

Important Construction Management Formulas PDF



Formulas Examples with Units

List of 28 Important Construction Management Formulas

1) Construction Safety Management Formulas

1.1) Injury Frequency Rate Formula

Formula

$$I_r = I_n \cdot \frac{100000}{N_{mh}}$$

Example

$$800 = 20 \cdot \frac{100000}{2500}$$

Evaluate Formula 

1.2) Injury Frequency Rate given Injury Index Formula

Formula

$$I_r = II \cdot \frac{1000}{I_n \cdot R_i}$$

Example

$$800 = 288 \cdot \frac{1000}{20 \cdot 18}$$

Evaluate Formula 

1.3) Injury Index Formula

Formula

$$II = I_r \cdot R_i \cdot \frac{I_n}{1000}$$

Example

$$288 = 800 \cdot 18 \cdot \frac{20}{1000}$$

Evaluate Formula 

1.4) Injury Severity Rate Formula

Formula

$$R_i = D_l \cdot \frac{1000}{N_{mh}}$$

Example

$$18 = 45 \cdot \frac{1000}{2500}$$

Evaluate Formula 

1.5) Number of Days Lost given Severity Rate Formula

Formula

$$D_l = R_i \cdot \frac{N_{mh}}{1000}$$

Example

$$45 = 18 \cdot \frac{2500}{1000}$$

Evaluate Formula 

1.6) Number of Disabling Injuries given Frequency Rate Formula

Formula

$$I_n = I_r \cdot \frac{N_{mh}}{100000}$$

Example

$$20 = 800 \cdot \frac{2500}{100000}$$

Evaluate Formula 



1.7) Number of Man-Hour Worked given Frequency Rate Formula

Formula

$$N_{mh} = I_n \cdot \frac{100000}{I_r}$$

Example

$$2500 = 20 \cdot \frac{100000}{800}$$

Evaluate Formula 

1.8) Severity Rate given Injury Index Formula

Formula

$$R_I = II \cdot \frac{1000}{I_n \cdot I_r}$$

Example

$$18 = 288 \cdot \frac{1000}{20 \cdot 800}$$

Evaluate Formula 

2) Economics of Project Management Formulas

2.1) Contribution per Unit Formula

Formula

$$CM = SP - V$$

Example

$$40 = 120 - 80$$

Evaluate Formula 

2.2) Fixed Cost Formula

Formula

$$FC = T_c - TVC$$

Example

$$2000 = 3500 - 1500$$

Evaluate Formula 

2.3) Profit for Total Expenses Formula

Formula

$$P = TR - (FC + TVC)$$

Example

$$500 = 4000 - (2000 + 1500)$$

Evaluate Formula 

2.4) Selling Price Formula

Formula

$$SP = \frac{FC + V \cdot V_o}{V_o}$$

Example

$$120 = \frac{2000 + 80 \cdot 50}{50}$$

Evaluate Formula 

2.5) Total Cost Formula

Formula

$$T_c = FC + TVC$$

Example

$$3500 = 2000 + 1500$$

Evaluate Formula 

2.6) Total Cost given Profit Formula

Formula

$$T_c = TR - P$$

Example

$$3500 = 4000 - 500$$

Evaluate Formula 



2.7) Total Revenue Formula

Formula

$$TR = P + (FC + TVC)$$

Example

$$4000 = 500 + (2000 + 1500)$$

Evaluate Formula 

2.8) Total Variable Cost Formula

Formula

$$TVC = T_c - FC$$

Example

$$1500 = 3500 - 2000$$

Evaluate Formula 

2.9) Volume of Output Formula

Formula

$$V_o = \frac{FC}{SP - V}$$

Example

$$50 = \frac{2000}{120 - 80}$$

Evaluate Formula 

3) Management of Construction Equipment Formulas

3.1) Average Investment if Salvage Value is not 0 Formula

Formula

$$I_a = \frac{S_s \cdot (n - 1) + P_{\text{Capital}} \cdot (n + 1)}{2 \cdot n}$$

Example with Units

$$1381.8 = \frac{456 \cdot (5 \text{ Year} - 1) + 1999 \cdot (5 \text{ Year} + 1)}{2 \cdot 5 \text{ Year}}$$

Evaluate Formula 

3.2) Average Investment when Salvage value is 0 Formula

Formula

$$I_a = \left(\frac{1 + n}{2 \cdot n} \right) \cdot P_{\text{Capital}}$$

Example with Units

$$1199.4 = \left(\frac{1 + 5 \text{ Year}}{2 \cdot 5 \text{ Year}} \right) \cdot 1999$$

