now able to express the length s of the curve $\overline{mg} + \overline{gp}$ in a formula :

$$s = w\left\{1 + \tfrac{2}{3}\left(\frac{f}{w}\right)^2 - \tfrac{2}{5}\left(\frac{f}{w}\right)^4\right\}$$
$$+ B\left\{1 + \tfrac{2}{3}\left(\frac{a}{B}\right)^2 - \tfrac{2}{5}\left(\frac{a}{B}\right)^4\right\}$$
$$-(B-l)\left\{1 + \tfrac{2}{3}\left(\frac{a-h}{B-l}\right)^2 - \tfrac{2}{5}\left(\frac{a-h}{B-l}\right)^4\right\}\,*$$

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* The above formula gives the length only approximately. The mathematically correct formula is the following :

$$s = \frac{p}{2}\left\{\sqrt{\frac{2f}{p}\left(1 + \frac{2f}{p}\right)}\right.$$
$$\left. + \text{log. nat.}\left(\sqrt{\frac{2f}{p}} + \sqrt{1 + \frac{2f}{p}}\right)\right\}$$
$$+ \frac{p_1}{2}\left\{\sqrt{\frac{2a}{p_1}\left(1 + \frac{2a}{p_1}\right)}\right.$$
$$\left. + \text{log. nat.}\left(\sqrt{\frac{2a}{p_1}} + \sqrt{1 + \frac{2a}{p_1}}\right)\right\}$$
$$- \frac{p_1}{2}\left\{\sqrt{\frac{2(a-h)}{p_1}\left(1 + \frac{2(a-h)}{p_1}\right)}\right.$$
$$\left. + \text{log. nat.}\left(\sqrt{\frac{2(a-h)}{p_1}} + \sqrt{1 + \frac{2(a-h)}{p_1}}\right)\right\}$$

in which $p = \dfrac{w^2}{2f}$ $\quad p_1 = \dfrac{B^2}{2a} = \dfrac{(B-l)^2}{2(a-h)}$