EMG Education

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REVIEW PACK
GRADE 8 MATHS

Algebraic Expression and Equations
Solving and Graphing Linear Equations
Solving and Graphing Quadratic Equations
Solving Equations with Two Unknowns
Inequalities

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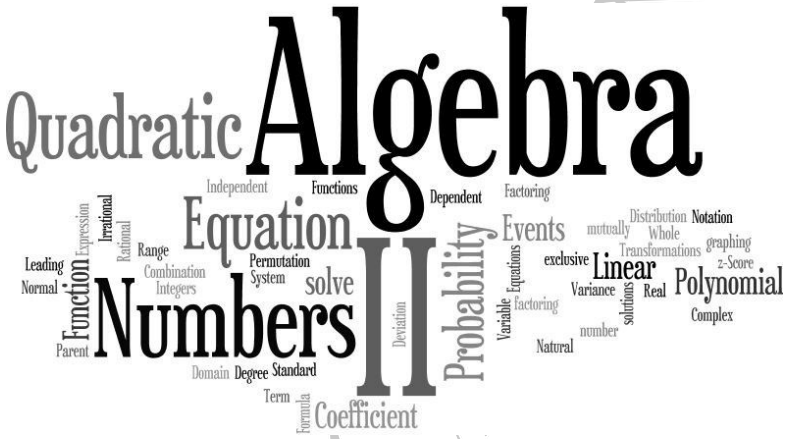
ALGEBRAIC EXPRESSION AND EQUATIONS

- **LEARNING OBJECTIVES:**
  1. Distinguish between expressions and equations.
  2. Expand the product of two linear expressions.
  3. Expand and factorise expressions involving powers.



- **RESOURCES**
  1. http://www.mathnstuff.com/math/algebra/aequex.htm
  2. https://www.youtube.com/watch?v=9StltKtqtyM
  3. Exploring Maths Book pages 17 - 21

- **VOCABULARY**

Algebraic expression is a mathematical phrase that can contain ordinary numbers, variables (like *x* or *y*) and operators (like add, subtract, multiply, and divide).

Examples: $a + 3$
$4ab - 9$

Algebraic equation is the combination of two equivalent expressions that are separated by an equals sign.

Examples: $3x + 2 = 14$
$5y + 7 = 4y + 10$

WORKSHEET ON ALGEBRAIC EXPRESSIONS AND EQUATIONS

1. Write the mathematical phrase of the following.

a) Jane has *m* mangoes. She sells 4 of them.
(i) Write an expression to represent how many mangoes she has now.
.....
(ii) If he has 10 mangoes, write an equation to represent the situation.
.....

b) Mark is 15 years old. How old will he be in *y* years time?
(i) Write an expression to represent Mark's age in *y* years time.
.....
(ii) In y years time Mark will be 28. Write an equation to represent the situation.
.....

(4 marks)

2. Expand;

c) $5(x + 3)$ .....

d) $6(2x - 5)$ .....

e) $-3x(5x + 7)$ .....

f) $2x^2(x - 7)$ .....

(4 marks)

3. Expand and simplify;

g) $5(x + 4) + 7(x + 3)$ .....

h) $6(x - 3) - 4(x - 2)$ .....

i) $4(3x + 4) + 5(x + 1)$ .....

j) $6(3x + 5) - 2(x + 7)$ .....

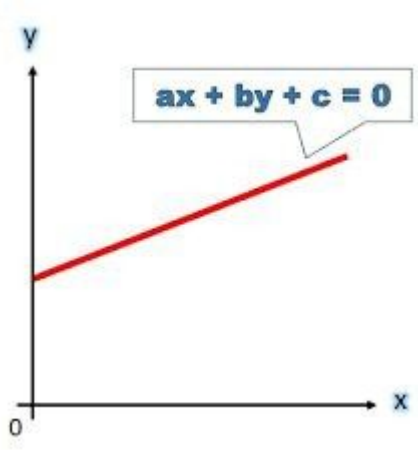
k) $2(10x + 7) - 5(3x + 4)$ .....

