

# Unit 2 Test Study Guide (Algebraic Expressions)

Name: Key

Date: \_\_\_\_\_

Per: \_\_\_\_\_

## Topic 1: Translating Expressions

**Directions:** Translate each expression.

1. "the product of -6 and a number"

$$-6n$$

2. "the difference between a number and 25"

$$n - 25$$

3. "17 more than the quotient of a number and 4"

$$\frac{n}{4} + 17$$

4. "13 less than two-thirds of a number"

$$\frac{2}{3}n - 13$$

5. "the sum of renting bowling shoes and \$3 per game"

$$3g + 5$$

6. "nine subtracted from twice a number"

$$2n - 9$$

## Topic 2: Simplifying Expressions

**Directions:** Simplify each expression.

7.  $18 - 6x + 5x - 11$

$$-x + 7$$

8.  $-2a - 6 + 15a - 21 + 5$

$$13a - 22$$

9.  $7m + 19m - 11n - 4m + 3n$

$$22m - 8n$$

10.  $6(w + 2)$

$$6w + 12$$

11.  $-4(2p - 7)$

$$-8p - (-28)$$

$$-8p + 28$$

12.  $5(a - 2b)$

$$5a - 10b$$

13.  $7(5x - 2) - 29x + 10$

$$35x - 14 - 29x + 10$$

$$6x - 4$$

14.  $-3(2 - k) + 11 - 10k$

$$-6 - (-3k) + 11 - 10k$$

$$-6 + 3k + 11 - 10k$$

$$-7k + 5$$

15.  $18 + 7(4c - 2) - 15c$

$$18 + 28c - 14 - 15c$$

$$13c + 4$$

16.  $-19 - 2(a + 9) + 5a - 3$

$$-19 - 2a + (-18) + 5a - 3$$

$$3a - 40$$

17.  $8p - 5(p - 13) - 27 + 4p$

$$8p - 5p + 65 - 27 + 4p$$

$$7p + 38$$

18.  $-5x - 4(x + 2y) + 9y - 7x$

$$-5x - 4x - 8y + 9y - 7x$$

$$-16x + y$$

### Topic 3: Factoring Expressions

**Directions:** Factor each expression. If it cannot be factored, write "prime."

19. $3x - 15$	20. $10c - 10$	21. $8k + 36$
22. $9r + 24$	23. $27r - 15$	24. $40a + 24b$
<b>Directions:</b> Simplify, then factor each expression.		
25. $-7m - 16 + 9m + 2$	26. $18y - (2y + 17) - 11$	
27. $-5 + 3(10 - x) + 9x - 1$	28. $3a - 5(a + 2b) + 8(4a - b)$	

### Topic 4: Operations with Monomials

**Directions:** Complete the following rules.

Zero Exponent	Negative Exponent	Product Rule	Quotient Rule	Power Rule
$x^0 = 1$	$x^{-a} = \frac{1}{x^a}$	$x^a \cdot x^b = x^{a+b}$	$\frac{x^a}{x^b} = x^{a-b}$	$(x^a)^b = x^{ab}$

**Directions:** Simplify each expression. Final answers must have positive exponents only.

29. $2ab + 9ab$ $11ab$	30. $-14m^3n^2 - 2m^3n^2$ $-16m^3n^2$	31. $2k^2 - 2k - 8k + k^2$ $3k^2 - 10k$
32. $5^{10} \cdot 5^2$ $5^{12}$	33. $r^{-4}s^2 \cdot r^{-3}s^{12}$ $r^{-7}s^{14} = \frac{s^{14}}{r^7}$	34. $(-8p^3q^7)(2p^{-1}q^{-7})$ $-16p^2q^0 = -16p^2$
35. $\frac{2^2}{2^9} = 2^{-7} = \frac{1}{2^7}$	36. $\frac{48k^{20}}{-8k^4} = -6k^{16}$	37. $\frac{3a^{-1}b^2}{6a^8b^{-3}} \cdot \frac{1}{2a^9}$

