Name: ______________________ Block: _____ Date: ______________

LESSON 11.1 & 11.2 NOTES

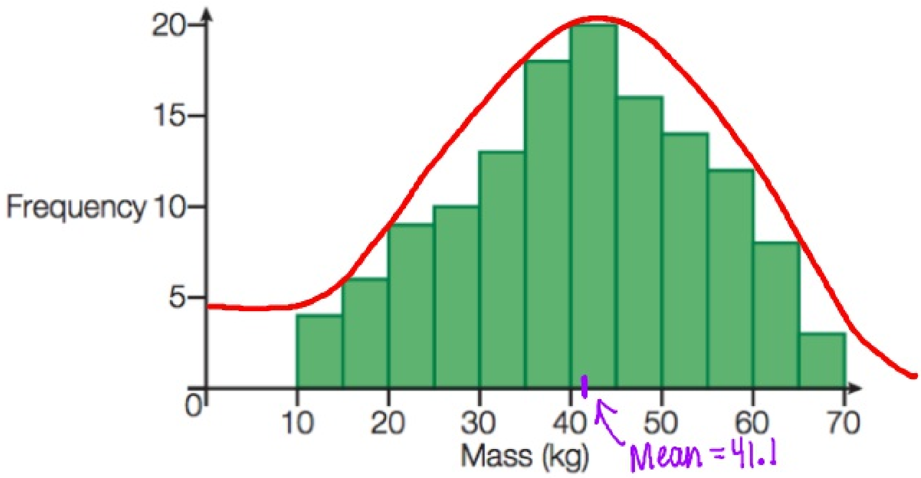
I. INTRODUCTION

Every year Nando weighs his lambs before taking them to market. He can only take lambs above a certain mass, and any that are too light are left behind. He finds that most of his lambs are approximately the same mass, but some are heavier and some are lighter.

Mean = 41.1

If Nando drew a histogram of the masses of his lambs, it would look like this:

Std. Dev = 13.5



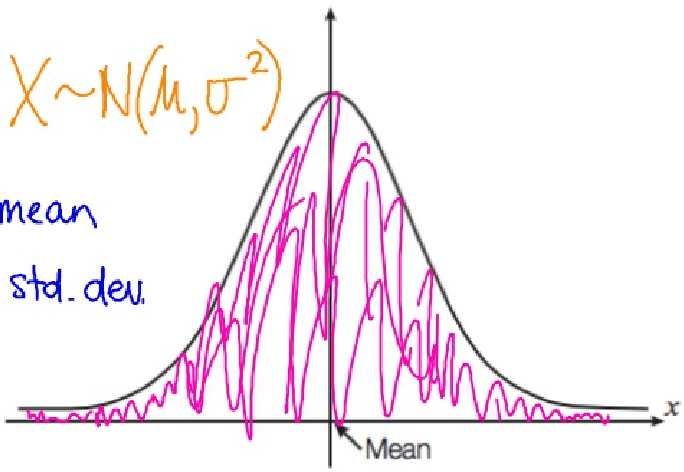
- The masses of the lambs clustered around a central value.
- The high and low values occur less frequently than those that are close to the central value.

II. LESSON 11.1 - THE NORMAL DISTRIBUTION CURVE

$X \sim N(\mu, \sigma^2)$

μ = mean

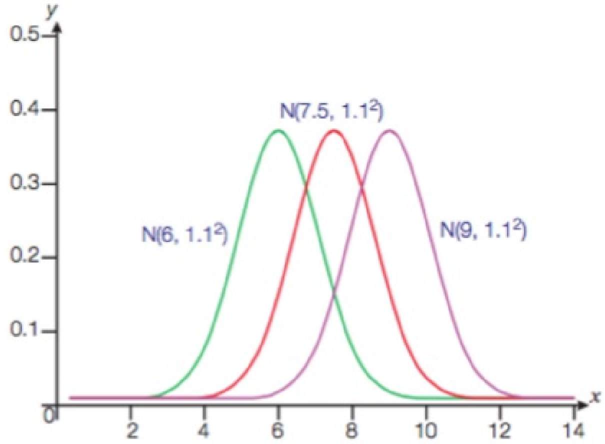
σ = std. dev.



* Area under the curve equals 1 or 100%
* Highest point is the mean
* Symmetrical about the mean.

