Exponents & scientific notation unit review

There were five main ideas in this unit. The problems on the following pages will be like the problems on tomorrow's test.

Get a piece of notebook paper. Number it evens 2 through 50. You may use your computer's calculator. You will be working through these problems with me in class.

Your test is tomorrow.

Lesson 6-1

- To write numbers in standard form and scientific notation

A number is in **scientific notation** if the first factor is greater than or equal to 1 and less than 10 and the second factor is a power of 10. Multiplying a number by 10^n moves the decimal point n places to the right if n is positive or n places to the left if n is negative. To write a number in scientific notation, determine the first factor. Then write the second factor as a power of 10.

Write each number in standard form.

2. 2.5×10^3
2,500

3. 8×10^5
800,000

4. 6.1×10^{-6}
0.0000061

Write each number in scientific notation.

5. 40,000
4×10^4

6. 0.0003205
3.205×10^{-4}

7. 93,000,000
9.3×10^7

8. Probability If you flip a coin 9 times, the probability that the coin will land on "heads" each time is 2^{-9}. How do you represent 2^{-9} as a fraction? $\frac{1}{512}$

Lesson 6-2

- To multiply powers with the same base

To multiply numbers with the same base, add the exponents.

Write each expression using a single exponent.

9. $8^{10} \cdot 8^9$
8^{19}

10. $(-3)^4 \cdot (-3)^9$
$(-3)^{13}$

11. $2.6^{12} \cdot 2.6^{12}$
2.6^{24}

12. $x \cdot x^2$
x^3

13. $c \cdot c \cdot c$
c^3

14. $(-b)^3 \cdot (-b)^8$
$(-b)^{11}$

Simplify each expression.

15. $7a^4 \cdot a^2$
$7a^6$

16. $3x^4 \cdot 4x^4$
$12x^8$

17. $5n^3 \cdot 5n^3$
$25n^6$

18. $-8x \cdot x^3$ $-8x^4$

19. $r \cdot r^2 \cdot r^3$
r^6

20. $-m \cdot 5m^5$
$-5m^6$

21. $\frac{1}{3}x^2 \cdot 12x^3$
$4x^5$

22. $\frac{1}{2}x \cdot \frac{2}{3}x^2$ $\frac{1}{3}x^3$

23. Meteorology A weather report states that the average rainfall in an area is 2^{-4} in. for the month of July. How do you represent 2^{-4} as a fraction? $\frac{1}{16}$ in.

Lesson 6-3

- To multiply numbers written in scientific notation and choose units with scientific notation

To multiply numbers written in scientific notation, multiply the first factors. Then multiply the powers of 10 by adding the exponents.

Multiply. Write each product in scientific notation.

24. $(3 \times 10^6)(2 \times 10^{12})$
6×10^{18}

25. $5(1.4 \times 10^6)$
7×10^6

26. $(6 \times 10^9)(5 \times 10^4)$
3×10^{14}

27. $(2.1 \times 10^7)(7 \times 10^{12})$
1.47×10^{20}

28. $(9.3 \times 10^2)(6 \times 10^{-9})$
5.58×10^{-6}

29. $4(8.4 \times 10^3)$
3.36×10^4

30. Choose the most reasonable unit to describe the quantity. Then use scientific notation to describe the quantity using the other unit.

A typical cell of the human body is 5×10^{-2} _____. (km, mm)
5×10^{-2} mm; 5×10^{-8} km

Lesson 6-4

• To divide powers with the same base and to simplify expressions with negative exponents

To divide nonzero numbers with the same base, subtract the exponents. Any nonzero number with a zero exponent equals 1. For any nonzero number a and integer n, $a^{-n} = \frac{1}{a^n}$.

Write each expression using a single exponent.

31. $\dfrac{5^{10}}{5^7}$ **5^3**

32. $\dfrac{(-8)^{12}}{(-8)^2}$ **$(-8)^{10}$**

33. $\dfrac{76^{11}}{76^5}$ **76^6**

34. $\dfrac{1.8^6}{1.8^5}$ **1.8^1 or 1.8**

Simplify each expression.

35. 8^0 **1**

36. $(-16)^0$ **1**

37. $g^0 g^5$ **g^5**

38. $(8b)^0 0^2$ **0**

39. 5^{-4} **$\dfrac{1}{625}$**

40. x^{-9} **$\dfrac{1}{x^9}$**

41. 9^{-2} **$\dfrac{1}{81}$**

42. h^{-8} **$\dfrac{1}{h^8}$**

Lesson 6-5

• To divide and compare numbers written in scientific notation

To divide numbers written in scientific notation, divide the first factor of the first term by the first factor of the second term. Then divide the powers of 10 by subtracting the exponents. You can estimate how many times greater one number in scientific notation is than another by dividing the larger number by the smaller number.

Simplify. Write each quotient in scientific notation.

43. $(8 \times 10^5) \div (4 \times 10^2)$
2×10^3

44. $(7 \times 10^8) \div (5 \times 10^5)$
1.4×10^3

45. $(4 \times 10^{18}) \div (9 \times 10^7)$
4.4×10^{10}

46. $(6.3 \times 10^8) \div 7.4$
8.5×10^7

47. $9.1 \div (4.3 \times 10^4)$
2.1×10^{-4}

48. $(3.6 \times 10^9) \div (2.4 \times 10^3)$
1.5×10^6

49. Order the numbers from greatest to least.

$3.7 \times 10^{-4}, \quad 3.6 \times 10^3, \quad 4.1 \times 10^4, \quad 4.0 \times 10^3$

$4.1 \times 10^4, 4.0 \times 10^3, 3.6 \times 10^3, 3.7 \times 10^{-4}$

You have a paper/pencil test tomorrow.

You will NOT use notes or calculators.

The division problems on the test are small numbers that terminate.