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Lesson Exemplar for Mathematics

Quarter 3

Lesson

3

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Lesson Exemplar for Mathematics Grade 8
Quarter 3: Lesson 3 (Week 3)
SY 2025-2026

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MATHEMATICS / QUARTER 3 / GRADE 8

I. CURRICULUM CONTENT, STANDARDS, AND LESSON COMPETENCIES	
A. Content Standards	The learners should have knowledge and understanding of linear inequalities in one variable and their graphs.
B. Performance Standards	By the end of the quarter, the learners are able to: - Solve linear equations and linear inequalities in one variable. (NA) - Graph linear inequalities in one variable. (NA)Graph linear equations in two variables. (NA)
C. Learning Competencies and Objectives	Learning Competency - solve linear inequalities in one variable. - graph on a number line the solution of linear inequalities in one variable. - solve problems involving linear inequalities in one variable.
D. Content	Linear Inequalities in One Variable and their Graphs Word Problems Involving Linear Inequalities in One Variables
E. Integration	Real Life Situations

II. LEARNING RESOURCES
Varsity Tutors. (2024). <i>Graphing Inequalities in One Variable</i>. https://www.varsitytutors.com/hotmath/hotmath_help/topics/graphing-inequalities-in-one-variable Math planet. (2011, March 2). <i>Solving linear inequalities</i>. [Video]. https://www.mathplanet.com/education/algebra-1/linear-inequalities/solving-linear-inequalities#:~:text=The%20graph%20of%20a%20linear,circle%20for%20%E2%89%A4%20and%20%E2%89%A5.&text=Inequalities%20that%20have%20the%20same,there%20were%20properties%20of%20equality

$$5x + 7 < 22$$

$$-2(x + 8) + 6 \geq 20$$

$$-2(4x - 5) < 9 - 2(x - 2)$$

A solution to a linear inequality is a number that makes the inequality a true statement when substituted for the variable. Linear inequalities can have infinitely many solutions or no solution at all. If infinitely many solutions exist, the solution set can be graphed on a number line and/or expressed using interval notation.

Are $x = -2$ and $x = 4$ solutions to $3x + 7 < 16$?

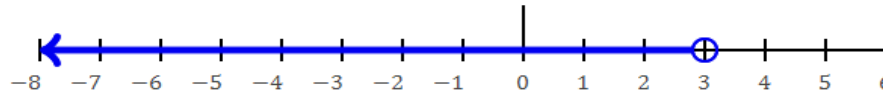
Solution:

Substitute the values for x , simplify and check to see if we obtain a true statement.

$$\begin{aligned}\text{Check: } x &= -2 \\ 3(-2) + 7 &< 16 \\ -6 + 7 &< 16 \\ 1 &< 16 \checkmark\end{aligned}$$

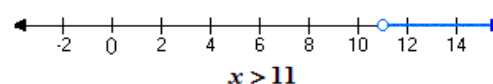
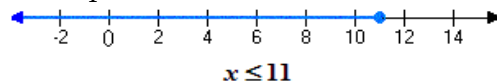
$$\begin{aligned}\text{Check: } x &= 4 \\ 3(4) + 7 &< 16 \\ 12 + 7 &< 16 \\ 19 &< 16\end{aligned}$$

Answer: $x = -2$ is a solution and $x = 4$ is not.



Inequalities can be graphed on the number line as rays. If the inequality is "strict" ($<$ or $>$), we use an open dot to indicate that the endpoint of the ray is not part of the solution. For the other types of inequalities ($\leq$ and $\geq$), we use a closed dot.

Example:



DAY 2-3

2. Worked Example

1. Solve:

Let's solve your inequality step-by-step:

Step 1: Subtract 1 from both sides.

Step 2: Divide both sides by -2.

$$-2x + 1 \geq 21$$

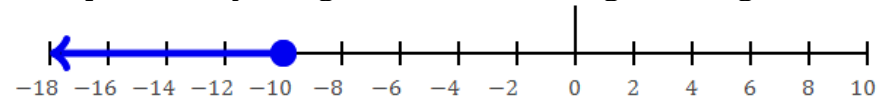
$$-2x + 1 - 1 \geq 21 - 1$$

$$-2x \geq 20$$

$$-2x / -2 \geq 20 / -2$$

$$x \leq -10$$

Note: When you divide both sides of an inequality by a negative number, the direction of the inequality sign is reversed. This happens because multiplying or dividing an expression by a negative number changes the sign of that expression.



