Algebra 1 Readiness - EXPRESSIONS

Adding and Subtracting Fractions - Leave answers as simplified improper fractions

EXAMPLE

$$\frac{1}{4} + \frac{3}{5}$$

Numerator & Denominator × 5

Numerator & Denominator × 4

$$\frac{5}{20} + \frac{12}{20} = \frac{17}{20}$$

What common denominator could we use?

$$\frac{1}{3} + \frac{1}{4}$$

Numerator & Denominator × 4

Numerator & Denominator × 3

$$\frac{4}{12} + \frac{3}{12} = \frac{7}{12}$$

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1. Simplify

$$\frac{3}{7} + \frac{2}{7}$$

2. Simplify

$$\frac{2}{5} - \frac{4}{5}$$

3. Simplify

$$\frac{5}{3} - \frac{1}{4}$$

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4. Simplify

$$\frac{5}{6} + \frac{2}{3}$$

5. Simplify

$$\frac{1}{2} - \frac{7}{8}$$

6. Simplify

$$\frac{4}{3} + \frac{3}{5}$$

Multiplying Fractions - Leave answers as simplified improper fractions

Whenever multiplying fractions together:

$$\frac{a}{b} \times \frac{c}{d} = \frac{a \times c}{b \times d}$$

Multiply the numerators together, then multiply the denominators together.

$$\frac{3}{4} \cdot \frac{2}{7} = \frac{6}{28}$$

$$\frac{6 \div 2}{28 \div 2} = \frac{3}{14}$$

7. Simplify $$\frac{3}{4}\left(\frac{2}{9}\right)$$	8. Simplify $$-\frac{2}{3}\left(\frac{1}{6}\right)$$	9. Simplify $$-\frac{3}{10}\left(-\frac{5}{2}\right)$$
10. Simplify $$-\frac{8}{3}\left(\frac{1}{4}\right)$$	11. Simplify $$\frac{15}{2}\left(\frac{4}{5}\right)$$	12. Simplify $$\frac{2}{9}\left(\frac{18}{5}\right)$$

Distributive Property

Example/Model

$$a(\overset{\frown}{b+c})$$
$$= ab + ac$$

$$4(5x + 2)$$
$$= 4(5x) + 4(2)$$
$$= 20x + 8$$
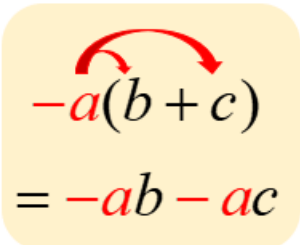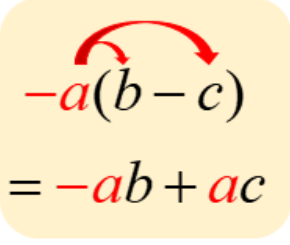
$$a(\overset{\frown}{b+c})$$
$$= ab + ac$$

$$6(3x - 4)$$
$$= 6(3x) + 6(-4)$$
$$= 18x - 24$$

13. Simplify $$3(n + 2)$$	14. Simplify $$5(3n + 10)$$	15. Simplify $$7(5 + 6x)$$

16. Simplify $\frac{1}{2}(16y + 22)$	17. Simplify $6(3x - 1)$	18. Simplify $\frac{1}{3}(15x - 18)$
19. Simplify $\frac{1}{4}\left(\frac{1}{2}a + \frac{4}{5}\right)$	20. Simplify $4(6a - 2b + c)$	21. Simplify $5(-4b - 2)$
22. Simplify $\frac{2}{3}(9x - 21)$	23. Simplify $(-3 - 4y)(2)$	24. Simplify $3(5a - 6b)$

