Inequalities on a number line mathswatch answers

Continue

Name : _____ Score : _____

Identifying Solutions - MCQ

One-step: S1

Choose the correct solution that best describes each inequality.

1) $x + 6 \geq 14$ or $x - 2 \leq 3$

a) $x \leq 5$ or $x \geq 8$ b) $x \leq 5$

c) $5 \leq x \leq 8$ d) $x \geq 8$

2) $2x < 12$ and $x - 1 \geq 2$

a) $x < 6$ b) $3 < x \leq 6$

c) $x \leq 3$ d) $3 \leq x < 6$

3) $3x < 21$ or $5x > 55$

a) $x < -11$ or $x > 7$ b) $x < 7$ or $x > 11$

c) $x < 7$ d) $x > -11$

4) $-5 \leq x + 15 < 7$

a) $x \geq -20$ b) $x < -8$

c) $-20 \leq x < -8$ d) $-20 \leq x < 8$

5) $\frac{x}{2} > 4$ and $\frac{x}{9} < 2$

a) $x > 8$ and $x < 18$ b) $x < -18$

c) $x > 8$ d) $-18 < x < 8$

6) $5x \geq 15$ or $x + 4 > 13$

a) $x \leq 3$ or $x > 9$ b) $x \geq 3$

c) $3 \leq x < 9$ d) $x > 9$

7) $16 \leq 4x < 28$

a) $x \geq 7$ b) $x < 7$

c) $7 \geq x > 4$ d) $4 \leq x < 7$

8) $8x \geq 32$ or $\frac{x}{9} > 2$

a) $x \geq 4$ b) $4 \leq x < 18$

c) $x > 4$ d) $x \geq 18$

9) $7x \geq 49$ or $2x < -16$

a) $x \geq 7$ b) $-8 < x \leq 7$

c) $x < -8$ or $x \geq 7$ d) $x < -8$

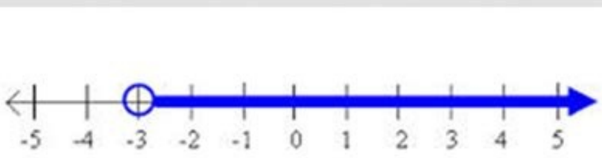
10) $10 + x \geq 7$ and $3x \leq 36$

a) $3 \leq x \leq 12$ b) $x \leq 12$

c) $x \geq -3$ d) $x \geq -3$ and $x \leq 12$

GRAPHING INEQUALITIES

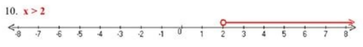
$x > -3$



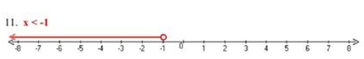
Write the inequality for the number line provided.

9. $x \leq -5$

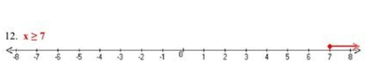
10. $x > 2$



11. $x < -1$



12. $x \geq 7$



Solve and graph each inequality

13. & 14.) $x + 4 < -3$
$-4 \quad -4$
$x < -7$

Solve and graph the solution set

a) $\frac{x^2 - 9}{x^2 - 64} \leq 0$

$A^2 - B^2 = (A+B)(A-B)$

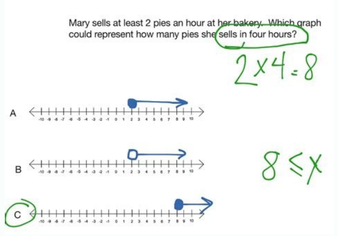
$\frac{(x+3)(x-3)}{(x+8)(x-8)} \leq 0$

$x = -9$ (+)
$\frac{(-9+3)(-9-3)}{(-9+8)(-9-8)} = \frac{(-)(-)}{(-)(-)}$

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

$x = 0$ (+)
$\frac{(0+3)(0-3)}{(0+8)(0-8)} = \frac{(+)(-)}{(+)(-)}$

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



Inequalities on a number line lesson. How to show the inequality on a number line. How do you work out inequalities on a number line.

