

Basic Math

① Arithmetic, weighted Average, Cumulative Sum

Let's discuss with examples:-

① Calculate the weighted mean of following numbers:

16 20 12 16 16 10 16 20 24 20

Arithmetic Mean = ?

$$\bar{X} = \frac{\sum X}{n} \rightarrow \begin{array}{l} \text{Total Sum of Numbers} \\ \text{Numbers} \end{array}$$

$$\bar{X} = \frac{16+20+12+16+16+10+16+20+24+20}{10}$$

$$\bar{X} = \frac{170}{10} = [17]$$

We can calculate it more specifically as well:-

Weighted mean = ?

$$\bar{X}_w = \frac{\sum w_x}{\sum w} \rightarrow \begin{array}{l} \text{Number and its frequency} \\ \text{Numbers} \end{array}$$

$$\begin{aligned} \bar{X}_w &= \frac{1(10) + 1(12) + 4(16) + 3(20) + 1(24)}{10} \\ &= \frac{170}{10} = [17] \end{aligned}$$

Same Answers...

② In a class of 20, eight students averaged a score of 86, seven students had an average of 74 and five students had an average of 98. What is average test score of all the class?

$$\begin{aligned}\bar{X}_w &= \frac{\sum Wx}{\sum W} = \frac{8(86) + 7(74) + 5(98)}{20} \\ &= \frac{1696}{20} = \boxed{84.8}\end{aligned}$$

③ In a certain college, 20% of students have an average weight of 140lbs, 35% of students have an average weight of 160lbs, 30% have 175lbs and 15% have 195lbs. What is average weight of all students.

As we know:

$$\begin{aligned}\bar{X}_w &= \frac{\sum Wx}{\sum W} = \frac{W_1X_1 + W_2X_2 + W_3X_3 + W_4X_4}{W_1 + W_2 + W_3 + W_4} \\ &= \frac{0.20(140) + 0.35(160) + 0.30(175) + 0.15(195)}{1}\end{aligned}$$

$$\boxed{\bar{X}_w = 165.75 \text{ lbs}}$$

4. Using the following information, calculate final semester grades of John & Kelly

weighted values

Homework	15%
Quiz	10%
Lab	20%
Test	25%
Final	30%

John's Record

Homework	92
Quiz	74
Lab	83
Test	76
Final	88

Kelly's Record

Homework	100
Quiz	82
Lab	95
Test	70
Final	76

$$\bar{X}_w = \frac{0.15(92) + 0.10(74) + 0.20(83) + 0.25(76) + 0.30(88)}{1}$$

$$= \boxed{83.2}$$

$$\bar{X}_w = \frac{0.15(100) + 0.10(82) + 0.20(95) + 0.25(70) + 0.30(76)}{1}$$

$$= \boxed{82.5}$$

5. Using the information, calculate the GPA

Class	Hours	Grade	Points
Chemistry	3	B	3
Physics	3	C	2
Chem Lab	1	A	4
Calculus	4	A	4
English	3	B	3

As we know:

$$\bar{X}_w = \frac{\sum XW}{\sum W}$$

$$= 3(3) + 3(2) + 1(4) + 4(4) + (3)(3)$$

$$= \frac{44}{14} = [3.14]$$

6. Rachel mixes 5 gallons of a 20% antifreeze solution with 10 gallons of a 50% antifreeze solution to form a new solution with different antifreeze concentration.

a) find concentration of new antifreeze solution.

b) Will new solution have concentration that is closer to 20% or 50%.

S_1	S_3	S_2
$W_1 \rightarrow 5 \text{ gal}$	15 gal	$W_2 \rightarrow 10 \text{ gal}$
$X_1 \rightarrow 20\%$	\bar{X}_w	$X_2 \rightarrow 50\%$

b) - Solution :-

$$\frac{20\% + 50\%}{2} = 35\% \text{ closer to 20 and 50 both}$$

but 50% have more gallons so

(35-50) - Rorfe

a) Solution :-

$$\bar{X}_w = \frac{\sum XW}{\sum W} = \frac{(5)(20) + (10)(50)}{5+10} = \frac{100+500}{15}$$

$$= [40\%]$$

↓ this is (35-50)%