2. Solve:

$$2x - 8 < 14$$

Let's solve your inequality step-by-step:

Step 1: Add 8 to both sides.

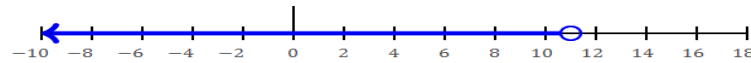
$$2x - 8 + 8 < 14 + 8$$

$$2x < 22$$

Step 2: Divide both sides by 2.

$$2x/2 < 22/2$$

$$x < 11$$



3. Solve:

$$4x - 4 > 12$$

Let's solve your inequality step-by-step:

Step 1: Add 4 to both sides.

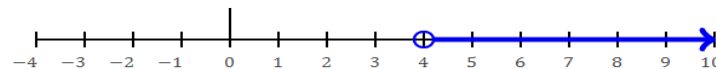
$$4x - 4 + 4 > 12 + 4$$

$$4x > 16$$

Step 2: Divide both sides by 4.

$$4x/4 > 16/4$$

$$x > 4$$



4. Solve:

$$5x + 3 \leq 28$$

Let's solve your inequality step-by-step:

Step 1: Add -3 to both sides.

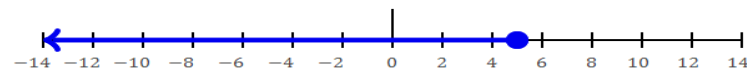
$$5x + 3 - 3 \leq 28 - 3$$

$$5x \leq 25$$

Step 2: Divide both sides by 5.

$$5x/5 \leq 25/5$$

$$x \leq 5$$



5. Solve:

$$\frac{1}{2}x - 7 < 13$$

Let's solve your inequality step-by-step:

Step 1: Add 7 to both sides.

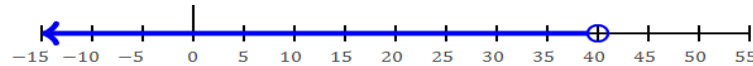
$$\frac{1}{2}x - 7 + 7 < 13 + 7$$

$$\frac{1}{2}x < 20$$

Step 2: Multiply both sides by 2.

$$(\frac{1}{2}x)2 < (20)2$$

$$x < 40$$



3. Lesson Activity

Exercises: Solving Linear Inequalities

Solve the following inequalities and graph their solutions on a number line.

1. $x + 5 > 7$

6. $4 - x \leq 10$

2. $3x - 4 \leq 8 \leq 8$

7. $-3x + 9 < 0$

3. $-2x + 6 \geq 2$

8. $2(x - 3) > 4$

4. $\frac{1}{2}x - 1 < 3$

9. $3x + 12 \geq 5$

5. $5x + 3 > 2x - 7$

10. $7 - 2x < 3x - 8$

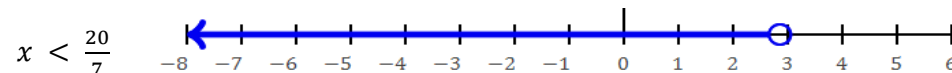
SUB-TOPIC 2: Word Problems Involving Linear Inequalities in One Variables

1. Explicitation

Let's consider a real-life situation to understand the need for linear inequalities. Imagine Lisa is at a book fair to buy some novels for himself. He has a total of P200 with him, and the book fair has a special sale policy offering any book at P70. Let's say x is the number of books he bought. This situation can be represented mathematically by the following inequality:

$$70x < 200$$

This inequality represents the fact that he cannot spend the full amount on books, and the amount spent will always be less than Rs 200. Linear inequalities are formed by linear equations connected by symbols such as ' $>$ ', ' $<$ ', ' $\geq$ ', and ' $\leq$ '. They can be categorized as strict inequalities (with symbols like ' $>$ ' or ' $<$ ') and slack inequalities (with symbols like ' $\geq$ ' or ' $\leq$ ').