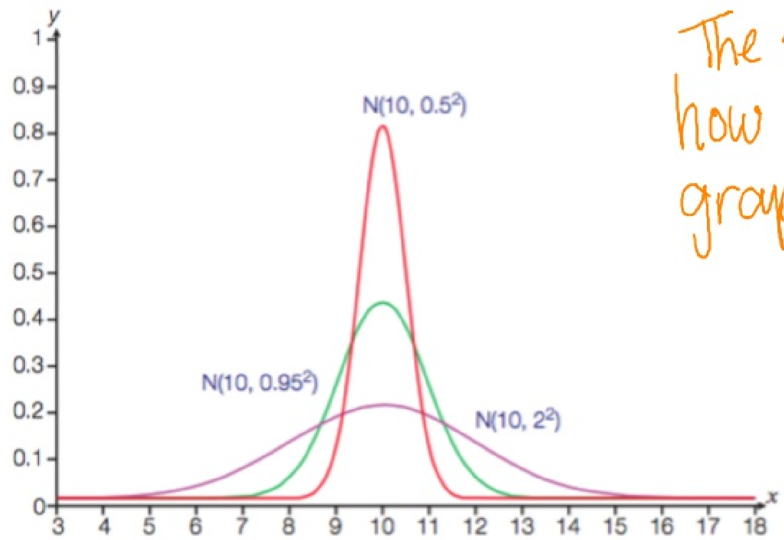
A. OBSERVATION

1. Look at the graph below and write down how the mean effect the shape of the curve.



Shifts the graph from left to right.

2. Look at the graph below and write down how the standard deviation effect the shape of the curve.

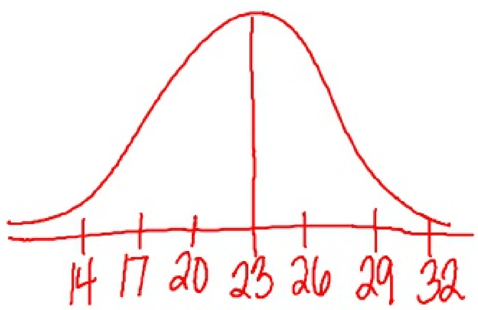


The std. dev. determines how tall + wide the graph is.

B. HOW TO SKETCH A NORMAL DISTRIBUTION CURVE

Mark the mean on the x-axis and use the standard deviation to scale the rest of the x values around the mean. Write the distribution beside the curve.

EXAMPLE #1: *SKETCH:* $X \sim N(23, 3^2)$



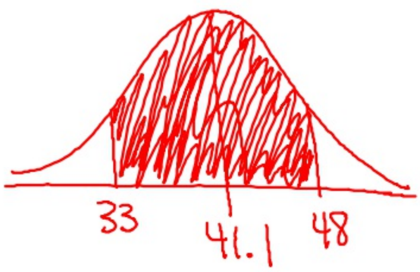
III. LESSON 11.2 - PROBABILITY CALCULATIONS USING THE NORMAL DISTRIBUTION

A. HOW TO SKETCH THE PROBABILITY AREA OF A NORMAL DISTRIBUTION CURVE

Mark the mean, mark the lower/upper boundaries, and shade in the area that you need to find.

EXAMPLE #2: Sketch the curve if Nando wants to estimate the number of lambs whose mass is between 33 kg and 48 kg.

* Remember : Mean = 41.1 + Std. Dev. = 13.5



B. HOW TO CALCULATE PROBABILITIES OF NORMAL DISTRIBUTIONS

1. Press 2ND VARS
2. Select "normalcdf("
3. Type in your lower bound, upper bound, mean, and standard deviation
    a. If your lower bound is negative infinity = -1E99
    b. If your lower bound is negative infinity = 1E99
4. Press enter.

EXAMPLE #3: If $X \sim N(0, 1^2)$, find the probability that X is 1.15 or less.

$$P(X \leq 1.15) = \text{normalcdf}(-1\times10^{99}, 1.15, 0, 1)$$

$$= \boxed{0.875 \text{ or } 87.5\%}$$

EXAMPLE #4: If $X \sim N(0, 1^2)$, find the probability that X lies between -1.5 and 0.7.

$$P(-1.5 < X < 0.7) = \text{normalcdf}(-1.5, 0.7, 0, 1)$$

$$= \boxed{0.691 \text{ or } 69.1\%}$$

EXAMPLE #5: If $X \sim N(40, 1^2)$, find the probability $X \leq 38$.

lower : -1×10^{99}
upper : 38
μ : 40
σ : 1

$$P(X \leq 38) = \boxed{0.0228 \text{ or } 2.28\%}$$

EXAMPLE #6: If $X \sim N(150, 12^2)$, find the probability $X \geq 158$.

lower : 158
upper : 1×10^{99}
μ : 150
σ : 12

$$P(X \geq 158) = \boxed{.252 \text{ or } 25.2\%}$$

EXAMPLE #7: If $X \sim N(45, 9^2)$, find the probability $P(36 \leq X \leq 54)$.

lower : 36
upper : 54
μ : 45
σ : 9

$$P(36 \leq X \leq 54) = \boxed{.683 \text{ or } 68.3\%}$$