GCSE 4 - 5KS3AQAEdexcelOCRWJECFoundation Level 4-5 Before learning about how to display inequalities on a number line, you firstly need to know the following symbols and their definitions: > means “greater than”, \geq means “greater than or equal to“, < means “less than”, \leq means “less than or equal to“. We call \leq and \geq inclusive inequalities, and we call < and > strict inequalities. For example x\leq 8 includes the value 8 as a possibility for x, whilst the inequality x3, will require an open circle at 3 and an arrow pointing right. The other inequality, y y x is greater than y. Example: 6 > 3 Example: The number of days in a month is greater than the number of days in a week. x < y x is less than y. Example: The number of days in a week is less than the number of days in a year. x is greater than or equal to y. Example: 31 is greater than or equal to the number of days in a month. x is less than or equal to y. Example: The speed of a car driving legally in a 25 mph zone is less than or equal to 25 mph. The important thing about inequalities is that there can be multiple solutions. For example, the inequality “31 ≥ the number of days in a month” is a true statement for every month of the year—no month has more than 31 days. It holds true for January, which has 31 days (31 ≥ 31); September, which has 30 days (31 ≥ 30); and February, which has either 28 or 29 days depending upon the year (31 ≥ 28 and 31 ≥ 29). The inequality x > y can also be written as y < x. The sides of any inequality can be switched as long as the inequality symbol between them is also reversed. Representing Inequalities on a Number Line Inequalities can be graphed on a number line. Below are three examples of inequalities and their graphs. x < 2 x ≤ −4 x ³ −3 Each of these graphs begins with a circle—either an open or closed (shaded) circle. This point is often called the end point of the solution. A closed, or shaded, circle is used to represent the inequalities greater than or equal to () or less than or equal to (). The point is part of the solution. An open circle is used for greater than (>) or less than (b, then a + c > b + c If a > b, then a − c > b − c Because inequalities have multiple possible solutions, representing the solutions graphically provides a helpful visual of the situation. The example below shows the steps to solve and graph an inequality. Example Problem Solve for x. Isolate the variable by subtracting 3 from both sides of the inequality. Answer x < 2 The graph of the inequality x < 2 is shown below. Just as you can check the solution to an equation, you can check a solution to an inequality. First, you check the end point by substituting it in the related equation. Then you check to see if the inequality is correct by substituting any other solution to see if it is one of the solutions. Because there are multiple solutions, it is a good practice to check more than one of the possible solutions. This can also help you check that your graph is correct. The example below shows how you could check that x < 2 is the solution to x + 3 < 5. Example Problem Check that x < 2 is the solution to x + 3 < 5. Substitute the end point 2 into the related equation, x + 3 = 5. Pick a value less than 2, such as 0, to check into the inequality. (This value will be on the shaded part of the graph.) Answer x < 2 is the solution to x + 3 < 5. The following examples show additional inequality problems. The graph of the solution to the inequality is also shown. Remember to check the solution. This is a good habit to build! Advanced Example Problem Solve for x. Subtract from both sides to isolate the variable. Answer Example Problem Solve for x. Isolate the variable by adding 10 to both sides of the inequality. Answer x −2 The graph of this solution in shown below. Notice that a closed circle is used because the inequality is “less than or equal to” (). The blue arrow is drawn to the left of the point −2 because these are the values that are less than −2. Example Problem Check that is the solution to Substitute the end point −2 into the related equation x – 10 = −12. Pick a value less than −2, such as −5, to check in the inequality. (This value will be on the shaded part of the graph.) Answer is the solution to Example Problem Solve for a. Isolate the variable by adding 17 to both sides of the inequality. Answer The graph of this solution in shown below. Notice that an open circle is used because the inequality is “greater than” (>). The arrow is drawn to the right of 0 because these are the values that are greater than 0. Example Problem Check that is the solution