

LEARNING CURVE THEORY

LC-1

- as the production of given item doubles the time taken to produce that item decreases with a constant rate. time ↓ cost ↓ (only human resources) ~~not related to machine~~
- also called cost experience curve / improvement / progress curve.

Constant rate = $\frac{\text{average time per unit for } 2N \text{ units}}{\text{avg time per } N \text{ unit}}$

$y = ax^b$

y: avg time per unit when we produce 'n'
x: no of units.
a = avg time for 1st unit / batch / lot.

$b = \frac{\log LC1}{\log 2}$

$\log 2 = 0.3010$

Formal LC1 = 80%

units	Avg hours	Total hrs (unit x avg)	marg hrs.	T.C hrs x cph
1	100	100 x 1 = 100		
2	100 x 80% = 80	80 x 2 = 160	160 - 100 = 60	
4	80 x 80% = 64			
8				
16				

- go lot wise - as per 8.
- be careful: table only for doubling
- dept (machine / tech) - x LC1
- dept (manually) - ✓ LC1

$\frac{\log LC1}{\log 2} = -ve \log 7.9031$
 $\frac{1 + 0.9031}{0.3010} = \frac{0.0969}{0.3010}$

$3^{-0.033} = \frac{1}{3^{0.033}}$

use log & antilog to find $3^{0.033}$

prototype or demo = 1 unit
 next 20 orders = 91 - 1 *

next orders: always incremental.

order together (80) = 80
 order 20 + 20 = 20 [40 - 20] 40 [60 - 40]

Incremental cost (repeat orders)

41-80 units = cost 80
 → cost 41

- If hrs x given & cost is given then also avg hrs put avg cost.
- F.O.H (consider downtime) - recovery rate.

if order cancelled
 eg order = 32
 cancelled after = 8

loss to be w/o

seq to charged 8 units LC1
 → actual recovery $\frac{(32 \text{ units}) LC1}{\text{Loss w/o. ()}}$

if LC1 table given
 1.0 100 then find
 1.5 87.6 $\frac{\text{prop} = \text{cum units}}{\text{1st unit.}}$
 2 80

order	cum	prop ⁿ 4 LC	LC1
160	160		
80	240	240/160 = 1.5	87.6
80	320	320/160 = 2	80.

LO 4

ANTILOG

Fit to ① Log table.

$$\begin{aligned}\log 20 &= \log 20 - (0) = 3010. \\ \log 35.86 &= \log 35 \rightarrow 8 + \text{mean diff } 6 = 5547. \\ \log 0.86 &= \log 86 \rightarrow 0. = 9345.\end{aligned}$$

② Put decimal ^{no} ~~at~~ no. of digits by decimal - 1 ^(no) ~~digit by~~ $\rightarrow$

$$\begin{aligned}\log 20.00 &= 2-1 = 1 \therefore 1.3010. \\ \log 35.86 &= 2-1 = 1 \therefore 1.5547 \\ \log 0.86 &= 0-1 = -1 = \bar{1} \therefore \bar{1}.9345 \\ &\quad [T + 0.9345] \\ \log 10 &= 2-1 = 1 = \underline{1.0}\end{aligned}$$

no. of digits by decimal - 1

① See after decimal value (4 digit)

$$\begin{aligned}\text{① AL of } 1.3010 &= 1.30 - 1 + \text{MD}(0) \\ &= 2000 \\ \text{② AL of } 1.5547 &= 0.55 \rightarrow 4 + \text{MD}(7) \\ &= 3586. \\ \text{③ AL of } \bar{1}.9345 &= 0.93 \rightarrow 4 + \text{MD}(5) \\ &= 8600.\end{aligned}$$

② Put decimal.

$$\begin{aligned}\text{Value of digit by decimal } + 1 \\ \text{AL} &= 2 + 1 = 2 \text{ digit} = \underline{20} \\ \text{AL} &= 1 + 1 = 2 \text{ digit} = \underline{35.86} \\ \text{value of digit by } + 1 \\ \text{AL} &= \bar{1} + 1 = 0 = \underline{0.86}\end{aligned}$$

log $\rightarrow$ antlog will give you same no.

$$\begin{aligned}3^{-0.33} &= 2 \times 3^{-0.33} \\ &= 2 \text{ find using log.}\end{aligned}$$

$$3^{-0.33} = \frac{1}{3^{0.33}}$$

$$\log 3^{0.33} = 0.33 \times \log 3 = x$$

$$\text{antlog } x = y$$

$$2 \times \frac{1}{y} = \text{ans.}$$