

Algebra 2 - Radical and Rational Equations - Answer Key

Common Core A-REI.A.2 · maths-pdf.fr/en/

Every worksheet problem on radical and rational equations is solved here, one step at a time. Compare your method as well as your final answer, because the steps show where keeping an extraneous solution can go wrong. Final answers appear in bold so you can find them quickly when you only need a check.

Algebra 2 · Common Core State Standards: **A-REI.A.2**

Exercise 1 - Basic radical equation

Square both sides: $x+5=16$, so $x=11$.

Check: $\sqrt{16}=4$.

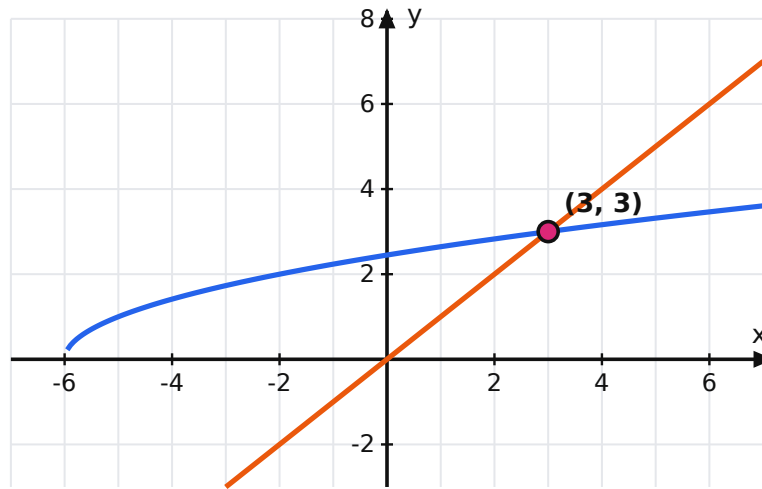
$x=11$

Exercise 2 - Radical with a coefficient

$2x-1=25$, so $x=13$. Check: $\sqrt{25}=5$.

$x=13$

Exercise 3 - Extraneous solution



One intersection at $x = 3$.

$x+6 = x^2$, so $x^2 - x - 6 = 0$ and $(x-3)(x+2) = 0$.

Check $x = 3$: $\sqrt{9} = 3$, true. Check $x = -2$: $\sqrt{4} = 2 \neq -2$, extraneous.

$x = 3$

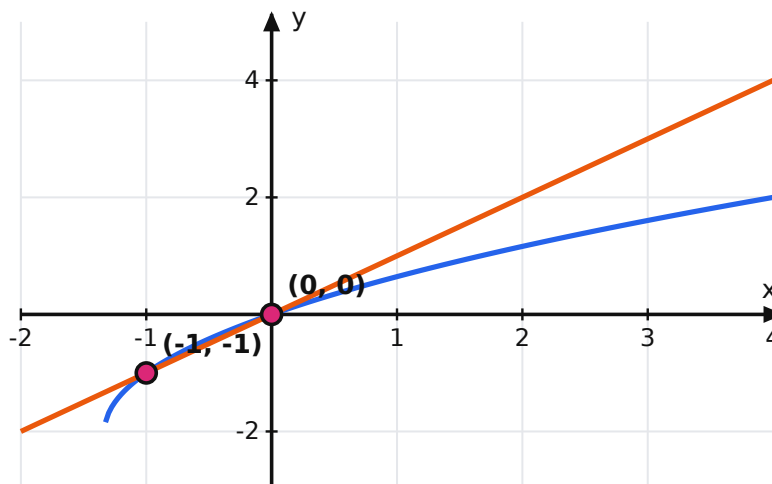
Exercise 4 - Radical equal to a binomial

Square: $x^2 - 2x + 1 = x + 11$, so $x^2 - 3x - 10 = 0$ and $(x-5)(x+2) = 0$.

Check $x = 5$: $4 = \sqrt{16}$, true. Check $x = -2$: $-3 = \sqrt{9} = 3$, false.

$x = 5$

Exercise 5 - Both solutions valid



Both candidates are valid.

Isolate: $\sqrt{3x+4} = x+2$. Square: $3x+4 = x^2+4x+4$, so $x^2+x=0$ and $x=0$ or -1 .

Check $x=0$: $\sqrt{4}-2=0$. Check $x=-1$: $\sqrt{1}-2=-1$. Both are valid.

$x=0$ **and** $x=-1$

Exercise 6 - Cube root equation

Cube both sides: $x-3=8$.

$x=11$

Exercise 7 - Radicals on both sides

Square: $x+7=2x-1$, so $x=8$. Check: $\sqrt{15}=\sqrt{15}$.

$x=8$

Exercise 8 - Two radicals

Isolate one radical: $\sqrt{x+3}=3-\sqrt{x}$. Square: $x+3=9-6\sqrt{x}+x$.

So $6\sqrt{x}=6$, $\sqrt{x}=1$, $x=1$. Check: $2+1=3$.

