmother gave her 3 rattles. Sage put the rattles on a shelf that measures 100 units.

About how much shelf space is left over?

Choice 2

Jonathan's uncle gave him 4 drums. He put the drums on a shelf that measures 150 units.

About how much shelf space is left over?
Your Turn

• Work with a partner.
• Think about a topic where you think choice would be useful.
• Develop a short diagnostic to find out how your students might actually differ.
Your Turn

• Create a parallel task (with questions) to meet those needs.
• Perhaps begin with a task from a resource you usually use and think about how to adjust it.
I don’t believe this is a passing fad.
We have an ethical and professional obligation to help every student.
That means meaning that student where (s)he is, not where we want them to be.
For more information and examples
To Download

• Download some of these ideas from www.nelson.com/bigideas