Warmup 8 / $\left(\boldsymbol{Solution\ of\ \frac{1}{11}x = 2}\right)$

1. A number that has a square root that is a **whole number** is called a **perfect square**.

2. Estimate the square root of 2.

$$\sqrt{2} \approx 1.414$$

(This is a well-known value. This one and $\sqrt{3} \approx 1.732$ are the only ones I have memorized myself)

Warmup (continued)

3) There are two numbers between 0 and 100 that are both a **perfect square** and a **perfect cube**. What are they???

Purple Chair Reward

- I will select one random person – that person gets to sit in the purple chair all week!
- To be eligible, you need to have done ALL your homework the previous week, or not been penalized for forgetting materials or talking, etc.
- You are responsible for getting the chair and returning it to its spot by my desk each period.
- If you did not win the purple chair, **you may not sit in it!!!**

Returning the quizzes

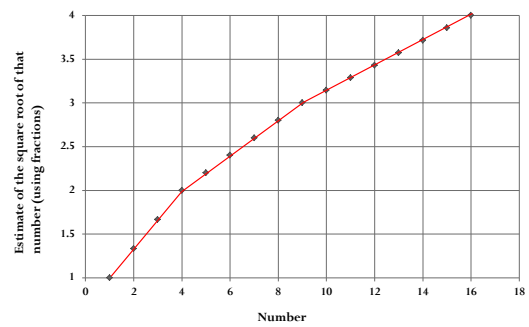
- Your quizzes will go in your **summatives folder**.
- These will be alphabetized in the crate – you can go back and look at your quizzes and do corrections for retakes.

- 3/9 simplifies
- #8 – imagining long division is fine but I prefer reasoning with the numbers
- Was picky about explanation for 9 – "0.15 is too low"…how do you know?
- It

Consecutive sums bonus task

- A few different strategies I saw…

Perfect square patterns



More patterns – Perfect Squares

$1^2 = 1$	$11^2 = 121$
$2^2 = 4$	$12^2 = 144$
$3^2 = 9$	$13^2 = 169$
$4^2 = 16$	$14^2 = 196$
$5^2 = 25$	$15^2 = 225$
$6^2 = 36$	$16^2 = 256$
$7^2 = 49$	$17^2 = 289$
$8^2 = 64$	$18^2 = 324$
$9^2 = 81$	$19^2 = 361$
$10^2 = 100$	$20^2 = 400$

Look at all of the ones digits. Do you notice anything?

Find $\sqrt{484}$.

Based on this pattern, the square root MUST end in 2 or 8.

(That is, unless it's not a perfect square in the first place. For example, $\sqrt{14}$)

More patterns – Perfect Cubes

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

Any guesses for $\sqrt[3]{2197}$?

Any guesses for $\sqrt[3]{17576}$?

Estimate for $\sqrt[3]{480}$?

Plan for this week

MONDAY: Last day of roots
TUESDAY: Rational vs. Irrational
WEDNESDAY: Rational vs. Irrational
THURSDAY: Review
FRIDAY: Unit 1 Test (Covers last week and this week)

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Making our square root estimates more exact

- How can you **CHECK** an estimate?
- To check an estimate, multiply it back out to see how close it is.
- $\sqrt{52}$
- $7.3 \cdot 7.3 = 53.29$ **(too high)**
- $7.2 \cdot 7.2 = 51.84$ **(too low)**
- **7.2 was closer , so 7.2 is the best estimate to the nearest tenth.**

- Find each square root. Your estimate MUST be accurate to the **nearest tenth**.

1. $\sqrt{22}$ 4.7
2. $\sqrt{83}$ 9.1
3. $\sqrt{129}$ 11.4

Challenge

- Find the square root. Your answer must be accurate **to the nearest hundredth.**
- $\sqrt{18}$

$4.2 \cdot 4.2 = 17.64$ (too low)
$4.3 \cdot 4.3 = 18.49$ (too high)
$4.25 \cdot 4.25 = 18.0625$ (too high)
$4.24 \cdot 4.24 = 17.9776$ (too low)

17.9776 is closer to 18 than 18.0625.

Therefore, 4.24 is the best estimate.

Using roots to solve equations

The way to solve equations is to use <u>inverse operations.</u>

SOLVE: $x + 8 = 12$

SOLVE: $x - 3 = 27$

SOLVE: $4x = 32$

Solving x^2 and x^3 equations

- Let's refresh our memory on some symbols…
- $\sqrt{49}$ **(the positive square root)** 7
- $-\sqrt{49}$ **(the negative square root)** -7
- $\pm\sqrt{49}$ **(both!)** 7, -7

Solve: $x^2 = 64$

What is the <u>inverse</u> of "squaring"?

$\sqrt{x^2} = \sqrt{64}$

Would positive 8 **AND** negative 8 both work?

So you should do $\sqrt{x^2} = \pm\sqrt{64}$

$x = 8, -8$

- Solve: $x^3 = 27$
- Would the positive and negative root both work?

$\sqrt[3]{x^3} = \sqrt[3]{27}$
$x = 3$

Solving x^2 and x^3 equations

1. $x^2 = 196$ $\quad x = 14, -14$
2. $x^3 = 125$ $\quad x = 5$
3. $x^3 = -64$ $\quad x = -4$
4. $x^2 = -289$ $\quad$ *no solution*

IMPORTANT: Be sure to check the positive and the negative root!

What if it's not a perfect square?

Solve each equation. Write both an exact answer and an estimate rounded to the nearest tenth.

5. $x^2 = 40$

ROUNDED ANSWER: $\boldsymbol{x \approx \pm 6.3}$
EXACT ANSWER: $\boldsymbol{x = \pm\sqrt{40}}$

How about...

$$\sqrt{x} = 16$$

HOMEWORK: Least to Greatest

- Comparing numbers in different forms
- You do **NOT** have to get the exact answers of everything!!! You should try to "reason it out" first.
- For example: $\frac{1}{8}, \frac{1}{7}, \frac{4}{21}$