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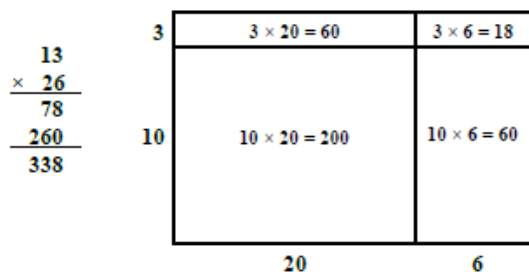
CCGPS Math 7 Unit 2 Study Guide – Expressions and Equations

Use properties of operations to generate equivalent expressions.

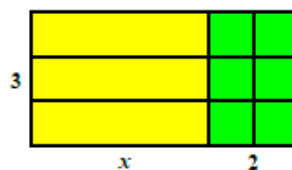
MCC7.EE.1 Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.

Property	In Words	Using Symbols
Commutative Property	The sum of two numbers is the same no matter which order is used to add them.	$a + b = b + a$
Associative Property	The sum of three numbers is the same whether you group the first two numbers or the second two numbers.	$(a + b) + c = a + (b + c)$
Distributive Property	To multiply a number by a sum of two terms, you can multiply that number by each term and add the products.	$a(b + c) = ab + ac$

Models for the distributive property/factoring



Examine the distributive shown above.
 $13 \times 6 = 6(10 + 3)$ or $60 + 18$
 $13 \times 20 = 20(10 + 3)$ or $200 + 60$



...and now with symbols
 $3(x+2) = 3x + 6$



$(x+1)(x+1) = x^2 + 2x + 1$

- Write an equivalent expression for $3(4 + 5) - 2$
- Kalista thinks the two expressions $2(a - 2) + 4a$ and $10a - 2$ are equivalent? Is she correct? Explain why or why not?
- Which shows the simplified form of the following expression?
 $12x + 4x + 25y + 15y$

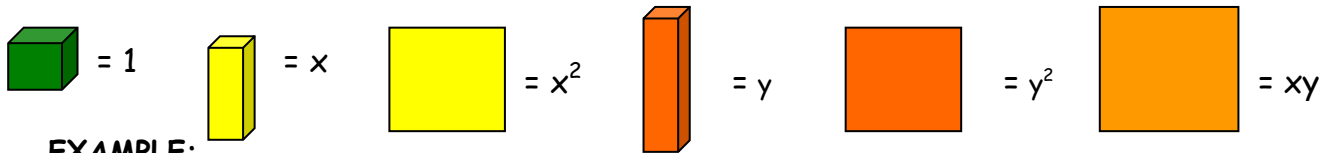
a) $16x - 10y$ b) $16x + 40y$ c) 56 d) $8x + 40y$

4. Simplify the expression: $6x + 9y + 11x + 13y$

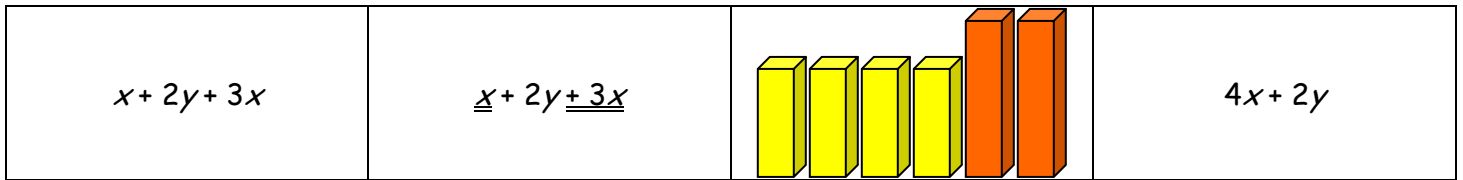
- a) $17x + 22y$ b) $39xy$ c) $15xy + 24xy$ d) $15x + 24y$

5. What is the sum of $x - 3$ and $2x + 7$?

- a) $2x + 4$ b) $2x + 10$ c) $3x + 4$ d) $3x + 10$



EXAMPLE:



6. Use the Distributive Property to simplify the expressions.

$2(3x + 8y)$

$3(4x - 6)$

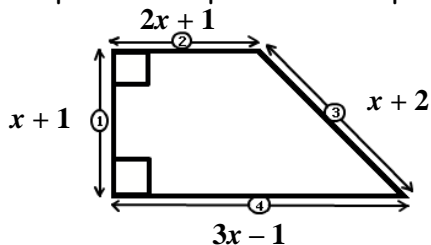
7. Which expression below is equivalent to $\frac{4}{3}x + 4\frac{2}{3}$?

- a) $\frac{4}{3}(x+2)$ b) $\frac{1}{3}(4x+6)$ c) $\frac{2}{3}(2x+4)$ d) $\frac{2}{3}(2x+7)$

8. When $\frac{5}{8}x + 1\frac{1}{3}$ is subtracted from $1\frac{1}{4}x - 5\frac{1}{6}$, the result is

- a) $\frac{5}{8}x - 3\frac{5}{6}$ b) $\frac{5}{8}x - 6\frac{1}{2}$ c) $-\frac{5}{8}x + 3\frac{5}{6}$ d) $-\frac{5}{8}x + 6\frac{1}{2}$

9. Which expression represents the perimeter, in units, of this trapezoid?



- a) $7x + 3$ b) $7x - 1$ c) $2x + 1$ d) $2x - 1$

MCC7.EE.2 Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related.

algebraic expression numbers, letters, and/or symbols connected by an operation or operations

Operation	Some Word Phrases	Math Example
Addition	n plus 7 add 7 to a number 7 more than n the sum of 7 and n	$n + 7$
Subtraction	k minus 4 subtract 4 from a number 4 less than k the difference between k and 4	$k - 4$
Multiplication	2 times a number b multiply 2 and a number twice a number b the product of 2 and b	$2b$
Division	the quotient of x and 10 divide a number x by 10 x divided by 10 one tenth of a number	$x \div 10$ or $\frac{x}{10}$

10. Jamie and Ted both get paid an equal hourly wage of \$9 per hour. This week, Ted made an additional \$27 dollars in overtime. Write an expression that represents the weekly wages of both if J = the number of hours that Jamie worked this week and T = the number of hours Ted worked this week? Can you write the expression in another way?

11. Anne is 2 years older than Beth, who is twice as old as Christine. If Christine is c years old, which expression represents Anne's age?

- e) $c - 2$ f) $2c - 2$ g) $2 + 2c$ h) $2 + c$

12. Which algebraic expression shows "twice a number increased by 17"?

- a) $17n + 2$ b) $2n + 17$ c) $\frac{n+17}{2}$ d) $\frac{n+2}{17}$

13. Andrew collects comic books. The number of books in his collection at m months since he started is $40 + 7m$. How many comic books will Andrew have when $m = 24$?

- a) 64 b) 71 c) 208 d) 304

Solve real-life and mathematical problems using numerical and algebraic expressions and equations.

MCC7.EE.3 Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations as strategies to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.

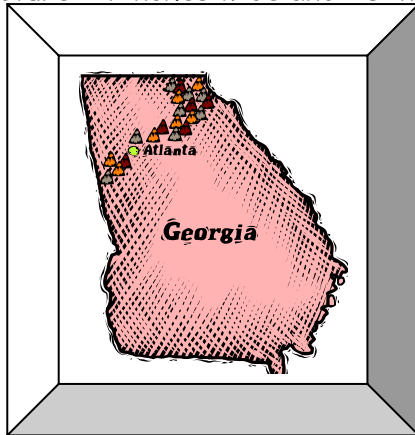
Example:

The youth group is going on a trip to the state fair. The trip costs \$52. Included in that price is \$11 for a concert ticket and the cost of 2 passes, one for the rides and one for the game booths. Each of the passes cost the same price. Write an equation representing the cost of the trip and determine the price of one pass.

x	x	11
52		

$$\begin{aligned}2x + 11 &= 52 \\2x &= 41 \\x &= \$20.5\end{aligned}$$

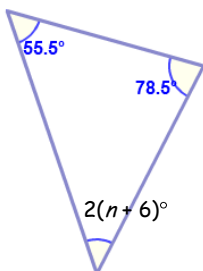
14. A framed picture 24 inches wide and 28 inches high is shown in the diagram below.



