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MAKING & USING A
STUDY GUIDE
for a test

Exam-2: Algebraic Models

Study Guide: helps you ①summarize, ②visualize, and analyze③ concepts learned in class

* Warning: simply making a study guide does not guarantee you an A+ on the test.

Order of Operations in Solving

Parenthesis
Exponents ❯ Do these first, in the order indicated by the parenthesis.   ( )

Multiplication
Division ❯ Do these next, from left to right.   •, ÷

Addition
Subtraction ❯ Do these last, from left to right.   +, −

1   **Solve the equation.**

$$3n + 19 = 28$$

$$-19 \quad -19 \quad \text{Subtract 19 from both sides of the equation.}$$

$$\frac{3n}{3} \quad \frac{9}{3} \quad \text{Divide each side by 3}$$

$$n = 3$$

Check your Answer

$$3(3) + 19 \overset{?}{=} 28$$

yes ✓

2

Solve for x

$$y = mx + b.$$

$$-b \qquad -b$$ To undo adding b, subtract b.

$$\frac{y-b}{m} \qquad \frac{mx}{m}$$ To undo multiplying by m, divide by m

$$\frac{y-b}{m} = x$$

3

Solve for p in the literal equation $9p + 4r = q$.

$$9p + 4r = q$$

$$-4r \qquad\qquad -4r$$

$$\frac{9p}{9} \qquad\qquad \frac{q - 4r}{9}$$

$$p = \frac{q - 4r}{9}$$

4   Solve the inequality.

$$\frac{9}{2}(2x + 4) < 9$$

The solution is $x < -1$

$$\frac{9}{2}(2x) + \frac{9 \cdot 2}{2}(4)$$

$$9x + 18$$

$$-18$$

$$\frac{9x}{9}$$

$$x < -1$$

9

9

-18

$$-\frac{9}{9}$$

type in as.

5

Solve the inequality.

> **Inequality Rule**
>
> When multiplying or dividing by a **negative** number, you must **reverse** the inequality symbol.

$$-3\left(\frac{1}{6}x + 7\right) \geq 5$$

$$-3\left(\frac{1}{6}x\right) + -3(7) \quad \Big| \quad 5$$

$$-\frac{1}{2}x - 21 \quad \Big| \quad 5$$

$$+21 \qquad\qquad +21$$

$$\left(\frac{-2}{1}\right)-\frac{1}{2}x \qquad 26\left(-\frac{2}{1}\right)$$

$$x \leq -52$$

"Flip"

The solution is $\boxed{x \leq -52}$

6

Solve the inequality.

$$4(x - 9) > -8$$

$4x - 36 \qquad -8$

$+36 \qquad +36$

$\dfrac{4x}{4} \qquad \dfrac{28}{4}$

$x > 7$

Type in as:

The solution is $x > 7$.

7 Solve the inequality.

$$8 + 8(x + 4) \geq 32$$

$$8 + 8x + 32 \qquad | \qquad 32$$

$$40 + 8x \qquad | \qquad 32$$
$$-40 \qquad\qquad | \qquad -40$$

$$\frac{8x}{8} \qquad\qquad | \qquad \frac{-8}{8}$$

$$x \geq -1$$

The solution is $\boxed{x \geq -1}$

8 | Solve the inequality.

$$5 + \frac{1}{2}(5 - x) < -3$$

$-5 \qquad\qquad -5$

$(2)\frac{1}{2}(5-x) \qquad -8\,(2)$

$5 - x \qquad\qquad -16$

$-5 \qquad\qquad -5$

$\dfrac{-x}{-1} \qquad\qquad \dfrac{-21}{-1}$

$x > 21$

flip

The solution is $x > 21$

9 Solve the inequality.

$$6(x + 7) - 5(x + 3) \geq 19$$

$6x + 42 - 5x - 15 \qquad 19$

$x + 27 \qquad 19$

$-27 \qquad -27$

$x \geq -8$

The solution is $\boxed{x \geq -8}$

10

Solve the inequality.

