Grade 7 Mathematics

Review Questions

Topic 4: Algebraic and Equivalent Expressions

Name: _____ Section: _____

4-1: Write and Evaluate Algebraic Expressions

1. Evaluate $5.5r - 8.35s$ when $r = 12$ and $s = 4$. Show all substitutions.

2. Almonds cost \$9.60 per pound and cashews cost \$12.80 per pound. Write an expression for the total cost of a pounds of almonds and c pounds of cashews. Find the cost of 1.5 pounds of almonds and 2.25 pounds of cashews.

3. A tank contains 42 gallons of water and leaks 0.75 gallon per minute. Write an expression for the water left after m minutes. Evaluate it after 18 minutes.

4. Evaluate $\frac{3}{4}x - 2.5$ when $x = -2$. Explain why the product is negative.

4-2: Generate Equivalent Expressions

5. Write two different expressions equivalent to $4n - 5$. Show why each new expression has the same value for every n.

6. A rectangular boat dock is $(x+8)$ feet long and $(x+3)$ feet wide. Write one perimeter expression with parentheses and another without parentheses. Simplify.

7. Bread is discounted by 18%. Five loaves originally cost b dollars each. Show that $5(b - 0.18b)$ is equivalent to a single-term expression. Name the property used.

8. A student claims $-37g + 10$ and $-10 + 37g$ are equivalent. Evaluate both for $g = 2$, and explain the sign error.

4-3: Simplify Expressions

9. Simplify $-1.3f + 0.4j - 12 - 1 + 2.9f$. Identify which terms combine.

10. Simplify $2.8 - 4.4n - 2n + 7$. Write terms in standard order.

11. A garden is x units long and $\frac{1}{2}x - 7$ units wide. Write a perimeter expression and simplify completely.

12. Simplify $4x^2 + 3x - 2x^2 + 5x - 7$. Explain why x^2 terms and x terms cannot combine.

4-4: Expand Expressions

13. Expand and simplify $-2.5(-3 + 4n + 8)$. Show distribution to each term.

14. Expand $-\frac{1}{3}(y - x)$. Show how the negative sign affects each term.

15. A rectangular deck is 5 meters wide and $(x + 8)$ meters long. Expand $5(x + 8)$ and explain what each part represents in the area model.

16. A store offers a 13% discount on bread. Six loaves cost b dollars each before the sale. Expand and simplify $6(b - 0.13b)$, and identify the original total and total discount.

17. Expand and simplify $7(7x - 3y) - 6$.

4-5: Factor Expressions

18. Factor $63a - 42b$ completely using the greatest common factor.

19. Factor $14x + 28y + 21$ completely. Check your answer by distributing.

20. Factor $-15y - 40$ in two different ways, including one form with a negative factor. Show how each form expands back to the original expression.

21. A rectangular mural has an area of $3x + 12$ square meters. Factor its area expression to give possible dimensions. Find the area when $x = 5$.

4-6: Add Expressions

22. Add and simplify $(5.2c - 7.35) + (-3.9c + 2.65)$.

23. Add and simplify $(3.2 + 4x) + (18.25 + 6x)$.

24. Savings account A has \$125 and grows by \$15 weekly. Account B has \$89 and grows by \$20 weekly. Write and simplify an expression for the combined balance after w weeks. Evaluate at $w = 6$.

25. Add and simplify $\left(\frac{1}{4}p + \frac{2}{3}\right) + \left(\frac{1}{2}p - \frac{1}{6}\right)$. Express fractions in simplest form.

4-7: Subtract Expressions

26. Subtract and simplify $(6x - 2y - 5) - (-5 + 9y - 8x)$. Show the change of signs.

27. Simplify $\left(7x - 6\frac{2}{3}\right) - \left(-3x + 4\frac{3}{4}\right)$. Write the constant as a mixed number.

28. Plan A costs \$18 plus \$4.50 per mile. Plan B costs \$10 plus \$6 per mile. Write and simplify $A - B$ for m miles. When $m = 8$, which plan is cheaper, and by how much?

29. A student simplifies $2.5p - (1.25p + 4)$ to $1.25p + 4$. Identify the error and give the correct simplified expression.

30. Simplify $(0.25n - 0.3) - (0.8n - 0.25)$.

4-8: Analyze Equivalent Expressions

31. A college increases tuition by 10%. If t is the original tuition, write two equivalent expressions for the new cost. Calculate the new cost when $t = \$9{,}500$.

32. A shopper buys \$25 pants and a \$10 shirt. Which offer saves more: 15% off the pants only, or 10% off the entire purchase? Write an expression for each offer, calculate each total, and justify your choice.

33. The area of an extended rectangular playground is $352+22x$ square meters. Factor the expression and use it to give possible dimensions.

34. An equilateral triangular fence requires $9x + 15$ meters of rope. Rewrite the expression to show the length of each side. Find each side when $x = 2$.

35. A mural has width 5.5 meters and length $(7.5 + x)$ meters. Write the area in factored and expanded forms. Explain which part of the expanded form is the original area; find the total when $x = 2$.