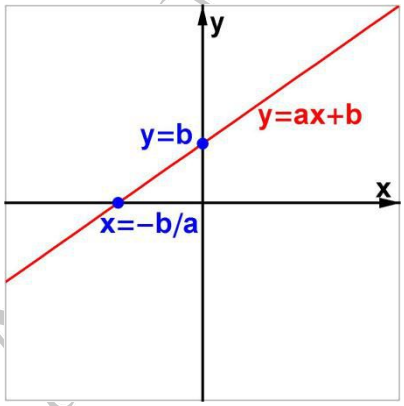
(5 marks)

SOLVING AND GRAPHING LINEAR EQUATIONS

● **LEARNING OBJECTIVES:**

1. Solve linear equations and check it using substitution.
2. Identify a directly proportional relationship from a graph.
3. Draw, use and interpret distance-time graphs.
4. Draw and interpret linear and non-linear graphs in real-life contexts.
5. Solve problems by sketching, drawing and interpreting real-life graphs.





● **RESOURCES**

1. https://www.youtube.com/watch?v=hvn5x_ISago
2. https://www.mathsisfun.com/algebra/linear-equations.html
3. Exploring Maths Book pages 14-17 and 98-100

● **Vocabulary:**

Linear Equation is an equation with two variables that gives a straight line when plotted on a graph.

Substitution is a method of solving an equation by putting numbers where the letters are.

Gradient is another word for slope which represents the change in y-value over the change in x-value.

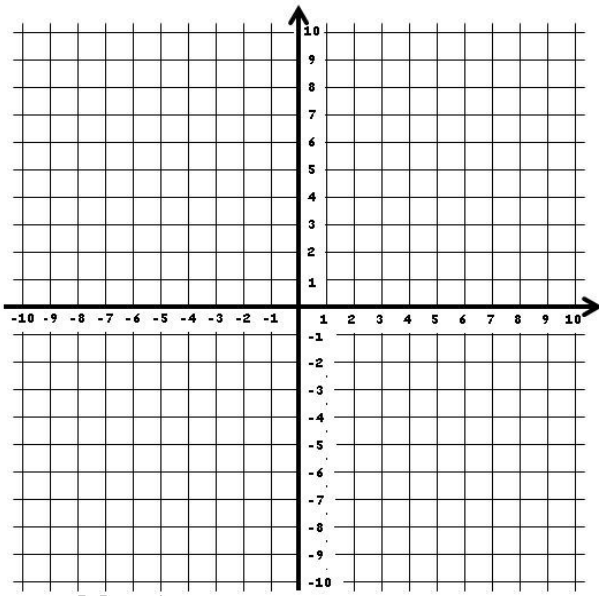
y - intercept is the value of y at the point where the line crosses the y-axis.

WORKSHEET ON SOLVING AND GRAPHING LINEAR EQUATIONS

1. Graph the following.

a) y = x + 6

x	0	1	2
y			

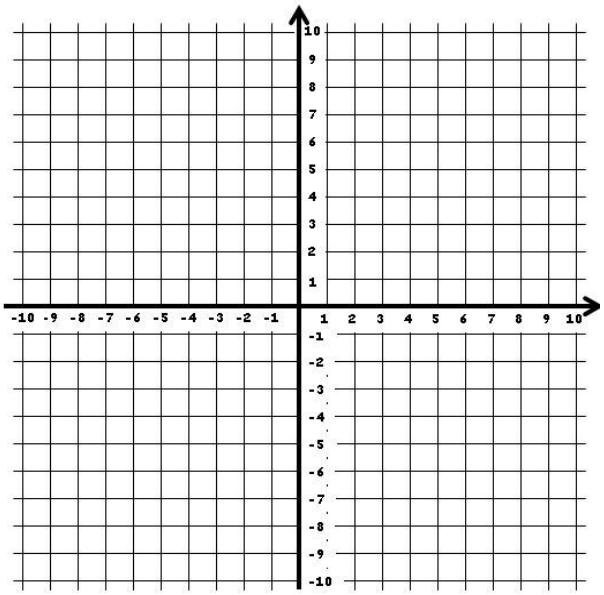


What is the gradient of the graph above? .....
What is the y-intercept? .....

(5 marks)

b) y = 3x - 7

x	0	1	2
y			

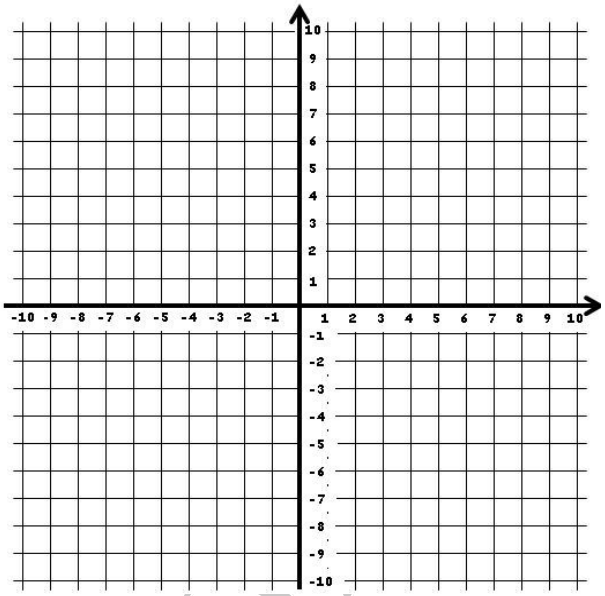


What is the gradient of the graph above? .....
What is the y-intercept? .....

