

Radicals and Exponential Functions: math practice, Grade 9 – download the PDF

23 problems graded by difficulty (★ easy, ★★ medium, ★★★ hard). Try first, without looking at the solutions!

1 Perfect squares and roots



Evaluate each expression without a calculator.

a. $\sqrt{49}$

b. $\sqrt{144}$

c. $\sqrt{\frac{1}{9}}$

d. $\sqrt{0.25}$

2 Simplify the radical



Write each radical in simplest form.

a. $\sqrt{20}$

b. $\sqrt{48}$

c. $\sqrt{75}$

d. $\sqrt{98}$

3**Add and subtract like radicals**

Simplify.

a. $4\sqrt{2} + 9\sqrt{2}$

b. $6\sqrt{7} - 2\sqrt{7} + \sqrt{7}$

c. $8\sqrt{3} - 3\sqrt{3} + 2\sqrt{5}$

4**Multiply radicals**

Multiply and simplify.

a. $\sqrt{3} \cdot \sqrt{12}$

b. $2\sqrt{5} \cdot 3\sqrt{5}$

c. $\sqrt{6} \cdot \sqrt{10}$

5**Growth or decay?**

For each function, give the initial value ***a***, the factor ***b***, and say whether it models growth or decay.

a. $y = 5(1.3)^x$

b. $y = 200(0.9)^x$

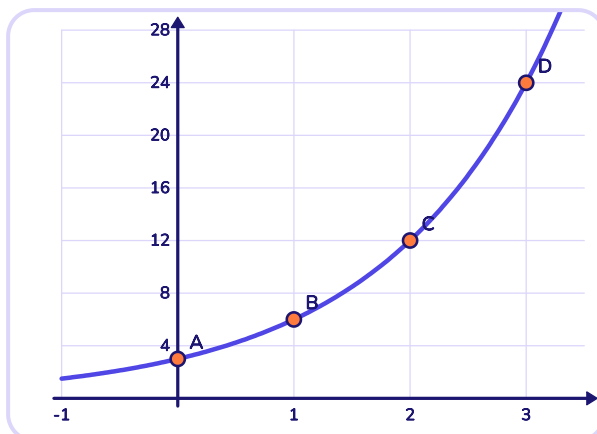
c. $y = 0.5 \cdot 4^x$

d. $y = 7\left(\frac{3}{4}\right)^x$

6 Reading a graph



The graph of an exponential function f is shown below.



- Read $f(0)$, $f(1)$, $f(2)$ and $f(3)$.
- What is the factor between two consecutive values?
- Write a formula for $f(x)$.
- Compute $f(4)$.

7 Next terms



The sequence 2, 10, 50, 250, ... is geometric. Find the common ratio and the next two terms.

8 Rationalize the denominator



Rationalize each denominator.

- $\frac{10}{\sqrt{5}}$
- $\frac{9}{2\sqrt{3}}$
- $\frac{7}{\sqrt{14}}$

9 A radical rectangle



A rectangular garden bed has length $\sqrt{72}$ feet and width $\sqrt{18}$ feet. Write the perimeter and the area in simplest radical form, then give the perimeter to the nearest hundredth.

10 Expand with radicals



Expand and simplify $(\sqrt{2} + 3)(\sqrt{2} + 5)$.

11 A phone loses value



A new phone costs \$800 and loses 20% of its value each year. Write a function for its value after t years and find the value after 3 years.

12 Savings account



You deposit \$3,500 in an account paying 4% interest compounded annually. How much is in the account after 5 years? Round to the nearest cent.

13 Linear or exponential?



Decide whether each table is linear or exponential and write an equation.

x	0	1	2	3	4
A: y	5	10	20	40	80
B: y	7	11	15	19	23

14 Find a term and its position

A geometric sequence has $a_1 = 6$ and $r = 3$. (a) Write the explicit formula. (b) Find a_5 . (c) Which term equals 1,458?

15 True or false?

Say whether each statement is true or false and justify.

a. $\sqrt{9} + \sqrt{16} = \sqrt{25}$

b. $\sqrt{2} \cdot \sqrt{8} = 4$

c. $3\sqrt{2} + 2\sqrt{3} = 5\sqrt{5}$

16 Conjugates

Rationalize each denominator.

a. $\frac{6}{\sqrt{7} - 1}$

b. $\frac{2}{\sqrt{5} + \sqrt{3}}$

17 Squares and conjugate products

Simplify.

a. $(3 - 2\sqrt{5})^2$

b. $(4 + \sqrt{3})(4 - \sqrt{3})$

18 A growing culture

A lab culture starts with 40 cells and doubles every 3 hours, so $N(t) = 40 \cdot 2^{t/3}$ where t is in hours. (a) How many cells are there after 12 hours? (b) After how many hours are there 2,560 cells?

19 Medicine in the body

A patient takes 480 mg of a medicine. Every 4 hours the amount in the body is cut in half. (a) How much remains after 12 hours? (b) The amount is checked every 4 hours. At the first check, how many hours after the dose is the amount below 10 mg?

20 When does exponential win?

Two accounts start with \$1,000. Account A adds \$80 each year: $A(t) = 1000 + 80t$. Account B earns 6% compounded annually: $B(t) = 1000 \cdot 1.06^t$. Compare them at $t = 10$, $t = 11$ and $t = 12$ and decide in which year B first beats A.

21 Compounding frequency

You invest \$5,000 at 6% for 3 years. Compare the final balance when interest is compounded annually and when it is compounded monthly. How much extra do you earn with monthly compounding? Round to the nearest cent.

22 A bouncing ball

A ball is dropped from 10 feet. After each bounce it rises to 60% of its previous height. (a) Write the height after the n th bounce. (b) What is the height after the 5th bounce? (c) After which bounce does the ball first rise to less than 1 foot?

23

Missing terms

In a geometric sequence, $a_2 = 12$ and $a_5 = 324$. Find the common ratio, the first term and a_7 .

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