$$7(2 - x) - 4(2 - 3x) > 5$$

$$14 - 7x - 8 + 12x \qquad \qquad 5$$

$$6 + 5x \qquad \qquad 5$$

$$-6 \qquad \qquad -6$$

$$\frac{5x}{5} \qquad \qquad \frac{-1}{5}$$

$$x > -\frac{1}{5}$$

The solution is $x > -\dfrac{1}{5}$

11 Solve the inequality.

$$\frac{1}{2}(4x-6) - \frac{2}{3}(6x+9) \le 8$$

$$\frac{1}{2}(4x) - \frac{1}{2}(6) - \frac{2}{3}(6x) - \frac{2}{3}(9) \quad 8$$

$$2x - 3 - 4x - 6 \qquad 8$$

$$-2x - 9 \qquad 8$$

$$+9 \qquad +9$$

Inequality Rule

When multiplying or dividing by a **negative number**, you must **reverse** the inequality symbol.

$$\frac{-2x}{-2} \qquad \frac{17}{-2}$$

Flip

$$x \ge -\frac{17}{2}$$

The solution is $x \ge \dfrac{-17}{2}$.

12 Solve the inequality.

$$x + 5 > -4(4 - 2x)$$

$x + 5 \quad \vert \quad -16 + 8x$

$-5 \quad\quad -5$

_____

$1x \qquad\quad -21 + 8x$

$- 8x \qquad\qquad\quad -8x$

_____

$-7x \qquad\qquad -21$

$\overline{-7} \qquad\quad \overline{-7}$

Flip

$x < 3$ The solution is $x < 3$

13 Solve the inequality. Enter any fractions as reduced improper fractions.

$$\frac{8}{3}(6x + 3) \le 8x - 4$$

$$\frac{8}{3}(6x) + \frac{8}{3}(3)$$

$$16x + 8 \qquad\qquad 8x - 4$$
$$\quad -8 \qquad\qquad\qquad -8$$

$$16x \qquad\qquad 8x - 12$$
$$-8x \qquad\qquad -8x$$

$$\frac{8x}{8} \qquad\qquad \frac{-12}{8}$$

$$x \le -\frac{12}{8} \div 4$$
$$\qquad \div 4$$

$$x \le -\frac{3}{2}$$

The solution is $x \le -\dfrac{3}{2}$

14 **Solve the inequality.**

$$\frac{1}{2}(-2x - 18) > 5(6 - 8x)$$

$$\frac{1}{2}(-2x) - \frac{1}{2}(18)$$

$$-x - 9$$

$$+9$$

$$-x$$

$$+40x$$

$$39x$$

$$5(6) - 5(8x)$$

$$30 - 40x$$

$$+9$$

$$39 - 40x$$

$$+40x$$

$$39$$

$$x \geq 1$$

15 Solve the inequality. Enter any fractions as reduced improper fractions.

$$4x \leq -\frac{2}{3}(6x + 6)$$

$$4x \mid -4x - 4$$

$$+4x \mid +4x$$

$$\frac{8x}{8} \mid \frac{-4}{8}$$

$$x \leq -\frac{1}{2}$$

16   Solve the inequality.

$$-9 - 3x \geq 3(15 + 2x) + 9$$

| $-9 - 3x$ | $45 + 6x + 9$ |

| $-9 - 3x$ | $54 + 6x$ |
| $+9$ | $+9$ |

| $-3x$ | $63 + 6x$ |
| $-6x$ | $-6x$ |

| $\dfrac{-9x}{-9}$ | $\dfrac{63}{-9}$ |

$$x \leq -7$$

17 Solve the inequality. Reduce any fractions.

$-3(8x + 30) \geq 34x - 34$

$$-3(8x + 30) \geq 34x - 34$$
$$-24x - 90 \geq 34x - 34$$
$$-24x - 34x - 90 \geq 34x - 34x - 34$$
$$-58x - 90 \geq -34$$
$$-58x \geq 56$$
$$x \leq -\frac{28}{29}$$

18

Solve the inequality.

