1 *Consider the line through the point* $(1, 2)$ *with slope* 3.

a *Draw a graph of this line on the number plane below.*

I start at the point $(1, 2)$ and move either up 3 and right 1 or down 3 and left 1, as often as fits. This produces also the points $(2, 5)$, $(0, -1)$, and $(-1, -4)$. The graph is on the next page.

b **Extra credit:** *Refer to your graph; what is its y-intercept? What is an equation for this line?*

Since the line goes through

$$(0, -1),$$

that is the intercept. Since also the slope is 3, an equation for the line is

$$y = 3x - 1.$$

2 *Consider the line with equation*

$$2x + y = 2.$$

a *What is the slope of this line? (Show what equation you solve or what numerical calculation you make.)*

I solve the equation for y:

$$\begin{aligned} 2x + y &= 2; \\ y &= -2x + 2. \end{aligned}$$

Since the coefficient on x is -2, the slope of the line is also

$$-2.$$

b *What is the slope of a line perpendicular to this line?*

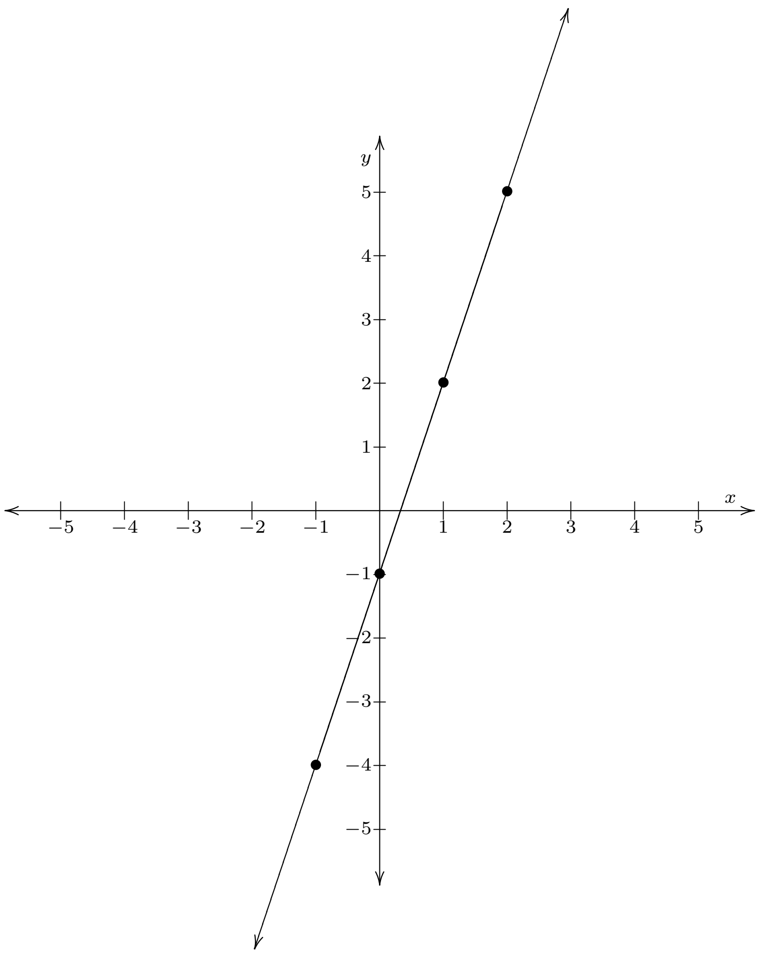
Since the slope of the original line is -2, the slope of the perpendicular line is

$$-\frac{1}{-2} = 1/2.$$

c *Find an equation for a line that passes through* $(-3, 0)$ *and is perpendicular to the line above.*

This line with slope $1/2$ goes through $(-3, 0)$, so its equation is

$$\begin{aligned} y &= \frac{1}{2}\big[x - (-3)\big] + 0; \\ y &= \frac{1}{2}x + \frac{3}{2}. \end{aligned}$$



y
x
5
4
3
2
1
−1
−2
−3
−4
−5
−5
−4
−3
−2
−1
1
2
3
4
5