$$0x - 13y = -39,$$

Therefore, $y = 3$ and now substitute the value in equation 1 or 2 to get $x = 4$.

Final note:
There is one very important fact one should remember whenever solving equations, and that is:
When you multiply two or more factors, their product can only be zero if at least one of their factors is zero.
Example: $x(x + 3)(x - 2) = 0$ Whenever an equation is set up this way, the first solution that must cross your mind is that $x = 0$. (and of course, we will also find that $x = -3$ and $x = 2$ are the other solutions).

Summation Notation: $P_a + P_{a+1} + P_{a+2} \ldots \ldots P_n = \sum_{k=a}^{n} P_a$
The K= a, indicates the starting number of the sequence, n= number of times.

Chapter 3 Basic Notations

Economic Application: Price Indices (Inflation) for a group of goods

$$\frac{Total\ cost\ of\ goods\ in\ final\ year}{Total\ cost\ of\ goods\ in\ Initial\ year} = \frac{\sum_{k=1}^{m} P_F^{(k)} Q^{(k)}}{\sum_{k=1}^{n} P_I^{(k)} Q^{(k)}} \times 100 = Price\ Index$$

Where, $Q^{(k)}$ = Number of gook K,

$P_I^{(k)}$ = Price/good k in Initial/first year

$P_F^{(k)}$ = Price/good k in final year

Laspeyres Price Index: When the quantity consumed is based on the initial year f or the above formula.
Paashe Price Index: When the quantity consumed is based on the final year f or the above formula.

Properties:
1. $\sum_{k=1}^{n}(s_k + r_k) = \sum_{k=1}^{n} s_k + \sum_{k=1}^{n} r_k$
2. $r \sum_{k=1}^{n} s_k = \sum_{k=1}^{n} r \times s_k$
3. $\sum_{k=1}^{n}(s_k + r) = \sum_{k=1}^{n} s_k + nr$
4. $\sum_{k=1}^{n} K^2 = \frac{1}{6} n(n + 1)(2n + 1)$
5. $\sum_{k=1}^{n} K^3 = \left[\sum_{k=1}^{n} K\right]^2$
6. $(x + a)^n = \sum_{k=0}^{n} \binom{n}{k} x^k a^{n-k}$, where $\binom{n}{k} = \frac{n(n-1)(n-2)\ldots(n-m+1)}{m!}$

Example: $\binom{7}{3} = \frac{7 \times 6 \times 5}{3 \times 2 \times 1} = 7 \times 5 = 35$

h

7. $\sum_{k=1}^{n} s_{k1} + \sum_{k=1}^{n} s_{k2} + \ldots + \sum_{k=1}^{n} s_{kb} = \sum_{r=1}^{n} [\sum_{k=1}^{n} s_{kr}]$

Example: $\sum_{r=1}^{2} [\sum_{k=1}^{3} (2r + 4k)] = \sum_{r=1}^{2} [(2r + 4) + (2r + 8) + (2r + 12)]$

$= \sum_{r=1}^{2} [6r + 24] = (6 + 24) + (12 + 24) = 66$

Just Logic:

Implication - symbol: '=>' or '<=', and the pointer shows the direct the logic holds true,

1. Logical equivalence – symbol '⇔' this means that the statement on right and left are true if even one of them is true.

2. The term 'or' in mathematics implies that in the case 'a' or 'b', both terms 'a' and 'b' hold true.

3. Necessary condition - b=> a, For example, 'the brakes are working (a)' is necessary condition for saying 'the bicycle is in good condition (b)'

4. Sufficient Condition - a=>b, For example, 'the brakes are working (a)' is sufficient condition for saying 'the bicycle is in good condition (b)' is false, as the brakes could be working but the wheels could be missing. But 'heart is beating' is sufficient condition for saying 'the person is alive'. Because, even if all the other systems are dead, the person is still considered to be alive as long as his heart is beating/or made to beat.

5. Deductive Reasoning: Used in Mathematics, reasoning is based on logic

6. Inductive Reasoning: Coming to general assumptions based on few situations or cases.

7. Venn Diagram:

$W \subseteq X$

Fig.4:

W is a part of X, all values of W are values of X

The non-colored parts- Fig5

The non-colored part- Fig.6

The non-colored part-Fig.7

Chapter 4 Functions

Defining terms:

Independent variable: a variable that causes change in other variables.