$x=1$

Exercise 9 - Proportion

Cross multiply: $3x=24$.

$x=8$

Exercise 10 - Rational equation

Cross multiply: $3x=x+2$, so $x=1$. Excluded values are -2 and 0 .

$x=1$

Exercise 11 - Clear the fractions

Multiply by the LCD $3x$: $6+x=3x$, so $x=3$.

Check: $\frac{2}{3} + \frac{1}{3} = 1$.

$$x=3$$

Exercise 12 - An extraneous solution

Step	Work
Multiply by $x - 2$	$x = 2 + 3(x - 2)$
Solve	$x = 2$
Check $x = 2$	denominator 0

The candidate $x = 2$ is excluded.

Multiply by $x-2$: $x=2+3x-6$, so $-2x=-4$ and $x=2$.

But $x=2$ makes the denominator 0, so it is extraneous.

No solution

Exercise 13 - Common denominator

Multiply by x^2-1 : $(x+1)+(x-1)=4$, so $2x=4$ and $x=2$.

$$x=2$$

Exercise 14 - Both candidates excluded

Multiply by $(x+3)(x-3)$: $x(x-3)+3(x+3)=18$, so $x^2+9=18$ and $x=\pm 3$.

Both values make a denominator 0.

No solution

Exercise 15 - Rational leads to a quadratic

Multiply by x : $6 = x^2 - x$, so $x^2 - x - 6 = 0$ and $(x-3)(x+2) = 0$.

Check $x = 3$: $2 = 2$. Check $x = -2$: $-3 = -3$.

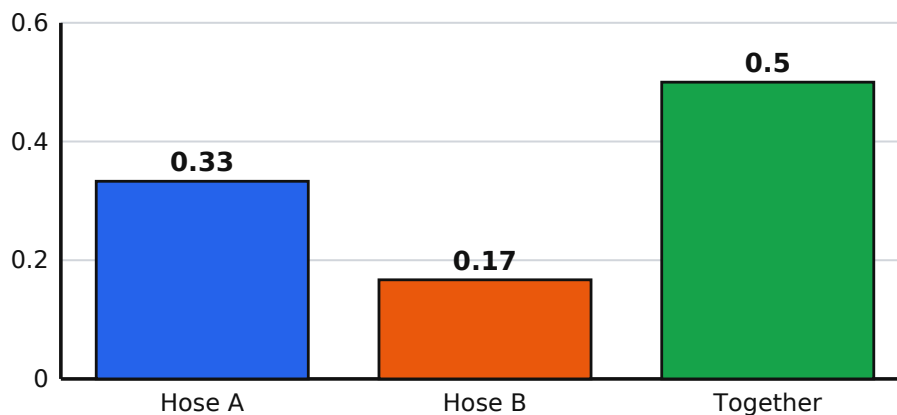
$x = 3$ and $x = -2$

Exercise 16 - Filling a pool

Rates: $\frac{1}{4} + \frac{1}{4+3} = \frac{1}{2}$. Multiply by $2t(t+3)$: $2(t+3) + 2t = t(t+3)$.

$4t + 6 = t^2 + 3t$, so $t^2 - t - 6 = 0$ and $(t-3)(t+2) = 0$. Time cannot be negative.

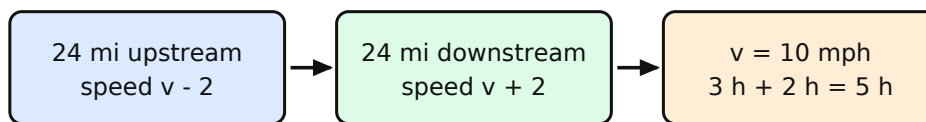
Hose A: 3 hours, hose B: $3+3=6$ hours. Check: $\frac{1}{3} + \frac{1}{6} = \frac{1}{2}$.



Rates $1/3$, $1/6$, $1/2$.

Hose A: 3 hours; hose B: 6 hours

Exercise 17 - Boat and current



Check: $24/8 + 24/12 = 3 + 2 = 5$.

Multiply by $(v-2)(v+2)$: $24(v+2) + 24(v-2) = 5(v^2-4)$, so $48v = 5v^2 - 20$.

$5v^2 - 48v - 20 = 0$ factors as $(5v+2)(v-10) = 0$. Speed is positive, so $v = 10$.

Check: $\frac{24}{8} + \frac{24}{12} = 3 + 2 = 5$.

10 mph

Exercise 18 - Free fall

$\frac{\sqrt{h}}{4} = 3$, so $\sqrt{h} = 12$. Square: $h = 144$.

144 feet

Exercise 19 - Skid marks

$\sqrt{24d} = 36$. Square: $24d = 1296$, so $d = 54$.

54 feet

Exercise 20 - Find the error

Squaring both sides can create extraneous solutions. For $x = -2$ the left side is $\sqrt{4} = 2$, which is not -2 .

$x = -2$ is extraneous; the only solution is $x = 3$