

Show all of your work. Complete this test in pencil. Make sure you write neatly and circle your answers.

1. Simplify. Your answer should contain only positive exponents.

$$\frac{a^4 b \cdot a^4 b^3}{a^3 b^7} = \frac{a^8 b^4}{a^3 b^7} = \frac{a^5}{b^3}$$

$$(2p^2)^3 \cdot 2p^4$$

$$8p^6 \cdot 2p^4$$

$$= 16p^{10}$$

2. The population of Bengal Tigers decreases at a rate of 7% a year. There were 3,200 Bengal tigers in 2005.

- a. Write a function that models this scenario. (Your function should have a  $t$  in it.)

$$F(t) = 3,200(1 - .07)^t$$

$$= 3,200(.93)^t$$

- b. How many tigers are left now?

$$t = 11$$

$$F(t) = 3,200(.93)^{11}$$

$$= 1,440.33$$

1,440 Tigers

3. Simplify. Make sure all of your radicals are in simplest form any further.

$$\sqrt{108a^5b^8}$$

$$\begin{array}{c} \swarrow \quad \downarrow \quad \searrow \\ \sqrt{36} \quad \sqrt{3} \quad \sqrt{a^4} \sqrt{a} \quad b^4 \\ \downarrow \quad \quad \downarrow \quad \quad \downarrow \\ 6 \quad \quad a^2 \quad \quad b^4 \end{array}$$

$$\boxed{6a^2b^4\sqrt{3a}}$$

$$4\sqrt{28} - 5\sqrt{63}$$

$$\begin{array}{c} \swarrow \quad \downarrow \quad \searrow \quad \swarrow \quad \downarrow \quad \searrow \\ \sqrt{4} \quad \sqrt{7} \quad \sqrt{9} \quad \sqrt{7} \\ 4 \cdot 2\sqrt{7} - 5 \cdot 3\sqrt{7} \\ 8\sqrt{7} - 15\sqrt{7} \\ -7\sqrt{7} \end{array}$$

4. Simplify. Your answer should contain only positive exponents.

$$\frac{2xy^9 \cdot x^{-4}y^{-1}}{(x^2y^2)^3}$$

$$= \frac{2x^{-3}y^8}{x^6y^6}$$

=

$$\frac{2y^2}{x^9}$$

5. Steven has \$2,500 to invest. His bank gives him two options. How much money will he have in 5 years for each of the options?

Option A: A savings account that earns 11% interest a year.

$$F(t) = 2500(1.11)^5 = \$4,212.65$$

Option B: A savings bond that earns 2% interest per month.

$$F(t) = 2500(1.02)^{60} = \$8,202.58$$

Which option should Steven choose? Explain your reasoning.

He should choose option B!

6. Simplify. Make sure all of your radicals are in simplest form and radicals cannot be combined any further.

$$5\sqrt{2} * 3\sqrt{10}$$

$$= 15\sqrt{20}$$
$$\begin{array}{c} \sqrt{4} \sqrt{5} \\ 15 \cdot 2 \sqrt{5} \\ \hline 30\sqrt{5} \end{array}$$

$$\frac{4\sqrt{16}}{2\sqrt{12}}$$

$$= \frac{4}{3}$$

$$\frac{2}{1}$$

$$\frac{4}{3}$$

$$\frac{2}{1} \cdot \frac{\sqrt{4}}{\sqrt{3}} = 2$$

$$= \frac{4}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}}$$

$$= \frac{4\sqrt{3}}{3}$$

7. Simplify:

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$$3\sqrt{20a^7b^2} * 2\sqrt{5ab^5}$$

$$= 6\sqrt{100a^8b^7}$$

Diagram showing the simplification of the radical expression:

$$\begin{array}{c} \downarrow \quad \downarrow \quad \swarrow \quad \searrow \\ 100 \quad a^4 \quad \sqrt{b^6} \quad \sqrt{b} \\ \downarrow \\ b^3 \end{array}$$

$$60a^4b^3\sqrt{b}$$

8. A certain bacteria multiplies at a rate of 19% per day. A sample of the bacteria contained 200 specimens on day zero.

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Which of the following would you use to determine how many bacteria there would be in 3 weeks?

- i.  $f(t) = 200(1 - 0.19)^3$
- ii.  $f(t) = 200(1 + 0.19)^3$
- iii.  $f(t) = 200(1.19)^{21}$
- iv.  $f(t) = 200(0.81)^{21}$

Explain your choice:

9. Fill in the following table:

Function	Growth or Decay	Initial Amount	Rate (as a percent)	Time
$f(t) = 5000(0.3)^{12}$	D	5000	70%	12
$f(t) = 2(1.48)^{100}$	G	2	<del>48%</del>	100
$f(t) = 1.36(1 - .04)^5$	D	1.36	4%	5

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10. Simplify:

$$\frac{3\sqrt{6x^4y^3} \cdot 2\sqrt{3x^2y^2}}{9\sqrt{5x^2y^2}} = \frac{6\sqrt{18x^6y^5}}{9\sqrt{5x^2y^2}}$$

$$\frac{2\sqrt{2x^4y^3}}{\sqrt{5}} \rightarrow \frac{\sqrt{x^4} = x^2}{\sqrt{y^3} = y\sqrt{y}}$$

$$\frac{2x^2y\sqrt{2y}}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}} = \frac{2x^2y\sqrt{10y}}{5}$$

11. Charlotte was working on simplifying the following problem:

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$$(-2mn \cdot nm^{-1})^{-4}$$

She made a few mistakes in her work. Describe **one** of her mistakes and write the **exponent rule** that was not correctly followed.

$$(-2mn \cdot nm^{-1})^{-4}$$

$$8m^{-4}n^{-4} \cdot n^{-4}m^4$$

$$8m^0n^{16}$$

$$8n^{16}$$

12. The length of a rectangle can be represented as  $2x^4y^2z$  and the width is  $3x^3y^2$ . What is the area of the rectangle?

$$A = L \cdot W$$

$$= (2x^4y^2z) \cdot (3x^3y^2)$$

$$= 6x^7y^4z$$

Extra Time? Draw a picture of a sea monster!

