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## Sec. 1.4: Write Equations and Inequalities

Equation: a mathematical sentence formed by placing the symbol  $=$  between two \_\_\_\_\_.

Inequality: a mathematical sentence formed by placing one of the symbols  $<$ ,  $>$ ,  $\leq$ , or  $\geq$  between two expressions.

Open sentence: an equation or inequality that contains an \_\_\_\_\_ expression

Symbol	Meaning	Associated Words
$=$	is	
$<$	is	
$\leq$	is	
$>$	is	
$\geq$	is	

Combining Inequalities: In some situations two inequalities are combined—for instance when a variable can fall within a certain range of values. For example, we can combine  $x > 5$  and  $x < 12$  into one inequality:  $5 < x < 12$ . (Note that we arrange the compound inequality so that both symbols read ' $<$ '.) This could be read "x is greater than 5 and less than 12," or you might hear some people say, "5 is less than x is less than 12."

Solution of an equation or inequality: A solution is a value that, when \_\_\_\_\_ for a variable in an equation or inequality, makes that equation or inequality \_\_\_\_\_.

For example, say  $x + 8 = 10$ . If we substitute 2 for x, we get  $10 = 10$ , which is true. Therefore, 2 is a solution of that equation.

For the inequality  $x > 15$ , any number greater than 15 will be a solution for that inequality.

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### Examples

Write an equation or inequality that corresponds to the verbal sentence.

1. The sum of a number  $y$  and 12 is 33.
2. The difference of the square of a number  $m$  and 5 is greater than 40.
3. The product of a number  $x$  and 7 is no more than 85.

Check if 5 is a solution of the equation or inequality.

4.  $2k + 8 = 18$

5.  $y^2 - 10 \geq 15$

6.  $9 - 4k < -11$

7. You and three friends went to a movie. You had a coupon valid for a discount of \$5 (total among the four of you), and together the four of you paid \$19 for tickets. How much is the normal price per ticket?
8. A fitness enthusiast ran 1000 miles last year. If she runs 20 miles a week this year, will she run more total miles than last year?

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Sec. 1.4 Practice Problems

Write an equation or inequality.		
1) The sum of a number $n$ and 35 is 48.	2) The difference of a number $q$ and 7 is 19.	3) The difference of 20 and the quotient of a number $w$ and 4 is 13.
4) The sum of 4 and the quantity 9 times a number $t$ is equal to 50.	5) The product of 6 and the quantity 7 more than a number $h$ is less than 90.	6) The quotient of 20 and a number $v$ is at most 10.
7) The sum of a number $p$ and 3 is greater than 15 and less than 22.	8) The product of 5 and a number $g$ is at least 12 and no more than 40.	9) The difference of a number $c$ and 14 is greater than 25 and at most 42.
Write an inequality for the price $p$ (in dollars) described.		
10) Big Sale! All items on sale, nothing over \$20!	11) Ticket prices start at \$9.	
Describe AND correct the error in writing the verbal sentence as an equation or an inequality.		
12) The sum of a number $n$ and 5 is no more than 21. $n + 5 < 21$	13) The difference of a number $q$ and 7 is greater than 10 and less than 34. $q + 7 > 10 < 34$	

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Check whether the given number is a solution of the equation or inequality.		
14) $x + 5 = 21$ ; 16	15) $7 + 3y = 19$ ; 4	16) $30 - 4t = 16$ ; 3
17) $\frac{r}{2} + 5 = 17$ ; 24	18) $\frac{x+2}{4} < 5$ ; 18	19) $28 - 4y > 10$ ; 6
Solve the equation using mental math.		
20) $x + 4 = 16$	21) $3y = 21$	22) $t - 8 = 10$

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Sec. 1.4 Practice Problems

Write an equation or inequality.		
1) The sum of a number $n$ and 35 is 48.  $n + 35 = 48$	2) The difference of a number $q$ and 7 is 19.  $q - 7 = 19$	3) The difference of 20 and the quotient of a number $w$ and 4 is 13.  $20 - \frac{w}{4} = 13$
4) The sum of 4 and the quantity 9 times a number $t$ is equal to 50.  $4 + 9t = 50$	5) The product of 6 and the quantity 7 more than a number $h$ is less than 90.  $6(h + 7) < 90$	6) The quotient of 20 and a number $v$ is at most 10.  $\frac{20}{v} \leq 10$
7) The sum of a number $p$ and 3 is greater than 15 and less than 22.  $15 < p + 3 < 22$	8) The product of 5 and a number $g$ is at least 12 and no more than 40.  $12 \leq 5g \leq 40$	9) The difference of a number $c$ and 14 is greater than 25 and at most 42.  $25 < c - 14 \leq 42$
Write an inequality for the price $p$ (in dollars) described.		
10) Big Sale! All items on sale, nothing over \$20!  $p \leq 20$ (or $0 < p \leq 20$ )	11) Ticket prices start at \$9.  $p \geq 9$	
Describe AND correct the error in writing the verbal sentence as an equation or an inequality.		
12) The sum of a number $n$ and 5 is no more than 21. $n + 5 < 21$  "No more than 21" means the sum can equal 21.  $n + 5 \leq 21$	13) The difference of a number $q$ and 7 is greater than 10 and less than 34. $q + 7 > 10 < 34$  "Difference" indicates subtraction, and both inequality symbols should go the same direction.  $10 < q - 7 < 34$	

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Check whether the given number is a solution of the equation or inequality.		
14) $x + 5 = 21$ ; 16  <i>yes</i>	15) $7 + 3y = 19$ ; 4  <i>yes</i>	16) $30 - 4t = 16$ ; 3  <i>no</i>
17) $\frac{r}{2} + 5 = 17$ ; 24  <i>yes</i>	18) $\frac{x+2}{4} < 5$ ; 18  <i>no</i>	19) $28 - 4y > 10$ ; 6  <i>no</i>
Solve the equation using mental math.		
20) $x + 4 = 16$  <i><math>x = 12</math></i>	21) $3y = 21$  <i><math>y = 7</math></i>	22) $t - 8 = 10$  <i><math>t = 18</math></i>