

Radicals and Rational Exponents Made Clear

Grade 11 – Algebra 2 math · Test Answer Key · Standards: N-RN.A.1, N-RN.A.2, A-REI.A.2

Each solution shows the work and a scoring guide. Give partial credit for correct setup, and remember that a candidate answer that is not checked earns no credit for the final answer in the radical-equation questions.

Standards: N-RN.A.1, N-RN.A.2, A-REI.A.2 · **Level:** Grade 11 Algebra 2

Question 1 Evaluate (2 points)

a) $(-6)^3 = -216$: **-6**.

b) $(\sqrt[5]{32})^3 = 2^3 = \mathbf{8}$.

c) $81^{-3/4} = 1/(\sqrt[4]{81})^3 = 1/27$: $\frac{1}{27}$.

d) $5^4 = 625$: **5**.

Scoring: 0.5 point each.

Question 2 Changing forms (2 points)

a) $x^{3/5}$.

b) $\sqrt[4]{(y^7)}$ or $(\sqrt[4]{y})^7$.

Scoring: 1 point each.

Question 3 Simplify radicals (3 points)

a) $98x^6 = 49x^6 \cdot 2$: **$7x^3\sqrt{2}$** .

b) $81y^5 = 27y^3 \cdot 3y^2$: **$3y\sqrt[3]{(3y^2)}$** .

Scoring: 1 point for (a); 1 point for the factor $3y$, 1 point for $\sqrt[3]{(3y^2)}$.

Question 4 Exponent rules (2 points)

a) Exponent: $3/2 + 1/4 - (-1/4) = 2$. **x^2** .

b) $16^{3/4} = 8$ and $(4/3)(3/4) = 1$: **8a.**

Scoring: 1 point each.

Question 5 Radical expressions (3 points)

a) $3 \cdot 2\sqrt{5} + 3\sqrt{5} = 9\sqrt{5}$.

b) Multiply by $3 + \sqrt{2}$: $\frac{10(3 + \sqrt{2})}{(9 - 2)} = \frac{(30 + 10\sqrt{2})}{7}$.

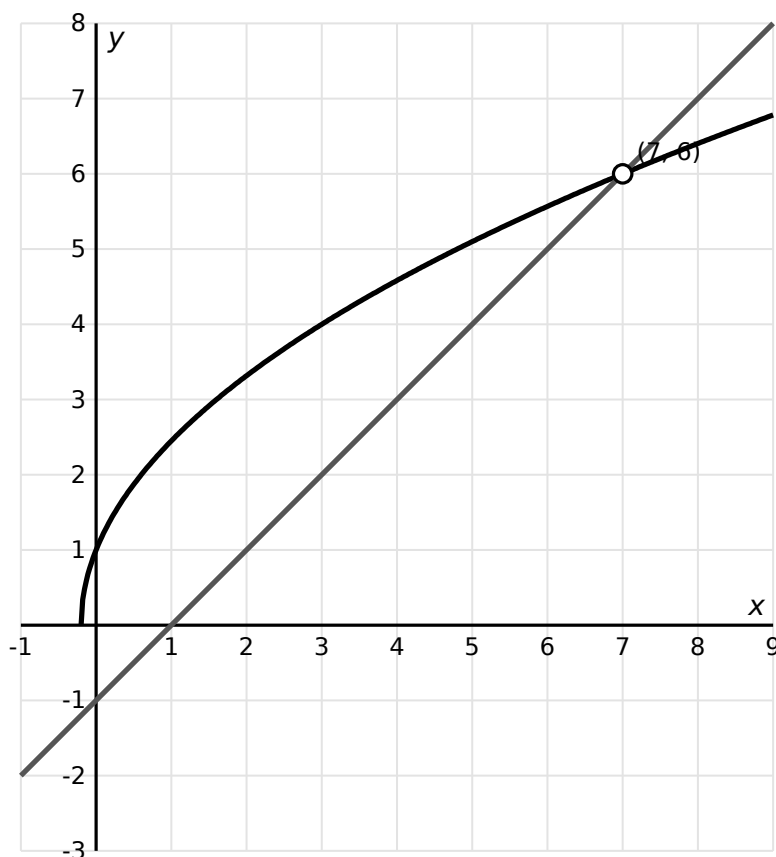
Scoring: 1 point for (a); 1 point for the conjugate step, 1 point for the result.

Question 6 Radical equation and its graph (3 points)

a) $5x + 1 = x^2 - 2x + 1$, so $x^2 - 7x = 0$ and $x = 0$ or $x = 7$. Check 0: $\sqrt{1} = 1$ but $0 - 1 = -1$ ✗. Check 7: $\sqrt{36} = 6 = 7 - 1$ ✓. **$x = 7$**

b) The graphs meet only at (7, 6); at $x = 0$ the line is below the x-axis while the radical is positive, so 0 is extraneous.

Scoring: 1 point for the squared equation and candidates, 1 for the check; 1 point for the explanation.



The only intersection.

Question 7 Two radicals (3 points)

$\sqrt{x+3} = 3 - \sqrt{x}$. Square: $x + 3 = 9 - 6\sqrt{x} + x$, so $6\sqrt{x} = 6$ and $x = 1$.

Check: $\sqrt{4} + \sqrt{1} = 2 + 1 = 3$ ✓.

$x = 1$

Scoring: 1 point for isolating and squaring, 1 for solving, 1 for the check.

Question 8 Falling time (2 points)

a) $\sqrt{h} / 4 = 3.5$, so $\sqrt{h} = 14$ and $h = 196$. **196 feet**

b) $\sqrt{144} / 4 = 12/4 = 3$ **seconds**.

Scoring: 1 point each.