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Time Estimation Formulas

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List of 16 Time Estimation Formulas

Time Estimation

1) Early Finish Time

Open Calculator

fx $$EFT = EST + S$$

ex $$19.02963\text{d} = 19\text{d} + 2560$$

2) Expected Waiting Time for Customers in Queue

Open Calculator

fx $$W_q = \frac{\lambda_a}{\mu \cdot (\mu - \lambda_a)}$$

ex $$0.0045 = \frac{1800}{2000 \cdot (2000 - 1800)}$$

3) Expected Waiting Time for Customers in System

Open Calculator

fx $$W_s = \frac{1}{\mu - \lambda_a}$$

ex $$0.005 = \frac{1}{2000 - 1800}$$

4) Free Float

Open Calculator

$$FF_0 = EFT - EST - t_{activity}$$

ex $7d = 46d - 19d - 20d$

5) Independent Float

Open Calculator

$$IF_0 = EFT - LST - t_{activity}$$

ex $3d = 46d - 23d - 20d$

6) Independent Float given Slack

Open Calculator

$$IF_{0\ slack} = FF_0 - s$$

ex $2 = 8d - 6d$

7) Late Finish Time

Open Calculator

$$LFT = LST + dur$$

ex $44d = 23d + 21d$

8) PERT Expected Time

Open Calculator

$$t_e = \frac{T_{optimistic} + 4 \cdot t_m + T_{Pessimistic}}{6}$$

ex $5.166667d = \frac{9d + 4 \cdot 3d + 10d}{6}$

9) Standard Deviation given Optimistic and Pessimistic Time

Open Calculator

fx $$\sigma = \frac{T_{Pessimistic} - T_{optimistic}}{6}$$

ex $$0.166667\text{d} = \frac{10\text{d} - 9\text{d}}{6}$$

10) Standard Normal Variation

Open Calculator

fx $$Z = \frac{T_z - T_e}{\sigma}$$

ex $$0.002315 = \frac{170 - 160}{0.05\text{d}}$$

11) Time Taken for Manufacturing Model with Shortage

Open Calculator

fx $$t_{ms} = \frac{EOQ_{ms}}{D}$$

ex $$0.05 = \frac{500}{10000}$$

12) Time Taken for Purchase Model with No Shortage

Open Calculator

fx $$t_{\text{no shortage}} = \frac{EOQ}{D}$$

ex $$0.0045 = \frac{45}{10000}$$

13) Time Taken for Purchase Model with Shortage

Open Calculator

fx $$t_{\text{with shortage}} = \frac{EOQ_{ps}}{D}$$

ex $$0.107703 = \frac{1077.033}{10000}$$

14) Total Float

Open Calculator

fx $$TF_0 = LFT - (EST + t_{\text{activity}})$$

ex $$18\text{d} = 57\text{d} - (19\text{d} + 20\text{d})$$

15) Total Float given Finish Time

Open Calculator

fx $$TF_{0\text{finish}} = LFT - EFT$$

ex $$11\text{d} = 57\text{d} - 46\text{d}$$

16) Total Float given Start Time

Open Calculator

fx $$TF_0 = LST - EST$$

ex $$4\text{d} = 23\text{d} - 19\text{d}$$

Variables Used

- **μ** Mean Service Rate
- **D** Demand per Year
- **dur** Duration of Activity *(Day)*
- **EFT** Early Finish Time *(Day)*
- **EOQ** Economic Order Quantity
- $\mathbf{EOQ_{ms}}$ EOQ Manufacturing Model with Shortage
- $\mathbf{EOQ_{ps}}$ EOQ Purchase Model
- **EST** Early Start Time *(Day)*
- $\mathbf{FF_0}$ Free Float *(Day)*
- $\mathbf{IF_{0\ slack}}$ Independent Float given Slack
- $\mathbf{IF_0}$ Independent Float *(Day)*
- **LFT** Late Finish Time *(Day)*
- **LST** Late Start Time *(Day)*
- **s** Slack of Event *(Day)*
- **S** Safety Stock
- $\mathbf{t_{activity}}$ Activity Time *(Day)*
- $\mathbf{t_e}$ PERT Expected Time *(Day)*
- $\mathbf{T_e}$ Expected Value
- $\mathbf{t_m}$ Most Likely Time *(Day)*
- $\mathbf{t_{ms}}$ Time taken for Manufacturing Model with Shortage
- $\mathbf{t_{no\ shortage}}$ Time taken for Purchase Model no Shortage
- $\mathbf{T_{optimistic}}$ Optimistic Time *(Day)*

- $T_{Pessimistic}$ Pessimistic Time *(Day)*
- $t_{with\ shortage}$ Time taken for Purchase Model with Shortage
- T_z Normal Variate
- TF_0 Total Float *(Day)*
- $TF_{0finish}$ Total Float given Finish Times *(Day)*
- W_q Expected Waiting Time for Customers in Queue
- W_s Expected Waiting Time for Customers in System
- Z Standard Normal Variation
- λ_a Mean Arrival Rate
- σ Standard Deviation *(Day)*

Constants, Functions, Measurements used

- Measurement: **Time** in Day (d)
  Time Unit Conversion

Check other formula lists

- **Basics of Industrial Engineering Formulas**
- **Industrial Parameters Formulas**
- **Manufacturing and Purchase Model Formulas**
- **Manufacturing Period Formulas**
- **Time Estimation Formulas**

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