25. Create a problem that simplifies to **24x + 18** and show that it works.

$$\underline{\quad}(\underline{\quad}x + \underline{\quad})$$

Distributive Property with Negatives

Example/Model

$-a\overset{\frown}{(b+c)}$
$= -ab - ac$

$-2(3x + 5)$
$= -2(3x) - 2(5)$
$= -6x - 10$

$-a\overset{\frown}{(b-c)}$
$= -ab + ac$

$-4(x - 3)$
$= -4(x) - 4(-3)$
$= -4x + 12$

26. Simplify $-3(5n + 10)$	27. Simplify $-5(x - 9)$	28. Simplify $-(6y + 3)$

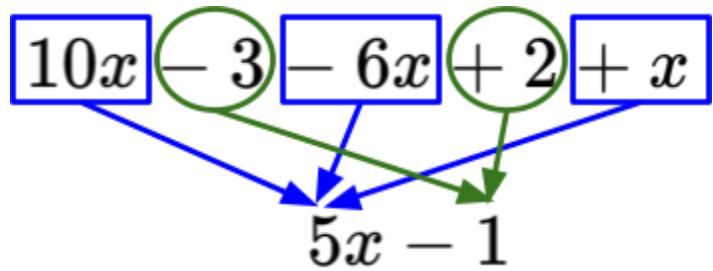| 29. Simplify $$-\frac{1}{2}(20a + 14)$$	30. Simplify $$-\frac{1}{3}(6a - 33)$$	31. Simplify $$-(3 + 2x)$$
32. Simplify $$-5(-2x - 7)$$	33. Simplify $$-3(5a - 2b + 2)$$	34. Simplify $$(5b - 3)(-6)$$

Combining Like Terms

Example/Model

Collect like terms

$$\underline{4a} + \underline{5} + \underline{2a} - \underline{3}$$

$$= 6a + 2$$

$$\boxed{10x} - \boxed{3} - \boxed{6x} + \boxed{2} + \boxed{x}$$

$$5x - 1$$

35. Simplify $$6y + 8 - 2y$$	36. Simplify $$3 - 4x + 9$$	37. Simplify $$9a - 5 - 2a + 1$$
38. Simplify $$3 - x + 2x - 10$$	39. Simplify $$-7b - 6 - 2 + b$$	40. Simplify $$3a + 2b - 1 + 7a$$

41. Simplify $9y - 2x + 7y - 5x$	42. Simplify $12a + 4b - 2a - 2b$	43. Simplify $\dfrac{1}{2}x - \dfrac{4}{3} + \dfrac{3}{4}x + \dfrac{2}{3}$

Simplifying Expressions with Distribution and Combining Like Terms

Example/Model

Distribute

$$5 - 3(6n + 2) + 7n$$

Combine like terms

$$5 - 18n - 6 + 7n$$

$$-11n - 1$$

44. Simplify $2(d + 3) + d$	45. Simplify $4(2c - 3) - c$	46. Simplify $-2(3 - 4x) + 7x$
47. Simplify $5(x + 7) + x$	48. Simplify $z + 4(2z + 3)$	49. Simplify $9 - 2(1 + 5x) + 3x$
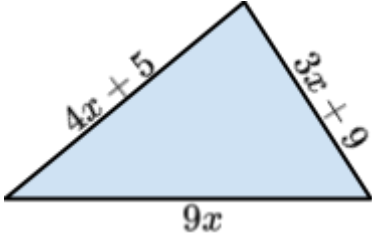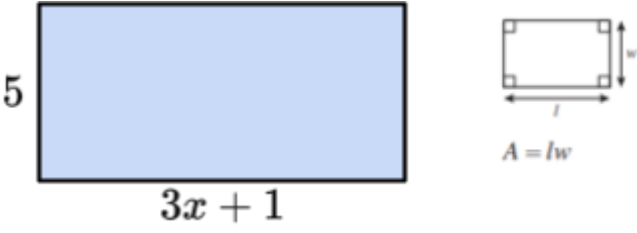
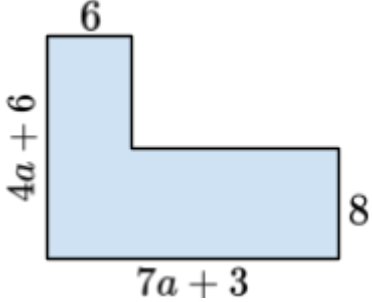| 50. Simplify	51. Simplify	52. Simplify
$4\left(7x-2\right)-3\left(2x+1\right)$	$8\left(m-1\right)-\left(3m+2\right)$	$\dfrac{1}{2}\left(12y-10\right)+3\left(x-5\right)$
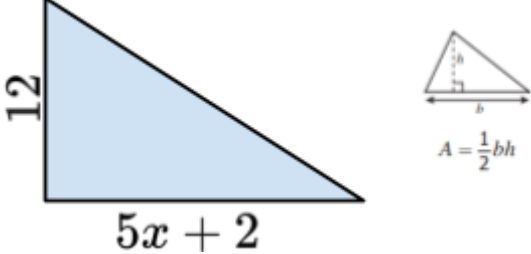
Simplifying Expressions - APPLICATIONS

