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Photogrammetry Stadia and Compass Surveying Formulas

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List of 17 Photogrammetry Stadia and Compass Surveying Formulas

Photogrammetry Stadia and Compass Surveying 🡵

Photogrammetry 🡵

1) Elevation of Point, Line or Area 🡵

Open Calculator 🡵

fx $h_1 = \left(H - \left(\frac{f_{len}}{P} \right) \right)$

ex $9m = \left(11m - \left(\frac{4.2m}{2.1} \right) \right)$

2) Flying Height of Airplane above Datum 🡵

Open Calculator 🡵

fx $H = \left(\left(\frac{f_{len}}{P} \right) + h_1 \right)$

ex $11m = \left(\left(\frac{4.2m}{2.1} \right) + 9m \right)$

3) Focal Length of Lens given Photo Scale 🡵

Open Calculator 🡵

fx $f_{len} = (P \cdot (H - h_1))$

ex $4.2m = (2.1 \cdot (11m - 9m))$

4) Photo Scale given Focal Length ⤢

fx $P = \left(\dfrac{f_{len}}{H - h_1} \right)$

Open Calculator ⤢

ex $2.1 = \left(\dfrac{4.2m}{11m - 9m} \right)$

Stadia Surveying ⤢

5) Additive Constant or Stadia Constant ⤢

fx $C = (f + D_c)$

Open Calculator ⤢

ex $10m = (2m + 8m)$

6) Distance Equation given Index Error ⤢

fx $D = \left(K_M \cdot \dfrac{s_i}{m - e} \right) + C_{add}$

Open Calculator ⤢

ex $35.5m = \left(12 \cdot \dfrac{3m}{3.1 - 1.5} \right) + 13$

7) Horizontal Distance between Center of Transit and Rod ⤢

fx

Open Calculator ⤢

$H_{Horizontal} = \left(K \cdot R_i \cdot (\cos(a))^2 \right) + (fc \cdot \cos(a))$

ex $26.90396m = \left(11.1 \cdot 3.2m \cdot (\cos(30°))^2 \right) + (0.3048m \cdot \cos(30°))$

8) Horizontal Distance using Gradienter ⎋

Open Calculator ⎋

$$fx \ D = s_i \cdot \frac{100 \cdot \cos(x)^2 \cdot 0.5 \cdot \sin(2 \cdot x)}{m \cdot c}$$

$$ex \ 10.98572m = 3m \cdot \frac{100 \cdot \cos(20°)^2 \cdot 0.5 \cdot \sin(2 \cdot 20°)}{3.1 \cdot 2.5m}$$

9) Intercept on Rod between Two Sighting Wires ⎋

Open Calculator ⎋

$$fx \ R = \frac{D_s}{\left(\frac{f}{R_i}\right) + C}$$

$$ex \ 6.023529m = \frac{64m}{\left(\frac{2m}{3.2m}\right) + 10m}$$

10) Stadia Distance from Instrument Spindle to Rod ⎋

Open Calculator ⎋

$$fx \ D_s = R \cdot \left(\left(\frac{f}{R_i}\right) + C\right)$$

$$ex \ 63.75m = 6m \cdot \left(\left(\frac{2m}{3.2m}\right) + 10m\right)$$

11) Stadia Interval ⎋

Open Calculator ⎋

$$fx \ S_i = m \cdot P_{screw}$$

$$ex \ 15.5m = 3.1 \cdot 5m$$

12) Staff Intercept 🔗

fx $s_i = D \cdot (\tan(\theta_1) - \tan(\theta_2))$

ex $3.982713m = 35.5m \cdot (\tan(25°) - \tan(19.5°))$

13) Staff Intercept in Gradienter given Horizontal Distance 🔗

fx $s_i = \dfrac{D}{\dfrac{100 \cdot \cos(x)^2 \cdot 0.5 \cdot \sin(2 \cdot x)}{m \cdot c}}$

ex $9.6944m = \dfrac{35.5m}{\dfrac{100 \cdot \cos(20°)^2 \cdot 0.5 \cdot \sin(2 \cdot 20°)}{3.1 \cdot 2.5m}}$

14) Staff Intercept in Gradienter given Vertical Distance 🔗

fx $s_i = \dfrac{V}{\dfrac{100 \cdot \sin(2 \cdot x) \cdot 0.5 \cdot \sin(x)^2}{m \cdot c}}$

ex $8.245573m = \dfrac{4m}{\dfrac{100 \cdot \sin(2 \cdot 20°) \cdot 0.5 \cdot \sin(20°)^2}{3.1 \cdot 2.5m}}$

15) Vertical Distance between Center of Transit and Rod Intersected by Middle Horizontal Crosshair ⧉

Open Calculator ⧉

fx
$$V = \frac{1}{2 \cdot ((K \cdot R_i \cdot \sin(2 \cdot a)) + (fc \cdot \sin(a)))}$$

ex
$$0.016174m = \frac{1}{2 \cdot ((11.1 \cdot 3.2m \cdot \sin(2 \cdot 30°)) + (0.3048m \cdot \sin(30°)))}$$

16) Vertical Distance between Instrument Axis and Lower Vane ⧉

Open Calculator ⧉

fx $V = D \cdot \tan(\theta_2)$

ex $12.57121m = 35.5m \cdot \tan(19.5°)$

17) Vertical Distance using Gradienter ⧉

Open Calculator ⧉

fx
$$V = s_i \cdot \frac{100 \cdot \sin(2 \cdot x) \cdot 0.5 \cdot \sin(x)^2}{m \cdot c}$$

ex
$$1.455326m = 3m \cdot \frac{100 \cdot \sin(2 \cdot 20°) \cdot 0.5 \cdot \sin(20°)^2}{3.1 \cdot 2.5m}$$

Variables Used

- **a** Vertical Inclination of Line of Sight *(Degree)*
- **c** Distance in One Turn *(Meter)*
- **C** Stadia Constant *(Meter)*
- **C$_{add}$** Additive Constant
- **D** Distance between Two Points *(Meter)*
- **D$_c$** Distance from Center *(Meter)*
- **D$_s$** Stadia Distance *(Meter)*
- **e** Index Error
- **f** Focal Length of Telescope *(Meter)*
- **f$_{len}$** Focal Length of Lens *(Meter)*
- **fc** Instrument Constant *(Meter)*
- **H** Flying Height of Airplane *(Meter)*
- **h$_1$** Elevation of Point *(Meter)*
- **H$_{Horizontal}$** Horizontal Distance *(Meter)*
- **K** Stadia Factor
- **K$_M$** Multiplying Constant
- **m** Revolution of Screw
- **P** Photo Scale
- **P$_{screw}$** Pitch Screw *(Meter)*
- **R** Intercept on Rod *(Meter)*
- **R$_i$** Rod Intercept *(Meter)*
- **s$_i$** Staff Intercept *(Meter)*

- **S$_i$** Stadia Interval *(Meter)*

- **V** Vertical Distance *(Meter)*

- **x** Vertical Angle *(Degree)*

- **θ$_1$** Vertical Angle to Upper Vane *(Degree)*

- **θ$_2$** Vertical Angle to Lower Vane *(Degree)*

Constants, Functions, Measurements used

- Function: **cos**, cos(Angle)
  Trigonometric cosine function

- Function: **sin**, sin(Angle)
  Trigonometric sine function

- Function: **tan**, tan(Angle)
  Trigonometric tangent function

- Measurement: **Length** in Meter (m)
  Length Unit Conversion

- Measurement: **Angle** in Degree (°)
  Angle Unit Conversion

Check other formula lists

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