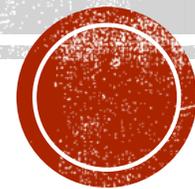


# LET'S LOOK AT GR 6-10

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# TOPICS WE WILL DISCUSS

- Gathering assessment data (but what do we care about?)
- Open and parallel tasks that cross strands
- What is level 4? How do you encourage it?



# WHAT DO WE WANT ASSESSMENT DATA ON?

- Is it knowledge?
- Is it understanding?
- Is it application?
- Is it thinking?
- What is communication anyway?



# KNOWLEDGE VS UNDERSTANDING

I could ask:

- What is  $\frac{3}{5} + \frac{2}{3}$ ?
- OR



# KNOWLEDGE VS UNDERSTANDING

- **WITHOUT ADDING**, tell what a good estimate for  $3/5 + 2/3$  would be and why.



# KNOWLEDGE VS UNDERSTANDING

- I could ask:
- What is the area of a parallelogram with a base of 5 cm and height of 3 cm? OR



# KNOWLEDGE VS UNDERSTANDING

- I could ask:
- Two parallelograms have the same area.
- But one has twice the height of the other.
- What else do you know about the parallelograms?



# KNOWLEDGE VS UNDERSTANDING

I could ask:

- What is  $5/8 \times 7/6$ ? OR



# KNOWLEDGE VS UNDERSTANDING

- I want to multiply two fractions and the answer to be just a little bit less than each of them. What could I multiply?



# KNOWLEDGE VS UNDERSTANDING

I could ask:

- What is the slope of the line that goes through  $(3,2)$  and  $(4, 5)$ ?

OR



# KNOWLEDGE VS UNDERSTANDING

- Two lines go through  $(3,2)$ .
- One has a greater slope than the other.
- How do the intercepts relate?



# KNOWLEDGE VS UNDERSTANDING

- I could ask:
- A batch of cookies needs  $2 \frac{1}{4}$  cups of flour for every  $\frac{3}{4}$  cup sugar.
- How much flour would you need if you only use  $\frac{1}{2}$  cup sugar?

OR



# KNOWLEDGE VS UNDERSTANDING

- A batch of cookies uses  $2 \frac{1}{4}$  cups of flour for every  $\frac{3}{4}$  cup sugar.
- You have a measuring cup with no markings on it. You fill it with sugar. Can you be sure how much flour to pour in? Explain.



# KNOWLEDGE VS UNDERSTANDING

- I could ask:
- Solve  $100x + 6 = 87x + 2$

OR



# KNOWLEDGE VS UNDERSTANDING

- **WITHOUT SOLVING**, tell why the solution to  $100x + 6 = 87x + 2$  **HAS TO** be negative.



# KNOWLEDGE VS UNDERSTANDING

- I could ask:
  - What is  $(3x + 2) - (2x^2 - 8)$ ?
- OR



# KNOWLEDGE VS UNDERSTANDING

- When you subtract two binomials, show that your answer could be a monomial, a binomial, or a trinomial.



# CHANGE THESE TO UNDERSTANDING

- Evaluate these algebraic expressions if  $a = 0$ ,  $b = 1$ ,  $c = -1$  and  $d = 2$ :
  - a)  $b + 3c$       b)  $3b + 2c - d$
  - c)  $2a^2 + b - d$       d)  $3(2b - 3c)$
- Represent  $(-7)^4$  using repeated multiplication
- Simplify  $(b^3)^2$
- Simplify  $(2x + 3) + (5x - 4)$



# MY ATTEMPTS

- I changed the value of  $b$  by 1 in an algebraic expression and the value of the expression went down by 3. What could the expression have been?



# MY ATTEMPTS

Which expression(s) can be written more quickly and why only those?

$$(-7) \times (-7) \times (-7) \times (-7)$$

$$(-7) + (-7) + (-7) + (-7)$$

$$(-7) \times (7) \times (-3) \times (-4)$$



# MY ATTEMPTS

- How would you figure out the square root of  $(??)^6$
- Four different pairs of binomial expressions simplify to  $7x - 1$ . What could they be?



## **NOW YOU TRY**

- How could you change some knowledge questions in something you are working on now to understanding ones?



# SO IF YOU WANT TO GATHER THIS KIND OF DATA..

- How many questions do you need to ask on a topic?
- Can you have 1 minute "interviews" and gather data while kids are working?
- Can you get them to record answers and just randomly select a certain percent to read?



**SO IF YOU WANT TO GATHER THIS KIND OF DATA..**

- Can you use “explain everything”?



# APPLICATION VS THINKING

- What do you see as the difference?
- How much data do you want to gather on each? Why?



# FOR APPLICATION

- Can you give kids a choice of, e.g. 3 application problems on a topic and they choose which one they want you to assess.



# **CAN YOU USE “GROUP” INTERVIEWS?**

- **Could you watch a group of 4 kids interacting as they solve a problem and assess what they know?**



# WHAT DO YOU THINK COMMUNICATION IS?

- What do you currently assess as communication– oral or written?
- Format or substance?
- Use of math terminology or not?



# CAN YOU

- Choose 5 kids a day to really focus on and rotate through rather than gathering data on each kid each day?