Reminders –

Perimeter: the sum of the measures of all sides of a two-dimensional figure

Area: the amount of space a two-dimensional figure takes up – use area formulas

53. Find the perimeter of this triangle

$4x+5$ $3x+9$ $9x$

54. Find the area of this rectangle

5 $3x+1$

$A = lw$

55. Find the total area of the figure

6 $4a+6$ 8 $7a+3$

56. Find the area of the triangle

12 $5x+2$

$A = \frac{1}{2}bh$

Algebra 1 Readiness - EQUATIONS

Solving Two-Step Equations

Solving Two-Step Equations

1. Add or subtract to isolate the variable term.
2. Multiply or divide to solve for the variable.
3. Check your solutions.

Example:
$$3x + 5 = -16$$
$$\underline{-5 \quad -5} \quad \text{Subtract}$$
$$3x = -21$$
$$\frac{3x}{3} = \frac{-21}{3} \quad \text{Divide}$$
$$x = -7$$
$$3(-7) + 5 = -16 \quad \text{Check}$$

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1. Solve
$$3x - 4 = -13$$

2. Solve
$$4x + 9 = 17$$

3. Solve
$$10 - 3x = -11$$

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4. Solve
$$-2x - 8 = -6$$

5. Solve
$$22 = 5x - 8$$

6. Solve
$$51 = 9 + 7x$$

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7. Solve
$$17 = 12 - x$$

8. Solve
$$5 = 11x + 5$$

9. Solve
$$8x - 9 = -5$$

Solving Two-Step Equations with Fractions

Examples/Models		
$\frac{x}{2}+1=6$ $\underline{-1-1}$ $(2)\frac{x}{2}=5\,(2)$ $x=10$	$\frac{1}{3}x-4=1$ $\underline{+4+4}$ $(3)\frac{1}{3}x=5\,(3)$ $x=15$	$(3)\frac{x-2}{3}=4\,(3)$ $x-2=12$ $\underline{+2+2}$ $x=14$

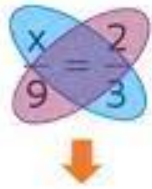| 10. Solve $2=\dfrac{x}{5}-1$	11. Solve $5+\dfrac{x}{2}=-4$	12. Solve $\dfrac{x}{4}+9=14$
13. Solve $\dfrac{1}{3}x-4=1$	14. Solve $\dfrac{1}{2}x+6=-3$	15. Solve $\dfrac{3}{2}x-2=19$
16. Solve $\dfrac{x-4}{5}=-2$	17. Solve $\dfrac{9+x}{2}=8$	18. Solve $\dfrac{x-7}{3}=-5$

Solving Proportions

Example/Model

$$\frac{x}{4} \diagup\hspace{-1em}\diagdown \frac{9}{20}$$

Cross-Multiply

$(x)(3) = (2)(9)$ Set the cross-products equal to each other.

$\dfrac{3x}{3} = \dfrac{18}{3}$ Simplify.