<b>38.</b> $(4^{-2})^3$ $4^{-6} = \frac{1}{4^6}$	<b>39.</b> $(9c^4d^7)^2$ $9^2 c^8 d^{14} = 81 c^8 d^{14}$	<b>40.</b> $(-3m^{-5}n^4)^4$ $-3^4 m^{-20} n^{16} = \frac{81 n^{16}}{m^{20}}$
<b>41.</b> $-2x^7y^4 + \frac{18x^{10}y^3}{3x^3y^{-1}}$ $-2x^7y^4 + 6x^7y^4$ $4x^7y^4$	<b>42.</b> $(2k^3)^4 \cdot -3k^2$ $2^4 k^{12} \cdot -3k^2$ $16k^{12} \cdot -3k^2$ $-48k^{14}$	<b>43.</b> $\frac{8r^7s^{-2}}{10r^4s \cdot 3r^2s^3}$ $\frac{8r^7s^{-2}}{30r^6s^4} = \frac{4r^1}{15s^6}$
<b>44.</b> $(-6a^5b^7)^2 - 17a^{10}b^{14}$ $-6^2 a^{10} b^{14} - 17a^{10}b^{14}$ $36a^{10}b^{14} - 17a^{10}b^{14}$ $19a^{10}b^{14}$	<b>45.</b> $\left(\frac{4}{3}v^7 \cdot 6v^{-4}\right)^2$ $\frac{16}{1^2} v^{14} \cdot \frac{36}{3^2} v^{-8}$ $64v^6$	<b>46.</b> $18m^9n^2 + 7m^{10}n \cdot -3m^{-1}n$ $18m^9n^2 + -21m^9n^2$ $-3m^9n^2$
<b>47.</b> Subtract $9x^3y$ from $-4x^3y$ . $-4x^3y - 9x^3y = -13x^3y$	<b>48.</b> Find the product of $18p^3q^{-15}$ and $3p^5q^4$ . $18p^3q^{-15} \cdot 3p^5q^4$ $54p^8q^{-11} = \frac{54p^8}{q^{11}}$	
<b>49.</b> Find the quotient of $-28a^{14}b^5$ and $4a^{11}b^6$ . $\frac{-28a^{14}b^5}{4a^{11}b^6} = -\frac{7a^3}{b}$	<b>50.</b> Find $9a^8$ more than the product of $-12a^5$ and $2a^3$ . $9a^8 + (-12a^5 \cdot 2a^3) = 9a^8 + (-24a^8)$ $= -15a^8$	

### Topic 5: Polynomials

**Directions:** Write each expression in standard form.

<b>51.</b> $25 - 3x$ $-3x + 25$	<b>52.</b> $-11 - 2p^2 + 8p$ $-2p^2 + 8p - 11$	<b>53.</b> $4y^2 + 25 - 13y + y^3$ $y^3 + 4y^2 - 13y + 25$
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**Directions:** Simplify each expression. Write all final answers in standard form.

<b>54.</b> $(4w - 7) + (2w + 23)$	<b>55.</b> $(9h + 10) - (7 + 12h)$
<b>56.</b> $(4x^2 + 13x - 2) + (x^2 - 5x + 16)$	<b>57.</b> $(2a^2 - a - 11) - (4a^2 + 10a - 11)$

58.  $(10 + k^2 - 8k) - (3k + 17 - 2k^2)$

59.  $(-2c - 17 + 9c^2) + (24 - 2c^2 - 2c)$

60. What is  $7m - 19$  less than  $6 - 2m$ ?

61. What is  $-6p + 1$  increased by  $4 - 11p$ ?

### Topic 6: Operations with Scientific Notation

**Directions:** Evaluate each expression. Give all final answers in scientific notation.

62.  $(9 \times 10^{-4})(4 \times 10^{10})$   
 $36 \times 10^6$

63.  $(8.6 \times 10^{-7})(2.5 \times 10^{-2})$   

$$\begin{array}{r} 8.6 \\ \times 2.5 \\ \hline 430 \\ 1720 \\ \hline 21.50 \end{array} = 21.50 \times 10^{-9} = 2.150 \times 10^{-8}$$

64.  $(2 \times 10^{13}) \div (5 \times 10^3)$

$0.4 \times 10^{10} = 4 \times 10^9$

$\frac{2 \times 10^{13}}{5 \times 10^3}$

65.  $\frac{1.1 \times 10^{-2}}{1.6 \times 10^4} = 0.6875 \times 10^{-6}$   
 $= 6.875 \times 10^{-7}$

66.  $(8.2 \times 10^9) + (2.5 \times 10^9)$

67.  $(4 \times 10^{-3}) - (9.8 \times 10^{-5})$

68. Asia is approximately  $1.7 \times 10^7$  square miles while Europe is  $3.8 \times 10^6$  square miles. How many more square miles is Asia than Europe?

69. An average of  $3.53 \times 10^5$  babies are born each day around the world. How many babies are born around the world in January?

$3.53 \times 10^5 (31)$   
 $109.43 \times 10^5$   
 $1.0943 \times 10^7$

$$\begin{array}{r} 3.53 \\ \times 31 \\ \hline 353 \\ 10560 \\ \hline 109.43 \end{array}$$

70. The volume of the moon is approximately  $2.2 \times 10^{10}$  cubic kilometers while the volume of the sun is  $1.4 \times 10^{18}$  cubic kilometers. How many times larger is the volume of the sun than the moon?

$\frac{1.4 \times 10^{18}}{2.2 \times 10^{10}} = 6.361 \times 10^7$

$$\begin{array}{r} 0.6361 \\ 2.2 \overline{) 1.4000} \\ \underline{132} \phantom{00} \\ 780 \phantom{00} \\ \underline{66} \phantom{00} \\ 140 \phantom{00} \end{array}$$