LEARNING AS ONE NATION

Expanded Project

Stat & Prob_Q3_8

S H S L E A R N I N G A C T I V I T Y

Name: _____ **Score/Mark:** _____

Grade and Section: _____ **Date:** _____

Strand: ☐ STEM ☐ ABM ☐ HUMSS ☐ ICT (*TVL Track*)

Subject: ***Statistics & Probability***

Type of Activity: ☐ Concept Notes ☐ Skills: Exercise/Drill ☐ Illustration ☐ Performance Task ☐ Essay/Report ☐ Others: _____

Activity Title: The Normal Distribution

Learning Target: To describe the normal probability distribution.
To construct a normal curve.

References: *(Author, Title, Pages)*
1) Walpole, R. E. et al. "Probability and Statistics for Engineers & Scientists, 8th Ed", pp. 172-185;
2) L.A. Sajulga, CVIF Learning Activities

<u>The Normal Distribution</u> (or normal probability distribution)

- discovered by <u>Abraham DeMoivre</u> who developed its corresponding mathematical equation.

- referred to as the **<u>Gaussian distribution</u>**, in honor of <u>Karl Friedrich Gauss</u> who used it in his studies in physics and astronomy.

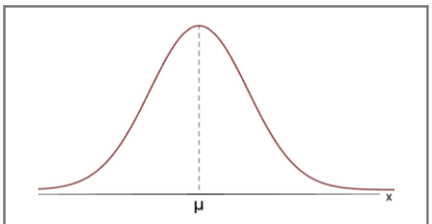

Figure 1: The Normal Curve

- has a graph called the **<u>normal curve</u>**, <u>with a bell-shaped form</u> (shown in Figure 1).

- can graphically represent many real-world events. For example, a particular species of tree in a certain forest '*normally*' consists of a few short ones, a few tall ones, and most of them are between tall and short. Other examples are in business, economics, medicine, engineering, physics, biology, and education, among many others.

The <u>density function</u> is given by:

$$\boxed{f(x) = \frac{1}{\sqrt{2\pi\sigma^2}}\, e^{\frac{-1}{2\sigma^2}(x-\mu)^2}} \quad , \; -\infty < x < +\infty$$

where $\pi \approx 3.14159\ldots$ and e = 2.71828… constants which are irrational numbers.

- A continuous random variable X that generates a bell-shaped curve is then called a <u>normal random variable</u>.

- As illustrated in Figure 2, the family of any normal curves can have infinitely many possible shapes depending on values of the mean (μ) and standard deviation (σ).

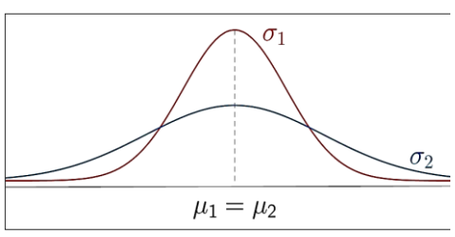

Figure 2: Normal curves with $\mu_1 = \mu_2$ *and* $\sigma_1 < \sigma_2$

Exercises:

1. Give at least two (2) real-world situations that can be modeled or represented using the normal curve.
2. Based on Figures 1 and 2, give one evident characteristic of a graph of a normal distribution that you have observed.