Unit 2 Review: Polynomial Expressions

Evaluate each expression when *a* = -2, *b* = 4 and *c* = ¼ . All negative numbers need to be placed in ( )!

1. $a^2 + 3a - 4$

   $(-2)^2 + 3(-2) - 4$

   $4 - 6 - 4$

   -6

2. $(b - a)^3$

   $[4 - (-2)]^3$

   $(6)^3$

   216

3. c^3

   $\left(\frac{1}{4}\right)^3$

   $\frac{1}{64}$

4. $-a^2$

   $-(-2)^2$

   $-(4)$

   -4

5. $3ab^2$

   $3(-2)(4)^2$

   $3(-2)(16)$

   -96

Write an expression to model the situation.

6. A pair of Nike sneakers cost ***x*** dollars. In terms of ***x***, express the cost of a pair of sneakers after a 15% discount is applied.

   x* – 0.15*x *The price of the sneakers (x) – the discount (15% of x)*

   or

   .85*x* *simplified equivalent expression*

7. Jane's age is represented by ***a***. If Greg is six years younger than Jane, represent his age in terms of ***a***.

   ***a* – 6** *Subtract 6 years from Jane's age to represent Greg's age*

8. Jared earns 0.25 vacation days for every week that he works in a calendar year. He also gets 10 paid company holidays per year. Write an expression in terms of ***w*** to represent the amount of time he gets off from work in a year after working ***w*** weeks. Identify the units associated with the expression.

   Expression: **0.25*w* + 10** Units: **days**

   w: *the number of weeks Jared works*
   0.25*w*: *the total number of vacation days earned from working **w** weeks*
   10: *the number of days that the company gives Jared (company holidays)*

9. Terry has two jobs. He babysits for his neighbor ***b*** hours per week and tutors at an afterschool program for ***t*** hours per week. If Terry earns $10.50 an hour babysitting and $15 an hour tutoring, represent his total earnings in one week in terms of ***b*** and ***t***.

   Expression: **10.50*b* + 15*t*** Units: **Dollars**

   b: *the number of hours spent babysitting*
   t: *the number of hours spent tutoring*
   10.50*b*: *the total amount of money earned from babysitting **b** hours*
   15*t*: *the total amount of money earned from tutoring **t** hours*

10. A cell phone plan has a fixed base fee that includes a certain amount of data and an overage charge for data use beyond the plan. The plan charges a base fee of $55 which includes the use of data up to 2 gigabytes. The plan charges an overage fee of $25 per gigabyte, ***g***, of data that exceeds 2 gigabytes. Choose the expression below that represents the cost of the plan when more than 2 gigabytes of data is used.

(1) $55 + 25g$ (2) $55 + 25(2 - g)$ **(3) $55 + 25(g - 2)$** (4) $25 + 55(g - 2)$

To help you figure out what expression reflects the situation described, create a numerical example. For instance, let's say that a person uses 5 gigabytes of data. We know that they are charged $55 for the first 2 gigabytes and $25 for the remaining 3 gigabytes.

55 + 25(3)
55 + 75
$130

Choice (3) Check →

55 + 25(g – 2) when g = 5
55 + 25(5 – 2)
55 + 25(3)
55 + 75
$130

11. **Complete parts A – G**.

You are making ***n*** loaves of bread for a bake sale and the recipe calls for 3.25 cups of flour per loaf. You are also making ***n* + 1** pies for the bake sale, and the pie recipe calls for 2 cups of flour per pie. The expression **3.25*n* + 2(*n* + 1)** can be used to represent the total amount of flour needed for making the bread and pies.

A. What does the term **3.25*n*** represent?

The total number of cups of flour used to make ***n*** loaves of bread

B. What does the term **2(*n* + 1)** represent?

The total number of cups of flour used to make ***(n + 1)*** pies

C. How many more pies than loaves of bread are being made?

If ***n*** loaves of bread are being baked than the number of pies (***n + 1***) baked as compared to the number of loaves of bread is one more. For example, if 5 loaves of bread were baked than 6 pies (5 + 1) were made.

D. What are the units associated with the expression?

cups of flour

E. How would the original expression change if the same amount of pies were made as loaves of bread? Rewrite the expression to reflect this change.

3.25*n* + 2*n* *See change indicated in green*

F. How would the original expression change if one less pie was made as compared to the number of loaves of bread made? Rewrite the expression to reflect this change.

