

LINEAR EQUATIONS

❖ Equation: $y = mx + b$

❖ $M = \text{SLOPE}$ and $B = \text{y-intercept}$

❖ This equation has an “x”, but NO EXPONENT

❖ Examples:

❖ $y = 5x + 1$

❖ $f(x) = \frac{1}{2}x$

❖ $2x + 3y = 6$

❖ $y = 5$

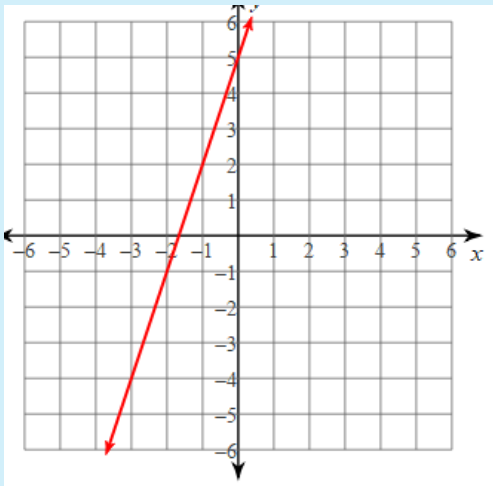
❖ $f(x) = -3x + 4$

LINEAR GRAPHS

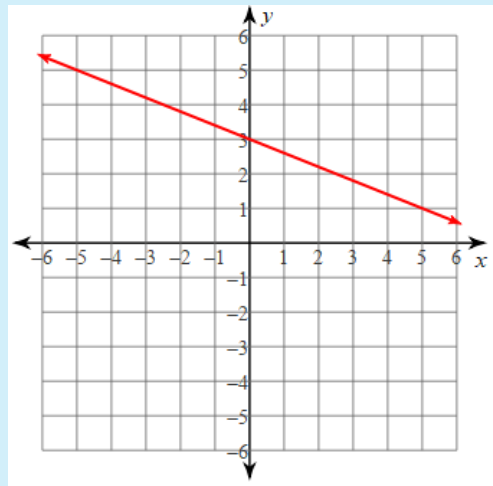
❖ SHAPE = LINE

❖ The line will either have positive slope, negative slope, or no slope.

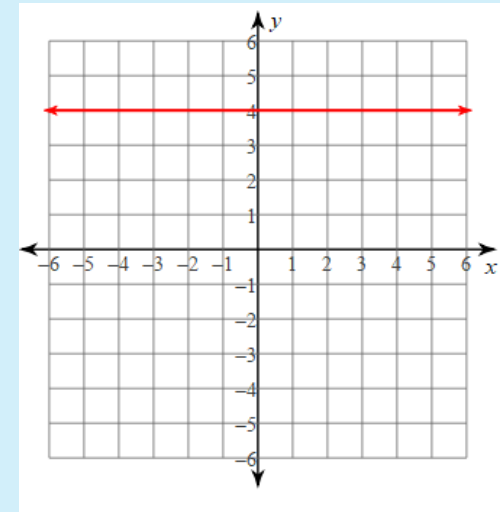
❖ Positive Slope:



Negative Slope:



Zero Slope :
(Horizontal Line)



LINEAR TABLES

- ❖ If x 's are consecutive, y -values will have an ADDING or SUBTRACTING PATTERN
- ❖ SAME 1st DIFFERENCES
- ❖ You will never see the same y - value twice
- ❖ Examples:

x	y
-2	0
-1	2
0	4
1	6

Slope: +2
 y - intercept : (0, 4)
Equation: $y = 2x + 4$

x	y
1	2
2	5
3	8
4	11

Slope: +3
 y - intercept : (0, - 1)
Equation: $y = 3x - 1$

LINEAR CHARACTERISTICS AND KEYWORDS

CHARACTERISTICS:

- ❖ Constant Slope
- ❖ Always increasing or decreasing
- ❖ Will always have a y intercept
- ❖ Always have x -intercept (unless horizontal)

KEYWORDS:

- ❖ Perimeter
- ❖ Base amount and add or subtract another amount
- ❖ Increase or decrease by set amount
- ❖ Constant rate of change

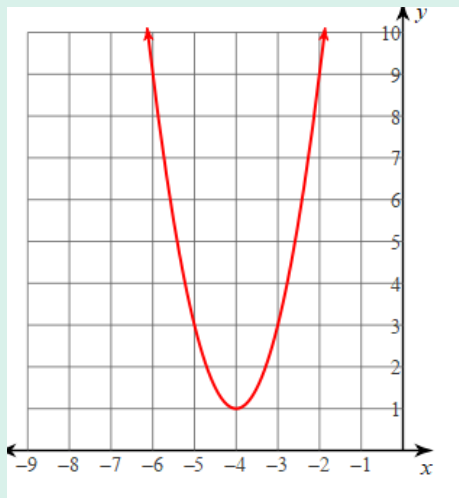
QUADRATIC EQUATIONS

- ❖ Equation: $y = ax^2 + bx + c$ or $y = a(x - h)^2 + k$
- ❖ Has an “x squared” (x^2) as the HIGHEST EXPONENT
- ❖ Examples:
 - ❖ $y = 2x^2 + 3x - 5$
 - ❖ $f(x) = (x + 2)^2 + 9$
 - ❖ $f(x) = -x^2 + 4x - 4$
 - ❖ $x^2 + y = 7$