(5 marks)

c) $2y + x = 12$

x	0	1	2
y			



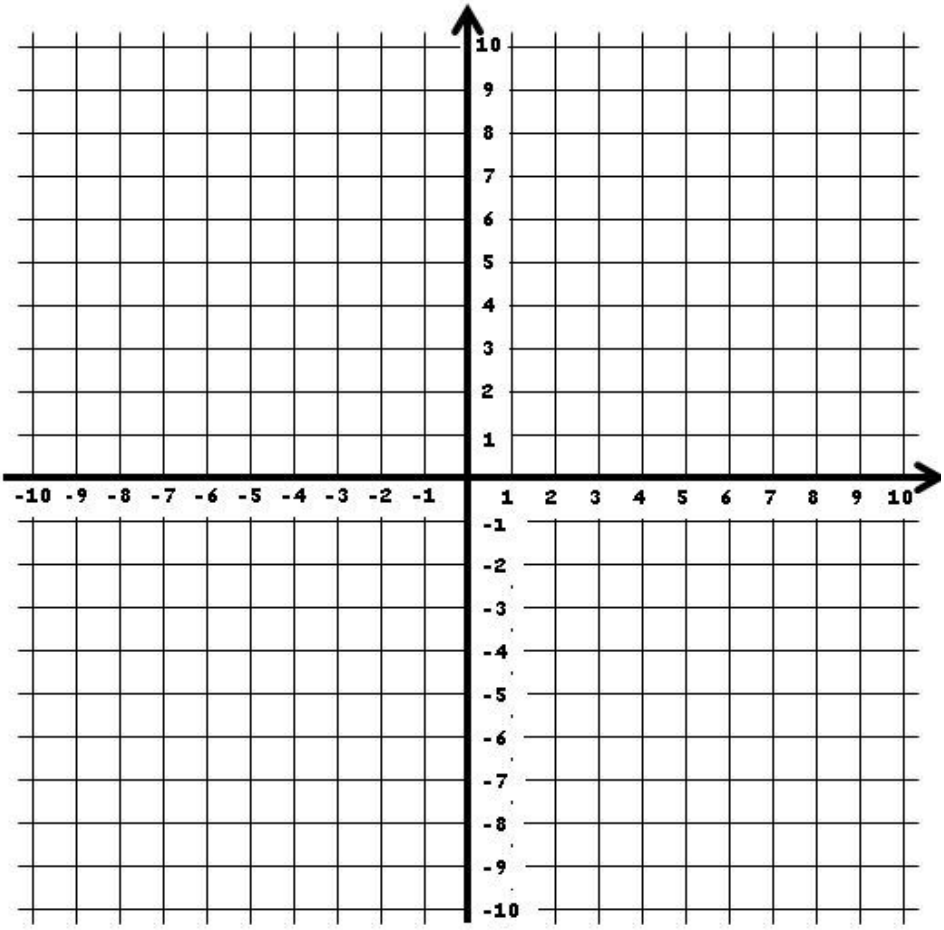
What is the gradient of the graph above? .....

What is the y-intercept? .....

(5 marks)

.....

Investigation: Plot an equation of your choice. Now, reverse the positions of the y and x, and plot the new graph on the same axes. What do you notice? Is this always true?