When solving linear inequalities, remember the following rules:

1. Adding or subtracting equal numbers from both sides of the inequality does not change the sign of the inequality.
2. Multiplying or dividing both sides by a positive number does not change the sign of the inequality.
3. However, if both sides are multiplied or divided by a negative number, the sign of the inequality is reversed.

DAY 2-3

2. Worked Example

Problem 1: Community Service Hours

To graduate, a student must complete at least 40 hours of community service. If the student has already completed 25 hours, how many more hours are needed to meet the requirement?

a) Write an inequality to represent the situation:

Let h be the number of additional hours needed.

Inequality: $25+h \geq 40$

b) Solve the inequality and answer the question:

Subtract 25 from both sides: $h \geq 15$

Answer: The student needs to complete at least 15 more hours of community service.

Graph: Closed circle at 15, shade to the right.

Problem 2: Calorie Consumption

A diet plan requires consuming no more than 2000 calories per day. If someone has consumed 1350 calories by dinner, how many more calories can they consume for the rest of the day without exceeding the limit?

a) Write an inequality to represent the situation:

Let c be the number of additional calories that can be consumed.

Inequality: $1350+c \leq 2000$

b) Solve the inequality and answer the question:

Subtract 1350 from both sides: $c \leq 650$

Answer: The person can consume up to 650 more calories for the rest of the day.

Graph: Closed circle at 650, shade to the left.

Share real-world examples or problems that involve linear inequalities to capture students' interest and demonstrate the practical applications of the concept.

Engage students in solving and graphing linear inequalities through a series of guided examples. Start with straightforward inequalities and gradually increase in complexity.

Problem 3: Library Books

A library allows a maximum of 10 books to be checked out at a time. If Emma currently has 4 books checked out, how many more books can she check out without exceeding the limit?

a) Write an inequality to represent the situation:

Let b be the number of additional books Emma can check out.

Inequality: $4+b \leq 10$

b) Solve the inequality and answer the question:

Subtract 4 from both sides: $b \leq 6$

Answer: Emma can check out up to 6 more books.

Graph: Closed circle at 6, shade to the left.

3. Lesson Activity

1. Nayeon won 40 lollipops playing at the school fair. She gave two to every student in her math class. She has at least 7 lollipops left.

a) Write an inequality to represent the situation.

b) Solve the inequality to find the maximum number of students in her class.

2. More than 450 students went on a field trip. Ten vans were filled and 5 more students traveled in a car.

a) Write an inequality to represent the situation.

b) Solve the inequality to find the minimum number of people on each van.

3. Maloi spent less than P26 on a magazine and five stationaries. The magazine cost 4.

a) Write an inequality to represent the situation.

b) Solve the inequality to find the maximum cost of each stationary,

4. Sheenah rented a bike. They charged her P20 per hour, plus a P10 fee. She paid less than P270.

a) Write an inequality to represent the situation.

b) Solve the inequality to find the maximum number of hours Sheenah rented the bike.

Answer Lesson Activity 2:

1. a) Inequality: $40-2s \geq 7$

b) Subtract 7 from both sides:
 $40-2s \geq 7$

Simplify: $40-2s \geq 7$

Subtract 40 from both sides:

$-2s \geq -33$

Divide by -2 (flip inequality):

$s \leq 16.5$

Answer: Since the number of students must be a whole number, the maximum number of students is 16.

Graph: Closed circle at 16, shade to the left.

2. a) Let v be the number of students in each van.

Inequality: $10v+5 > 450$

b) Subtract 5 from both sides:
 $10v > 445$

Divide by 10: $v > 44.5$

Answer: Since the number of students must be a whole number, the minimum number of students per van is 45.

Graph: Open circle at 45, shade to the right.

3. a) Let s be the cost of each stationery item.