# CROSS-STRAND TASKS

- One question I'd ask is why you want them to be cross-strand.
- Will you be comfortable “separating out” the strand marks for Grades 6 – 8?



# SOME IDEAS

- Proportional reasoning often blends with other topics, e.g.



# SOME IDEAS

- Create a cylinder and a prism where the ratio of surface areas is 3:4.



# SOME IDEAS

- Create an algebraic expression where the value when you substitute  $x = 10$  is 45% of the value when you substitute  $x = 20$ .



# SOME IDEAS

- Create a set of data where the mean is  $\frac{3}{4}$  of the median.



# MEASUREMENT AND NUMBER INTEGRATE

- You could, of course, require the use of fractional measurements in calculations involving area or volume to involve both appropriate number work and measurement work.



# MEASUREMENT AND NUMBER INTEGRATE

- So it might be--- The height of a cylinder is  $2\frac{3}{4}$  as big as the radius.
- Choose a radius that is an odd number.
- Calculate the volume and surface area.



# MEASUREMENT AND NUMBER INTEGRATE

- The use of the Pythagorean theorem, in different ways, almost always involves number work.



# FOR EXAMPLE

- Build similar shapes on the three sides of a right triangle. Compare the areas of the three shapes.
- What do you notice?



# MEASUREMENT AND ALGEBRA INTEGRATE

- Algebra is part and parcel of any formula work kids do when dealing with measurements.



## **FOR EXAMPLE**

- **The volume of a cone is 3.5 times the volume of a certain cylinder.**
- **Determine the dimensions of each.**



# DATA AND NUMBER INTEGRATE

- E.g. in analyzing temperature graphs involving negative numbers



# PATTERN AND NUMBER INTEGRATE

- E.g. The 50<sup>th</sup> term of a linear growing pattern is 87.
- List 5 possible pattern rules where this could happen and tell what the 100th term would be each time.



# TALKING ABOUT LEVEL 4

- Kids have to learn what you think level 4 means.
- It should not be about “perfection”.
- It should be about “insightful” approaches.



# FOR EXAMPLE

- You need to solve this problem **WITHOUT USING OR REFERRING TO SOLVING EQUATIONS.**
- In what situations is the perimeter of a rectangle three times its length? Why does your result make sense?



# LET'S TRY THIS

- You multiply two fractions.
- The result is **MUCH LESS** than one of the fractions but **JUST A LITTLE MORE** than the other.
- Tell what the fractions might be and why your values have to make sense without actually saying what the answer is.



# TO GET THERE

- I think you need to practice what good thinking looks like.
- I will talk about two approaches.



# **BUILDING A CULTURE OF DEEP THINKING**

- **Would like to propose we “adopt” from the U.S. their standard for mathematical practice:**
- **Construct viable arguments and critique the reasoning of others**
- **I think the heart of math really is reasoning, so this makes sense to me.**



## **DEBATE (OR SOMETIMES, ALWAYS, NEVER)**

- If you halve the area of a rectangle, the new perimeter can be half of the old one.



# **DEBATE (OR SOMETIMES, ALWAYS, NEVER)**

- The volume of a cone can be the same value as the volume of a prism.



## **DEBATE (OR SOMETIMES, ALWAYS, NEVER)**

- You can multiply two fractions and get a product with a smaller denominator than the ones you started with.



# TWO TRUTHS AND A LIE

- 1. There are more ways to divide up 72 into equal groups than 60.
- 2. There are more ways to write 60 as a product of factors that don't include 1 than to write 50 as a product of factors that don't include 1
- 3. There are more multiples of 8 between 100 and 200 than multiples of 10.



# TWO TRUTHS AND A LIE

- 1. There is a fraction equivalent to  $5/11$  where the denominator is between 80 and 100.
- 2. There is a fraction equivalent to  $5/11$  where the numerator and denominator are 64 apart.
- 3. There is a fraction equivalent to  $5/11$  where the numerator is even.



# TWO TRUTHS AND A LIE

- Suppose  $A = 30\%$  of  $B$ .
- 1.  $A = 60\%$  of  $2B$ .
- 2.  $2A = 30\%$  of  $2B$ .
- 3.  $A/2 = 15\%$  of  $B$ .



# TWO TRUTHS AND A LIE

- 1. The cosine of an angle close to  $45^\circ$  is very close to the sine of that angle.
- 2. The tangent of an angle close to  $90^\circ$  is very close to the cosine of that angle.
- 3. The tangent of an angle close to  $0^\circ$  is very close to the sine of that angle.



# THEN

- We need to give kids feedback to help them to see the difference between “yeoman” work (which should be level 3) and “insightful” work (which should be level 4).



# SO

- What would you see the difference as yeoman vs insightful work for this task?
- You need to find out what numbers you can or cannot make by adding only as many as you want of the values 6, 9 and 20.



# SO

- What would you see the difference as yeoman vs insightful work for this task?
- The price of a sweater that is 40% off is the same as the price of shoes that are 20% off. How are the original prices related?



# **OTHER ISSUES**

- **What else do you want to raise today?**



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- [www.onetwoinfinity.ca](http://www.onetwoinfinity.ca)
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