Created by Mr. Lischwe

Warmup 8/(**9+10**+2)

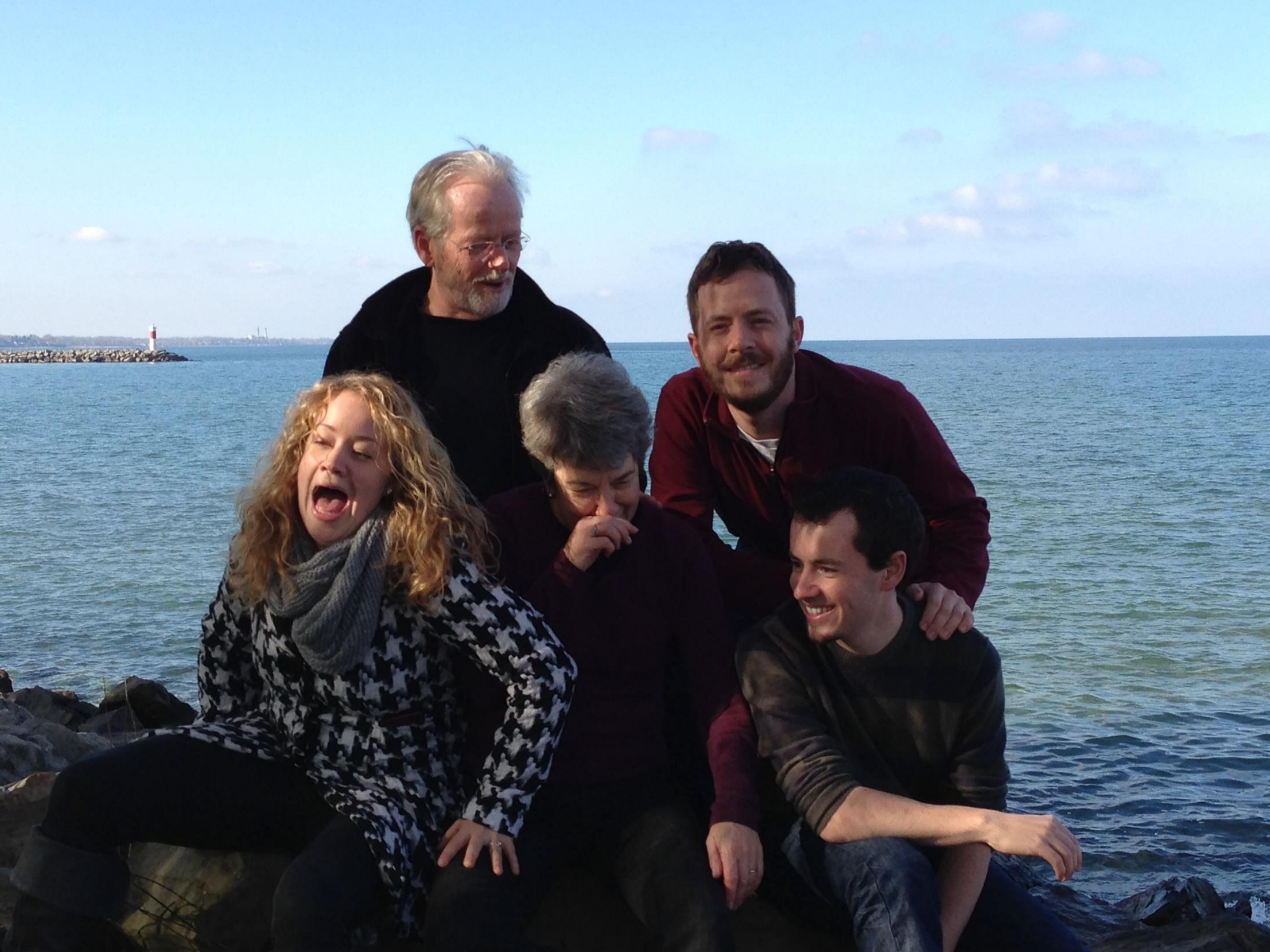
Make sure there is a whiteboard, marker, and eraser in your desk! (3rd period, get them from the cabinet!)