Equation I chose:

_____

Equation with x and y switched:

_____

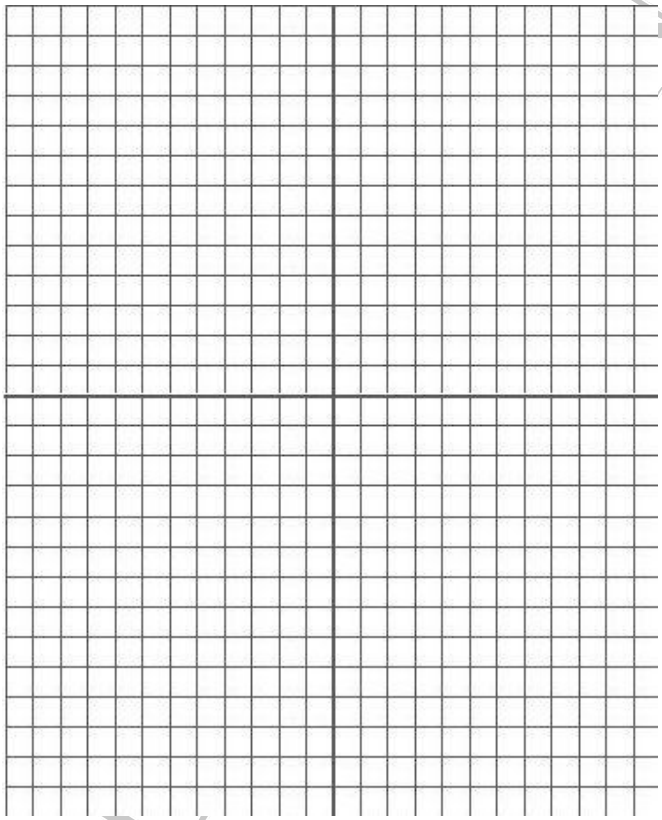
(5 marks)

2. Plotting Real-Life Graphs

(a) Cost of Potatoes

Weight (kg)	1	2	3	4	5
Cost (p)	15	30	45	60	75

(i) Draw the graph for the table of results.



(ii) Predict how much 6kg of potatoes would cost.

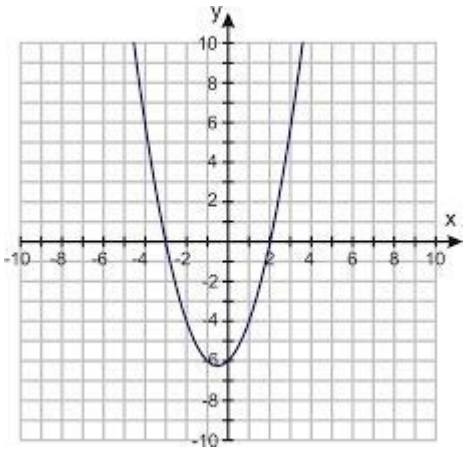
(iii) How much would 3.5kg of potatoes cost?

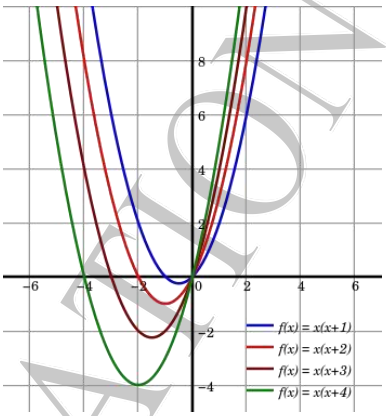
(4 marks)

SOLVING AND GRAPHING QUADRATIC EQUATIONS

● **LEARNING OBJECTIVES:**

1. Understand and draw graphs of quadratic functions.
2. Solve problems using quadratic graphs.
3. Use quadratic graphs to solve equations.





● **RESOURCES**

1. https://www.youtube.com/watch?v=7C3f-sYMNCU
2. https://www.mathsisfun.com/algebra/quadratic-equation-graphing.html
3. Exploring Maths Book pages 148-149

● **Vocabulary:**

Quadratic equation is a second-order polynomial equation in a single variable *x.*

