

Radicals and Rational Exponents: math test solutions, Grade 11 – download the PDF

Test solutions with the detailed point scale. Add up your points and spot what to review.

Suggested time: 45 minutes. Out of 20 points. Calculator allowed only when the problem says so.

1 Roots and exponents

/ 3 pts

- a) **13** (0.5 pt). b) **-6** (0.5 pt). c) $\sqrt[4]{625} = 5$ (0.5 pt). d) $7^3 = 343$ (0.5 pt). e) $\frac{1}{2^2} = \frac{1}{4}$ (0.5 pt). f) $\left(\frac{2}{3}\right)^3 = \frac{8}{27}$ (0.5 pt).

2 Simplifying radicals

/ 4 pts

- a) $\sqrt{49 \cdot 2} = 7\sqrt{2}$ (1 pt).
 b) $\sqrt[3]{27 \cdot 2 \cdot x^3 \cdot x} = 3x\sqrt[3]{2x}$ (1.5 pt: 0.5 factoring, 1 result).
 c) $\frac{10\sqrt{5}}{5} = 2\sqrt{5}$ (0.5 pt).
 d) $\frac{5(3 + \sqrt{2})}{9 - 2} = \frac{5(3 + \sqrt{2})}{7}$ (1 pt).

3 Exponent rules

/ 3 pts

a) $\frac{5}{6} + \frac{2}{6} = \frac{7}{6}$, so $x^{7/6}$ (1 pt).

b) $8^{2/3} \cdot a^4 = 4a^4$ (1 pt).

c) $x^{-2}y^3 = \frac{y^3}{x^2}$ (1 pt).

4 Solving equations

/ 4 pts

a) $4x + 1 = 49$, so $x = 12$; check $\sqrt{49} = 7$ (1.5 pt).

b) $\sqrt[3]{2x-5} = 3$, so $2x - 5 = 27$ and $x = 16$; check $\sqrt[3]{27} + 1 = 4$ (1.5 pt).

c) $x - 3 = 125^{2/3} = 25$, so $x = 28$; check $25^{3/2} = 125$ (1 pt).

5 Extraneous solution

/ 3 pts

Square both sides: $3x + 7 = x^2 + 2x + 1$ (1 pt). Then $x^2 - x - 6 = 0$, so $(x - 3)(x + 2) = 0$ and the candidates are **3** and **-2** (1 pt).

Check $x = 3$: $\sqrt{16} = 4 = 3 + 1$, valid. Check $x = -2$: $\sqrt{1} = 1 \neq -1$, extraneous. The solution is $x = 3$ (1 pt).

6 A radical function

/ 3 pts

a) $x + 3 \geq 0$ gives domain $x \geq -3$ (0.5 pt); range $y \geq -4$ (0.5 pt).

b) $f(-3) = -4$, $f(-2) = 2 - 4 = -2$, $f(1) = 4 - 4 = 0$, $f(6) = 6 - 4 = 2$ (1 pt).

c) $f(x) = 0$ gives $\sqrt{x+3} = 2$, so $x = 1$: the x -intercept is **(1, 0)** (0.5 pt).

$f(0) = 2\sqrt{3} - 4 \approx -0.54$: the y -intercept is **(0, $2\sqrt{3} - 4$)** (0.5 pt).



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