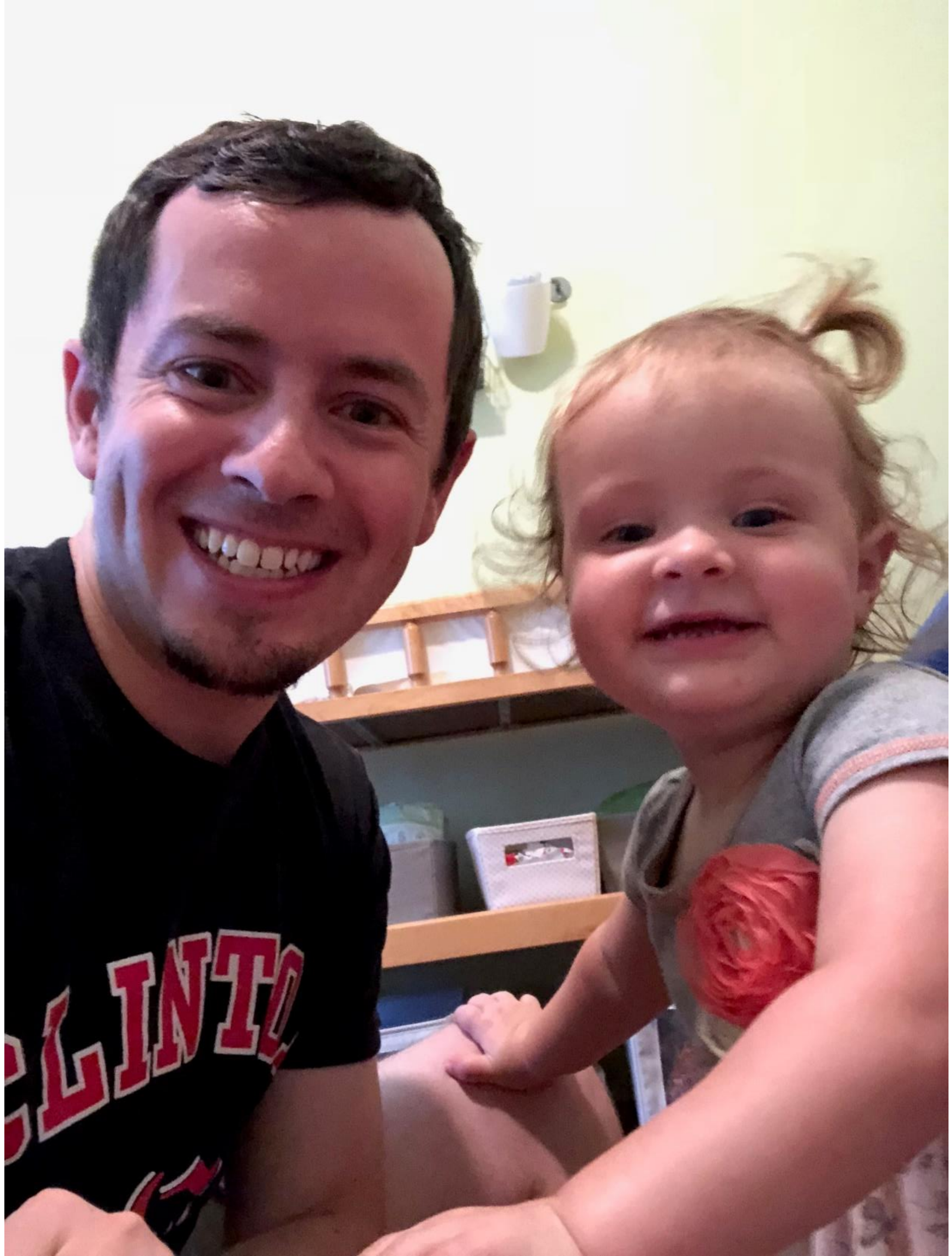
Multiply.

1. $-2 \cdot -2 \cdot -2 \cdot -2$
2. $-5 \cdot -5 \cdot -5$
3. Will $(-3)^8$ be positive or negative? Explain, in words, how you know.

Lischwe Age Problem, Part 2

- Nate's age + Anne's age = 67
- 26 years ago, Nate was twice as old as Anne.




CLINTO

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$$\left(\sqrt{81}\right)^2 = 81$$

$$\left(\sqrt{196}\right)^2 = 196$$

$$\left(\sqrt{\mathbf{14.23}}\right)^{\mathbf{2}} = 14.23$$

- **If you square a square root, you get the original number again!**

$$\left(\sqrt{12345}\right)^2 = 12345$$

- You can also have cube roots, 4th roots, 5th roots, etc.

