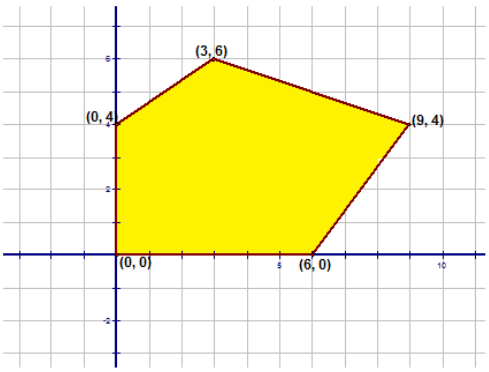
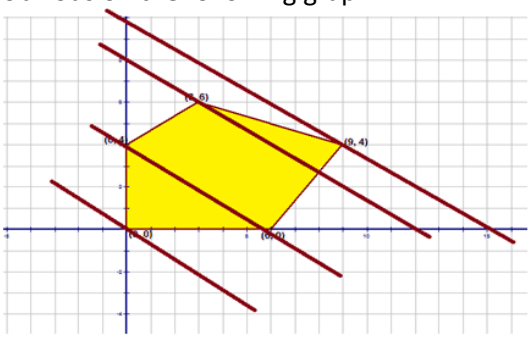
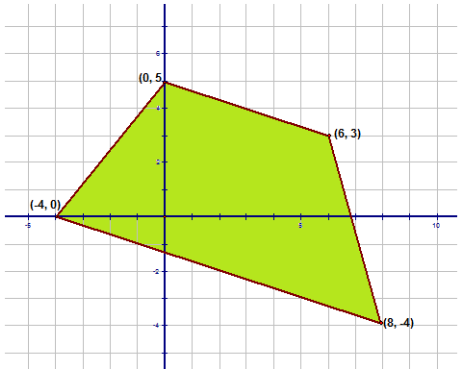
BASIC 9

WEEKLY LESSON PLAN – WEEK 8

Strand:	Algebra		**Sub-Strand:**	Variables and Equations	
Content Standard:	B9.2.3.1 Demonstrate understanding of single variable linear inequalities with rational coefficients including: • solving inequalities • verifying • comparing • graphing				
Indicator (s)	B9.2.3.1.3 Solve real-life problems involving linear equations and inequalities.		**Performance Indicator;** Learners can solve real-life problems involving linear equations and inequalities.		
Week Ending	01-03-2024				
Class	B.S.9	**Class Size:**		**Duration:**	
Subject	Mathematics				
Reference	Mathematics Curriculum, Teachers Resource Pack, Learners Resource Pack				
Teaching / Learning Resources	Poster, Pictures, video		**Core Competencies:**	• Operational skills • Manipulative skills	

DAY/DATE	**PHASE 1 : STARTER**	**PHASE 2: MAIN**	**PHASE 3: REFLECTION**
MONDAY	Discuss with the Learners about the meaning "vertex theorem".	1. Assist Learners to write system of inequalities for real-world problems. 2. Demonstrate solving system of inequalities for real-world problems by graphing. 3. Assist Learners to solve system of inequalities for real-world problems by graphing. **Steps for Solving a System of Inequalities Word Problem** • Read the problem and highlight important information. • Identify the variables. • Find one piece of information in the problem that you can use to write an inequality. • Find a different piece of information that you can use to write a second inequality.	Reflect on the steps to follow to solve system of inequalities. **Exercise;** Sarah is selling bracelets and earrings to make money for summer vacation. The bracelets cost $2 and earrings cost $3. She needs to make at least $500. i. Write an inequality to represent the income from the jewelry sold. ii. Sarah knows that she will see more

		• Graph both inequalities on a grid. Make sure you use appropriate boundary lines and shade the correct half plane for each inequality. • Identify the intersection of the two inequalities and answer the questions that pertain to the problem.	than 50 bracelets. Write an inequality to represent this situation. iii. Graph the two inequalities and shade the intersection. iv. Identify a solution. How many bracelets and earrings can Sarah sell?
WEDNESDAY	Through questions and answers, review Learners knowledge on the previous lesson.	1. Discuss with the Learners about how to determine the vertices algebraically by solving the linear inequalities. 2. Learners in small groups to determine the vertices of graphs by solving linear inequalities. 3. Assist Learners to use the vertex theorem to determine the answer to the real-world problem. A system of linear inequalities is often used to determine the best solution to a problem. This solution could be as simple as determining how many of a product should be produced to maximize a profit or as complicated as determining the correct combination of drugs to give a patient. Regardless of the problem, there is a theorem in mathematics that is used, with a system of linear inequalities, to determine the best solution to the problem. **Guidance** The following diagram shows a feasible region that is within a polygonal region.  The linear function z=2x+3y will now be evaluated for each of the vertices of the polygon. To evaluate the value of 'z' substitute the coordinates of	Engage small groups of Learners in using vertex theorem to determine the answers to real-world problems. **Exercise;** 1. A company that produces flags makes two flags for Nova Scotia-the traditional blue flag and the green flag for Cape Breton. To produce each flag, two types of material, nylon and cotton, are used. The company has 450 units of nylon in stock and 300 units of cotton. The traditional blue flag requires 6 units of nylon and 3 units of cotton. The Cape Breton flag requires 5 units of nylon and 5 units of cotton. Each blue flag that is made realizes a profit of $12 for the company, whereas each Cape Breton flag realizes a profit

