

PRACTICE CUMULATIVE EVALUATION B1 FOR INTEGRATED ALGEBRA 1 – FORM 1

Lessons 2.1 (Algebraic Expressions) & 2.3a (Problem Solving 1: Translating Words into Algebra) + Review: Unit A

Ground Rules for Test Completion

1. Present your work in a neat and organized manner. Use complete sentences whenever you are asked to make a statement.
2. SHOW YOUR WORK: Partial credit will be awarded on the basis of the work shown.
3. Make sure you answer ALL parts of problems.



Review and Extension Questions for Subunit A1:

1. [8] Evaluate each of the following. **Partial Credit will not be awarded unless work is shown!**
 - a. $-7^2 + 11^0 - (4 + 1)^3$
 - b. $(-2)^4 - |30 - 2(15)| - |-14^1|$
2. [2] Write $2 \cdot 2 \cdot 5 \cdot 5 \cdot 5 \cdot 5 \cdot 8 \cdot 8 \cdot 8$ in Exponential Form.

Review and Extension Questions for Subunit A2:

3. [3] Prime factor 3240.
4. **Answer any 3 of the 4 application problems below. Give your answers in complete sentences.** (You may do the remaining question for extra credit.)
 - a. [5] One cubic foot of water weighs $62\frac{1}{2}$ pounds. How much do $3\frac{2}{5}$ cubic feet of water weigh?
Give your answer as a mixed number in lowest terms.
 - b. [5] From a 10-pound bag of rice, Ken used $4\frac{3}{8}$ pounds to make a side dish for the church supper. How many pounds of rice does he have left in the bag? **Give your answer as a mixed number in lowest terms.**
 - c. [5] Millie participated in a bike ride to raise money for a local charity. The three legs of the fundraiser were $6\frac{7}{10}$ miles, $5\frac{7}{16}$ miles and $7\frac{3}{4}$ miles. Millie completed all three legs. How many miles did she ride altogether? **Give your answer as a mixed number in lowest terms.**
 - d. [5] Wynne needs $2\frac{5}{8}$ yards to make one child's outfit, how many **complete** outfits can she make with 16 yards of material?

Review and Extension Questions for Subunit A3:

5. [12] Show how to calculate the value of each expression below **using the Order of Operations.** **NOTE: No credit will be awarded unless work is shown.**
 - a. $\frac{5}{6}(3 \cdot 7 - 51 \div 17)$
 - b. $4 + \frac{6 - (-5)(6)}{12 \div 2 - 4 \cdot 30 \div 10}$
 - c. $(2^5 - 10^2) \div 4^2 + 11 \cdot [-9]$

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6. [4] Determine whether each of the following statements is true or false.
- The sum of two numbers with opposite signs is negative if the absolute value of the negative number is greater than the absolute value of the positive number. *[Hint: Try some numerical examples.]*
 - The quotient of two negative non-zero numbers is always positive. *[Hint: Try some numerical examples.]*
 - The result of multiplying an even number of negative numbers will always be negative. *[Hint: Try some numerical examples.]*
 - The difference of two negative numbers is negative if the smaller number is subtracted from the larger number. *[Hint: Try some numerical examples.]*
7. [5] Match each equation in the left column with its corresponding property from the right column:
- | | |
|--|------------------------|
| a. $5 \cdot (7 \cdot 9) = (5 \cdot 7) \cdot 9$ | Multiplicative Inverse |
| b. $5(2 - x) = (5 \cdot 2) - (5 \cdot x)$ | Distributive Property |
| c. $(\frac{13}{17})(\frac{17}{13}) = 1$ | Commutative Property |
| d. $(-85) + 85 = 0$ | Associative Property |
| e. $a + b = b + a$ | Additive Inverse |
8. [5] Samantha started the week with \$114.56 in her checkbook. Since then she has made two deposits of \$125 and 457.31. She has also written checks for rent (\$450), electricity (\$67.32), phone (\$54.86), and cable (\$44.98). She wants to order 3 CDs at \$10.95 each plus 6% sales tax and \$3.95 for S&H. What will her checkbook balance be if she orders the CDs? **NOTE: No credit will be awarded unless work is shown.**

Questions for Subunit B1:

9. [6] Given the expression: $-2a^3b^5 + a^2b^3 - 4ab^2 - 219\dots$
- What are the terms in the expression?
 - What are the coefficients in the expression?
 - What is the degree of this polynomial?
10. [12] **Completely simplify** each of the expressions below. Give your answer in **descending order**. **NOTE: Partial credit will not be awarded unless work is shown.**
- a. $27k + 18 - 8k + 16$ b. $19x + 5(6 - 4x)$ c. $3(12z + 14) - 17z$
11. [15] **Completely simplify** each of the expressions below. Give your answer in **descending order**. **NOTE: Partial credit will not be awarded unless work is shown.**
- $-(4a - 15) + 5a(-2y + 8)$
 - $6(11 - 7p) + 89 - 9(4p + 3p^2)$
 - $7m(n - 6) + 10m + 3(n^2 - 8mn)$

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12. [15] Evaluate each expression below using the given values for the variables. **NOTE: Partial credit will not be awarded unless work is shown.**
- a. $4x + 6y - 7$, when $x = 4$ and $y = -2$.
 - b. $2c^3 + 7d - 16c$, when $c = 3$ and $d = 5$.
 - c. $4a^2 - 6ab + 5ac - 3c + 1$, when $a = -5$, $b = 4$, and $c = -2$
13. [4] Sherrie bought 5 pounds of 80% for \$3.09 per pound, 2 cans of tomatoes for 77¢ per can, and a gallon of milk for \$3.49.
- a. Write an expression that can be used to determine how much she spent all together.
 - b. Evaluate your expression from Part a to find out how much she spent altogether?
14. [8] Translate each phrase below into an algebraic expression.
- a. the product of 14 and j
 - b. increase y by the product of twelve and z
 - c. 55 less than $\frac{3}{10}$ of q
 - d. the sum of m and n , divided by 13

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ANSWER KEY with SOLUTIONS TO SELECTED PROBLEMS

Review and Extension Questions for Subunit A1:

1. [8] Evaluate each of the following. **Partial Credit will not be awarded unless work is shown!**

a. $-7^2 + 11^0 - (4 + 1)^3$

Simplify using the 'Order of Operations' [PEMDAS]:

$$\begin{aligned} -49 + 1 - (5)^3 &= \\ -49 + 1 - 125 &= \\ -49 + 1 + (-125) &= \\ -48 + (-125) &= -173 \end{aligned}$$

b. $(-2)^4 - |30 - 2(15)| - |-14^1|$

Simplify using the 'Order of Operations' [PEMDAS] & the definition of 'Absolute Value':

$$\begin{aligned} 16 - |1 - 2(15)| - |-14| &= \\ 16 - |1 - 30| - 14 &= \\ 16 - |-29| - 14 &= \\ 16 - 29 - 14 &= \\ 16 + -29 + -14 &= \\ 16 + -43 &= -27 \end{aligned}$$

2. [2] Write $2 \cdot 2 \cdot 5 \cdot 5 \cdot 5 \cdot 5 \cdot 8 \cdot 8 \cdot 8$ in Exponential Form. $2^2 \cdot 5^4 \cdot 8^3$

Review and Extension Questions for Subunit A2:

3. [3] Prime factor 3240.

$$\begin{array}{r} 5 \\ 3 \overline{) 15} \\ 3 \overline{) 45} \\ 3 \overline{) 135} \\ 3 \overline{) 405} \\ 2 \overline{) 810} \\ 2 \overline{) 1620} \\ 2 \overline{) 3240} \end{array} = 2 \cdot 2 \cdot 2 \cdot 3 \cdot 3 \cdot 3 \cdot 3 \cdot 5 \text{ OR } 2^3 \cdot 3^4 \cdot 5$$

4. **Answer any 3 of the 4 application problems below. Give your answers in complete sentences. (You may do the remaining question for extra credit.)**

a. [5] One cubic foot of water weighs $62\frac{1}{2}$ pounds. How much do $3\frac{2}{5}$ cubic feet of water weigh?

Give your answer as a mixed number in lowest terms.

1. Use rounded values to decide what operation(s) should be used to solve the problem and use these values and operation(s) to estimate the answer.

One cu ft weighs about 60 lbs and $3\frac{2}{5}$ cu ft is about 3 cu ft.

Using these rounded values we can more easily see that we must multiply, since 3 cu ft of water weighs 3 times as much as 1 cu ft.

Thus, $3\frac{2}{5}$ cu ft of water weighs about 180 lbs. ($3 \text{ ft}^3 \times 60 \frac{\text{lb}}{\text{ft}^3}$)

2. Multiply the original values to arrive at the exact answer.

$$3\frac{2}{5} \times 62\frac{1}{2} = \frac{17}{5} \times \frac{125}{2} = \frac{17}{1} \times \frac{25}{2} = \frac{425}{2} = 212\frac{1}{2}$$

Thus, $3\frac{2}{5}$ cubic feet of water weighs $212\frac{1}{2}$ pounds.

