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Density of Soil Formulas

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List of 17 Density of Soil Formulas

Density of Soil ⤴

1) Bulk Density of Soil ⤴

Open Calculator ⤴

$$fx \quad \gamma_t = \frac{W_t}{V}$$

$$ex \quad 6.52848 \text{kg/m}^3 = \frac{80 \text{kg}}{12.254 \text{m}^3}$$

2) Density of Water given Dry Density and Void Ratio ⤴

Open Calculator ⤴

$$fx \quad \rho_w = \rho_{ds} \cdot \frac{1+e}{G_s}$$

$$ex \quad 995.3962 \text{kg/m}^3 = 1199 \text{kg/m}^3 \cdot \frac{1+1.2}{2.65}$$

3) Dry Density Given Void Ratio ⤴

Open Calculator ⤴

$$fx \quad \rho_{ds} = \frac{G_s \cdot \rho_w}{1+e}$$

$$ex \quad 1200.932 \text{kg/m}^3 = \frac{2.65 \cdot 997.0 \text{kg/m}^3}{1+1.2}$$

4) Dry Density of Soil ⬏

$$fx\ \rho_d = \frac{W_s}{V}$$

$$ex\ 0.049127\text{kg/m}^3 = \frac{0.602\text{kg}}{12.254\text{m}^3}$$

5) Dry Density of Solids ⬏

$$fx\ \rho_{dry} = \frac{W_s}{v_{so}}$$

$$ex\ 0.049023\text{kg/m}^3 = \frac{0.602\text{kg}}{12.28\text{m}^3}$$

6) Mass of Saturated Sample given Saturated Density of Soil ⬏

$$fx\ W_{sat} = \rho_{sat} \cdot V$$

$$ex\ 19.97402\text{kg} = 1.63\text{kg/m}^3 \cdot 12.254\text{m}^3$$

7) Saturated Density of Soil ⬏

$$fx\ \rho_{sat} = \frac{M_{sat}}{V}$$

$$ex\ 1.63212\text{kg/m}^3 = \frac{20\text{kg}}{12.254\text{m}^3}$$

8) Saturated Unit Weight given Submerged Unit Weight ⌲

Open Calculator ⌲

fx $\gamma_{\text{saturated}} = y_S + \gamma_{\text{water}}$

ex $10.77\text{kN/m}^3 = 0.96\text{kN/m}^3 + 9.81\text{kN/m}^3$

9) Submerged Unit Weight of Soil ⌲

Open Calculator ⌲

fx $y_S = \dfrac{W_{\text{su}}}{V}$

ex $0.962951\text{kN/m}^3 = \dfrac{11.8\text{kN}}{12.254\text{m}^3}$

10) Submerged Weight of Soil given Submerged Unit Weight of Soil ⌲

Open Calculator ⌲

fx $W_{\text{su}} = y_S \cdot V$

ex $11.76384\text{kN} = 0.96\text{kN/m}^3 \cdot 12.254\text{m}^3$

11) Total Mass of Soil given Bulk Density of Soil ⌲

Open Calculator ⌲

fx $W_t = \gamma_t \cdot V$

ex $79.89608\text{kg} = 6.52\text{kg/m}^3 \cdot 12.254\text{m}^3$

12) Total Volume given Submerged Unit Weight of Soil ⤴

Open Calculator ⤴

$$fx \quad V = \frac{W_{su}}{y_S}$$

$$ex \quad 12.29167 m^3 = \frac{11.8 kN}{0.96 kN/m^3}$$

13) Total Volume of Soil given Bulk Density of Soil ⤴

Open Calculator ⤴

$$fx \quad V = \frac{W_t}{\gamma_t}$$

$$ex \quad 12.26994 m^3 = \frac{80 kg}{6.52 kg/m^3}$$

14) Total Volume of Soil given Dry Unit Weight ⤴

Open Calculator ⤴

$$fx \quad V = \frac{W_{sk}}{\gamma_{dry}}$$

$$ex \quad 30.03268 m^3 = \frac{183.8 kN}{6.12 kN/m^3}$$

15) Total Volume with respect to Saturated Unit Weight of Soil ⤴

Open Calculator ⤴

$$fx \quad V = \frac{W_{satk}}{\gamma_{saturated}}$$

$$ex \quad 7.616484 m^3 = \frac{90.56 kN}{11.89 kN/m^3}$$

16) Unit Weight of Water 🔗

fx $\gamma_{water} = \gamma_{saturated} - y_S$

Open Calculator 🔗

ex $10.93 \text{kN/m}^3 = 11.89 \text{kN/m}^3 - 0.96 \text{kN/m}^3$

17) Weight of Solids given Unit Weight of Solids 🔗

fx $W_{sk} = \gamma_{soilds} \cdot V$

Open Calculator 🔗

ex $183.81 \text{kN} = 15 \text{kN/m}^3 \cdot 12.254 \text{m}^3$

Variables Used

- **e** Void Ratio
- **G$_s$** Specific Gravity of Soil
- **M$_{sat}$** Mass of Saturated Soil *(Kilogram)*
- **V** Total Volume in Soil Mechanics *(Cubic Meter)*
- **v$_{so}$** Volume of Solids in Soil *(Cubic Meter)*
- **W$_s$** Weight of Solids in Soil Mechanics *(Kilogram)*
- **W$_{sat}$** Saturated Weight of Soil *(Kilogram)*
- **W$_{satk}$** Saturated Weight of Soil in KN *(Kilonewton)*
- **W$_{sk}$** Weight of Solids in Soil Mechanics in KN *(Kilonewton)*
- **W$_{su}$** Submerged Weight of Soil *(Kilonewton)*
- **W$_t$** Total Weight of Soil *(Kilogram)*
- **y$_S$** Submerged Unit Weight in KN per Cubic Meter *(Kilonewton per Cubic Meter)*
- **γ$_{dry}$** Dry Unit Weight *(Kilonewton per Cubic Meter)*
- **γ$_{saturated}$** Saturated Unit Weight of Soil *(Kilonewton per Cubic Meter)*
- **γ$_{soilds}$** Unit Weight of Solids *(Kilonewton per Cubic Meter)*
- **γ$_t$** Bulk Density of Soil *(Kilogram per Cubic Meter)*
- **γ$_{water}$** Unit Weight of Water *(Kilonewton per Cubic Meter)*
- **ρ$_d$** Dry Density *(Kilogram per Cubic Meter)*
- **ρ$_{dry}$** Dry Density of Solids *(Kilogram per Cubic Meter)*
- **ρ$_{ds}$** Dry Density in Soil Mechanics *(Kilogram per Cubic Meter)*

- ρ_{sat} Saturated Density *(Kilogram per Cubic Meter)*

- ρ_w Density of Water *(Kilogram per Cubic Meter)*

Constants, Functions, Measurements used

- Measurement: **Weight** in Kilogram (kg)
  Weight Unit Conversion 📲

- Measurement: **Volume** in Cubic Meter (m³)
  Volume Unit Conversion 📲

- Measurement: **Force** in Kilonewton (kN)
  Force Unit Conversion 📲

- Measurement: **Density** in Kilogram per Cubic Meter (kg/m³)
  Density Unit Conversion 📲

- Measurement: **Specific Weight** in Kilonewton per Cubic Meter (kN/m³)
  Specific Weight Unit Conversion 📲

Check other formula lists

- **Density of Soil Formulas** ⬈
- **Dry Unit Weight of Soil Formulas** ⬈
- **Unit Weight of Soil Formulas** ⬈
- **Water Content and Volume of Solids in Soil Formulas** ⬈

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