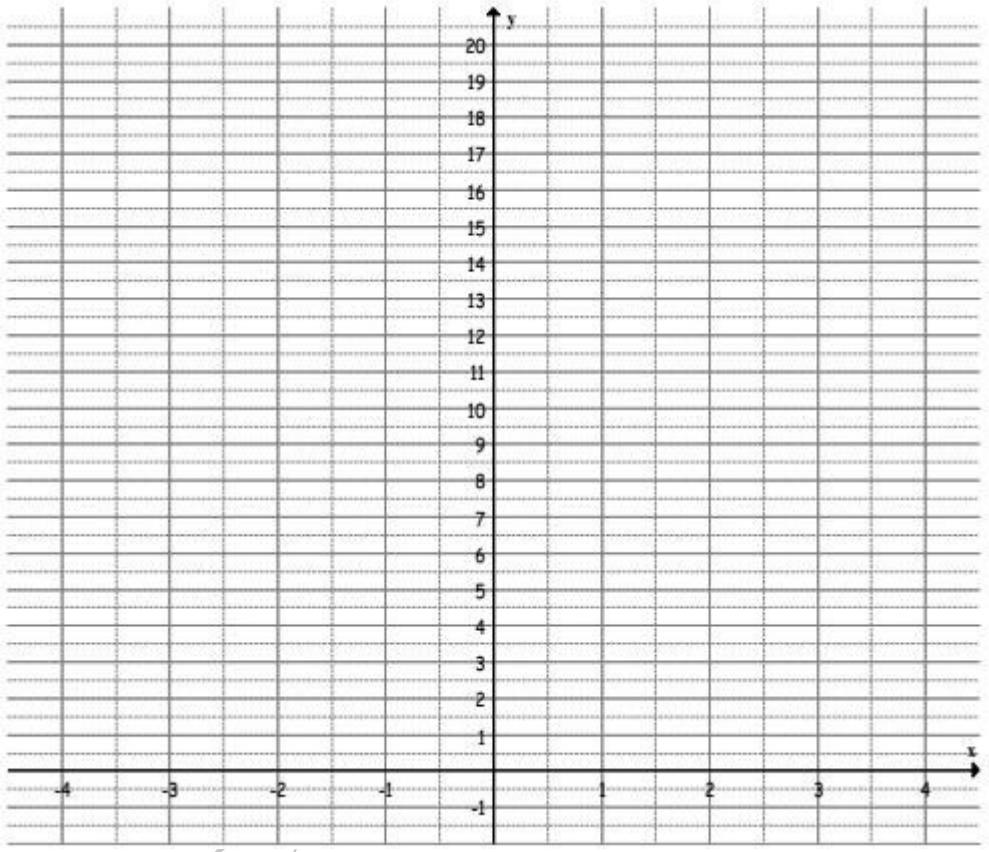
Standard form of a quadratic equation is

$$ax^2 + bx + c = 0 \qquad a \neq 0$$

WORKSHEET ON SOLVING AND GRAPHING QUADRATIC EQUATIONS

1. Fill in the table and then draw the graph of $y = x^2$ for the values of x between -4 and 4.

X	-4	-3	-2	-1	0	1	2	3	4
x^2									



a) Is the graph symmetrical?.....

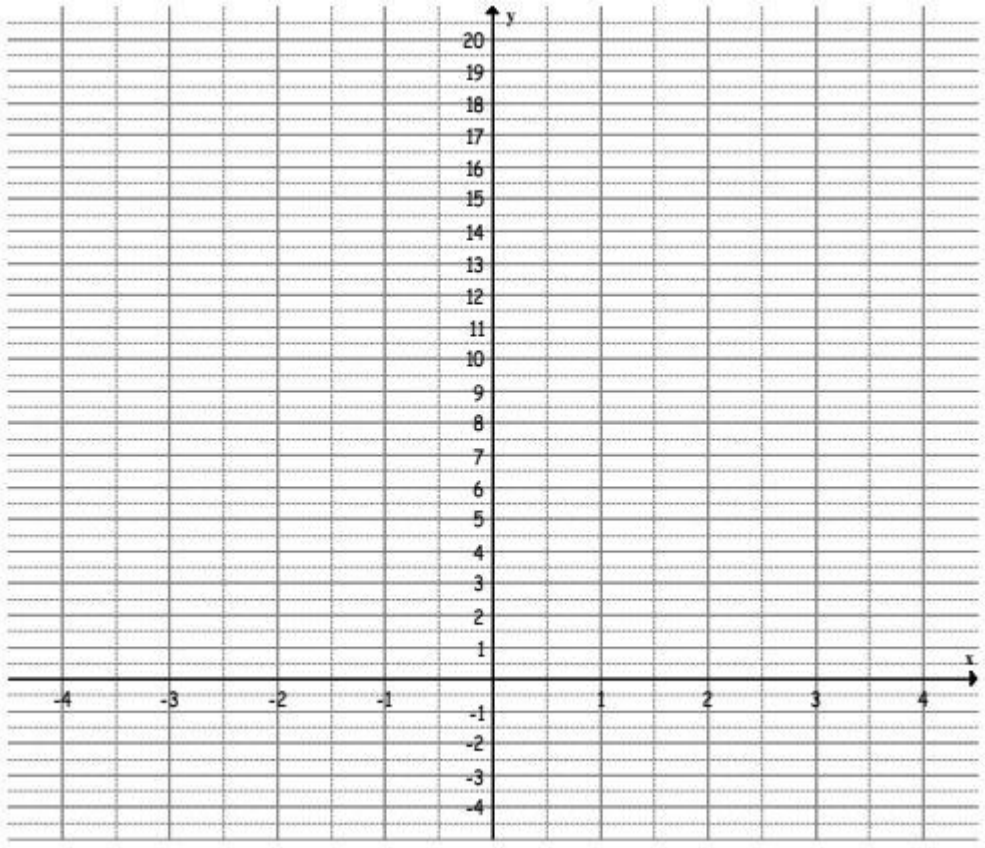
b) If so, what is the line of symmetry? .....