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- b. [5] From a 10-pound bag of rice, Ken used $4\frac{3}{8}$ pounds to make a side dish for the church supper. How many pounds of rice does he have left in the bag? **Give your answer as a mixed number in lowest terms.**

1. Use rounded values to decide what operation(s) should be used to solve the problem and use these values and operation(s) to estimate the answer.

We are told that Ken started with 10 lbs of rice and used about 4 lbs.

Since the **keyword** 'used' indicates Ken has less than his original 10 lbs, we must subtract.

Thus, Ken has about 4 lbs of rice left. ($10\text{ lb} - 4\text{ lb}$)

2. Subtract the original values to arrive at the exact answer.

$$\begin{array}{r} 10 \quad \rightarrow \quad 10\frac{9}{8} \\ -4\frac{3}{8} \quad \rightarrow \quad -4\frac{3}{8} \\ \hline \quad \quad \quad 5\frac{5}{8} \end{array}$$

Thus, Ken has $5\frac{5}{8}$ pounds of rice left.

- c. [5] Millie participated in a bike ride to raise money for a local charity. The three legs of the fundraiser were $6\frac{7}{10}$ miles, $5\frac{7}{16}$ miles and $7\frac{3}{4}$ miles. Millie completed all three legs. How many miles did she ride altogether? **Give your answer as a mixed number in lowest terms.**

1. Use rounded values to decide what operation(s) should be used to solve the problem and use these values and operation(s) to estimate the answer.

The distances that Millie biked round to 7, 5, and 8 miles, respectively.

The **keyword** 'altogether' indicates that we want to know the **total distance** she biked; therefore, we must add.

Thus, Millie biked about 20 miles altogether. ($7\text{ mi} + 5\text{ mi} + 8\text{ mi}$)

2. Add the original values to arrive at the exact answer.

$$\begin{array}{r} 6\frac{7}{10} \quad \rightarrow \quad 6\frac{7}{10} \times \frac{8}{8} = 6\frac{56}{80} \\ 5\frac{7}{16} \quad \rightarrow \quad 5\frac{7}{16} \times \frac{5}{5} = 5\frac{35}{80} \\ \underline{7\frac{3}{4}} \quad \rightarrow \quad \underline{7\frac{3}{4} \times \frac{20}{20}} = \underline{7\frac{60}{80}} \\ \phantom{6\frac{7}{10}} \phantom{5\frac{7}{16}} \phantom{7\frac{3}{4}} \quad \quad \quad 18\frac{151}{80} = 19\frac{71}{80} \end{array}$$

Thus, she rode $19\frac{71}{80}$ miles altogether.

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- d. [5] Wynne needs $2\frac{5}{8}$ yards to make one child's outfit, how many **complete** outfits can she make with 16 yards of material?

1. Use rounded values to decide what operation(s) should be used to solve the problem and use these values and operation(s) to estimate the answer.

We are told that Wynne has 16 yards of material that she is going to use to make outfits requiring about 3 yards per outfit.

Since each outfit uses the same amount of material, we must **divide the original amount of material by the amount needed per outfit**.

Thus, Wynne can make about 5 outfits. ($16 \text{ yd} \div 3 \frac{\text{yd}}{\text{outfit}} \approx 5 \text{ outfits}$)

2. Divide the original values to arrive at the exact answer.

$$16 \div 2\frac{5}{8} = \frac{16}{1} \div \frac{21}{8} = \frac{16}{1} \times \frac{8}{21} = \frac{128}{21}$$

$$\begin{array}{r} 6 \\ 21 \overline{)128} \\ \underline{126} \\ 2 \end{array}$$

Thus, she can make six **complete** outfits.

Review and Extension Questions for Subunit A3:

5. [12] Show how to calculate the value of each expression below **using the Order of Operations**.
NOTE: No credit will be awarded unless work is shown.

a. $\frac{5}{6}(3 \cdot 7 - 51 \div 17)$

$$\begin{array}{l} \frac{5}{6}(21 - 3) \\ \frac{5}{6}(18) = \frac{5}{6}(\frac{18^3}{1}) = 15 \end{array}$$

b. $4 + \frac{6 - (-5)(6)}{12 \div 2 - 4 \cdot 30 \div 10}$

$$\begin{array}{l} 4 + \frac{6 - (-30)}{6 - 120 \div 10} \\ 4 + \frac{6 + (+30)}{6 - 12} \\ 4 + \frac{36}{-6} = 4 + (-6) = -2 \end{array}$$

c. $(2^5 - 10^2) \div 4^2 + 11 \cdot [-9]$

$$\begin{array}{l} (32 - 100) \div 16 + [-99] \\ (-68) \div 16 + [-99] \\ \frac{(-68)}{16} + [-99] \\ -4\frac{1}{4} + [-99] = -103\frac{1}{4} \end{array}$$

