Represent each of the following as an algebraic inequality.

1) x is <u>at most</u> 30 $x \leq 30$

2) the sum of 5x and 2x is <u>at least</u> 14 $5x + 2x \geq 14$

3) the product of x and y is <u>less than or equal to</u> 4 $xy \leq 4$

4) 5 less than a number y is <u>under</u> 20 $y - 5 < 20$

1st: Read carefully and <u>underline key words</u>
2nd: Write a let statement
3rd: Determine whether to use <, ≤, >, or ≥
4th: Write and solve the inequality

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5) If 5 times a number is increased by 4, the result is at least 19. Find the least possible number that satisfies these conditions.

$5x + 4 \geq 19$ Equation
$\quad -4 \quad -4$
$\quad 5x \geq 15$
$\quad \frac{5x}{5} \geq \frac{15}{5}$
$\quad x \geq 3$
$\quad \{x | x \geq 3\}$

6) The sum of twice a number and 5 is at most 15. What are the possible values for the number?

$2x + 5 \leq 15$ Equation
$\quad -5 \quad -5$
$\quad 2x \leq 10$ Equation
$\quad \frac{2x}{2} \leq \frac{10}{2}$
$\quad x \leq 5$
$\quad \{x | x \leq 5\}$

7) The cost of a gallon of orange juice is \$3.50. What is the maximum number of containers you can buy for \$15?

$3.50x \leq 15$

$\frac{3.50x}{3.50} \leq \frac{15}{3.50}$

$x \leq 4.28$

So 4 containers of orange juice

8) Three times a number increased by 8 is no more than the number decreased by 4. Find the number.

$3x + 8 \leq x - 4$
$-x - x$
$2x + 8 \leq -4$
$-8 - 8$
$2x \leq -12$
$\frac{2x}{2} \leq \frac{-12}{2}$
$x \leq -6$
$\{x | x \leq -6\}$

9) Two-thirds of a number plus 5 is greater than 12. Find the number.

$\frac{2}{3}x + 5 > 12$

$\phantom{\frac{2}{3}x}-5 - 5$

$\frac{2}{3}x > 7$

$\frac{3}{2} \cdot \frac{2}{3}x > 7 \cdot \frac{3}{2}$

$x > \frac{21}{2}$

$\{x | x > \frac{21}{2}\}$

_____1) In order to be admitted for a certain ride at an amusement park, a child must be **greater than or equal to 36 inches** tall and **less than 48 inches tall**. Which graph represents these conditions?

Maximum height is 47.999 because you can't include 48
Minimum height is 36.
So answer (1)

(1) ←|++|++|++|++|++|++|++|++|++|++|++|++|++|++|→
    24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54

(2) ←|++|++|++|++|++|++|++|++|++|++|++|++|++|++|→
    24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54

(3) ←|++|++|++|++|++|++|++|++|++|++|++|++|++|++|→
    24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54

(4) ←|++|++|++|++|++|++|++|++|++|++|++|++|++|++|→
    24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54
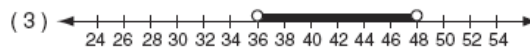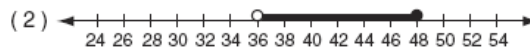
_____2) Which statement is modeled by 2p + 5 < 11?

(1) The sum of 5 and 2 times p is at least 11.

(2) Five added to the product of 2 and p is less than 11.

(3) Two times p plus 5 is at most 11.

(4) The product of 2 and p added to 5 is 11.

_____3) Which is NOT a solution of the inequality $5 - 2x \geq -3$?

(1) 0   (2) 2   (3) 4   **(4) 5**

$5 - 2x \geq -3$
$-5 \qquad -5$
$-2x \geq -8$
$\frac{-2x}{-2} \leq \frac{-8}{-2}$
$x \leq 4$
$\{x | x \leq 4\}$

5 is not in the solution set

3

__1__4) Which statement can be modeled by x + 3 ≤ 12?

   (1) Sam has 3 bottles of water. Together, Sam and Dave have at most 12 bottles of water.

   (2) Jennie sold 3 cookbooks. To earn a prize, Jennie must sell at least 12 cookbooks.

   (3) Peter has 2 baseball hats. Peter and his brothers have fewer than 12 baseball hats.

   (4) Kathy swam 3 laps in the pool this week. She must swim more than 12 laps.

5) The sum of a number and 81 is greater than the product of -3 and that number. What are the possible values for the number?

$$x + 81 > -3x$$
$$\underline{-x \qquad\quad -x}$$
$$81 > -4x$$
$$\frac{81}{-4} < \frac{-4x}{-4}$$

$$\frac{81}{-4} < x$$

$$\{x | x > \frac{81}{-4}\}$$

6) Four times a number is greater than -48. What are the possible values for the number?

$$4x > -48$$
$$\frac{4x}{4} > \frac{-48}{4}$$
$$x > -12$$

$$\{x | x > -12\}$$

Recall four steps to help solve these types of problems:

1. Read carefully and <u>underline key words</u>
2. Write a Let statement [e.g. let x = …]
3. Determined whether to use the $=, >, <, \geq$ or $\leq$ sign
4. Write and solve the inequality

1. The quotient of a number and 15 is no greater than 450. What are the possible values for the number?

$$\frac{x}{15} < 450$$

$$15 \cdot \frac{x}{15} < 450 \cdot 15$$

$$x < 6750$$

$$\{x|x < 6750\}$$

2. ~~Keith and Michelle went out to dinner. The total cost of the meal, including the tip, came to $53.70. If the combined tip came out to $9.60, and each friend spent an equal amount, how much did each friend pay not including the tip?~~

Badly worded question

3. Jason is saving up to buy a digital camera that costs $490. So far, he saved $175. He would like to buy the camera 3 weeks from now. What is the equation used to represent how much he must save every week to have enough money to purchase the camera?