Evaluate Formula 

3.3) Book Value for New Machine Formula

Formula

$$C_{bv} = \frac{D_h \cdot L_s}{0.9}$$

Example with Units

$$4002 = \frac{20.01 \cdot 180h}{0.9}$$

Evaluate Formula 



3.4) Capacity of Crankcase when Quantity of Oil is Determined Formula

Formula

$$C = 5 \cdot t \cdot \left(Q - \left(HP \cdot \eta \cdot \frac{0.0027}{0.74} \right) \right)$$

Example with Units

$$29.8649 \text{ L} = 5 \cdot 100 \text{ h} \cdot \left(0.41 \text{ L/h} - \left(160 \text{ hp} \cdot 0.6 \cdot \frac{0.0027}{0.74} \right) \right)$$

Evaluate Formula 

3.5) Capital Cost when Salvage Value is 0 Formula

Formula

$$P_{\text{Capital}} = \frac{2 \cdot n \cdot I_a}{1 + n}$$

Example with Units

$$1999.9544 = \frac{2 \cdot 5 \text{ Year} \cdot 1000}{1 + 5 \text{ Year}}$$

Evaluate Formula 

3.6) Depreciation Cost when Straight Line Method is Assumed Formula

Formula

$$D = \frac{T_c - S_c}{n}$$

Example with Units

$$630 = \frac{3500 - 350}{5 \text{ Year}}$$

Evaluate Formula 

3.7) Horsepower given Quantity of Oil Formula

Formula

$$HP = \left(Q - \left(\frac{C}{5 \cdot t} \right) \right) \cdot \left(\frac{0.74}{0.0027 \cdot \eta} \right)$$

Example with Units

$$159.8765 \text{ hp} = \left(0.41 \text{ L/h} - \left(\frac{30 \text{ L}}{5 \cdot 100 \text{ h}} \right) \right) \cdot \left(\frac{0.74}{0.0027 \cdot 0.6} \right)$$

Evaluate Formula 

3.8) Hourly Cost Worker Formula

Formula

$$H_c = 12 \cdot \frac{S_m}{H_{mh}}$$

Example with Units

$$96.0005 = 12 \cdot \frac{2000.01}{250 \text{ h}}$$

Evaluate Formula 

3.9) Hourly Depreciation Formula

Formula

$$D_h = 0.9 \cdot \frac{C_{bv}}{L_s}$$

Example with Units

$$20.0001 = 0.9 \cdot \frac{4000.01}{180 \text{ h}}$$

Evaluate Formula 



3.10) Life Span of Machine Formula

Formula

$$L_s = 0.9 \cdot \frac{C_{bv}}{D_h}$$

Example with Units

$$179.9105_h = 0.9 \cdot \frac{4000.01}{20.01}$$

Evaluate Formula 

3.11) Quantity of Lubricating Oil Formula

Formula

$$Q = \left(HP \cdot \eta \cdot \frac{0.0027}{0.74} \right) + \left(\frac{C}{5 \cdot t} \right)$$

Example with Units

$$0.4103_{L/h} = \left(160_{hp} \cdot 0.6 \cdot \frac{0.0027}{0.74} \right) + \left(\frac{30_L}{5 \cdot 100_h} \right)$$

Evaluate Formula 



Variables used in list of Construction Management Formulas above

- **C** Crankcase Capacity (*Liter*)
- **C_{bv}** Book Value
- **CM** Contribution Margin per Unit
- **D** Depreciation
- **D_h** Hourly Depreciation
- **D_l** Lost Days
- **FC** Fixed Cost
- **H_c** Hourly Cost
- **H_{mh}** Machine Hours (*Hour*)
- **HP** Engine power (*Horsepower*)
- **I_a** Average Investment
- **I_n** Number of Disabling Injuries
- **I_r** Injury Frequency Rate
- **II** Injury Index
- **L_s** Life Span (*Hour*)
- **n** Useful Life (*Year*)
- **N_{mh}** Man Hour
- **P** Cost of Profit
- **P_{Capital}** Capital Cost
- **Q** Quantity of Oil (*Liter per hour*)
- **R_i** Injury Severity Rate
- **S_c** Scrap Value
- **S_m** Monthly Salary
- **S_s** Salvage
- **SP** Selling Price
- **t** Time between Change of Oil (*Hour*)
- **T_c** Total Cost
- **TR** Total Revenue
- **TVC** Total Variable Cost
- **V** Variable Cost per Unit
- **V_o** Volume of Output
- **η** Operating Factor

Constants, Functions, Measurements used in list of Construction Management Formulas above

- **Measurement: Time** in Year (Year), Hour (h)
Time Unit Conversion 
- **Measurement: Volume** in Liter (L)
Volume Unit Conversion 
- **Measurement: Power** in Horsepower (hp)
Power Unit Conversion 
- **Measurement: Volumetric Flow Rate** in Liter per hour (L/h)
Volumetric Flow Rate Unit Conversion 





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