c) What are the coordinates of the point where the graph crosses the y-axis? .....

(10 marks)

2. Fill in the table and then draw the graph of $y = x^2 + 2$ for values of x between -4 and 4.

x	-4	-3	-2	-1	0	1	2	3	4
x^2									
+2									
y									



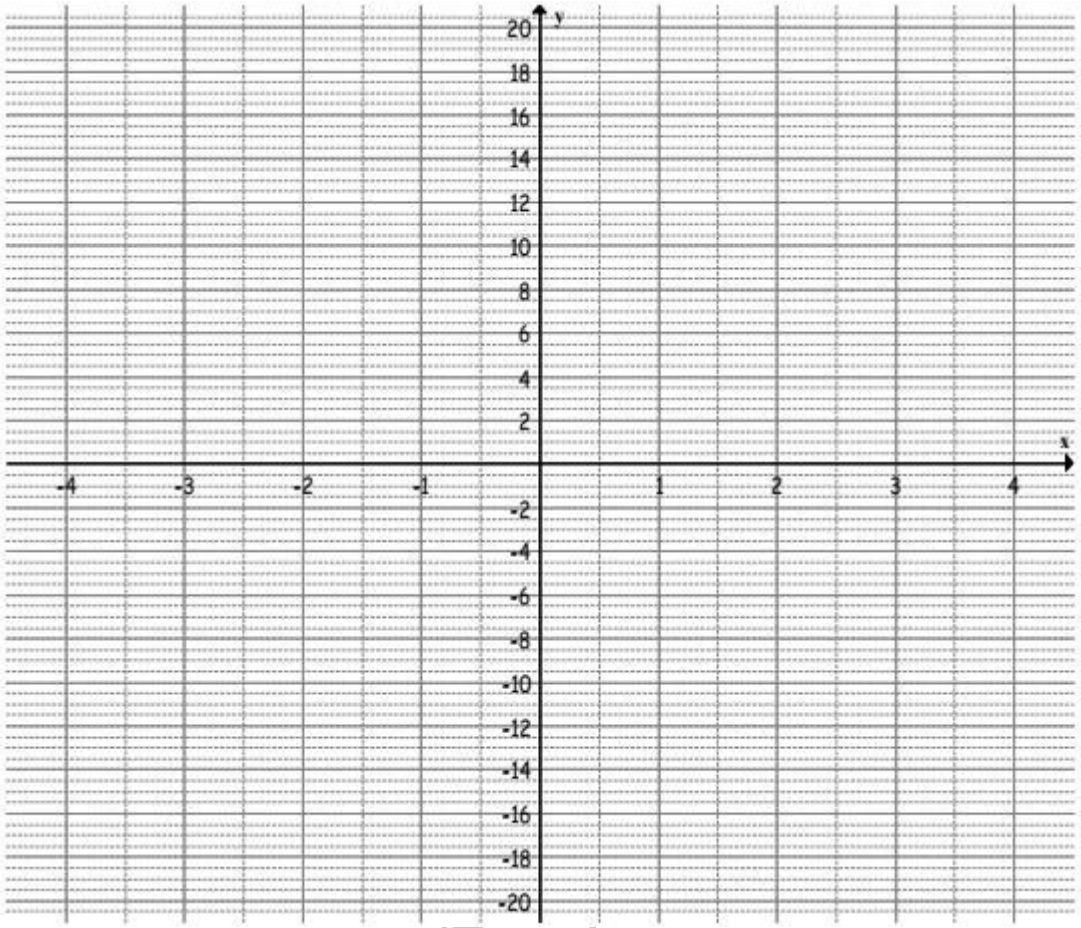
a) Is the graph symmetrical? .....

b) If so, what is the line of symmetry? .....

c) What are the coordinates of the point where the graph crosses the y-axis? .....

