√ Simplifying & ordering radicals

Date _____ Topic 1/3

CUES · QUESTIONS

1. Simplify $\sqrt{50}$.
2. Write $2\sqrt[3]{5}$ as an entire radical.
3. Perfect squares to know by heart?
4. First move to order $5\sqrt{2}$ and $4\sqrt{3}$?

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

√ Operations with radicals

Date _____ Topic 2/3

CUES · QUESTIONS

1. Conjugate of $5 - \sqrt{7}$?
2. $\sqrt{a} \cdot \sqrt{a}$ = ?
3. When can you add two radicals?
4. First move on $\dfrac{k}{a + \sqrt{b}}$?

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.

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SUMMARY — IN MY OWN WORDS, TWO SENTENCES

√ Radical equations & extraneous roots

Date _____ Topic 3/3

CUES · QUESTIONS

1. What is an extraneous root?
2. First move on $\sqrt{2x+1}-3=x$?
3. Restriction for $\sqrt{6-2x}$?
4. Do cube-root equations make extraneous roots?

Cover the notes. Answer each cue from memory.

NOTES

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SUMMARY — IN MY OWN WORDS, TWO SENTENCES

√ Radicals · Formula and trap sheet

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

Simplifying & ordering radicals

FORMULAS

$\sqrt{ab} = \sqrt{a}\,\sqrt{b} \quad (a, b \geq 0)$ — Product rule for radicals

$k\sqrt[n]{a} = \sqrt[n]{k^n a}$ — Mixed ↔ entire radical

REMEMBER

- Pull out the LARGEST perfect square (perfect cube for $\sqrt[3]{}$): $\sqrt{72} = 6\sqrt{2}$.
- Mixed → entire: square the outside number and multiply it in: $3\sqrt{5} = \sqrt{45}$.

WATCH OUT

- $\sqrt{72} = 2\sqrt{18}$ is not finished → $6\sqrt{2}$.
- $\sqrt{9+16} = 3+4$ × → $\sqrt{25} = 5$. Roots split over $\times$, never over $+$.

Operations with radicals

FORMULAS

$m\sqrt[n]{a} \cdot k\sqrt[n]{b} = mk\sqrt[n]{ab}$ — Multiplying radicals (same index)

$\left(\sqrt{a}+\sqrt{b}\right)\left(\sqrt{a}-\sqrt{b}\right) = a - b$ — Conjugates multiply to a rational number

REMEMBER

- Add/subtract LIKE radicals only — simplify each first: $\sqrt{12} + \sqrt{27} = 5\sqrt{3}$.
- Multiply outside × outside, inside × inside; expand brackets like FOIL.

WATCH OUT

- $\sqrt{2} + \sqrt{3} = \sqrt{5}$ × → unlike radicals stay as they are.
- $(3-\sqrt{2})^2 = 9+2$ × → $9 - 6\sqrt{2} + 2 = 11 - 6\sqrt{2}$.

Radical equations & extraneous roots

FORMULAS

$\sqrt{A} = B \;\Rightarrow\; A = B^2, \quad \text{valid only if } B \geq 0$ — Squaring step and the hidden condition

REMEMBER

- Restrictions → ISOLATE the radical → raise to the index → solve → CHECK in the original.
- Squaring can create extraneous roots: reject any root that fails the original.

WATCH OUT

- Squaring before isolating: $(\sqrt{x}+1)^2 = x+1$ × → $x + 2\sqrt{x} + 1$.
- $(2\sqrt{x+4})^2 = 2(x+4)$ × → $4(x+4)$.