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Time Estimation Formulas

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List of 16 Time Estimation Formulas

Time Estimation

1) Early Finish Time

$$fx \quad EFT = EST + S$$

[Open Calculator !\[\]\(a870788d6ed9b8fd294b7654a8c8526b_img.jpg\)](#)

$$ex \quad 19.02963d = 19d + 2560$$

2) Expected Waiting Time for Customers in Queue

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

[Open Calculator !\[\]\(c50c8b7b2cc2cf9ff925edec0ee94c0d_img.jpg\)](#)

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

3) Expected Waiting Time for Customers in System

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

[Open Calculator !\[\]\(f60b7a900783ac3fd531bfd9c111be6d_img.jpg\)](#)

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



4) Free Float

$$fx \quad FF_0 = EFT - EST - t_{\text{activity}}$$

[Open Calculator !\[\]\(cbe80b694ebd74fcfe136a095b608235_img.jpg\)](#)

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

5) Independent Float

$$fx \quad IF_0 = EFT - LST - t_{\text{activity}}$$

[Open Calculator !\[\]\(3e2231b1ad3ca8da8658228c00dd08e0_img.jpg\)](#)

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

6) Independent Float given Slack

$$fx \quad IF_{0 \text{ slack}} = FF_0 - s$$

[Open Calculator !\[\]\(0d5ec72f61334709c3fc9450209b754f_img.jpg\)](#)

$$ex \quad 2 = 8d - 6d$$

7) Late Finish Time

$$fx \quad LFT = LST + dur$$

[Open Calculator !\[\]\(b64b40baaee5acddc1eab8538ba84754_img.jpg\)](#)

$$ex \quad 44d = 23d + 21d$$

8) PERT Expected Time

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

[Open Calculator !\[\]\(aff7c69c44a5e015f18c35867ef3f5c3_img.jpg\)](#)

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



9) Standard Deviation given Optimistic and Pessimistic Time

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

[Open Calculator !\[\]\(e78f798d4ea5c530c9db49e7d26e6b95_img.jpg\)](#)

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

10) Standard Normal Variation

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

[Open Calculator !\[\]\(05be7c7a8995decd503647c99211f7c2_img.jpg\)](#)

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

11) Time Taken for Manufacturing Model with Shortage

$$\text{fx } t_{\text{ms}} = \frac{\text{EOQ}_{\text{ms}}}{D}$$

[Open Calculator !\[\]\(fe3aebe81acea8d45108cd2768939da7_img.jpg\)](#)

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

12) Time Taken for Purchase Model with No Shortage

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

[Open Calculator !\[\]\(899d8b7697d64725bf017d3296cfcf1b_img.jpg\)](#)

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



13) Time Taken for Purchase Model with Shortage

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

[Open Calculator !\[\]\(e2376d476d06eb31946dc01a69a4403a_img.jpg\)](#)

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

14) Total Float

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

[Open Calculator !\[\]\(0b5e7e25e8775f7e7e80906ada4f0021_img.jpg\)](#)

$$ex \quad 18d = 57d - (19d + 20d)$$

15) Total Float given Finish Time

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

[Open Calculator !\[\]\(bd3b31712ad9bab5a241210fa6925cdd_img.jpg\)](#)

$$ex \quad 11d = 57d - 46d$$

16) Total Float given Start Time

$$fx \quad TF_0 = LST - EST$$

[Open Calculator !\[\]\(7bc43b319a082987e20f7bf78f4bab80_img.jpg\)](#)

$$ex \quad 4d = 23d - 19d$$



Variables Used

- μ Mean Service Rate
- **D** Demand per Year
- **dur** Duration of Activity (Day)
- **EFT** Early Finish Time (Day)
- **EOQ** Economic Order Quantity
- **EOQ_{ms}** EOQ Manufacturing Model with Shortage
- **EOQ_{ps}** EOQ Purchase Model
- **EST** Early Start Time (Day)
- **FF₀** Free Float (Day)
- **IF_{0 slack}** Independent Float given Slack
- **IF₀** Independent Float (Day)
- **LFT** Late Finish Time (Day)
- **LST** Late Start Time (Day)
- **s** Slack of Event (Day)
- **S** Safety Stock
- **t_{activity}** Activity Time (Day)
- **t_e** PERT Expected Time (Day)
- **T_e** Expected Value
- **t_m** Most Likely Time (Day)
- **t_{ms}** Time taken for Manufacturing Model with Shortage
- **t_{no shortage}** Time taken for Purchase Model no Shortage
- **T_{optimistic}** Optimistic Time (Day)



- **T_{Pessimistic}** Pessimistic Time (Day)
- **t_{with shortage}** Time taken for Purchase Model with Shortage
- **T_Z** Normal Variate
- **TF₀** 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](#) 
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- [Manufacturing and Purchase Model Formulas](#) 
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