

Radicals and Exponential Functions: math test solutions, Grade 9 – 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 Simplifying radicals

/ 4 pts

- a. $\sqrt{9 \cdot 5} = 3\sqrt{5}$ (1 pt)
- b. $\sqrt{64 \cdot 2} = 8\sqrt{2}$ (1 pt)
- c. $5 \cdot 2\sqrt{3} = 10\sqrt{3}$ (1 pt)
- d. $\sqrt{36} = 6$ (1 pt)

2 Operations with radicals

/ 4 pts

- a. $\sqrt{12} = 2\sqrt{3}$, so the sum is $7\sqrt{3} - 2\sqrt{3} + 2\sqrt{3} = 7\sqrt{3}$ (2 pts).
- b. $4 - 6 = -2$ (1 pt)
- c. $3 + 8\sqrt{3} + 16 = 19 + 8\sqrt{3}$ (1 pt)

3 Rationalizing

/ 3 pts

a. $\frac{12\sqrt{6}}{6} = 2\sqrt{6}$ (1 pt)

b. Multiply by the conjugate $3 + \sqrt{5}$: $\frac{8(3 + \sqrt{5})}{9 - 5}$ (1 pt) $= 2(3 + \sqrt{5}) = 6 + 2\sqrt{5}$ (1 pt)

4 A growing app

/ 3 pts

a. The growth factor is $1 + 0.15 = 1.15$, so $U(t) = 8000 \cdot 1.15^t$ (1 pt).

b. $U(4) = 8000 \cdot 1.15^4 \approx 8000 \cdot 1.749006 = 13,992$ users (2 pts: 1 for the substitution, 1 for the result).

5 Compound interest

/ 3 pts

$$A = 2500 \cdot 1.03^6 \text{ (1 pt)} \approx \$2,985.13 \text{ (1 pt).}$$

$$\text{Interest earned: } 2985.13 - 2500 = \$485.13 \text{ (1 pt).}$$

6 Identifying a model

/ 3 pts

a. The ratios $\frac{12}{4} = \frac{36}{12} = \frac{108}{36} = 3$ are constant, while the differences (8, 24, 72) are not. It is exponential (1 pt).

b. $y = 4 \cdot 3^x$ (1 pt)

c. $y = 4 \cdot 3^5 = 4 \cdot 243 = 972$ (1 pt)



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