

#. Gradient :

* slope provided in longitudinal direction.

1. Ruling gradient :

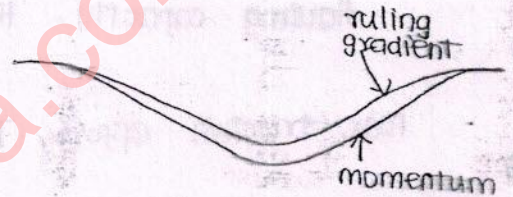
The max. gradient that can be provided with most general conditions.

In plain regions = 1 in 150 to 1 in 200.

In mountainous area = 1 in 100 to 1 in 150.

2. Momentum gradient :

Only in case of a valley curve where a falling gradient is meeting a rising gradient. The gradient can be slightly increased. The train can easily run on the rising gradient with extra momentum gained during downward movement of falling gradient.



3. Pusher gradient :

Only in exceptional cases, when there is no other option. Extra locomotive is required to pull the train on the steeper gradient provided (1 in 75) may be provided that will need one extra locomotive.

#. Grade compensation :

Grade compensation is required when gradient has been provided at the location of curve also. To

accommodate the effect of curve resistance, the gradient provided is kept slightly less (reduced gradient is provided). This reduction in gradient is called grade compensation.

Grade compensation:

$$= 0.0004 \cdot D^\circ \quad (\text{B.G.}) \quad (0.04\% \text{ per degree of curve})$$

$$= 0.0003 \cdot D^\circ \quad (\text{M.G.})$$

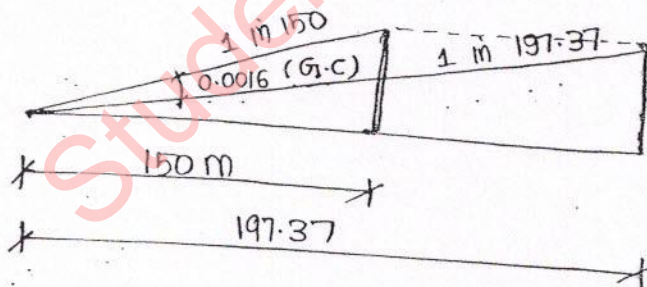
$$= 0.0002 \cdot D^\circ \quad (\text{N.G.})$$

Ex. 1. If ruling gradient is 1 in 150. There is curve also with gradient of 4° . What is grade compensation. What may be the max. gradient provided. BG track.

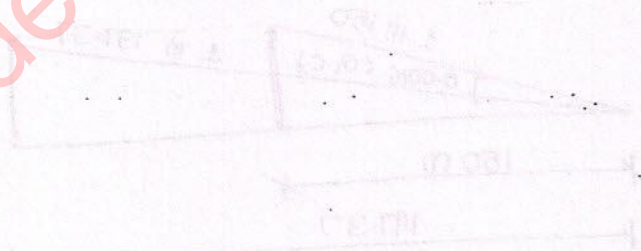
$$\text{Grade compensation} = 0.0004 \times 4^\circ = 0.0016$$

$$\text{Ruling gradient} = 1 \text{ in } 150$$

$$\text{Gradient to be provided} = \frac{1}{150} - 0.0016 = \frac{1}{197.37}$$



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that 3 of them are accepted?

$$n = 4$$

$$p = 0.4$$

$$q = 0.6$$

$$\begin{aligned} P(X=3) &= {}^4C_3 (0.6)^1 (0.4)^3 \\ &= 4 \times 0.6 \times (0.4)^3 = \end{aligned}$$

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17) Of the cigarette smoking population 70% men
30% women. 10% of these men and 20% of women
smoke WILLS. What is the probability that if a
person seen smoking WILLS will be a man?

$$M.C.S = 70\% = 70$$

$$W.C.S = 30\% = 30$$

$$M.W.C.S = \frac{10}{100} \times 70 = 7$$

$$W.W.C.S = \frac{20}{100} \times 30 = 6$$

$$\text{Total } 7+6 = 13$$

$$7/13 = \text{Answer.}$$

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