Let x be the weeks
$$3x + 175 > 490$$
$$-175 \quad -175$$
$$3x > 315$$
$$\frac{3x}{3} > \frac{315}{3}$$
$$x > 105$$

He would have to attest save 105 dollars each week

5

4. Adrian works in New York City and makes $42 per hour. She works in an office and must get her suit dry cleaned everyday for $75. If she wants to make more than $260 a day, *at least* how many hours must she work?

Let x be the hour

$42x - 75 > 260$

$+75 +75$

$42x > 335$

$\frac{42x}{42} > \frac{335}{42}$

$x > 7.97 \, ish$

She has to work 8 hours

5. Your brother has $2,000 saved for a vacation. His airplane ticket is $637. Write and solve an inequality to find out how much he can spend for everything else.

Let x be the money

$x + 637 < 2000$

$-637 -637$

$x < 1363$

He can spend up to $1363

6. Your local bank offers free checking for accounts with a balance of at least $500. Suppose you have a balance of $516.46 and you write a check for $31.96. How much do you need to deposit to avoid being charged a service fee?

$x - 31.96 + 516.46 < 500$

$-516.46 -516.46$

$x - 31.96 < -16.46$

$+31.96 +31.96$

$x < 15.5$

You have to write a check for greater than $15.50

1. $3x \leq 9$

   ■ $x \leq 3$
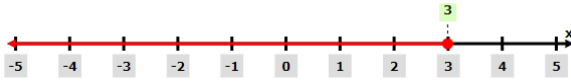
2. $4x - 3 \geq 13$

   ■ $x \geq 4$

3. $4x - 3 < 3$

   ■ $x < \dfrac{3}{2}$
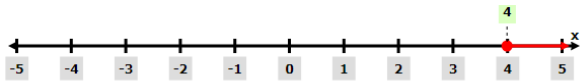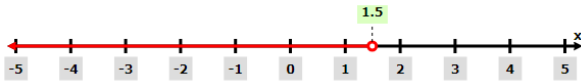
4. $5x + 10 > 14x - 8$

   ■ $x < 2$

5. $2x - 6 < 2$

   ■ $x < 4$
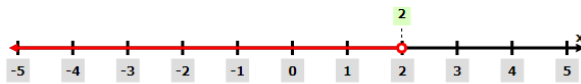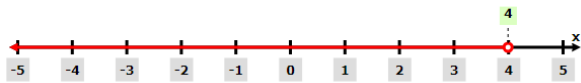
6. $2x - 5 \leq x - 2$

   ■ $x \leq 3$
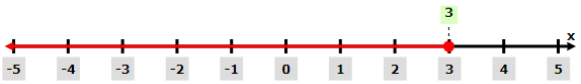
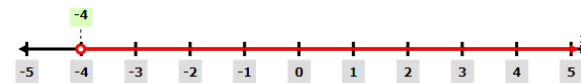7. $3x - 14 \geq 2 - 5x$

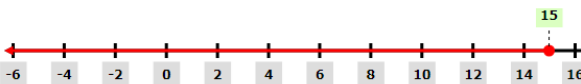   ■ $x \geq 2$
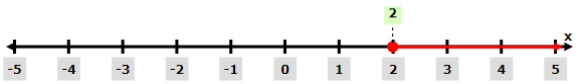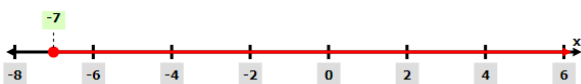
8. $-2x + 5 < 17 + x$

   ■ $x > -4$
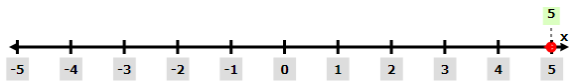
9. $-x \leq 15 - 2x$

   ■ $x \leq 15$

10. $5x \geq -35$

    ■ $x \geq -7$

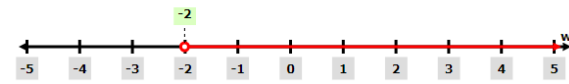1. $x - 4 > 1$
   - $x > 5$

2. $x + 1 \leq 4$
   - $x \leq 3$
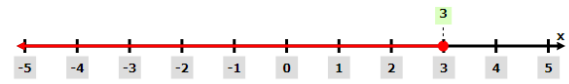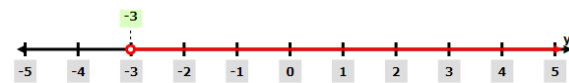
3. $4t \geq 8$
   - $t \geq 2$

4. $-5w < 10$
   - $w > -2$

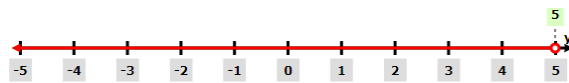5. $4x > -28$
   - $x > -7$
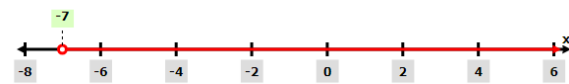
6. $27 > -9y$
   - $y > -3$

7. $2y + 7 < 17$
   - $y < 5$
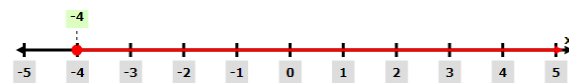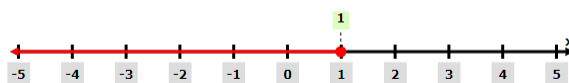
8. $2(2x - 8) - 8x \leq 0$
   - $x \geq -4$

9. $5x + 4 \leq 11 - 2x$
   - $x \leq 1$

10. $5x - (x - 8) > 9 + 3(2x - 3)$
    - $x < 4$