

## Simplifying Exponential Expressions and Scientific Notation

**Finish each rule.**

1.  $a^m \cdot a^n =$

2.  $(a^m)^n =$

3.  $(ab)^m =$

4.  $\frac{a^m}{a^n} =$

5.  $a^0 =$

6.  $a^{-n} =$

**Simplify the expression. The simplified expression should have no negative exponents.**

7.  $(x^5)^6$

8.  $3x^2 \cdot (4x^3)^2$

9.  $6^7 \cdot 6^9$

10.  $(-2x)^4$

11.  $(-5)^0 \cdot x$

12.  $\left(\frac{1}{3}\right)^{-1}$

13.  $\frac{4^5 \cdot 4^3}{4^2}$

14.  $\frac{y^8}{y^9}$

15.  $x^3 \cdot x^4 \cdot x^2$

16.  $\frac{(x^3)^2}{(x^5)^3}$

17.  $(x^2)^4$

18.  $(3^{-2})^{-1}$

19.  $\left(\frac{2x^3y^2}{3xy}\right)^{-3}$

20.  $\frac{1}{3x^{-3}}$

**Rewrite the number in decimal form.**

21.  $4.3269 \times 10^3$

22.  $7.1532 \times 10^{-5}$

**Rewrite the number in scientific notation.**

23. 0.0032

24. 1042000

**Evaluate the expression without using a calculator. Write the result in decimal form.**

25.  $(6 \times 10^{-2}) \cdot (7 \times 10^{-3})$

26.  $\frac{7.85 \times 10^{26}}{6.02 \times 10^{23}}$

27.  $\frac{(8.2 \times 10^{-3})(-7.9 \times 10^5)}{7.3 \times 10^{16}}$

Simplify, if possible. Write your answer as a power or as a product of powers. There should be no negative exponents in your answer.

1. $2^3 \cdot 2^5$	2. $(y^2)^4$
3. $(-3x^3)^4$	4. $4^0$
5. $(-3a^3)^3 \cdot (4a)^0$	6. $(-a^3b^5)^2 (a^4b)^2$
7. $3^{-5}$	8. $\left(\frac{4}{7}\right)^{-2}$
9. $2^{-1} \cdot 2^5$	10. $x^0 y^{-4}$
11. $5x^{-2}$	12. $(-5x^{-3}y^5)^2$
17. $\frac{6x^{-2}y^2}{3y^{-4}}$	18. $(-2x^2)^{-3}(4x^8)$
19. $\frac{15x^3z^{-5}}{25y^{-4}}$	20. $\frac{m^{-5}}{m^7 \cdot m^{-4}}$

<b>21.</b> $\frac{-20xy^8}{3x^{-4}y^2} \cdot \frac{-5x^{-3}y^5}{(-2y)^3}$	<b>22.</b> $\left(\frac{4x^{-3}y^2}{6xy^{-3}}\right)^{-2} \cdot \frac{y^4}{x^6y^{-5}}$
---	--

Write in Scientific Notation

<b>23.</b> 150,000	<b>24.</b> 0.000002
--------------------	---------------------

Write in Standard Form

<b>25.</b> $2.5 \times 10^{-2}$	<b>26.</b> $3.069 \times 10^6$
---------------------------------	--------------------------------

Multiply or Divide. Your final answer should be written in Scientific Notation.

<b>27.</b> $(2.6 \times 10^{-2})(1.6 \times 10^3)$	<b>28.</b> $(2.46 \times 10^4)(5.5 \times 10^5)$
<b>29.</b> $\frac{(4.9 \times 10^{-1})}{(5.5 \times 10^2)}$	<b>30.</b> $\frac{(4.56 \times 10^3)}{(1.35 \times 10^{-5})}$