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6. [4] Determine whether each of the following statements is true or false.
- a. The sum of two numbers with opposite signs is negative if the absolute value of the negative number is greater than the absolute value of the positive number. *[Hint: Try some numerical examples.]*

TRUE

Example 1: $5 + (-10) = -5$ and $|-10| > |5|$ since $10 > 5$

Example 2: $(-50) + (30) = -20$ and $|-50| > |30|$ since $50 > 30$

- b. The quotient of two negative non-zero numbers is always positive. *[Hint: Try some numerical examples.]*

TRUE

Example 1: $(-80) \div (-10) = 8$ since a negative divided by a negative is positive.

Example 2: $\frac{-6}{-3} = 2$ since a negative divided by a negative is positive.

- c. The result of multiplying an even number of negative numbers will always be negative. *[Hint: Try some numerical examples.]*

FALSE

To show that a statement is false we only need to find one **counterexample**.

That means that we need to find just one example that contradicts the statement.

Counterexample: $(-6) \times (-3) = 18$, which contradicts the statement

- d. The difference of two negative numbers is negative if the smaller number is subtracted from the larger number. *[Hint: Try some numerical examples.]*

FALSE

To show that a statement is false we only need to find one **counterexample**.

That means that we need to find just one example that contradicts the statement.

Counterex: $(-10) - (-15) = (-10) + (+15) = 5$, which contradicts the statement

7. [5] Match each equation in the left column with its corresponding property from the right column:

a. $5 \cdot (7 \cdot 9) = (5 \cdot 7) \cdot 9$ Multiplicative Inverse

b. $5(2 - x) = (5 \cdot 2) - (5 \cdot x)$ Distributive Property

c. $(\frac{13}{17})(\frac{17}{13}) = 1$ Commutative Property

d. $(-85) + 85 = 0$ Associative Property

e. $a + b = b + a$ Additive Inverse

Answers:

a. Associative Property

b. Distributive Property

c. Multiplicative Inverse

d. Additive Inverse

e. Commutative Property

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8. [5] Samantha started the week with \$114.56 in her checkbook. Since then she has made two deposits of \$125 and 457.31. She has also written checks for rent (\$450), electricity (\$67.32), phone (\$54.86), and cable (\$44.98). She wants to order 3 CDs at \$10.95 each plus 6% sales tax and \$3.95 for S&H. What will her checkbook balance be if she orders the CDs? **NOTE: No credit will be awarded unless work is shown.**

\$ 114.56	\$ 450.00							
\$ 125.00	\$ 67.32							
\$ 457.31	\$ 54.86							
\$ 0.00	\$ 44.98							
\$ 696.87	\$ 617.16	\$ 79.71						
		\$ 38.77						
		\$ 40.94	Thus, her ending balance will be \$40.98.					

Questions for Subunit B1:

9. [6] Given the expression: $-2a^3b^5 + a^2b^3 - 4ab^2 - 219...$

- a. What are the terms in the expression? The terms are: $-2a^3b^5, a^2b^3, -4ab^2, -219$
- b. What are the coefficients in the expression? The coefficients are: $-2, 1, -4, -219$
- c. What is the degree of this polynomial?

The *degree* of a polyomial is determined by finding the **largest sum of the exponents** of the terms. For this problem, the sums of the exponents of the terms, respectively, are: 8, 5, 3, & 0. **Thus, the degree of this polyomial is 8.**

10. [12] **Completely simplify** each of the expressions below. Give your answer in **descending order**. **NOTE: Partial credit will not be awarded unless work is shown.**

a. $27k + 18 - 8k + 16$

1. Change all subtraction to adding the opposite.

$$27k + 18 + [-8k] + 16$$

2. Add the like terms. (*Terms with the exact same letter portions.*)

$$\begin{array}{r} 27k \quad 18 \\ +[-8k] \quad +16 \\ \hline \end{array}$$

Answer: $19k + 34$

b. $19x + 5(6 - 4x)$

1. Change all subtraction to adding the opposite.

$$19x + 5(6 + [-4x])$$

2. Eliminate the parentheses using the Distributive Property.

$$19x + 30 + [-20x]$$

3. Add the like terms. (*Terms with the exact same letter portions.*)

$$\begin{array}{r} 19x \quad 30 \\ +[-20x] \quad \underline{\quad} \\ \hline \end{array}$$

