1 *Consider the line through the points* $(1, 3)$ *and* $(-1, 2)$.

a *What is the slope of this line?*

The rise is the change in the second coordinate: $(2) - (3) = -1$; the run is the change in the first coordinate: $(-1) - (1) = -2$. Then the slope is the rise divided by the run: $(-1)/(-2) = 1/2$. In summary, the slope is

$$\frac{(2) - (3)}{(-1) - (1)} = \frac{-1}{-2} = \frac{1}{2}.$$

b *Write down an equation in for this line in the variables* x *and* y.

In general, the equation is $y = mx + b$, where m is the slope. I know that $m = 1/2$; at one point, $x = 1$ and $y = 3$. This means that $3 = (1/2)(1) + b$, so $b = 5/2$. Therefore, the equation is

$$y = \frac{1}{2}x + \frac{5}{2}.$$

(There are at least five other ways that you could do this problem; all would give the same equation when solved for y and simplified.)

2 *Consider the line with the equation*

$$2x + y = 2$$

in x *and* y.

a *What is the slope of this line?*

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 that's perpendicular to this line?*

I take the opposite reciprocal:

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