A decorative graphic consisting of several overlapping, wavy, translucent blue bands that flow across the middle of the slide. The bands vary in opacity and color intensity, creating a sense of movement and depth.

# Open Questions to Differentiate Instruction

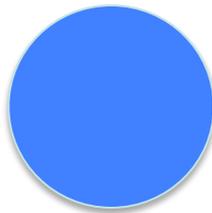
Marian Small

# Differentiating instruction

- Using open questions and parallel tasks is one very manageable way to differentiate instruction.
- Let's work on open questions first.

# They are...

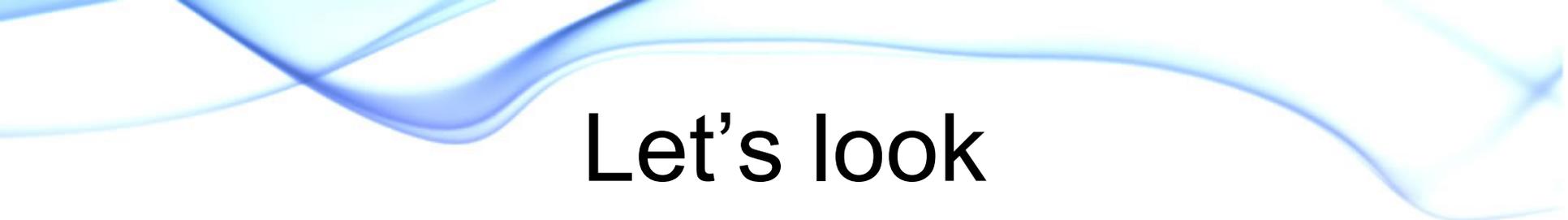
- Questions not only with different strategies but often with different answers or even different interpretations.
- For example, if I say “What shape do you think is most like this circle?”



..., kids can make very different decisions based on very different ideas.

# They are used...

- Sometimes as quickish “getting started” activities.
- Sometimes as “main problems”.
- Sometimes in consolidation of a lesson.



# Let's look

- We will consider a LOT of examples to give you a feel for them.

- 
- A number more than 100 is really easy to show with base ten blocks. What might it be?
  - A number can be shown with three base ten blocks. What might it be?
  - A number can be shown with 13 base ten blocks. What might it be?

- 
- You show an amount of money with one bill and 4 coins. What could it be?
  - An activity lasted for 1 hour 20 minutes. When could it have started? Ended?
  - The perimeter of a shape is 20 cm. What could it look like?
  - An array has a lot more columns than rows. What multiplication could I be showing?

- 
- Two triangles look a LOT different. What could they look like? What makes them both triangles?
  - A rectangle has a lot of perimeter, but not much area. What could it look like?
  - Think of three ways to continue this to form a growing pattern: 4, 7, .....

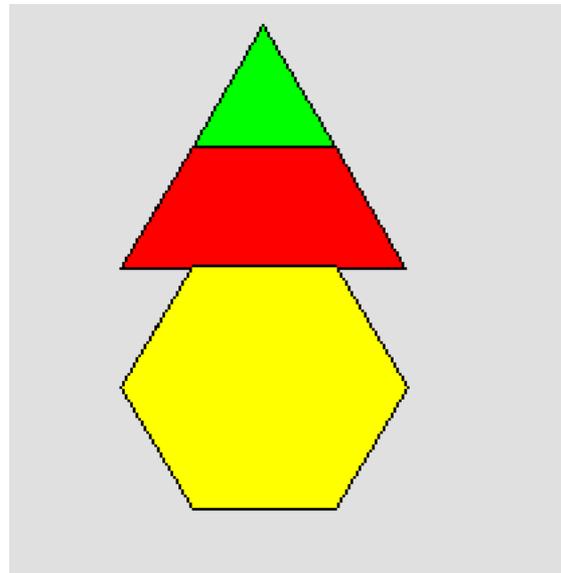
- 
- A 5-digit number is read as \_\_\_\_ thousand forty \_\_\_\_\_. What could it be?
  - A decimal number is rounded to 0.4. What might it have been?
  - Two fractions are super easy to compare. What might they have been?
  - You think this multiplication is really easy. What might you put in the blanks?

$$[] \times 2[]$$

- 
- Two fractions are equivalent. Both denominators are more than 10. What could they have been?
  - I had 5 bills and 20 coins. How much money might I have had?
  - I solved a problem by multiplying  $23 \times 24$ . What might the problem have been?

- 
- How are  $\frac{2}{5}$ , 0.47 and  $\frac{4}{9}$  alike?
  - A number is a lot more than five 42s. What might it be?
  - A number is just a little more than  $\frac{1}{2}$ . What might it be?

What fractions do you see?



- 
- Fill in the blanks to make this true:
  - \_\_\_\_\_ is 4 times as much as \_\_\_\_\_
  - \_\_\_\_\_ is 118 more than \_\_\_\_\_

- 
- Write 3000 as the product of three numbers.
  - Now write it as the product of four numbers.