- Examples

$\sqrt[3]{64} =$ ______ because ________________

$\sqrt[4]{16} =$ ______ because ________________

Technical Vocab Stuff:

- A radical sign without a number is automatically a square root. You will usually never see the "2" there.

$$\sqrt{x} \text{ means } \sqrt[2]{x}$$

KNOW THE DIFFERENCE:

$$\sqrt[3]{64}$$

"The cube root of 64"

$$3\sqrt{64}$$

"3 times the square root of 64"

$$= 3 \cdot 8 = 24$$

Perfect Cubes

- These are ALSO good to know:

$$1^3 = 1$$
$$2^3 = 8$$
$$3^3 = 27$$
$$4^3 = 64$$
$$5^3 = 125$$
$$6^3 = 216$$
$$7^3 = 343$$
$$8^3 = 512$$
$$9^3 = 729$$
$$10^3 = 1000$$

Negative Number stuff…

- What about these?
- $\sqrt{-25}$
- $\sqrt[3]{-8}$
- $\sqrt[4]{-10000}$
- $\sqrt[5]{-32}$

Roots of Negative Numbers

- **Odd roots (3rd root, 5th root, etc.) of negative numbers work.**
- **Even roots (square root, 4th root, etc.), of negative numbers are UNDEFINED (do not work).**

- In algebra 2, you will learn about **imaginary numbers,** which are what you get when you take the square root of a negative number.

Fractions…

- What about these?

- $\sqrt{\dfrac{\mathbf{64}}{\mathbf{9}}}$

- $\sqrt{\dfrac{\mathbf{32}}{\mathbf{8}}}$

Examples

1. $-\sqrt{49}$ $= -7$
2. $\sqrt{-49}$ $undefined$
3. $\sqrt[3]{-125}$ $= -5$
4. $\pm\sqrt{64}$ $= \pm 8$
5. $4\sqrt{25}$ $= 20$
6. $\sqrt{\frac{25}{4}}$ $= \frac{5}{2}$
7. $\sqrt[3]{-\frac{8}{27}}$ $= -\frac{2}{3}$
8. $\sqrt[87]{1}$ $= 1$

Challenge

- Without a calculator, find the square root of:

1. 576
2. 2209
3. 900,000,000

Homework (Due tomorrow)

- p.75 (1-4, 10, 16, 18-23)

- No calculator. You **MUST** show your work on problems **2, 10, and 16.**

Next objective: ESTIMATING square roots

- $\sqrt{60}$

DECIMAL CHALLENGE!

ESTIMATING SQUARE ROOTS

ESTIMATING ROOTS

- Based on your knowledge of the perfect squares, you should be able to estimate square roots of non-perfect squares pretty accurately.

- On your whiteboard, try to estimate the value of the square root **to the nearest hundredth** (two decimal places)

$$\sqrt{17}$$

$$\approx 4.12$$

$$\sqrt{46}$$

$$\approx 6.78$$

$$\sqrt{5}$$

$$\approx 2.24$$

$$\sqrt{34}$$

$$\approx 5.83$$

One estimation example for your notes…

Estimating Square Roots

- $\sqrt{84} \approx$ **9.2** because $\sqrt{81} = 9 \; and \; \sqrt{100} = 10$
  - **84 is closer to 81 than 100, so it should be less than 9.5.**

$$\sqrt{56} \approx 7.48$$

$$\sqrt{85}$$

$$\approx 9.22$$

$$\sqrt{105}$$

$$\approx 10.25$$

$$\sqrt{77}$$

$$\approx 8.77$$

$$\sqrt{8}$$

$$\approx 2.83$$

$$\sqrt{21}$$

$$\approx 4.58$$

$$\sqrt{152}$$

$$\approx 12.33$$

$$\sqrt{300}$$

$$\approx 17.32$$

$$\sqrt{215}$$

$$\approx 14.66$$

$$\sqrt{139}$$

$$\approx 11.79$$

$$\sqrt[3]{10} \approx 2.15$$

$$\sqrt[3]{70}$$

$$\approx 4.12$$

$$\sqrt[3]{124}$$

$$\approx 4.99$$

HOMEWORK (Due tomorrow)

- Estimating Roots Half-Sheet