$3.25n + 2(n - 1)$ *See change indicated in green*

G. How would the original expression change if 2½ cups of flour were needed to make each pie? Rewrite the expression to reflect this change.

$3.25n + 2.5(n + 1)$ *See change indicated in green*

Simplify the polynomial expressions below. <u>All answers should be written in standard form when possible</u>.

12. $(10x^2 + 3x) + (15x^2 - 2) - (-7x^2 + 5x + 1)$

$10x^2 + 3x + 15x^2 - 2 + 7x^2 - 5x - 1$

$32x^2 - 2x - 3$

13. Subtract $6x^2 + 2$ from $x^2 - 1$

$(x^2 - 1) - (6x^2 + 2)$

$x^2 - 1 - 6x^2 - 2$

$-5x^2 - 3$

14. $(6a^3b^2)(-5a^4b^2)(2ab)$

$6 \cdot -5 \cdot 2 \cdot a^3 \cdot a^4 \cdot a \cdot b^2 \cdot b^2 \cdot b$

$-60a^8b^5$

15. $-\frac{3}{4}x^2(9x - 7)$

$\left(-\frac{3}{4}x^2\right)(9x) + \left(\frac{3}{4}x^2\right)(7)$

$-\frac{27}{4}x^3 + \frac{21}{4}x^2$

16. $6x(x + 5) - 3(x^2 + x + 9)$

$6x^2 + 30x - 3x^2 - 3x - 27$

$3x^2 + 27x - 27$

17. $[(x + 5)(x + 2)] - [(3x + 1)(x + 7)]$

$(x^2 + 2x + 5x + 10) - (3x^2 + 21x + x + 7)$

$(x^2 + 7x + 10) - (3x^2 + 22x + 7)$

$x^2 + 7x + 10 - 3x^2 - 22x - 7$

$-2x^2 - 15x + 3$

18. Sydney claims that **$(x + 4)^2$** is equivalent to **$x^2 + 16$**. Do you agree or disagree with Sydney? Justify your response (*provide an explanation as to why or why not you agree and show an example*).

I disagree with Sydney. The quantity **$x + 4$** squared equals **$(x + 4)(x + 4)$** which is the same as **$x^2 + 8x + 16$**. Sydney distributed the exponent which is incorrect. You cannot distribute a power over addition or subtraction. I can prove that Sydney's expression is not equivalent to the original expression. See work below.

Let x = 3

$(x + 4)^2$		$x^2 + 16$
$(3 + 4)^2$		$3^2 + 16$
7^2		$9 + 16$
49	$\neq$	25

19. The RMS Mathletes have been selected to compete internationally. The club members are holding a car wash in order to raise money for travel expenditures. They have made a list of expenses and revenue. Using the list, write a *simplified* polynomial expression in standard form that represents their profit from the car wash if they wash ***c*** cars.

Revenue	***Expenses***
Car Wash Fee - $10.00 per car **10c**	*Gas Station Rental - $300* **300**
PFA Donation - $500 **500**	*Car Wash Supplies - $150* **150**
	Water Usage - $1.50 per car **1.50c**

Profit = Revenue – Expenses

P = (10c + 500) – (300 + 150 + 1.50c)
P = **10c + 500 – 300 – 150 – 1.50c**
P = 8.50c + 50

Using your expression, calculate the club's profit if members wash 78 cars.

8.50c + 50
8.50(78) + 50
663 + 50
713

The club will make $713 in profits

20. Write a polynomial expression with a degree of 7 and a leading coefficient of 4.

Many answers are applicable. Below are some examples that meet the criteria.
The leading coefficient is the number being multiplied by the variable with the largest exponent. The degree of the polynomial is the largest exponent. See examples below.

$4x^7 - 1$ | **$3x^5 + 4x^7 - 6x^4 + 11x$** | **$7x^6 + 4x^7$**

FYI: The constant term is -1 | *The constant term is 0* | *The constant term is 0*

Watch FLIP #2 to review all vocabulary

21. Is it possible that the sum of two binomials results in a monomial? Justify your response with an example.

It is possible for the sum of two binomials to result in a monomial if the sum of the terms includes a pair of additive inverses (zero pair).
Example: (3x + 6) + (7x – 6)

3x + 7x + 6 – 6

10x