

Exponents Study Guide

Math 1

Name: _____

Date: _____ Block: _____

Directions: Simplify each expression. Use positive exponents.

1. $\left(\frac{y^5}{x^4}\right)^{-3}$

2. $\frac{p^3q^{-1}}{q^2r^{-6}}$

3. $\left(\frac{16x^{-4}}{32y^{-5}}\right)^2$

4. $(m^3n^{-5}m^{-1})^{-3}$

5. $\left(\frac{3^2y^{-4}}{3^2x^0y^2}\right)^2$

$\left(\frac{x^4y^{-2}}{x^{-3}y^5}\right)^{-1}$

6. If $z = \frac{1}{2}$, which expression has the greatest value?

a) $z^{-6}z^4$

b) $(z^{-2}z^5)^{-2}$

c) $(z^3)^5$

d) $-(z^2z^{-4})^{-3}$

Simplify the following:

7. $\left(\frac{9a^{-3}}{18b^{-4}}\right)^2$

8. $\left(\frac{5^3t^{-2}}{5^3s^0t^3}\right)^2$

9. $(x^{-2})^{-5}$

10. $(x^2y^{-2})(xy)^4$

Write using rational exponents.

11. $(\sqrt[3]{3a})^4$

12. $\frac{1}{(\sqrt{3k})^5}$

13. $(\sqrt[3]{6x})^4$

14. $(\sqrt[4]{m})^3$

Write using radicals.

15. $(10n)^{\frac{3}{2}}$

16. $(27p^6)^{\frac{5}{3}}$

17. $(5x)^{-\frac{5}{4}}$

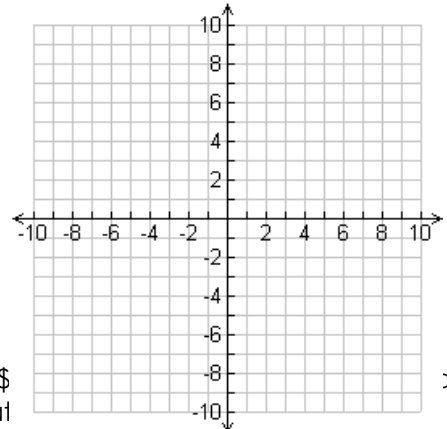
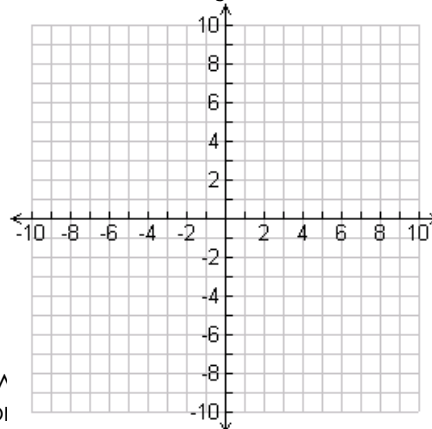
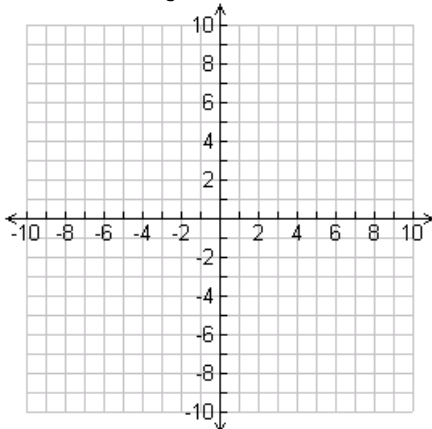
18. $a^{\frac{6}{5}}$

Graph each function. Make sure to draw a dotted line for the horizontal asymptote.

19. $f(x) = \frac{1}{3} \cdot 3^x - 2$

20. $y = 3 \cdot \left(\frac{1}{3}\right)^x + 2$

21. $y = 0.5^x + 3$



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- a. How much will the Honda be worth in 2012?
- b. How much will the Ford be worth in 2015?

23. The function $y = 195 \cdot 0.75^x$ models the average time (in minutes) of math tests in 1980.

- a. Does the exponential function represent *growth* or *decay*?
- b. Estimate the average time for math tests in 1990.
- c. Predict the average time for math tests in 2025.

24. Find the balance in a bank account after 8 years if \$500 is invested at 7% interest.

25. Find the balance in a bank account after 5 years if \$2000 is invested at 6% interest.

26. On the first swing, a pendulum swings through an arc of length 60 cm. On each successive swing, the length of the arc is 82% of the length of the previous swing.

- a. Write a rule to model this situation.
- b. Find the length of the arc on the fifth swing. Round your answer to the nearest cm.

27. **Reasoning:** Does the table below represent an exponential function? Explain why or why not.

x	2	3	4	5
y	2.25	3.375	5.063	7.953

28.

Bacteria in a culture are growing exponentially with time, as shown in the table below.

Bacteria Growth

Day	Bacteria
0	100
1	200
2	400

Which of the following equations expresses the number of bacteria, y , present at any time, t ?

- a) $y = 100 + 2^t$
- *b) $y = (100) \cdot (2)^t$
- c) $y = 2^t$
- d) $y = (200) \cdot (2)^t$

29.

This table shows the number of subscribers to four magazines.

Year	Subscribers to Music Magazine	Subscribers to Sports Magazine	Subscribers to Business Magazine	Subscribers to History Magazine
1	100,000	100,000	100,000	100,000
2	90,000	90,000	90,000	90,000
3	81,000	80,000	70,000	85,000
4	72,900	70,000	40,000	82,500

Which magazine's subscribers are *best* modeled by an exponential function?