(10 marks)

3. By drawing graphs confirm that the graph of $y = -x^2$ is a reflection of the graph $y = x^2$ in the x-axis.

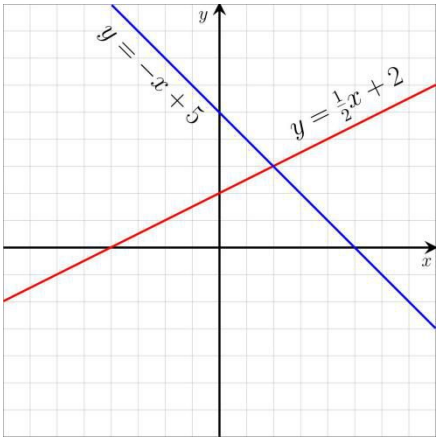


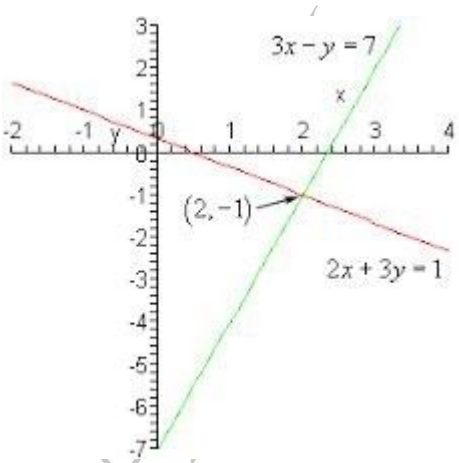
(5 marks)

SOLVING EQUATIONS WITH TWO UNKNOWNS

● **LEARNING OBJECTIVES:**

1. Construct and solve equations with unknown on both sides.
2. Construct and solve equations with unknown on both sides and including brackets and fractions.
3. Solve system of equations using substitution method.





● **RESOURCES**

1. https://www.youtube.com/watch?v=UZTvYYoOrmI
   https://www.youtube.com/watch?v=aZeXJZEh5nU
2. https://www.mathsisfun.com/algebra/systems-linear-equations.html
3. Exploring Maths Book pages 148-149

● **Vocabulary:**

System of equations is a set or collection of equations that you deal with all together at once.

WORKSHEET ON SOLVING EQUATIONS WITH TWO UNKNOWNS

1. Solve each system by substitution.

a) $y = -4x + 16$
$-3x + 8t = 23$

b) $y = 5x + 5$
$y = x + 5$

c) $x - 3y = -12$
$4x + 6y = -12$

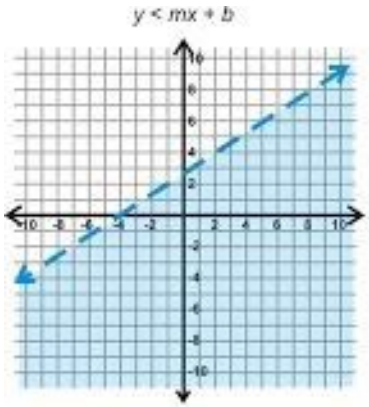
d) $y = -4$
$-3x - 6y = 15$

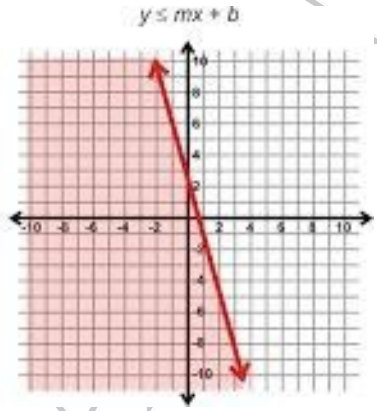
(12 marks)

INEQUALITIES

- **LEARNING OBJECTIVES:**

1. Solve linear inequalities in one unknown.
2. Represent solutions to linear inequalities on a number line.





- **RESOURCES**

1. https://www.youtube.com/watch?v=P_-c9D6mjGA
2. https://www.mathsisfun.com/algebra/graphing-linear-inequalities.html
3. Exploring Maths Book pages 114-116

