雙語教學主題(國中七年級教材):介紹一元一次不等式

Topic: introducing linear inequality

這個單元常用到的一些用語

Some words or expressions we use in this topic
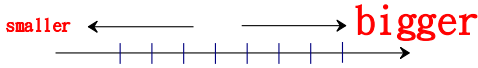
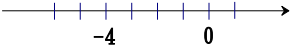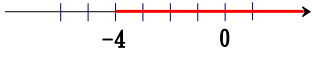| greater than	>	greater than or equal to	$\geq$
less than	<	less than or equal to	$\leq$
at least	至少	at most	最多
substitue		infinite	
compound inequality	含有兩個不等符號的一元一次不等式		

.
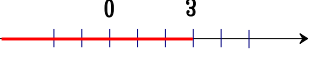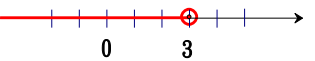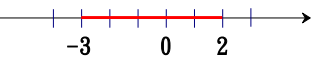
3=3 X=7 X+2y=-2 ...	We have learned equations like linear equations in one or two variables in which numbers are equal
$7 \neq 2$ 3<5 $x \geq -4$ ... These are called Inequalities	Actually, there are more numbers that are not equal When we compare two numbers that are not equal, we use inequality signs to show the relations between them For instance 7 is not equal to 2 3 is less than 5 X is greater than or equal to negative 4
The meaning of inequality signs > greater than	Examples: x>3: x is greater than 3 means the value of x can be 3.0001, 4, or 1000, ……. But $x \neq 3$ and x can not be 2.9999, -5 or -10000, ……
< less than	y<0: y is less than 0 means the value of y can be any negative numbers: -0.0001, -4 or

	-1000, ……. But y≠0 and y can not be any positive numbers like 0.1, 5, or 10000, ……
≥ greater than or equal to	a≥5: a is greater than or equal to 5 means the value of a can be 5, or a can be 6, $7\frac{2}{5}$,or 150, …… But a can never be 4.999, 3, 0 or -300……
≤less than or equal to	b≤-2: b is less than or equal to -2 means the value of b can be -2, and b can also be -2.0001, -4, or -1000, ……. But b can be like -1.9999, 5 or 10000, ……

Say your driving speed is x km/hr then x≤100
 	
        also x≥60
 	
We combine these two expressions and get a compound inequality
        60≤x≤100
This means your driving speed x can be 60, 100 km/hr or in between
	Let's see some examples This is a speed limit sign on a highway The red number 100 means the maximum of your driving speed is 100 km/hr So x can be 100 km/hr or Of course, your driving speed x can be lower than 100 km/hr The blue number 60 means the minimum of your driving speed is 60 km/hr So x can be 60 km/hr or your driving speed x must be over 60 km/hr

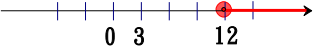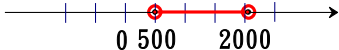|	
15+ 輔15級 If a movie is rated with this sign, means this movie is restricted if your age is under 15, If your age a <15, you can not watch this movie You can watch this movie only when you are older than 15 or above	In Taiwan, we have movie ratings system
PARENTS STRONGLY CAUTIONED **PG-13** CHECK THIS BOX FOR SPECIFIC CONTENT INFORMATION Some Material May Be Inappropriate for Children Under 13 ® It says: If the movie is rated PG-13 Means you can watch this movie only when your age is 13 or above Let's say your age is y You can not watch this movie if your age y<13 Only your age y≥13 is allowed to watch this movie	In many other countries, they also have their movie rating system. This is one of them The **Motion Picture Association film rating system** is used in some countries to rate a motion picture's suitability for certain audiences based on its content

