2.4 **18.** Write each product as a power, then evaluate the power.

a) $5^3 \times 5^4$ b) $(-2)^3 \times (-2)^2$

c) $3^2 \times 3^3 \times 3^1$ d) $-10^4 \times 10^0$

19. There are about 10^{11} galaxies in the universe. Each galaxy contains about 10^{11} stars. About how many stars are in the universe?

20. Write each quotient as a power, then evaluate the power.

a) $7^5 \div 7^3$ b) $(-10)^9 \div (-10)^3$

c) $\frac{8^4}{8^2}$ d) $-\frac{6^7}{6^4}$

21. a) Can you use the laws of exponents to simplify $6^3 \times 5^5$? Explain.

b) Can you use the laws of exponents to simplify $27^2 \div 9^2$? Explain.

22. Find and correct any errors in the student work below.

Explain how you think the errors occurred.

a) $(-3)^6 \div (-3)^2 = (-3)^3$

$= -27$

b) $(-4)^2 + (-4)^2 = (-4)^4$

$= -256$

c) $\frac{(-5)^2 \times (-5)^4}{(-5)^3 \times (-5)^0} = \frac{(-5)^6}{(-5)^3}$

$= 5^2$

$= 25$

2.5 **23.** Write each expression as a product or quotient of powers, then evaluate it.

a) $(3 \times 5)^3$ b) $(12 \div 3)^5$

c) $[(-4) \times 2]^4$ d) $(63 \times 44)^0$

e) $\left(\frac{3}{2}\right)^5$ f) $\left(\frac{15}{2}\right)^2$

24. Write each expression as a power.

a) $(3^2)^3$ b) $(4^0)^6$

c) $[(-2)^3]^3$ d) $(5^5)^2$

25. For each expression below:

Evaluate it in two different ways:

i) do the operation in brackets first

ii) use the exponent laws

In each case, which method is more efficient? Explain why.

a) $(5 \times 3)^3$

b) $(3 \times 3)^4$

c) $(8 \div 2)^5$

d) $\left(\frac{9}{3}\right)^2$

e) $(2^3)^4$

f) $(6^2)^0$

26. Write each expression as a power, then evaluate.

a) $6^4 \times 6^3$

b) $(-11)^7 \div (-11)^5$

c) $\frac{3^4 \times 3^5}{3^3}$

d) $\frac{5^5}{5^3 \times 5^2}$

e) $\frac{(-4)^3 \times (-4)^6}{(-4)^2 \times (-4)^4}$

f) $\frac{10^6 \times 10^0}{10^3 \times 10^2}$

27. Simplify, then evaluate each expression.

a) $2^3 \times 2^2 - 2^0 + 2^4 \div 2^3$

b) $\frac{(-2)^3 \times (-2)^2}{(-2)^3 - (-2)^2}$

c) $12^2 \times 12^4 \div (-2)^4 - 12^0$

d) $\frac{(-12)^2 \times (-12)^4}{(-2)^4 - 12^0}$