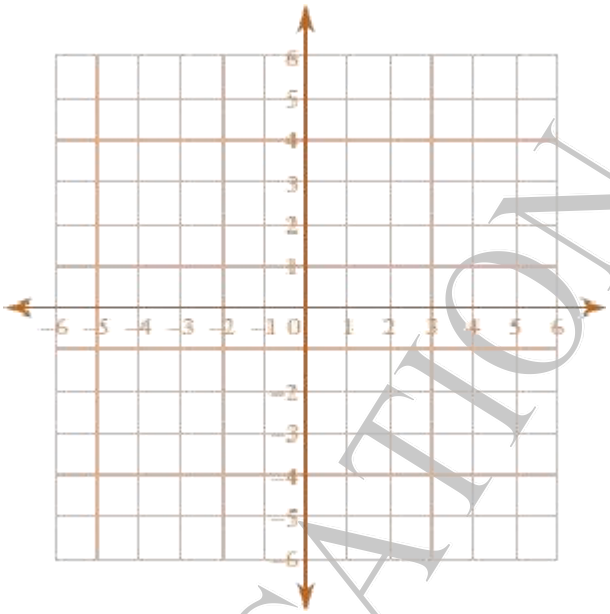
- **Vocabulary:**

Linear Inequality is an inequality which involves a linear function.

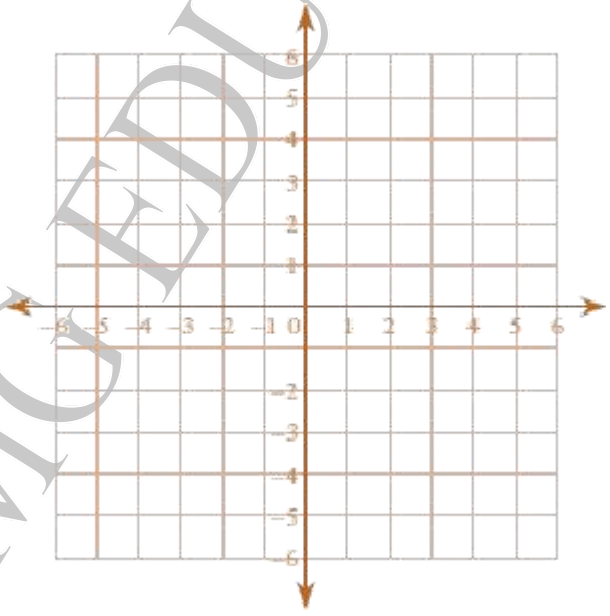
WORKSHEET ON INEQUALITIES

1. Shade each of the following regions on a graph.

a) $3x - y \geq 5$

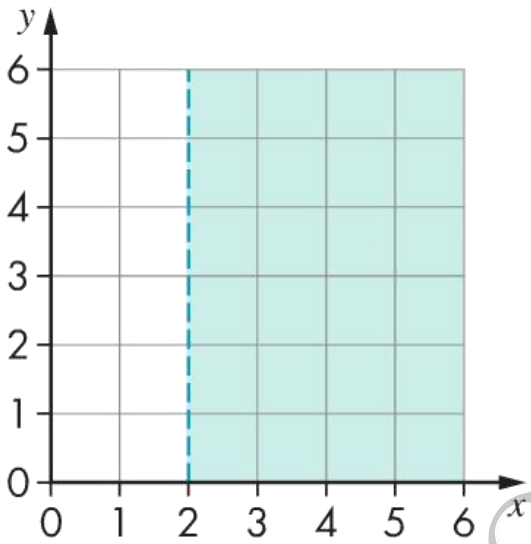


b) $x + 2y < -2$



(4 marks)

2. Circle the correct inequality shaded on the grid below:

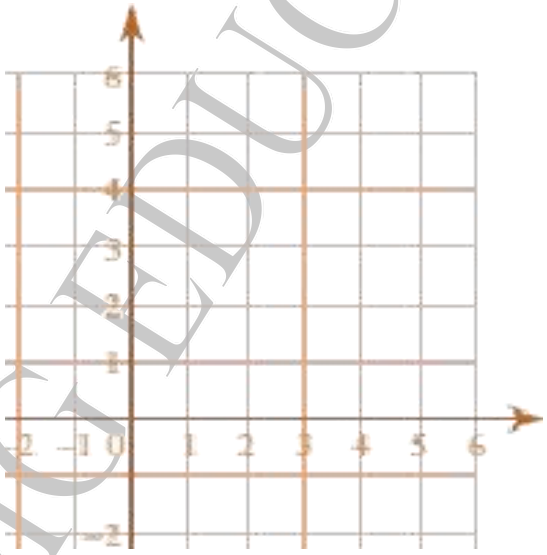


$y > 2$ $y \geq 2$ $x > 2$ $x \geq 2$

(2 marks)

3. On the grid, draw lines to find the region satisfied by the three inequalities:

$$y > 2 \quad y < x + 1 \quad x + y < 5$$



(3 marks)