Graphing linear inequalities

For example: x≥-4 If x=5, we substitute 5 in place of x we get 5≥-4, which is true we say 5 is a solution to this inequality If x=-100, we substitute -100 in place of x we get -100 ≥-4, which is definitely not true, we say -100 is not a solution of this inequality	When we say a value is a solution to an inequality, it means we plug this value into the variable, and the inequality is true
The solution for x≥-4 can be any values like 4, $4\frac{1}{3}$, 5, 100, ⋯→infinity	The solutions to an inequality are mostly more than one, and normally more to infinite possible answers, we can never finish writing down all of them So for us 7 graders, the easiest way to show all the solutions is graphing on the number line which we learned in last semester
smaller ←————— —————→ bigger ——++++++++→	The values decrease as they move to the left hand side of the number line, and the values increase as they move to the right hand side along the number line
——++++++++→ -4 0 ,	Now we plot the solutions for inequality x≥-4 on the number line First, we get -4 on the number line we know that all the numbers greater than -4 or equal to -4 are the solutions
——++++++++→ -4 0	so we shade the right hand side from -4 on the line
.	Since x=-4 is also a solution, we put a

 −4 0 This is a complete graphing solution for the inequality x≥-4	closed circle on the number -4 to indicate that x=-4 is Included
Graph the inequality y<3 0 3	Let's see another example y can be any values smaller than 3 we first set 3 on the number line
 0 3	The smaller values are on the left side of 3, so we shade the left side of 3 on the line
 0 3	Since 3 is not less than 3, 3 is not a solution to the inequality y<3 We put an open circle on the number 3 to indicate 3 is excluded here
Plot the compound inequality on the number line -3≤m<2	When we combine 2 inequalities -3≤m and m<2 together We get the compound inequality or double inequality -3≤m<2
 −3 0 2	We know the value of m is in between -3 and 2 So we connect -3 and 2 with the segment as it shows
 −3 0 2	From the inequality -3≤m<2, we can tell -3 is a solution, but 2 is not a solution for it So we put a closed circle on -3 and an open circle on 2
	Hope you find that plotting the inequalities on the number line is the easiest and the most convenient way to show the infinite solutions to inequalities
	Please notice You can read any inequalities from left to right or from right to left

	It will help a lot when we can read the inequalities from both sides Especially when we are going to solve the inequalities in the next section
x≥-4 ⟶ x≥-4 x is greater than or equal to negative 4	from left to right
x≥-4 ⟵ negative 4 is less than or equal to x	from right to left
-3≤m<2 ⟶ -3≤m<2 negative 3 is less than or equal to m and m is less than 2	from left to right
-3≤m<2 ⟵ 2 is greater than m and m is greater than or equal to negative 3	from right to left

Let's do some practice:

| Write the following sentences as inequalities:
1. A number p plus 4 is less than or equal to 10
Ans:_____

2. 3 times a number c is at most 15
Ans:_____

3. Twice a number z is fewer than -6
Ans:_____

4. A number n divided by -3 is at least 3 | 1. A number p plus 4 is less than or equal to 10
Ans:____ p+4 ≤ 10 _____

2. 3 times a number c is at most 15
Ans:_____ 3c≤15_____

3. Twice a number z is fewer than -6
Ans:____ 2z<-6_____

4. A number n divided by -3 is at least 3
Ans:____ $\dfrac{n}{-3} \geq 3$ _____ |

Ans:_____	
Tell whether the value x is the solution of the inequality 1. -3≤2x+3 (1) x=0 Ans:_____ (2)x=-3 Ans:_____ (3)x=-5 Ans:_____	1. -3≤2x,+3 (1) x=0 Ans:_____yes_____ (2)x=-3 Ans:_____yes_____ (3)x=-5 Ans:_____no_____
Write and graph an inequality for the situation 1. A board game is designed for ages 12 and up, let y be the age Ans:_____ 2. The price of a bike is more than NTD500 but less than NTD2000 Let p be the price Ans:_____	Ans:_____y≥12_____ 0 3 12 Ans:___500<p<2000_____ 0 500 2000

製作者: 北市金華國中 郝曉青