

UNIT 4: QUADRATIC RELATIONS I

PREREQUISITE SKILLS

1) *Integer rules:*

When Multiplying & Dividing

- if the signs are the SAME the answer will be +.
- if the signs are DIFFERENT the answer will be -.

When Adding & Subtracting

Change 2 signs into 1 $3 - (-4) = 3 + 4$

- if the signs are the SAME the answer will be +.
- if the signs are DIFFERENT the answer will be -.

Multiplying & Dividing

$$(-7)(4)$$

$$= -28$$

$$(-6)(-12)$$

$$= +72$$

$$(9) \div (-3)$$

$$= -3$$

Adding & Subtracting

$$3.8 + (-6.5)$$

$$= 3.8 - 6.5$$

$$= -2.7$$

$$19 - (-5)$$

$$= 19 + 5$$

$$= 24$$

$$(-5.7) - (3.3)$$

$$= -9$$

2) Like terms:

LIKE terms have the same variable & exponent

e.g. x and $20x$

e.g. $3y^2$ and $7y^2$

e.g. $2ab$ and $-10ab$

* Like terms can be added or subtracted

UNLIKE terms have different variables and exponents

e.g. x , x^2 and 7

* Unlike terms cannot be added or subtracted

Simplify, by combining like terms.

$$\begin{aligned} 2x^2 + 7 + 10x^2 - 4 \\ \text{~~~~~} = \text{~~~~~} \\ = 12x^2 + 3 \end{aligned}$$

$$\begin{aligned} -9x - (-6x) \\ = -9x + 6x \\ = -3x \end{aligned}$$

$$\begin{aligned} 2a^2b + 3ba^2 - 5b^2a \\ \text{~~~~~} \quad \text{~~~~~} \quad \text{~~~~~} \\ = 5a^2b - 5b^2a \end{aligned}$$

3) Expanding:

Multiply everything inside the brackets by the number in front of the brackets. **Rainbow**

$$\begin{aligned} 2(3x + 5) \\ = 6x + 10 \end{aligned}$$

$$\begin{aligned} -10(x^2 - 2x + 4) \\ = -10x^2 + 20x - 40 \end{aligned}$$

4) Simplify, by expanding then combining like terms.

$$3x^2 - (-5 + 6x^2) - 9x^2$$

$$= 3x^2 + 5 - 6x^2 - 9x^2$$

$$= -12x^2 + 5$$

$$-6x^2 + 5x + 2(6x^2 - 5x + 6)$$

$$= -6x^2 + 5x + 12x^2 - 10x + 12$$

$$= 6x^2 - 5x + 12$$

$$13x^2 - (3x^2 + 2x) - (-6)$$

$$= 13x^2 - 3x^2 - 2x + 6$$

$$= 10x^2 - 2x + 6$$

5) Find the value of "y" when $x = 0$.

$$y = 6x^2 + 5$$

$$= 6(0)^2 + 5$$

$$= 6(0) + 5$$

$$= 0 + 5$$

$$= 5$$

$$y = -5(x + 1)^2 + 3$$

$$= -5(0 + 1)^2 + 3$$

$$= -5(1)^2 + 3$$

$$= -5(1) + 3$$

$$= -5 + 3$$

$$= -2$$

6) Find the value of "y" when $x = -2$.

$$y = -3x^2$$

$$= -3(-2)^2$$

$$= -3(4)$$

$$= -12$$

$$y = 4x^2 - 6x + 2$$

$$= 4(-2)^2 - 6(-2) + 2$$

$$= 4(4) - 6(-2) + 2$$

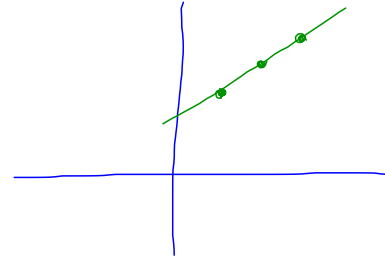
$$= 16 + 12 + 2$$

$$= 30$$

7) Complete the table of values.

x	$y = 2x + 5$
1	$2(1) + 5 = 7$
2	$2(2) + 5 = 9$
3	$2(3) + 5 = 11$

$$y = mx + b$$



b)

x	$y = -4x - 6$
-2	2
0	-6
2	-14

8) Use first or second differences, to determine if the function is linear or quadratic.

x	y	1 st
0	3	
2	7	$7 - 3 = 4$
4	11	$11 - 7 = 4$
6	15	$15 - 11 = 4$
8	19	$19 - 15 = 4$

↑
same

* If first differences are all the same,
graphing the points will give you a straight line.

x	y
0	0
1	1
2	4
3	9
4	16

1st

1
3
5

16 - 9 = 7

↑

2nd

2
2

7 - 5 = 2

same

↓

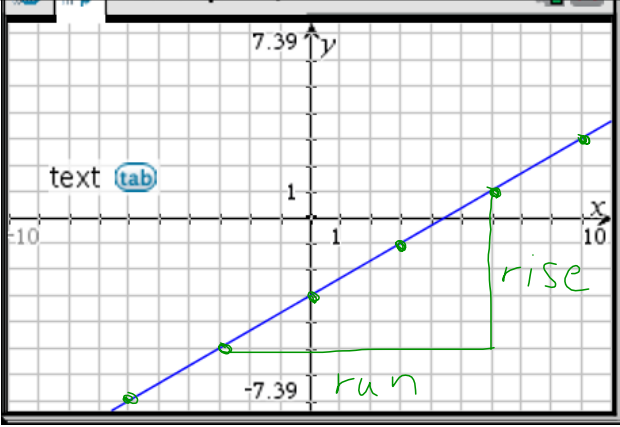
different ∴ NOT a straight line

* If second differences are all the same, graphing the points will give you a quadratic parabola.

9) Slope of a Straight Line

Using a graph

$$\frac{\text{rise}}{\text{run}} = \frac{6}{9} = \frac{2}{3}$$



Using 2 points (x_1, y_1) and (x_2, y_2)
 $(2, 3)$ and $(7, 5)$

$$\frac{y_2 - y_1}{x_2 - x_1} = \frac{5 - 3}{7 - 2} = \frac{2}{5}$$

Seatwork / Homework

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