

Warm-Ups: p.130 (1 - 8, 21 - 23, 27 - 29)



Write a variable expression. Let n represent "a number."

1. five less than a number

$$N - 5$$

2. twenty divided by a number

$$20 \div n \quad \frac{20}{n}$$

3. the product of a number and two

$$2n \quad n \cdot 2$$

4. a number decreased by six

$$n - 6$$

5. a number increased by three

$$N + 3$$

6. four more than a number

$$4 + n$$

7. two more than three times a number

$$2 + 3 \times n = 2 + 3n$$

8. six times a number decreased by one

$$6 \cdot N - 1$$

Evaluate each expression. Let $a = 3$, $b = -1$, and $c = 6$.

21. $a + (+2) =$
 $3 + 2 =$
 5

22. $-10c \div (-5)$
 $-10(6) \div -5$
 $-60 \div -5$
 12

23. $4b - 3$
 $4(-1) - 3$
 $-4 - 3$
 -7

27. $-3b + 4a$
 15
 $-3(-1) + 4(3)$
 $3 + 12$

28. $5b \cdot (-a)$
 $+15$
 $5(-1) \cdot (-3)$
 $-5(-3)$

29. $6b - 3c$
 12
 $-6 - 18$
 $-6 + -18$
 -24

Exponent Rules:

$$2^0 = 2^0 = 1$$

$$2^1 = 2$$

$$2^2 = 2 \cdot 2 = 4$$

$$2^3 = 2 \cdot 2 \cdot 2 = 8$$

$$2^4 = 2 \cdot 2 \cdot 2 \cdot 2 = 16$$

$$2 \boxed{y^x} 0$$

p. 8

$$y^{-3} = \frac{1}{y^3}$$

$$2^{-1} = \frac{1}{2^1} = \left(\frac{1}{2}\right)$$

$$2^{-2} = \frac{1}{2^2} = \frac{1}{4}$$

$$2^{-3} = \frac{1}{2^3} = \frac{1}{2 \cdot 2 \cdot 2} = \left(\frac{1}{8}\right)$$

$$2^{-4} = \frac{1}{2^4} = \frac{1}{2 \cdot 2 \cdot 2 \cdot 2} = \left(\frac{1}{16}\right)$$

RETEACHING 3-7

EXPONENTS AND SCIENTIFIC NOTATION

Multiples of a number can be written in **exponential form**. The base tells what factor is being multiplied. The exponent tells how many equal factors there are.

$$\underline{6} \cdot \underline{6} \cdot \underline{6} = 6^3$$

exponent
 Read "six to the third power."
 base

Base → 6 ← exponent

Very large and very small numbers can be written as the product of a number greater than or equal to 1 but less than 10 and a power of 10. A number expressed in this form is in **scientific notation**.

Example 1

- a. Write $3 \cdot 3 \cdot 3 \cdot 3$ in exponential form. b. Write 7^5 in standard form.

Solution

a. $3 \cdot 3 \cdot 3 \cdot 3 = 3^4$ 4 factors

b. $7^5 = 7 \cdot 7 \cdot 7 \cdot 7 \cdot 7 = 16,807$ 5 factors

7^5
 $7 \boxed{4^x} 5$

Example 2

- a. Write 5,600,000 in scientific notation. 5.6×10^6 positive exponent
 b. Write $3.8 \cdot 10^2$ in scientific form. 380 have decimal right

Solution $5,600,000$ ← 6 places

a. Move the decimal point to the right to get a number greater than or equal to 1 and less than 10.

Write 5,600,000 as the product of 5.6 and a power of 10 equal to the number of decimal places you moved the decimal point.

$5,600,000 = 5.6 \cdot 1,000,000 = 5.6 \cdot 10^6$

b. $3.8 \cdot 10^2 = 3.8 \cdot 100 = 380$

5.24×10^{-3} move decimal left

$.00524$

less than 1 $.000000492 = 4.92 \times 10^{-7}$

Bigger than 1 $49200 = 4.92 \times 10^4$

$4.92 E 10$

Write in exponential form.

1. $5 \cdot 5 \cdot 5 \cdot 5 \cdot 5 \cdot 5$ 5^6

2. $\underline{10} \cdot \underline{10} \cdot \underline{10} \cdot \underline{10}$ 10^4

Write in standard form.

3. 7^3 343

4. 8^0 1

5. 2^6 64

6. 30^2 900

7^3

$7 \cdot 7 \cdot 7$

anything
to the

zero power
is 1.

$\frac{2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2}{8 \cdot 8}$

$30 \cdot 30$

Write in scientific notation.

7. 3700 3.7×10^3

8. 24,000,000 $2.4 \cdot 10^7$

Write in standard form.

9. $1.6 \cdot 10^4$ 16,000.

10. $3.088 \cdot 10^8$ 308800000

16,000.

3,088,000,000.

TRY THESE EXERCISES

Write in exponential form.

1. $5 \cdot 5 \cdot 5 = 5^3$ 2. $3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 = 3^5$ 3. $\frac{1}{4 \cdot 4 \cdot 4 \cdot 4} = \frac{1}{4^4}$

Write in standard form.

4. $2^2 = 4$ 5. $4^{-3} = \frac{1}{4^3} = \frac{1}{64}$ 6. $-6^1 = -6$

7. $5,629 \cdot 10^3$ 8. $9.04 \cdot 10^5$ 9. $4.2 \cdot 10^{-6}$

Write in scientific notation.

10. 7302 11. 0.00009 12. 0.00000002195

$7.302 \cdot 10^3$ 9.0×10^{-5} 2.195×10^{-8}

Write in standard form.

24. 3^2 25. $-4^2 = -4 \cdot 4 = -16$
 28. 2^1 29. $6^{-4} = \frac{1}{6^4} = \frac{1}{1296}$
 32. $1^{10} = 1$ 33. $13^0 = 1$

36. $6.39 \cdot 10^4$ 37. $6,876 \cdot 10^{-7} =$
 40. $8.62154 \cdot 10^{-8}$ 41. $8.7231 \cdot 10^9$

Write in scientific notation.

44. $452,968$ 45. $0.00012 = 1.2 \cdot 10^{-4}$
 48. 0.0000007 49. $892 = 8.92 \cdot 10^2$