Divide both sides by 3 to get x by itself

$\boxed{x = 6}$

$$20\,(x) = 4\,(9)$$

$$\frac{20x}{20} = \frac{36}{20}$$

$$x = \frac{9}{5}$$

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19. Solve

$$\frac{10}{5} = \frac{2}{x}$$

20. Solve

$$\frac{3}{a} = \frac{2}{10}$$

21. Solve

$$\frac{n}{2} = \frac{4}{6}$$

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22. Solve

$$\frac{k}{6} = \frac{3}{9}$$

23. Solve

$$\frac{8}{10} = \frac{2}{n}$$

24. Solve

$$\frac{3x}{4} = \frac{9}{8}$$

Solving Equations with Variables on Both Sides

Example/Model		
$$15 + 6x = 45 + 8x$$		

$$15 + 6x = 45 + 8x$$
$$-6x -6x$$
$$15 = 45 + 2x$$

Check your answer:

$$-45 -45$$
$$\frac{-30}{2} = \frac{2x}{2}$$
$$\boxed{-15 = x}$$

$$15 + 6(-15) \overset{?}{=} 45 + 8(-15)$$
$$15 + (-90) \overset{?}{=} 45 + (-120)$$
$$-75 = -75 \checkmark$$

25. Solve $$7n + 7 = 2 + 8n$$	26. Solve $$4 + 6x = -4 + 2x$$	27. Solve $$-6n + 8 = 8 - 3n$$
28. Solve $$1 - 4a = 4 - 5a$$	29. Solve $$5n + 3 = -7 + 7n$$	30. Solve $$b + 2 = 4b + 2$$
31. Solve $$7x = 6 + 9x$$	32. Solve $$3x + 8 = 2x$$	33. Solve $$-10y = -5 - 5y$$

Solving Multistep Equations with Distribution

Example/Model		
$3(5+2x)=8(5+x)$		

$$15+6x=40+8x$$
$$-8x \quad\quad -8x$$
$$15-2x=40$$
$$-15 \quad\quad -15$$
$$\frac{-2x}{-2}=\frac{25}{-2}$$
$$x=\frac{-25}{2}$$

Check:

$$3(5+2(\tfrac{-25}{2}))\overset{?}{=}8(5+(\tfrac{-25}{2}))$$
$$3(5-25)\overset{?}{=}8(\tfrac{10}{2}-\tfrac{25}{2})$$
$$3(-20)\overset{?}{=}8(-\tfrac{15}{2})$$
$$-60=-60$$

34. Solve	35. Solve	36. Solve
$38-4x=-7(x-8)$	$8x-40=-4(-2-5x)$	$-7(3b+8)=-8b+9$

37. Solve	38. Solve	39. Solve
$6(p+7)=-4(p-8)$	$4(5a+5)=7(a+1)$	$-2(p+7)=3(p+7)$

Solving Multistep Equations with Combining Like Terms

Example/Model		

$$10z - 15 - 4z = 8 - 2z - 15$$

$$10z - 15 - 4z = 8 - 2z - 15$$
$$6z - 15 = -2z - 7 \quad \textit{Combine like terms.}$$
$$\underline{+\ 2z} \qquad \underline{+\ 2z} \qquad \textit{Add 2z to both sides.}$$
$$8z - 15 = \qquad -\ 7$$
$$\underline{+\ 15} \qquad \underline{+15} \quad \textit{Add 15 to both sides.}$$
$$8z = 8$$
$$\frac{8z}{8} = \frac{8}{8} \qquad \textit{Divide both sides by 8.}$$
$$z = 1$$

40. Solve	41. Solve	42. Solve
$5x - 7 = -11 + 8x - 2x$	$2n - 10 + 6n = 4n + 4 + 6n$	$m - 14 = 3m - 2 + 4m$

Solving Multistep Equations with Distribution & Combining Like Terms

43. Solve	44. Solve	45. Solve
$-36 - 4x = -5x - 3\left(4x - 1\right)$	$8\left(5 + 7a\right) - 5 = -15 + 6a$	$-24 - 7x = -8\left(3 + 8x\right) - 4x$