- 
- A really tall and really short rectangular prism had the same volume. What could their dimensions have been?
  - A scalene triangle was almost obtuse. What could its side lengths and angles have been?
  - The 25<sup>th</sup> number in a growing pattern is 400. What could the pattern have been?

- 
- A spinner lands on green just a little more than red and a little less than blue. Draw the spinner. Give a possible set of ten outcomes.
  - Is 10% a lot or not?

- 
- Use two colours of cubes (or counters or tiles...) so that you see the ratio 4:5. What other ratios do you see?
  - The area of a triangle is four times as much as the area of a parallelogram. What might the dimensions be?
  - The mean of a set of data is 8 more than the median. What could the data set be?



# Strategies

- There are some common strategies for opening up questions.
- I'll share these, but remember that it is still critical that the questions have purpose.

# Here is the answer

- Provide the answer and ask for the question. For example, the answer is 202. What might the question have been?
- The answer is *a rhombus*. What might the question have been?
- The answer is  $x = 4$ . What might the question have been?

# Alike and different

- How is multiplying decimals like multiplying whole numbers? How is it different?
- How is calculating the area of a triangle like calculating the area of a rectangle? How is it different?
- How is the number 1005 like 205? How is it different?



# A particular variation

- Who doesn't belong?
- Who belongs with us?

# Who doesn't belong?

$$3/5$$

$$2/3$$

$$3/8$$

$$4/5$$

$$515 \div 3$$

$$7 \times 15$$

$$21 \times 5$$

$$2.1 \times 10$$

# Who belong with us?

- 8, 18, 82
- $5 \times 4$ ,  $19 + 1$ ,  $45 - 5$

# Choose your own values

- Choose two 2-digit numbers that are not too close together. Multiply them.
- Choose the base and height for a parallelogram. Calculate its area.
- Choose two fractions that are pretty far apart on a number line. Tell how you know they are far apart.

# Use “flexible” words

- You divide two numbers and the answer is almost 8. What numbers might you have divided?
- One fraction is just slightly more than another. They have different denominators. What might they be?
- Create a pattern that grows really quickly. What is the 20<sup>th</sup> term in it?

# Let's try

- You will create some open questions, starting with more conventional questions.
- Here is the answer
- Choose own numbers
- Alike and different
- Flexible words

# Parallel tasks

- This time the tasks are tighter, but they are at different levels of complexity, one level better suiting some students and the other level better suiting other students.

# For example..

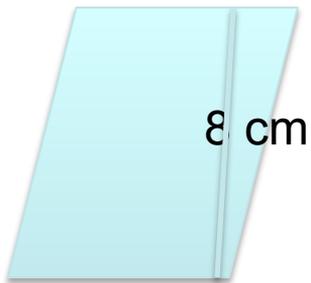
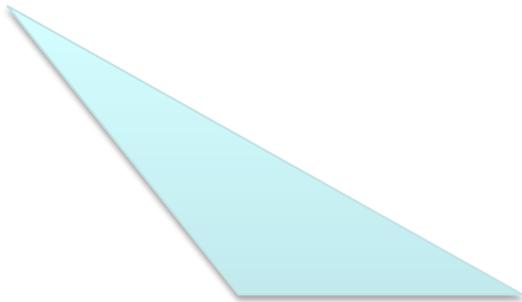
- Choice 1: A bus has 44 seats. How many people could sit, one to a seat, on 12 buses?
- Choice 2: A bus has 50 seats. How many people could sit, one to a seat, on 8 buses?

# Common questions

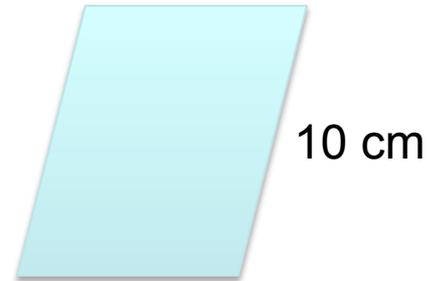
- Is it more than 100 people? Why?
- Is it more than 200 people? Why?
- Would it have been easier or not to figure out the number for 10 buses?
- How did you figure out your number of people?

# Or maybe...

- Choose one of these shapes and calculate the area.



5 cm



5 cm

10 cm

# Common questions

- Did you have all the measurements you needed or did you have to get more?
- Which more? Why those?
- What formulas did you use or did you use a formula?
- Would it have been easier or harder to get the areas if they had been on grid paper?

# Or maybe...

- Choose values for the missing numbers and put the fractions in order from least to greatest.
- Choice 1:  $\square/3$ ,  $5/\square$ ,  $4/9$ ,  $8/3$ ,  $\square/\square$
- Choice 2:  $\square/3$ ,  $\square/6$ ,  $8/9$ ,  $8/3$ ,  $\square/\square$

# Common questions

- Which fractions were easiest to compare? Why?
- Did you decide on your missing numbers first or did you think about what was easy to compare first?
- Did  $\frac{8}{3}$  have to be greatest? What did that depend on?
- What did you notice about the numerator and denominator of your least fraction?

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