$$8\left(\frac{1}{4}x - 5\right) + 40 < 4(x + 8)$$

$$
\begin{aligned}
8\left(\frac{1}{4}x - 5\right) + 40 &< 4(x + 8) \\
2x - 40 + 40 &< 4x + 32 \\
2x &< 4x + 32 \\
2x - 4x &< 32 \\
-2x &< 32 \\
x &> -16
\end{aligned}
$$

19

Solve the inequality.

$$4x - 2(x + 3) > 5 - 3(x + 4)$$

$$
\begin{aligned}
4x - 2(x + 3) &> 5 - 3(x + 4) \\
4x - 2x - 6 &> 5 - 3x - 12 \\
2x - 6 &> -3x - 7 \\
2x + 3x - 6 &> -3x + 3x - 7 \\
5x - 6 &> -7 \\
5x - 6 + 6 &> -7 + 6 \\
5x &> -1 \\
x &> -\frac{1}{5}
\end{aligned}
$$

20   ## Solve.

$$-24 - 4(x + 2) = 4x$$

$$-24 - 4x - 8 \quad \vert \quad 4x$$

$$-32 - 4x \quad\quad \vert \quad 4x$$

$$+4x \quad\quad\quad \vert \quad +4x$$

$$\frac{-32}{8} \quad\quad\quad \vert \quad \frac{8x}{8}$$

$$-4 = x$$

21   Solve.

$$300x - 600 > 60x - 120$$

$300x - 600 - 60x \; > \; 60x - 120 - 60x$	Use the Subtraction Property of Inequality to subtract $60x$ from each side.
$240x - 600 \; > \; -120$	Combine like terms.
$240x - 600 + 600x \; > \; -120 + 600$	Use the Addition Property of Inequality.
$240x \; > \; 480$	Combine like terms.
$\dfrac{240x}{240} \; > \; \dfrac{480}{240}$	Use the Division Property of Inequality.
$x \; > \; 2$	Simplify.

22 Look at each equation and possible solution.
Is the solution correct? Select Yes or No for each equation.

$3 - m \overset{?}{=} -2(m + 6); \ m = -15$

A   Yes   B   No

$3 + 15 \ | \ -2(-15 + 6)$
$18 \ \ | \ -2(-9)$
$18 \ \ | \ 18 \ \checkmark$

$5(p + 3) = -35; \ p = -4$

A   Yes   B   No

$5(-4 + 3) \ | \ -35$
$5(-1) \ \ | \ -35$
$\ \ -5 \ \ \ | \ -35 \ \ X$

$8q = 3(10 + q); \ q = 6$

A   Yes   B   No

$8(6) \ | \ 3(10 + 6)$
$48 \ | \ 3(16)$
$48 \ | \ 48$

23

$$y = mx + b$$

The equation solved for b is $b = y - mx$.

A True   **B** False

$$y = mx + b$$
$$-mx \quad -mx$$
$$\overline{\qquad} \quad \overline{\qquad}$$
$$y - mx = b$$

The equation solved for x is $x = \dfrac{y - b}{m}$.

A True   **B** False

$$y = mx + b$$
$$-b \qquad\qquad -b$$
$$\dfrac{y - b}{m} = \dfrac{mx}{m}$$

The equation solved for m is $m = x (y - b)$.

A True   **B** False

24

Solve the following equation for x.

2 . $\frac{1}{2}(5x + 12) = 2(2x - 3)$

$5x + 12 \quad | \quad 2(2x - 3)$

$5x + 12 \quad | \quad 4x - 6$
$\quad -12 \quad | \quad \quad -12$
$\overline{\quad\quad\quad} \quad | \quad \overline{\quad\quad\quad}$
$5x \quad\quad | \quad 4x - 18$
$-4x \quad\quad | \quad -4x$
$\overline{\quad\quad\quad} \quad | \quad \overline{\quad\quad\quad}$

$x = -18$

25

Drag and drop the appropriate property next to each step to justify the step.

$2x - 7 = -26$

$2x = -19$

$x = \dfrac{-19}{2}$

Addition Property of Equality

Division Property of Equality