The picture will be hung on a wall where the distance from the floor to ceiling is 8 feet. The picture must be $5\frac{1}{4}$ feet from the floor. Determine the distance from the ceiling to the top of the picture frame.

15. An equilateral triangle (hint: 3 equal side lengths and 3 equal interior angles) has a perimeter of $6x + 15$. What is the length of each of the sides of the triangle?

16. Find the value of n in the figure below.



17. What is the value of the expression $2x + 11 - 3x$ when $x = 9$?

- a) 2 b) 4 c) 56 d) 90

18. What is the value of the expression $3a + 7 - 4a + 11$ when $a = 10.7$?

- a) 8 b) 92.9 c) 7.3 d) -10.5

19. Solve the equation $\frac{y}{2} - 2 = 2$.

- a) $y = 0$ b) $y = 2$ c) $y = 6$ d) $y = 8$

20. Solve. $5b - 15 = 10.5$

MCC7.EE.4 Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.

21. This season, the number of points Geoff scored was 36 less than 4 times the number Fletcher scored. Geoff scored 64 points this season. The equation below represents this situation.

$$4n - 36 = 64$$

What does n represent in this equation?

- e) the number of points Geoff scored f) the number of points Fletcher scored g) how many more points Geoff scored than Fletcher h) how many points Geoff and Fletcher scored in all

22. Jason sold 5 times as many raffle tickets as Allison. If Jason sold 45 raffle tickets in all, which equation can be used to find a , the number of tickets Allison sold?

- a) $5 + a = 45$ b) $45 + a = 5$ c) $5a = 45$ d) $45a = 5$

23. Amie had \$26 dollars to spend on school supplies. After buying 10 pens, she had \$14.30 left. How much did each pen cost?

24. Florencia has at most \$60 to spend on clothes. She wants to buy a pair of jeans for \$22 dollars and spend the rest on t-shirts. Each t-shirt costs \$8. Write an inequality for the number of t-shirts she can purchase.

25. Steven has \$25 dollars. He spent \$10.81, including tax, to buy a new DVD. He needs to set aside \$10.00 to pay for his lunch next week. If peanuts cost \$0.38 per package including tax, what is the maximum number of packages that Steven can buy?

Write an equation or inequality to model the situation. Explain how you determined whether to write an equation or inequality and the properties of the real number system that you used to find a solution.

MCC7.EE.4a Solve word problems leading to equations of the form $px+q=r$ and $(x+q)=r$, where p , q , and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach.

26. The cost of a car including sales tax was \$29,150. If the sales tax on the purchase was \$1,650, what was the cost of the car before sales tax?

- a) \$27,500 b) \$28,500 c) \$30,700 d) \$30,800

MCC7.EE.4b Solve word problems leading to inequalities of the form $px+q>r$ or $px+q<r$, where p , q , and r are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem.

27. Solve $\frac{1}{2}x + 3 > 2$ and graph your solution on a number line.

28. Marquita's monthly earnings consist of a fixed salary of \$2,800 and an 18% commission on all her monthly sales. To cover her planned expenses, Marquita needs to earn an income of at least \$6,400 this month.

Part A: Write an inequality that, when solved, will give the amount of sales Marquita needs to cover her planned expenses.

Answer: _____

Part B: Graph the solution of the inequality on the number line.



29. When Javier bought his new computer, he purchased an online computer help service. The help service has a yearly fee of \$25.50 and a \$10.50 charge for each help session a person uses. If Javier can only spend \$170 for the computer help this year, what is the maximum number of help sessions he can use this year?