Conditions

find the slope of the line that is a) parallel and b) perpendicular to the given line

1a) 5x+2y=10

1b) y=-7

1c) x=10

write an equation for the line in point/slope form and slope/intercept form that has the given condition.

2a) passes through (-7,2) and is parallel to 7x+2y=0

2b) passes through (3,-1) and is perpendicular to y=2x-3

Solution

1a) $5x + 2y = 10$

$$y = -\frac{5}{2}x + 10$$

$$y = kx + b$$

The parallel line has the same slope, and it's equal to -5/2.

The perpendicular is:

$$k_1 = -\frac{1}{k} = \frac{2}{5}$$

1b) y=-7

For this line the parallel is each line:

$$y = const$$

Slope is equal to 0

Perpendicular:

$$x = const$$

There is no slope, it's an asymptotic line for $k \to \infty$

1c) x=10

For this line the parallel is each line:

$$x = const$$

There is no slope, it's an asymptotic line for $k \to \infty$

Perpendicular:

$$y = const$$

Slope is equal to 0

2a) passes through (-7,2) and is parallel to 7x+2y=0

$$y = kx + b$$

$$y = -\frac{7}{2}x + 0$$

The parallel line has a slope $-\frac{7}{2}$:

$$y = -\frac{7}{2}x + c$$

As it passes through (-7,2), then:

$$2 = -\frac{7}{2}(-7) + c$$

$$c = \frac{53}{2}$$

$$y = -\frac{7}{2}x + \frac{53}{2}$$

Or

$$2y + 7x = 53$$

2b) passes through (3,-1) and is perpendicular to y=2x-3

$$y = kx + b$$

$$y = 2x + (-3)$$

The perpendicular line has a slope -1/2:

$$y = -\frac{1}{2}x + c$$

As the line passes through (3,-1), then:

$$-1 = -\frac{1}{2}3 + c$$

$$c = \frac{1}{2}$$

$$y = -\frac{1}{2}x + \frac{1}{2}$$

Or

$$2y + x = 1$$