

Key

Unit 6 Test Study Guide

Exponents and Exponential Functions

Exponent Rules

PRODUCT RULE	POWER RULE	QUOTIENT RULE	NEGATIVE EXPONENT RULE
$x^a \cdot x^b = x^{a+b}$	$(x^a)^b = x^{ab}$	$\frac{x^a}{x^b} = x^{a-b}$	$x^{-a} = \frac{1}{x^a}$

WHAT ABOUT ADDING AND SUBTRACTING MONOMIALS?

Add or Subtract coefficients leaving exponents the same

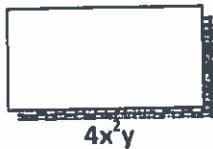
Simplifying Monomials

Final answers must have positive exponents only!

1. $6ab - 8ab$ $-2ab$	2. $-2xy^2 - 4xy + 6xy^2$ $4xy^2 - 4xy$
3. Subtract $-6b$ from $8b$ $8b - (-6b)$ $14b$	4. $7n^4 \cdot n^2$ $7n^6$
5. $8x^5 \cdot -3x^4$ $-24x^9$	6. $v^4 \cdot 7v^3 \cdot 5v$ $35v^8$
7. $(2y^3)^2$ $4y^6$	8. $(-4x^4)^3$ $-64x^{12}$
9. $(-a^6b)^2$ $a^{12}b^2$	10. $(-2y^4) \cdot (xy^3)^2 - 13x^2y^{10}$ $-2x^2y^{10} - 13x^2y^{10}$ $-15x^2y^{10}$
11. $\frac{a^6b^7}{a^5b^4}$ ab^3	12. $\frac{(-3x^6)^2}{5x^3 \cdot 3x^3} = \frac{9x^{12}}{15x^6} = \frac{3x^6}{5}$
13. $\left(\frac{4x^4y^2}{6xy}\right)^2 = \frac{16x^8y^4}{36x^2y^2} = \frac{4x^6y^2}{9}$	14. $\frac{7b^{-3} \cdot 3b^{-2}}{6b^2} = \frac{21b^{-5}}{6b^2} = \frac{7b^{-7}}{2} = \frac{7}{2b^7}$
15. $\frac{-9n^8}{27n^{10}} = \frac{-1}{3n^2}$	16. $\frac{a^{12}b^{-3}}{(ab)^{-4}} = \frac{a^{12}b^{-3}}{a^{-4}b^{-4}} = a^{16}b$

Geometric Applications

17. Find the perimeter and area of the following:



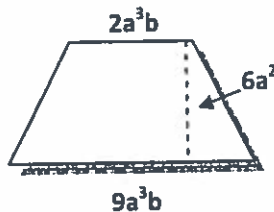
$$P = 2(4x^2y) + 2(13x)$$

$$= 8x^2y + 26x$$

$$A = 4x^2y(13x)$$

$$= 52x^3y$$

18. Find the area of the following:



$$A = \frac{2a^3b + 9a^3b}{2} \cdot 6a^2$$

$$= \frac{11a^3b}{2} \cdot 6a^2$$

$$= \frac{66a^5b}{2} = 33a^5b$$

Scientific Notation

Use exponent rules and LARS to evaluate.

19. $(8.6 \times 10^{-4}) + (3.5 \times 10^{-5})$

$$8.6 \times 10^{-4} + 0.35 \times 10^{-4}$$

$$8.95 \times 10^{-4}$$

20. $(9.8 \times 10^3) - (3.2 \times 10^2)$

$$9.8 \times 10^3 - 0.32 \times 10^3$$

$$9.48 \times 10^3$$

21. $(5.6 \times 10^4) \times (4.5 \times 10^6)$

$$25.2 \times 10^{10}$$

$$2.52 \times 10^{11}$$

22. $\frac{(1.75 \times 10^5)}{(5 \times 10^{-3})}$

$$= 0.35 \times 10^8$$

$$3.5 \times 10^7$$

$$\begin{array}{r} 0.35 \\ \times 11.75 \\ \hline 15 \\ 25 \\ \hline 0 \end{array}$$

23. The continent of North America has an area of approximately 9.4×10^6 square miles. The area of Asia is approximately 1.74×10^7 square miles. Approximately how many square miles larger is Asia than North America? Answer in scientific notation.

$$1.74 \times 10^7 - 0.94 \times 10^7$$

$$1.74 \times 10^7 - 0.94 \times 10^7$$

$$0.8 \times 10^7 = 8.0 \times 10^6$$

~~Geometric Sequences~~
 $a_n = a_1 \cdot r^{n-1}$

24. -2, 6, -18... (Find a_8)

25. 48, 24, 12... (Find a_5)

Exponential Growth
 $y = a(1+r)^t$

26. A population of a city is 422,000 and increases by 12% each year. Find the population of the city after 8 years.

$$y = 422,000(1.12)^8$$

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$$y = 1,044,856 \text{ people}$$

Exponential Decay
 $y = a(1-r)^t$

27. A car bought for \$13,000 depreciates at 15% per year. Find the value of the car after 5 years.

$$y = 13,000(0.85)^5$$

$$y = 86768.17$$

Radicals

28. $\sqrt{64} + \sqrt[3]{8}$

$$8 + 2 = 10$$

29. $\sqrt{240} \sqrt{16} \sqrt{15}$

$$4\sqrt{15}$$

30. $\sqrt[3]{-189}$

$$= \sqrt{-27} \sqrt[3]{7}$$

$$= -3 \sqrt[3]{7}$$

31. $\sqrt{75x^2y} \sqrt{25} \sqrt{3} \sqrt{x^2} \sqrt{y}$

$$5x\sqrt{3y}$$

32. $\sqrt{28x^3y^3} \sqrt{4} \sqrt{7} \sqrt{x^2} \sqrt{y^2} \sqrt{y}$

$$2x4\sqrt{7xy}$$

33. $\sqrt{200m^4n} \sqrt{100} \sqrt{2} \sqrt{m^4} \sqrt{n}$

$$10m^2\sqrt{2n}$$

LARS