		the point into the expression for ‘x’ and ‘y’. (0,0)(0,4)(6,0)(3,6)(9,4)z=2x+3y→z=2(0)+3(0)→z=0+0→z=0Therefore 2x+3y=0z=2x+3y→z=2(0)+3(4)→z=0+12→z=12Therefore 2x+3y=12z=2x+3y→z=2(6)+3(0)→z=12+0→z=12Therefore 2x+3y=12z=2x+3y→z=2(3)+3(6)→z=6+18→z=24Therefore 2x+3y=24z=2x+3y→z=2(9)+3(4)→z=18+12→z=30Therefore 2x+3y=30 The value of z=2x+3y, for each of the vertices, remains constant along any line with a slope of −23. This is obvious on the following graph.  As the line moved away from the origin, the value of z=2x+3y increased. The maximum value for the shaded region occurred at the vertex (9, 4) while the minimum value occurred at the vertex (0, 0). These statements confirm the vertex theorem for a feasible region: If a linear expression z=ax+by+c is to be evaluated for all points of a convex, polygonal region, then the maximum value of z, if one exists, will occur at one of the vertices of the feasible region. Also, the minimum value of z, if one exists, will occur at one of the vertices of the feasible region. **Example** Evaluate the expression z=3x+4y for the given feasible region to determine the point at which ‘z’ has a maximum value and the point at which ‘z’ has a minimum value.  (−4,0)(0,5)(6,3)(8,−4)z=3x+4y→z=3(−4)+4(0)→z=−12+0→z=−12Therefore 3x+4y=−12z=3x+4y→z=3(0)+4(5)→z=0+20→z=20Therefore 3x+4y=20z=3x+4y→z=3(6)+4(3)→z=1	of $15. For the nylon and cotton that the company currently has in stock, how many of each flag should the company make to maximize their profit? Let ‘x’ represent the number of blue flags. Let ‘y’ represent the number of green flags. 2. A local smelting company is able to provide its customers with iron, lead and copper by melting down either of two ores, A or B. The ores arrive at the company in railroad cars. Each railroad car of ore A contains 3 tons of iron, 3 tons of lead and I ton of copper. Each railroad car of ore B contains 1 ton of iron, 4 tons of lead and 3 tons of copper. The smelting receives an order for 7 tons of iron, 19 tons of lead and 8 tons of copper. The cost to purchase and process a carload of ore A is $7000 while the cost for ore B is $6000. If the company wants to fill the order at a minimum cost, how many carloads of each ore must be bought? Let ‘x’ represent the number of carloads of ore A to purchase.

		8+12→z=30Therefore 3x+4y=30z=3x+4y→z=3(8)+4(−4) →z=24−16→z=8Therefore 3x+4y=8 **The maximum value of 'z' occurred at the vertex (6, 3).** **The minimum value of 'z' occurred at the vertex (–4, 0).** Using the vertices of the feasible region to determine the maximum or the minimum value is the branch of mathematics known as ***linear programming***. Linear programming is a technique used by businesses to solve problems. The types of problems that usually employ linear programming are those where the profit is to be maximized and those where the expenses are to be minimized. However, linear programming can also be used to solve other types of problems. The solution provides the business with a program to follow to obtain the best results for the company. The following examples will demonstrate different types of real-world problems that use linear programming to obtain the solution.	Let 'y' represent the number of carloads of ore B to purchase Let 'x' represent the number of carloads of ore A to purchase. Let 'y' represent the number of carloads of ore B to purchase
FRIDAY	Review Learners knowledge on the previous lesson.	1. Assist Learners to solve real-life problems involving linear equations. 2. Learners brainstorm to solve real-life problems involving linear inequalities. **Real-life problems involving linear equations**; Example; A man has 260 metres of fencing which he is going to put around a rectangular field which is 50 metres wide. How long is the field? **Solution**: Since we need to find the length of the field, let x metres be the length. x + 50 + x + 50 or 2(x + 50) But this expression is given as 260m ∴ 2(x + 50) = 260 x + 50 =130 x=80m Example 2; A man paid GH¢ 290.00 for 11 books. Some of the books were geography books, and the rest were history books. If each geography book cost GH¢ 30.00 and each history book cost GH¢20.00, how many geography books did he buy? Solution: i. Total cost of the books is GH¢290.00; total number of books is 11. ii. 1 geography book costs GH¢30.00; 1 history book costs GH¢20.00, Total cost of all the books is 30x + 20(11– x) = GH¢ 290 ∴ 30x + 20(11–x)= GH¢ 290	Through questions and answers, conclude the lesson. **Exercise;** A student scores 70 and 76 marks in two tests. How many marks must she score in the third test to be put in Grade A if all students scoring an average of 80 or higher in three tests are put in grade A?

		30x + 220 – 20x = GH¢ 290 10x + 220 = 290 x = 7 books **real-life problems involving linear inequalities;** Example; Two sides of a triangle have lengths 6 cm and 8 cm.What is the length of the third side? If the third side is x cm long then, 6 + 8 > x giving x < 14. Also, 6 + x < 8 giving x > 2. [Also, 8 + x > 6 which gives x > –2.] Hence, 2 < x <14.That is, the third side has length between 2cm and 14cm.	

Name of Teacher: **School:** **District:**