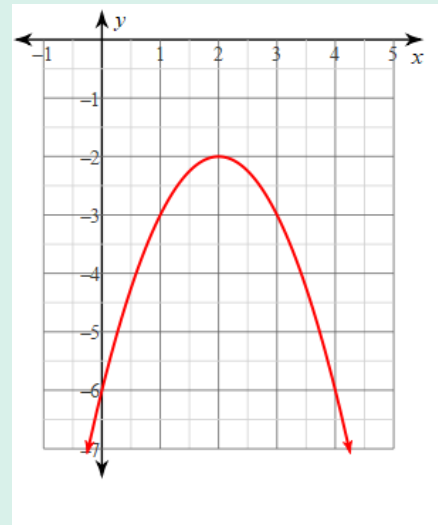
QUADRATIC GRAPHS

- ❖ SHAPE: Parabola (U-Shape)
- ❖ Either faces up (“a” is positive) or faces down (“a” is negative)
- ❖ Examples:

Faces up



Faces down



QUADRATIC TABLES

- ❖ When x 's are consecutive y -values will have the same **SECOND DIFFERENCE**
- ❖ Could possibly see y values more than once
- ❖ Table can have the symmetrical pattern where y values will match above and below the vertex
- ❖ Examples:

x	y
-3	6
-2	0
-1	-4
0	-6
1	-6
2	-4
3	0
4	6

1st Diff → 2nd Diff

-6	+2
-4	+2
-2	+2
0	+2
+2	+2
+4	+2
+6	+2

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

-5
-3
-1
1
3
5

2
2
2
2
2

QUADRATIC CHARACTERISTICS AND KEYWORDS

CHARACTERISTICS:

- ❖ has a vertex (h,k)
- ❖ has a minimum (lowest point) or a maximum (highest point)
- ❖ Could have 1 x-intercept, 2 x-intercepts, or no x-intercepts
- ❖ End behavior is always the same
- ❖ Ways to solve:
 - ❖ Factoring
 - ❖ Quadratic Formula
 - ❖ Square roots
 - ❖ Completing the square

KEYWORDS:

- ❖ Area
- ❖ Object falling, being kicked, or being thrown
- ❖ Projectile motion

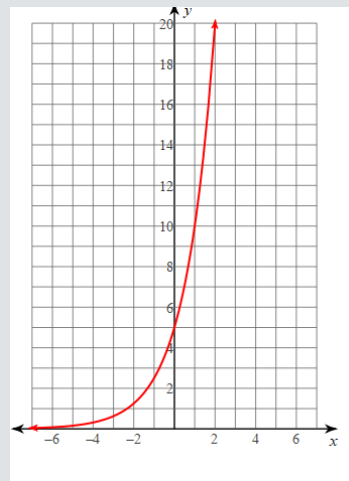
EXPONENTIAL EQUATIONS

- ❖ Exponential Equation: $y = ab^x$
 - ❖ a = start value and b = growth or decay factor
 - ❖ if $b > 1$ it is a growth
 - ❖ if $0 < b < 1$ it is a decay
- ❖ Has an “x” in the EXPONENT
- ❖ Examples:
 - ❖ $y = 3^x + 4$
 - ❖ $f(x) = 2(5)^{x+1}$
 - ❖ $4^x + y = 5$
 - ❖ $y = 2\left(\frac{1}{3}\right)^x$

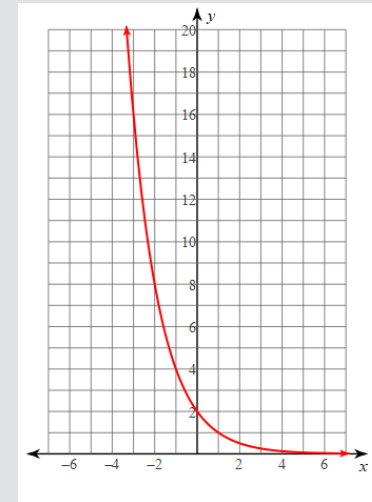
EXPONENTIAL GRAPHS

- ❖ SHAPE: Curve (J or L shape)
- ❖ Growth: increasing or going up ($b > 1$)
- ❖ Decay: decreasing or going down ($b < 1$)
- ❖ reflects over asymptote if “a” is negative

❖ Examples: Growth



Decay



EXPONENTIAL TABLES

- ❖ When x's are consecutive, y values will have a MULTIPLYING PATTERN
- ❖ Multiply by a number greater than 1 - y values are growing
- ❖ Multiply by a number less than 1 - y values are decreasing
- ❖ Never see same y value twice
- ❖ Y changes more quickly than x

❖ Examples :

x	y
0	2
1	4
2	8
3	16
4	32

Start value: 2
Ratio: $4/2 = 2$

Equation: $y = 2(2)^x$

Time (seconds)	Radioactivity level
0	20
1	10
2	5
3	2.5
4	1.25

Start value: 20
Ratio: $10/20 = \frac{1}{2}$

Equation: $y = 20(1/2)^x$

EXPONENTIAL CHARACTERISTICS AND KEYWORDS

CHARACTERISTICS:

- ❖ Has an asymptote (k value in equation)
- ❖ Will never cross or touch asymptote
- ❖ Will always have a y-intercept
- ❖ No maximum or minimum

KEYWORDS:

- ❖ Double, triple, half, quadruple
- ❖ Grow or increases by a %
- ❖ Decays or decreases by a %
- ❖ Compound interest