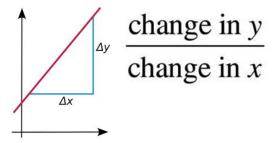


Slope (Gradient) of a line

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What is a Slope (Gradient)?

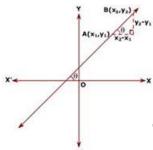


The <u>slope of a line</u> is a number that measures its "steepness". It is the change in y for a unit change in x along the line.

The slope of a line is generally denoted by m.

Thus,

m = tan ?

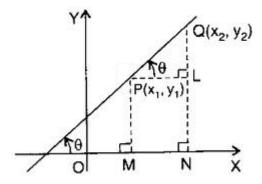


Since a line parallel to x – axis makes an angle of 0° with x – axis, therefore its slope is $\tan 0^{\circ} = 0$.

A line parallel to y – axis, perpendicular to x – axis makes an angle of 90 with x – axis, so its slope is $\tan 90^\circ = ?$. Also, the slope of a line equally inclined with axes is 1 or -1 as it makes 45° or 135° with x – axis.

The angle of inclination of a line with the positive direction of x – axis in anticlockwise sense always lies between 0° and 180° .

Slope of a line in terms of coordinates of any two points on it



Let P(x1, y1) and Q(x2, y2) be two points on a line making an angle? with the positive direction of x – axis. Draw PM, QN perpendiculars on x – axis and PL perpendicular on QN.

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Then, PL = MN = ON - OM = x2 - x1 and QL = ON - LN = QN - PM = y2 - y1 In ?PQL, tan ? = QL/PL = (y2 - y1)/(x2 - x1) Thus, if (x1, y1) and (x2, y2) are coordinates of any two points on a line, then its slope is m = (y2 - y1)/(x2 - x1) m = Difference of ordinates Difference of abscissae or, m = Vertical Step Horizontal Step
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Angle between two lines

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The angle ? between the lines having slopes m1 and m2 is given by tan ? = + m2 - m1
 1 + m1m2
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Slope (Gradient) of Parallel lines

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If two lines of slopes m1 and m2 are parallel, then the angle? between them is 0°.
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```
\tan ? = \tan 0^{\circ} = 0
m2 - m1 = 0
1 + m1m2
m2 = m1
```

Thus, when two lines are parallel, their slopes are equal.

Slope (Gradient) of Perpendicular lines

If two lines of slope m1 and m2 are perpendicular, then the angle ? between them is of 90°

```
cot ? = 1 + m1m2

m2 - m1

0 = 1 + m1m2

m1m2 = -1
```

Thus, when two lines are perpendicular, the product of their slopes is -1. If m is the slope of a line, then the slope of a line perpendicular to it is - (1/m).

Now try it yourself! Should you still need any help, click here to schedule live online session with e Tutor!

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Reference Links:

- http://en.wikipedia.org/wiki/Slope
- http://en.wikipedia.org/wiki/Perpendicular
- http://www.thefreedictionary.com/ordinates

• http://en.wikipedia.org/wiki/Abscissa

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