Answer: $-x + 30$

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c. $3(12z + 14) - 17z$

1. Change all subtraction to adding the opposite.
 $3(12z + 14) + [-17z]$

2. Eliminate the parentheses using the Distributive Property.
 $36z + 42 + [-17z]$

3. Add the like terms. (*Terms with the exact same letter portions.*)

$$\begin{array}{r} 36z \quad 42 \\ +[-17z] \quad \underline{\hspace{1cm}} \\ \hline \end{array}$$

Answer: $19z + 42$

11. [15] **Completely simplify** each of the expressions below. Give your answer in **descending order**. **NOTE: Partial credit will not be awarded unless work is shown.**

a. $-(4a - 15) + 5a(-2y + 8)$

1. Change all subtraction to adding the opposite.
 $[-1](4a + [-15]) + 5a(-2y + 8)$

2. Distribute to eliminate the parentheses.
 $[-4a] + 15 + [-10ay] + 40a$

3. Add the like terms.

$$\begin{array}{r} [-4a] \quad [-10ay] \quad 15 \\ +[40a] \quad \underline{\hspace{1cm}} \quad \underline{\hspace{1cm}} \\ \hline \end{array}$$

Answer: $36a - 10ay + 15$

b. $6(11 - 7p) + 89 - 9(4p + 3p^2)$

1. Change all subtraction to adding the opposite.
 $6(11 + [-7p]) + 89 + [-9](4p + 3p^2)$

2. Distribute to eliminate the parentheses.
 $66 + [-42p] + 89 + [-36p] + [-27p^2]$

3. Add the like terms.

$$\begin{array}{r} [-42p] \quad 66 \\ +[-27p^2] \quad +[-36p] \quad +89 \\ \hline \end{array}$$

Answer: $-27p^2 - 78p + 155$

c. $7m(n - 6) + 10m + 3(n^2 - 8mn)$

1. Change all subtraction to adding the opposite.
 $7m(n + [-6]) + 10m + 3(n^2 + [-8mn])$

2. Distribute to eliminate the parentheses.
 $7mn + [-42m] + 10m + 3n^2 + [-24mn]$

3. Add the like terms.

$$\begin{array}{r} 7mn \quad [-42m] \\ +3n^2 \quad +[-24mn] \quad +10m \\ \hline \end{array}$$

Answer: $3n^2 - 17mn - 32m$

12. [15] Evaluate each expression below using the given values for the variables. **NOTE: Partial credit will not be awarded unless work is shown.**

a. $4x + 6y - 7$,
 when $x = 4$ and $y = -2$

1. Substitute the given values for the variables.
 $4(4) + 6(-2) - 7$

2. Simplify using the Order of Operations.
 $16 + (-12) + [-7]$
 $16 + (-19)$

Answer: -3

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b. $2c^3 + 7d - 16c$,
when $c = 3$ and $d = 5$

1. Substitute the given values for the variables.

$$2(3)^3 + 7(5) - 16(3)$$

2. Simplify using the Order of Operations.

$$2(27) + 35 + [-48]$$

$$54 + 35 + [-48]$$

$$89 + [-48]$$

Answer: 41

c. $4a^2 - 6ab + 5ac - 3c + 1$,
when $a = -5$, $b = 4$,
and $c = -2$

1. Substitute the given values for the variables.

$$4(-5)^2 + [-6](-5)(4) + 5(-5)(-2) + [-3](-2) + 1$$

2. Simplify using the Order of Operations.

$$4(25) + (30)(4) + (-25)(-2) + 6 + 1$$

$$100 + 120 + 50 + 6 + 1$$

Answer: 277

13. [4] Sherrie bought 5 pounds of 80% for \$3.09 per pound, 2 cans of tomatoes for 77¢ per can, and a gallon of milk for \$3.49.

a. Write an expression that can be used to determine how much she spent all together.

Answer: $5(3.09) + 2(0.77) + 3.49$

b. Evaluate your expression from Part a to find out how much she spent altogether?

Answer: $15.45 + 1.54 + 3.49 = \$20.48$

14. [8] Translate each phrase below into an algebraic expression.

a. the product of 14 and j

Answer: $14j$ or $14 \times j$ or $14 \cdot j$ or $14 * j$ or $14(j)$ or $(14)j$ or $(14)(j)$

b. increase y by the product of twelve and z

Answer: $y + 12z$ or $12z + y$

c. 55 less than $\frac{3}{10}$ of q

Answer: $\frac{3}{10}q - 55$

d. the sum of m and n , divided by 13

Answer: $(m+n) \div 13$ or $\frac{m+n}{13}$