Inequality: $4+5s < 26$

b) Subtract 4 from both sides:
 $5s < 22$

Divide by 5: $s < 4.4$

	5. Ren is saving P5 each week. He earns an extra P15 by cleaning the garbage. How many weeks will he need to save to have at least P75? a) Write an inequality to represent the situation. b) Solve the inequality and answer the question.	Answer: The maximum cost of each stationery is P4.40. Graph: Open circle at 4.4, shade to the left. 4. a) Let h be the number of hours Sheenah rented the bike. Inequality: $20h+10<270$ b) Subtract 10 from both sides: $20h<260$ Divide by 20: $h<13$ Answer: The maximum number of hours Sheenah rented the bike is 12. Graph: Open circle at 13, shade to the left. 5. a) Let w be the number of weeks. Inequality: $5w+15\geq 75$ b) Subtract 15 from both sides: $5w\geq 60$ Divide by 5: $w\geq 12$ Answer: Ren will need to save for at least 12 weeks. Graph: Closed circle at 12, shade to the right.
D. Making Generalizations	DAY 4 1. Learners' Takeaways 1. Regarding linear inequalities in one variable, what are the steps you follow to solve them, and how do these steps differ from solving a linear equation? 2. When graphing the solution of a linear inequality on a number line, how do you determine whether to use an open circle or a closed circle?	

	2. Reflection on Learning 1. Reflect on a specific word problem involving a linear inequality that you found challenging. What made it difficult, and how did you overcome that difficulty? 2. How has learning to solve and graph linear inequalities in one variable improved your problem-solving skills in real-life situations? Provide an example.	
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IV. EVALUATING LEARNING: FORMATIVE ASSESSMENT AND TEACHER'S REFLECTION		NOTES TO TEACHERS
A. Evaluating Learning	DAY 4 1. Formative Assessment Part 1: Multiple Choice (10 items) Instructions: Choose the correct answer for each question. 1. Solve the inequality: $3x-5<10$ A. $x<5$	

	4. A factory produces at least 1500 widgets per day to meet demand. If it has already produced 850 widgets by noon, how many more widgets does it need to produce in the afternoon to meet the daily demand? 5. Jane wants to keep her monthly expenses under PHP 15,000. She has already spent PHP 8,000 this month. How much can she spend for the rest of the month without exceeding her budget? 6. A library allows a maximum of 10 books to be checked out at a time. If Emma currently has 4 books checked out, how many more books can she check out without exceeding the limit? 7. To qualify for a discount, a customer must spend more than PHP 5,000 at a store. If the customer has already spent PHP 3,500, how much more does the customer need to spend to get the discount? 8. A swimming pool can hold a maximum of 5000 gallons of water. If the pool currently contains 3200 gallons, how many more gallons can be added without exceeding the capacity? 9. A student needs to complete at least 40 hours of community service to graduate. If the student has already completed 25 hours, how many more hours are needed to meet the requirement? 10. Sheenah rented a bike. They charged her P20 per hour, plus a P10 fee. She paid less than P270. Write and solve an inequality to find the maximum number of hours Sheenah rented the bike. 2. Homework (Optional)			9. Solution: Inequality: $25+h \geq 40$ Subtract 25: $h \geq 15$ Minimum additional hours: 15 10. Solution: Inequality: $20h+10 < 270$ Subtract 10: $20h < 260$ Minimum rent hours: 12
B. Teacher's Remarks	<i>Note observations on any of the following areas:</i>	Effective Practices	Problems Encountered	The teacher may take note of some observations related to the effective practices and problems encountered after utilizing the different strategies, materials used, learner engagement, and other related stuff. Teachers may also suggest ways to improve the different activities explored/lesson exemplar.
	strategies explored			
	materials used			
	learner engagement/interaction			
	others			

C. Teacher's Reflection	<i>Reflection guide or prompt can be on:</i> • <u>principles behind the teaching</u> <i>What principles and beliefs informed my lesson?</i> <i>Why did I teach the lesson the way I did?</i> • <u>students</u> <i>What roles did my students play in my lesson?</i> <i>What did my students learn? How did they learn?</i> • <u>ways forward</u> <i>What could I have done differently?</i> <i>What can I explore in the next lesson?</i>	Teacher's reflection in every lesson conducted/facilitated is essential and necessary to improve practice. You may also consider this as an input for the LAC/Collab sessions.
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