to . Substitute the end point, 0 into the related equation. Pick a value greater than 0, such as 20, to check in the inequality. (This value will be on the shaded part of the graph.) Answer is the solution to Advanced Question Solve for x: A) x ≤ 0 B) x > 35 C) x ≤ 7 D) x ≥ 5 Show/Hide Answer A) x ≤ 0 Incorrect. To find the value of x, try adding 0.5x to both sides. The correct answer is x ≤ 7. B) x > 35 Incorrect. To find the value of x, try adding 0.5x to both sides. The correct answer is x ≤ 7. C) x ≤ 7 Correct. Adding 0.5x to both sides creates 1x, so x ≤ 7. D) x ≥ 5 Incorrect. To find the value of x, try adding 0.5x to both sides. The correct answer is x ≤ 7. Solving Inequalities Involving Multiplication Solving an inequality with a variable that has a coefficient other than 1 usually involves multiplication or division. The steps are like solving one-step equations involving multiplication or division EXCEPT for the inequality sign. Let’s look at what happens to the inequality when you multiply or divide each side by the same number. Let’s start with the true statement: 10 > 5 Let’s try again by starting with the same true statement: 10 > 5 Next, multiply both sides by the same positive number: 10 • 2 > 5 • 2 This time, multiply both sides by the same negative number: 10 • −2 > 5 • −2 20 is greater than 10, so you still have a true inequality: 20 > 10 Wait a minute! −20 is not greater than −10, so you have an untrue statement. −20 > −10 When you multiply by a positive number, leave the inequality sign as it is! You must “reverse” the inequality sign to make the statement true: −20 < −10 When you multiply by a negative number, “reverse” the inequality sign. Whenever you multiply or divide both sides of an inequality by a negative number, the inequality sign must be reversed in order to keep a true statement. These rules are summarized in the box below. Multiplication and Division Properties of Inequality If a > b, then ac > bc, if c > 0 If a > b, then ac < bc, if c < 0 If a > b, then , if c > 0 If a > b, then , if c < 0 Keep in mind that you only change the sign when you are multiplying and dividing by a negative number. If you add or subtract a negative number, the inequality stays the same. Advanced Example Problem Solve for x. Divide both sides by -12 to isolate the variable. Since you are dividing by a negative number, you need to change the direction of the inequality sign. Check Does ? Is It checks! Check your solution by first checking the end point , in the related equation. Pick a value greater than , such as 2, to check in the inequality. Answer Example Problem Solve for x. 3x > 12 Divide both sides by 3 to isolate the variable. Check your solution by first checking the end point 4, and then checking another solution for the inequality. Answer The graph of this solution is shown below. There was no need to make any changes to the inequality sign because both sides of the inequality were divided by positive 3. In the next example, there is division by a negative number, so there is an additional step in the solution! Example Problem Solve for x. −2x > 6 Divide each side of the inequality by −2 to isolate the variable, and change the direction of the inequality sign because of the division by a negative number. Check your solution by first checking the end point −3, and then checking another solution for the inequality. Answer Because both sides of the inequality were divided by a negative number, −2, the inequality symbol was switched from > to , you found that . B) Incorrect. You correctly multiplied by -5, but remember that the inequality sign flips when you multiply by a negative number. The correct response is: . C) Incorrect. It looks like you divided both sides by -5. While you remembered to flip the inequality sign correctly, division is not the correct operation here. The correct response is: . D) Incorrect. It looks like you divided both sides by -5. Division is not the correct operation here, and remember to flip the inequality sign when you multiply or divide by a negative number. The correct response is: . Solving inequalities is very similar to solving equations, except you have to reverse the inequality symbols when you multiply or divide both sides of an inequality by a negative number. Since inequalities can have multiple solutions, it is customary to represent the solution to an inequality graphically as well as algebraically. Because there is usually more than one solution to an inequality, when you check your answer you should check the end point and one other value to check the direction of the inequality.