Simplifying Radicals on Graph Paper: Step-by-Step Grid Support

Rubric key

Concise rubric key; full rubric text is in source.

Criterion	Met?
Correct prime factorization or perfect-square extraction shown in grid cells	
All pairs of identical factors identified and marked	
Outside factors multiplied correctly, including any coefficient	
Inside radicand contains no perfect-square factor greater than 1	
Final expression is in simplest form and matches the check by squaring	
Work is legible and follows the stated one-cell-per-factor convention; valid alternative layouts are accepted if pairs are clear	

Simplifying Radicals on Graph Paper: Step-by-Step Grid Support

Complete worked example / separate answer key

Simplify the square root of 72 using a factor tree on grid paper.

Answer: 6 times the square root of 2.

Reason: Factor 72 as 8 times 9, then 8 as 2 times 4, and 4 as 2 times 2; 9 as 3 times 3. The prime factors are 2, 2, 2, 3, 3. Pair the two 3s and one pair of 2s. Each pair contributes one factor outside: 3 and 2, giving 6 outside. One 2 remains unpaired inside. So the square root of 72 equals 6 times the square root of 2. Check: 6 squared is 36, and 36 times 2 is 72.

Simplifying Radicals on Graph Paper: Step-by-Step Grid Support

Original tasks 1, 2, 3, 4 / complete keys

Task 1

Simplify the square root of 48.

Answer: 4 times the square root of 3.

Reason: Factor 48 as 16 times 3. Since 16 is 4 squared, extract 4 outside and keep 3 inside. Alternatively, the prime factors are 2, 2, 2, 2, 3; two pairs of 2 give 2 times 2 equals 4 outside, and 3 stays inside.

Check: Square 4 to get 16, then multiply by 3 to get 48, matching the original radicand.

Task 2

Simplify 3 times the square root of 50.

Answer: 15 times the square root of 2.

Reason: Simplify the square root of 50 first: 50 equals 25 times 2, so the square root is 5 times the square root of 2. Multiply by the coefficient 3 to get 15 times the square root of 2.

Check: Square 15 to get 225, multiply by 2 to get 450. The original expression squared is 9 times 50, which is also 450.

Task 3

Simplify the square root of 98.

Answer: 7 times the square root of 2.

Reason: Factor 98 as 49 times 2. Since 49 is 7 squared, extract 7 outside and keep 2 inside. The prime factorization is 2, 7, 7; the pair of 7s gives 7 outside.

Check: Square 7 to get 49, then multiply by 2 to get 98, matching the original radicand.

Task 4

Simplify the square root of 200.

Answer: 10 times the square root of 2.

Reason: Factor 200 as 100 times 2. Since 100 is 10 squared, extract 10 outside and keep 2 inside. Alternatively, the prime factors are 2, 2, 2, 5, 5; the pair of 5s and one pair of 2s give 5 times 2 equals 10 outside, with one 2 inside.

Check: Square 10 to get 100, then multiply by 2 to get 200, matching the original radicand.

Simplifying Radicals on Graph Paper: Step-by-Step Grid Support

Task 1, Task 2, Task 3, Task 4 / Check-by-squaring values

Reference key only.

Task	Square outside	Multiply by inside	Compare with original
sqrt(48)	4^2 = 16	16 x 3 = 48	48 = 48
3*sqrt(50)	15^2 = 225	225 x 2 = 450	9 x 50 = 450
sqrt(98)	7^2 = 49	49 x 2 = 98	98 = 98
sqrt(200)	10^2 = 100	100 x 2 = 200	200 = 200

