

Parallel and Perpendicular Lines

Parallel and perpendicular lines can be drawn by changing the slope of the linear equation and the y intercept. A linear equation of y in terms of x can be expressed by the slope-intercept form $y = mx + b$, where m is the slope and b is the y -intercept.

Parallel lines have an equal slope with different y -intercepts. Perpendicular lines have slopes that are negative reciprocals of each other ($m = -\frac{1}{m}$). These characteristics can be verified by graphing these lines.

Example

Graph parallel lines and perpendicular lines.

- Graph the equations $y = 3x + 1$ and $y = 3x + 2$.
- Graph the equations $y = 3x - 1$ and $y = -\frac{1}{3}x + 1$.

Before Starting There may be differences in the results of calculations and graph plotting depending on the setting. Return all settings to the default value and delete all data.

Set the zoom to the decimal window: ZOOM C (ENTER ALPHA ▼) 7

Step & Key Operation

Display

Notes

- 1-1** Enter the equations $y = 3x + 1$ for Y1 and $y = 3x + 2$ for Y2.

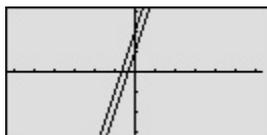
Y= 3 X/θ/T/M + 1 ENTER

3 X/θ/T/M + 2

```
Y1=3X+1
Y2=3X+2
Y3=
Y4=
Y5=
Y6=
```

- 1-2** View the graphs.

GRAPH



These lines have an equal slope but different y -intercepts. They are called parallel, and will not intersect.

- 2-1** Enter the equations $y = 3x - 1$ for Y1 and $y = -\frac{1}{3}x + 1$ for Y2.

Y= CL 3 X/θ/T/M - 1 ENTER

CL (-) 1 a/b 3 ► X/θ/T/M

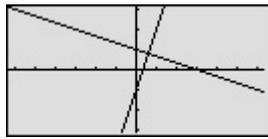
+ 1

```
Y1=3X-1
Y2=-1/3X+1
Y3=
Y4=
Y5=
```

Step & Key OperationDisplayNotes

2-2 View the graphs.

GRAPH



These lines have slopes that are negative reciprocals of each other ($m = -\frac{1}{m}$). They are called perpendicular. Note that these intersecting lines form four equal angles.

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The Graphing Calculator can be used to draw parallel or perpendicular lines while learning the slope or y -intercept of linear equations.