**Modeling Mathematics with**

**TI-30XS MultiView**

**Scientific Calculators**

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Many teachers do not think about using calculators to introduce new content, but there is a great opportunity for students to discover what rules are applied and how to use them.

Let’s first take a look at a few simple rules in mathematics:

**Adding and Subtracting + and – Integers**

Ask students to perform the following sets of addition and subtraction pairs, using the calculator, and then you can have a very rich discussion.

Let the students derive their own rules as you guide them to the best understanding.

Set A) 2+3= Set B) -2+3= Set C) 2-3= Set D) -2-3=

 2+2= -2+2= 2-2= -2-2=

 2+1= -2+1= 2-1= -2-1=

 2+0= -2+0= 2-0= -2-0=

 2+ -1= -2+ -1= 2- -1= -2- -1=

 2+ -2= -2+ -2= 2- -2= -2- -2=

 2+ -3= -2+ -3= 2- -3= -2- -3=

After your discussion, have the students turn the calculator face down on their desks, and then complete the following without the use of the calculator.

**PRACTICE:**

1. **-5 + 3 = 2. 4 + -9 = 3. -3 + -6 = 4. 2 + 7 =**

**5. 9 – 2 = 6. -2 - 8 = 7. 7 - -3 = 8. -4 - -5 =**

To wrap-up the discussion, ask students for their answers and have other students either validate or correct the answer with reasons why.

**Order of Operations**

Ask students to simplify the following expressions, and then compare the answers. Ask them if they can decide what the calculator is doing first, to arrive at their answer.

1. 10 – 5 X 2 = and (10 – 5) X 2 =
2. 6 X 3 + 4 = and 6 X (3 + 4) =
3. 12 4 + 2 = and 12 (4 + 2) =

After your discussion, have the students turn the calculator face down on their desks, and then complete the following without the use of the calculator.

**PRACTICE:**

1. **5 X 3 – 2 = 2. 5 X (3 – 2) = 3. 5 – 2 X 3 = 4. (5 – 2) X 3 =**

**4. 12 + 6 3 = 6. (12 + 6) 3 = 7. 20 2 + 2 = 8. 20 (2 + 2) =**

To wrap-up the discussion, ask students for their answers and have other students either validate or correct the answer with reasons why.

**CHALLENGE:**

**9. 10 – 5 X (3 – 2) =**

**10. 10 – 5 X 3 – 2 =**

**11. (10 – 5) X 3 – 2 =**

**12. (10 – 5) X (3 – 2) =**

**Fractions**

So, what is the difference between $3÷6$ and $\frac{3}{6}$

Using the MathType templates is a powerful tool to help students understand rules with fractions.

Ask students to simplify the following expressions, and then compare the answers. Ask them if they can decide how the calculator figures out the denominator, and then how to calculate the numerator.

1. $\frac{1}{2}+\frac{1}{3}$ B) $\frac{1}{4}+\frac{1}{5}$ C) $\frac{1}{3}+\frac{1}{5}$ D) $\frac{1}{2}+\frac{1}{7}$

What if…

1. $\frac{1}{2}+\frac{1}{4}$ E) $\frac{1}{9}+\frac{1}{3}$ F) $\frac{1}{4}+\frac{1}{16}$ G) $\frac{1}{5}+\frac{1}{25}$

And what happens when…

H) $\frac{2}{3}+\frac{1}{4}$ I) $\frac{2}{7}+\frac{1}{3}$ J) $\frac{1}{6}+\frac{2}{5}$ K) $\frac{4}{9}+\frac{2}{5}$

What is changed in the following?

L) $\frac{3}{4}+\frac{1}{6}$ M) $\frac{2}{9}+\frac{5}{12}$ N) $\frac{1}{6}+\frac{5}{9}$ O) $\frac{3}{4}+\frac{3}{14}$

After your discussion, have the students turn the calculator face down on their desks, and then complete the following without the use of the calculator.