Simplifying Radicals on Graph Paper: Step-by-Step Grid Support

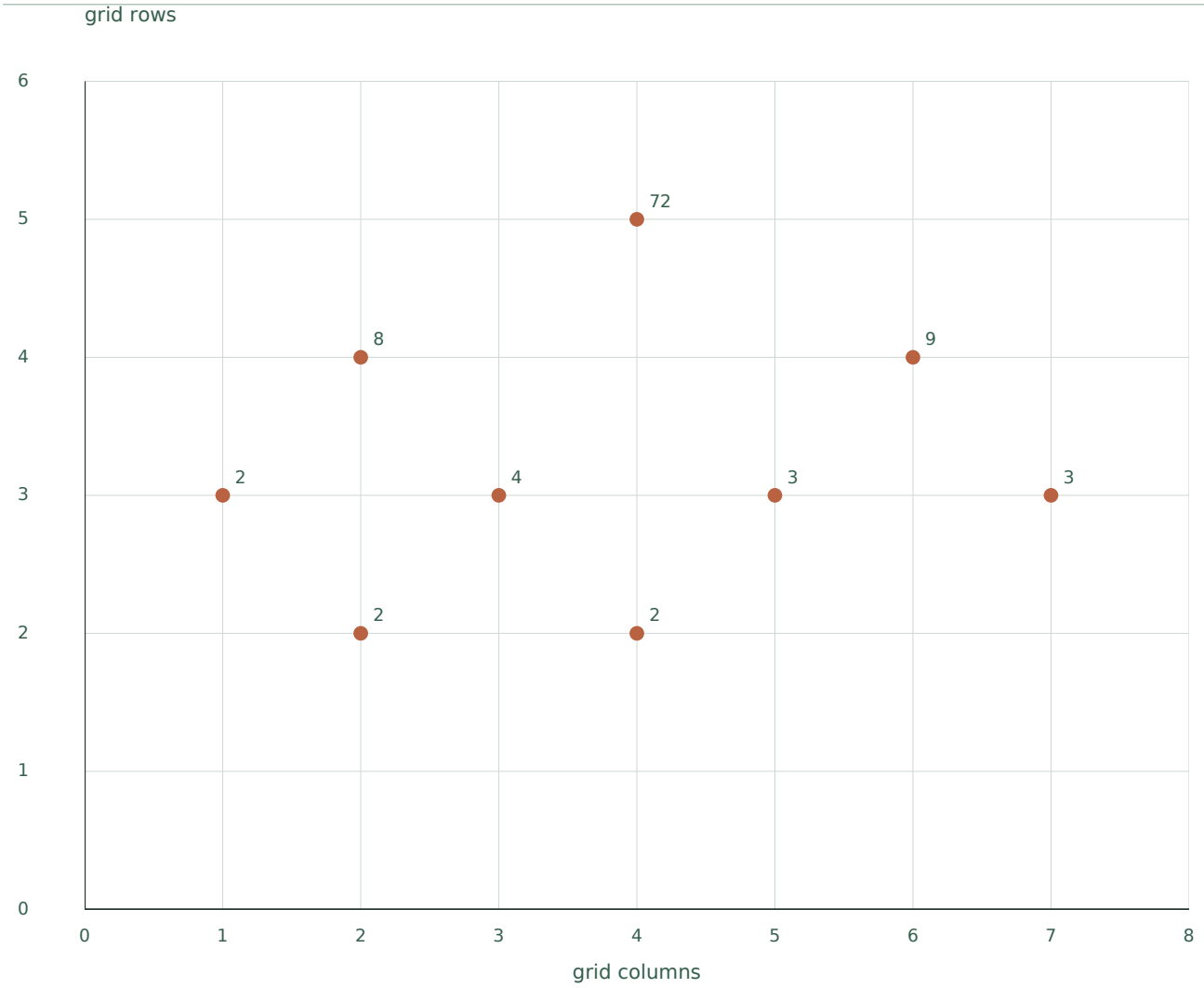
Worked example, Task 1, Task 2, Task 3, Task 4 / Answer key: stages for all four tasks

Reference key only; not a practice sheet.

Task	Factor tree or perfect-square split	Paired factors	Outside product (including coefficient if any) and inside radicand
sqrt(48)	48 = 16 x 3; or primes 2,2,2,2,3	two pairs of 2	outside 4; inside 3; final 4*sqrt(3)
3*sqrt(50)	50 = 25 x 2; sqrt(50)=5*sqrt(2)	pair of 5	outside 3*5=15; inside 2; final 15*sqrt(2)
sqrt(98)	98 = 49 x 2; primes 2,7,7	pair of 7	outside 7; inside 2; final 7*sqrt(2)
sqrt(200)	200 = 100 x 2; primes 2,2,2,5,5	pair of 5 and one pair of 2	outside 5*2=10; inside 2; final 10*sqrt(2)

Simplifying Radicals on Graph Paper: Step-by-Step Grid Support

Worked example / Factor tree for 72 on graph-paper cells



Factor tree: 72 -> 8 and 9; 8 -> 2 and 4; 4 -> 2 and 2; 9 -> 3 and 3. Prime factors: 2,2,2,3,3. Pairs: (2,2) and (3,3); one 2 remains unpaired inside. Outside product 2*3=6; inside 2; result 6*sqrt(2).

Simplifying Radicals on Graph Paper: Step-by-Step Grid Support

Source rubric / reflection

- [ ] Correct prime factorization or perfect-square extraction shown in grid cells.
- [ ] All pairs of identical factors identified and marked.
- [ ] Outside factors multiplied correctly, including any coefficient.
- [ ] Inside radicand contains no perfect-square factor greater than 1.
- [ ] Final expression is in simplest form and matches the check by squaring.
- [ ] Work is legible and follows the stated one-cell-per-factor convention; valid alternative layouts are accepted if pairs are clear.

Reflection: What did you check, what did you change, and what will you try next?