

## CALCULUS IIO

APPANDIX - B
Coordinate Geometry and lines

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## Slops

- The slope of a nonvertical line that passes through the points $P_{1}\left(x_{1}, y_{1}\right)$ and $P_{2}\left(x_{2}, y_{2}\right)$ is

$$
m=\frac{\Delta y}{\Delta x}=\frac{y_{2}-y_{1}}{x_{2}-x_{1}}
$$

The slope of a vertical line is not defined.

- The slope of a horizontal line is zero.
slope $=0$
- The following Figure shows several lines labeled with their slopes.
- The lines with positive slope slant upward to the right.
- The lines with negative slope slant downward to the right
- The steepest lines are the ones for which the absolute value of the slope is largest.

- A horizontal line has slope 0 .

Point-Slope Form of the Equation of a Line

An equation of the line passing through the point $P_{1}\left(x_{1}, y_{1}\right)$ and having slope $m$ is

$$
y-y_{1}=m\left(x-x_{1}\right)
$$

Slope-Intercept Form of the Equation of a Line

An equation of the line with slope $m$ and $y$-intercept $b$ is

$$
y=m x+b
$$

The Equation of every line is in the form

$$
A x+B y+C=0
$$

## Exercise 7:

Find the slope of the line through $P$ and $Q$.

$$
P(1,5), \quad Q(4,11)
$$

## Example 4:

Find an equation of the line through the points $(-1,2)$ and $(3,-4)$

## Example 3:

Find an equation of the line through
$(1,-7)$ with slope $-\frac{1}{2}$

## Exercise 28:

Find an equation of the line with slope $\frac{2}{5}$ and $y-$ intercept 4

## Parallel and Perpendicular lines

Two nonvertical lines are parallel if and only if they have the same slope.

$$
m_{1}=m_{2}
$$



Two lines with slopes $m_{1}$ and $m_{2}$ are perpendicular if and only if

$$
m_{1} m_{2}=-1
$$

that is, their slopes are negative reciprocals:

$$
m_{2}=-\frac{1}{m_{1}}
$$



## Example 7:

Find an equation of the line through the point $(5,2)$ that is parallel to the line

$$
4 x+6 y+5=0
$$

## Example 8:

Show that the lines $2 x+3 y=1$ and $6 x-4 y-1=0$ are perpendicular.

## Exercise 31:

Find an equation of the line that satisfies the given conditions
Through $(4,5)$, parallel to the $x$ - axis

## Exercise 39:

Find the slope and $y$-intercept of the line and draw its graph

$$
y=-2
$$

## Exercise 32:

Find an equation of the line that satisfies the given conditions
Through $(4,5)$,
parallel to the $y$-axis

## Exercise 41:

Find the slope and $y$-intercept of the line and draw its graph

$$
3 x-4 y=12
$$



$$
8,10,21,23,26,27,30,33,37,40,42
$$