**PRACTICE:**

1. $\frac{1}{3}+\frac{1}{4}$ **2.** $\frac{2}{3}+\frac{1}{7}$ **3.** $\frac{1}{5}+\frac{1}{9}$ **4.** $\frac{2}{9}+\frac{3}{5}$

**5.** $\frac{4}{7}+\frac{5}{14}$ **6.** $\frac{9}{10}+\frac{4}{15}$ **7.** $\frac{1}{6}+\frac{1}{10}$ **8.** $\frac{1}{8}+\frac{1}{24}$

**CHALLENGE**

**9.** $\frac{2}{3}+\frac{3}{4}$ **10.** $\frac{3}{8}+\frac{1}{4}$ **11.** $\frac{5}{6}-\frac{3}{8}$ **12.** $\frac{3}{6}+\frac{2}{4}$

**Just a reminder, always clear memory before starting a new activity.**

**Data Analysis:**

**One-Variable Data**

You can help students understand Measures of Central Tendencies as different perspectives for representing the *average* of a set of numbers and as important parts for creating and interpreting graphical representations.

Let’s use the following data:

11, 23, 27, 14, 5, 2, 16, 29, 30, 16, 20, 21, 18, 23, 11, 10, 9, 16

Do you need to organize the data? Not really!

Mean ($\overbar{x}$)= Median= Mode= Range=

5-Number Summary is needed for Box Plots (Box & Whisker)

Min= Q1= Median= Q3= Max=

How about data from a frequency table?

 

1. Min= B) Min=

Q1= Q1=

Med= Med=

Q3= Q3=

Max= Max=

Mode= Mode=

Range= Range=

Creating a Box Plot (Using the Dot Plot from the last example)

**PRACTICE**

**List the 5-Number Summary and make a Box Plot for the following data:**



**Two-Variable Data**

Writing Linear Equations

Let’s find the slope-intercept equation for the following data:

|  |  |
| --- | --- |
| X | Y |
| -2 | 2 |
| -1 | 4 |
| 0 | 6 |
| 1 | 8 |
| 2 | 10 |

After students find the slope-intercept equation, ask them if they see any relationship between the values in slope-intercept equation and the values & patterns in the table.

**PRACTICE (No calculators)**

1. **Find the slope-intercept equation for the following table.**

|  |  |
| --- | --- |
| X | Y |
| -3 | -12 |
| -2 | -9 |
| -1 | -6 |
| 0 | -3 |

But we don’t need an entire table of data…

Find the slope-intercept equation of the line through (-1, 3) and (4, 13)

After using the calculator to find the equation, ask students if they knew what the slope would be. Ask if they could have found the y-intercept.

**PRACTICE (No calculators)**

1. **Find the slope-intercept equation of the line through (3, -2) and (-1, 6)**

**CHALLENGE (No Calculators)**

1. **Find the slope-intercept equation of the line through (6, 4) and (-8, -3)**
2. **Find the slope-intercept equation of the line with a slope = -1,**

**through (3, -10)**

For what value will …

If you have an equation, how can you use tables to analyze the function values?

1. For f(x) = 2x-5 Find f(17) Find f(x) = 10
2. For f(x) = ½x + 4 Find f(17) Find f(x) = 10

With each example, ask students how the calculator is using the given value, to arrive at the desired value.

**PRACTICE**

1. **For f(x) = -2x + 5 Find f(13) Find f(x) = 7**
2. **For f(x) = -¼x + 2 Find f(-12) Find f(x) = 5**

**CHALLENGE**

1. **For f(x) = - ¼x + ½ Find f(12) Find f(x) = 2**

**Quadratics**

If you have an equation, how can you use tables to analyze the function values?

We can do the same thing with quadratics, as we did with linear functions.

However, using tables, we will be looking for solutions and vertex.

1. Find the solutions and vertex point for f(x) = x2 + 6x + 8
2. Find the solutions and vertex point for f(x) = x2 + 7x + 12

Ask your students if they see a pattern in their solutions, compared to the terms in the quadratic equation. Is there a direct relation to the solutions and the x-term of the vertex point?

**PRACTICE**

1. **Find the solutions and vertex point for f(x) = x2 + 8x + 12**

 **CHALLENGE**

1. **Find the solutions and vertex point for f(x) = x2 -12x + 10**