The real number system

Date _____ Topic 1/3

CUES · QUESTIONS

1. Order the sets from smallest to largest.
2. Decimal test for rational?
3. Is $\sqrt{-16}$ a real number?
4. Write $0.\overline{7}$ as a fraction.

Cover the notes. Answer each cue from memory.

NOTES

1 · Worked example Copy one example from the page. Next to each line write WHY in a few words.

2 · Fill in the blanks Cover the steps and redo it. Leave a gap where you are unsure.

3 · Your turn A new question. Then check it against the answer.

SUMMARY — IN MY OWN WORDS, TWO SENTENCES

🔢 Exponent laws (zero & negative)

Date _____ Topic 2/3

CUES · QUESTIONS

1. $a^m \cdot a^n = ?$ $(a^m)^n = ?$
2. a^{-n} means…
3. $\left(\frac{3}{5}\right)^{-2} = ?$
4. $(7x)^0$ vs $7x^0$?

Cover the notes. Answer each cue from memory.

NOTES

1 · Worked example Copy one example from the page. Next to each line write WHY in a few words.

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3 · Your turn A new question. Then check it against the answer.

SUMMARY — IN MY OWN WORDS, TWO SENTENCES

Rational exponents

Date _____ Topic 3/3

CUES · QUESTIONS

1. $a^{m/n}$ as a radical?
2. $32^{3/5}$ = ?
3. Root first or power first?
4. $\sqrt[4]{x} \cdot \sqrt{x}$ as one power?

Cover the notes. Answer each cue from memory.

NOTES

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3 · Your turn A new question. Then check it against the answer.

SUMMARY — IN MY OWN WORDS, TWO SENTENCES

🔢 Real Numbers & Powers • Formula and trap sheet

Everything you need before a test, on the fewest pages. Fold it and keep it in your binder.

The real number system

FORMULAS

$\mathbb{N} \subset \mathbb{W} \subset \mathbb{I} \subset \mathbb{Q} \subset \mathbb{R}, \qquad \mathbb{R} = \mathbb{Q} \cup \overline{\mathbb{Q}}$ — How the number families fit together

$0.\overline{ab} = \dfrac{ab}{99}$ — A two-digit repeating block over 99

REMEMBER

- $\mathbb{N} \subset \mathbb{W} \subset \mathbb{I} \subset \mathbb{Q} \subset \mathbb{R}$; 0 is whole but not natural.
- Rational = $\frac{a}{b}$ with integers a, b: decimal ends or repeats. Irrational: never ends, never repeats.

WATCH OUT

- $\frac{\pi}{2}$ "looks like a fraction" → rational ×. Top must be an integer: it is irrational.
- Root sign → irrational ×. $\sqrt{16} = 4$ is an integer.

Exponent laws (zero & negative)

FORMULAS

$a^m \cdot a^n = a^{m+n}, \quad \dfrac{a^m}{a^n} = a^{m-n}, \quad (a^m)^n = a^{mn}$ — Product, quotient, power laws

$(ab)^n = a^n b^n, \quad \left(\dfrac{a}{b}\right)^n = \dfrac{a^n}{b^n}$ — Power of a product / quotient

$a^0 = 1, \quad a^{-n} = \dfrac{1}{a^n}, \quad \left(\dfrac{a}{b}\right)^{-n} = \left(\dfrac{b}{a}\right)^n$ — Zero and negative exponents ($a, b \neq 0$)

REMEMBER

- Same base: multiply → add exponents, divide → subtract, power of a power → multiply.
- An outside power hits every factor, numbers too: $(3x^2)^3 = 27x^6$.

WATCH OUT

- $2^{-3} = -8$ × → $2^{-3} = \frac{1}{8}$.
- $-3^2 = 9$ × → $-3^2 = -9$, but $(-3)^2 = 9$.

Rational exponents

FORMULAS

$a^{\frac{1}{n}} = \sqrt[n]{a}, \qquad a^{\frac{m}{n}} = (\sqrt[n]{a})^m = \sqrt[n]{a^m}$ — Rational exponent ↔ radical

$a^{-\frac{m}{n}} = \dfrac{1}{a^{\frac{m}{n}}}$ — Negative rational exponent ($a \neq 0$)

REMEMBER

- $a^{m/n} = (\sqrt[n]{a})^m$: bottom of the exponent = root, top = power.
- By hand, take the root first: $27^{2/3} = 3^2 = 9$.

WATCH OUT

- $8^{2/3}$ = square root cubed × → cube root squared: $2^2 = 4$.
- $(-16)^{1/2} = -4$ × → not real; but $(-8)^{1/3} = -2$ is fine (odd root).