

## MAT 1275CO - Chapter 1.1.4 Problem Set Key

1. Simplify and write without using negative exponents.

(a)  $3 \cdot 3^5 \cdot 3^{12}$   $3^{18}$

(b)  $x^2y^4 \cdot x^3y^6$   $x^5y^{10}$

(c)  $(2x^2y)^4$   $16x^8y^4$

(d)  $x^4x^{12}$   $x^{16}$

(e)  $x^{-4}x^{12}$   $x^8$

(f)  $x^4x^{-12}$   $\frac{1}{x^8}$

(g)  $x^{-4}x^{-12}$   $\frac{1}{x^{16}}$

(h)  $\frac{w^6}{w^{15}}$   $w^{-9}$

(i)  $\frac{w^{-6}}{w^{15}}$   $w^{-21}$

(j)  $\frac{w^6}{w^{-15}}$   $\frac{1}{w^9}$

(k)  $\frac{w^{-6}}{w^{-15}}$   $\frac{1}{w^{21}}$

(l)  $(u^2v^2 \cdot 2u^4)^3$   $8u^{18}v^6$

(m)  $2x(x^4y^2)^3$   $2x^{13}y^6$

(n)  $\frac{n^{-3}(n^4)^2}{3m^{-2}n}$   $\frac{m^2n^4}{3}$

(o)  $\left(\frac{2q^3p^3r^4 \cdot 2p^4}{(qrp^3)^2}\right)^4$   $256p^4q^4r^8$

(p)  $\left(\frac{4s^{-3}t^{-4}}{s \cdot s^2t^{-3}}\right)^{-2}$   $\frac{t^2}{16}$

(q)  $(3a^2b^4)^2 + \left(\frac{1}{a^{-3}b^2}\right)^3$   $9a^4b^8 + \frac{a^9}{b^6}$

(r)  $(3a^4b^{-6})(2a^2b^{-2})^2$   $\frac{12a^8}{b^{10}}$

(s)  $\left(\frac{3m^{-5}n^2}{4m^{-2}n^0}\right)^2 \cdot \left(\frac{mn^4}{9n}\right)^2$   $\frac{n^{10}}{144m^4}$

2. A byte is a unit used to measure a computer's memory. The numbers of bytes in several units of measure are as follows.

- kilobyte -  $2^{10}$  bytes -  $2^{13}$  bits
- megabyte -  $2^{20}$  bytes -  $2^{23}$  bits
- gigabyte -  $2^{30}$  bytes -  $2^{33}$  bits
- terabyte -  $2^{40}$  bytes -  $2^{43}$  bits

(a) How many kilobytes are in 1 terabyte?  $2^{30}$

(b) How many megabytes are in 16 gigabytes?  $2^{24}$

(c) Another unit used to measure a computer's memory is a bit. There are 8 bits in a byte. How can you convert the number of bytes in each unit of measure given in the table to bits? Can you still use a base of 2? Explain. **Yes, see above. We can still use base 2 because  $8 = 2^3$  so each byte is  $2^3$  bits.**

### Critical Thinking

1. Can you use the Product of Powers Property to multiply  $52 \cdot 64$ ? Explain. **Yes.  $52 \cdot 64 = (2^2 \cdot 13) \cdot (2^6) = 2^8 \cdot 13$**

## MAT 1275CO - Chapter 1.1.3 Problem Set Key

Express answers as improper fractions when appropriate. Do not use decimals.

- Evaluate.
  - $3 + [6(11 + 1 - 4)] \div 8 \times 2$  **15**
  - $7 + 6(5) \div 2 - 2(12 \div 4 \times 2)$  **10**
  - $20 \times 2 - (\frac{1}{2})(16) + (-2)$  **30**
  - $30 - 8 \times 5 \div (-12 + 2(11))$  **26**
- Evaluate  $3x - (-\frac{4}{2x})$  when  $x = 2$ . **7**
- Evaluate  $3a - b$  when  $a = \frac{5}{3}$  and  $b = -1$ . **6**
- Evaluate  $3(\frac{x-y}{2z} + yz)$  when  $x = 4$ ,  $y = 3$ , and  $z = 2$ . **2**
- Evaluate  $(x - y) - 2(y - x)$  when  $x = \frac{9}{2}$  and  $y = \frac{3}{4}$ .  **$\frac{75}{4}$**
- Evaluate  $\frac{a+2b}{c-d}$  when  $a = \frac{3}{5}$ ,  $b = \frac{1}{3}$ ,  $c = \frac{1}{4}$  and  $d = \frac{1}{5}$ . Express the answer as a mixed number.  **$25\frac{1}{3}$**
- Alicia is making a reading plan for her book club selection. She has 14 days to finish the book. She plans to read 30 pages on weekdays and 70 pages per day on Saturday and Sunday. Following this plan, she still has 10 more pages to read at the end of 14 days. How many pages long is the book? Write an expression to figure out how many pages there are in the book. Use parentheses when necessary. Simplify the expression.  **$(10 \times 30) + (4 \times 70) + 10 = 590$  pages**
- Mr. Adam and Ms. Kendall are making gingerbread houses for the school bake sale. Each of Mr. Adam's 15 students brought in  $\frac{2}{3}$  lbs. of candy. Each of Ms. Kendall's 12 students brought in  $\frac{3}{4}$  lbs. of candy. If each gingerbread house requires  $\frac{1}{8}$  lb of candy, how many houses can Mr. Adam and Ms. Kendall make together? Write an expression to find how many houses Mr. Adam and Ms. Kendall can make. Simplify the expression.  **$(15(\frac{2}{3}) + 12(\frac{3}{4})) \div \frac{1}{8} = 152$  houses**
- Nayelin, Joshua and Brian are sharing a pizza. If Nayelin takes  $\frac{3}{7}$  of the pizza and Joshua takes  $\frac{1}{3}$  of the pizza, how much pizza is left for Brian? Write an expression to find how much pizza is left for Brian. Use parentheses when necessary. Simplify the expression.  **$1 - (\frac{3}{7} + \frac{1}{3}) = \frac{5}{21}$**

### Critical Thinking:

- Give an example of an expression where parentheses are not superfluous (that the value of the expression changes upon erasing the parentheses).  **$6(-3)$**
- Mark and Brittany are making fruit baskets for families in their community. Each family receives one basket. Each basket includes 3 fruits for every child in the family and 5 fruits for every adult in the family. In their community, there are seven families with 2 kids and 2 adults in the household, five families with 1 child and 1 adult in the household and six families with 2 adults and 1 child in the household. How many fruits will they need? How many baskets will they need? If fruits are \$2 each and baskets are \$3 each, how much money will they need to purchase everything? **They need 18 baskets, 230 fruit, and \$514.**