1. \(5x + 11y = 2014\) \(\Rightarrow x = (2014 - 11y) / 5\). In order for \(x\) to be an integer, \(11y\) must end in 4 or 9. The possible values for \(11y\) are 44, 99, 154, 44 + 55z, \(\ldots\), for \(z = 0, 1, 2, \ldots\). If \(44 + 55z < 2014\) then \(55z < 1970\) \(\Rightarrow z < 1970 / 55 = 35.81\). So \(z = 0, 1, 2, \ldots, 35\) and there are 36 pairs of positive integers \((x, y)\).

2. Let the origin be at the lower left corner of rectangle A. The line goes through the points \((1, 5)\) and \((6, 2)\). The equation of the line is \(y - 5 = -\frac{3}{5}(x - 1) = -\frac{3}{5}x + \frac{3}{5}\) or \(y = -\frac{3}{5}x + \frac{28}{5}\). When \(x = 4\), \(y = 16/5\).

3. Since \(140 = 4 \cdot 5 \cdot 7\) and the greatest common divisor of A and B is 4, there are two possible pairs with \(A < B\): A = 4 and B = 140, or A = 20 and B = 28.

4. If \(x\) and \(y\) are the dimensions of the rectangle, then the smallest value of the perimeter \(2x + 2y\) is when \(x = y = \sqrt{120}\). But this is not an integer. The smallest perimeter will occur when \(x\) and \(y\) are as close to equal as possible. This is when \(x = 10\) in and \(y = 12\) in and the perimeter is 44 in. Note: If \(x = y = \sqrt{120}\) in, then the perimeter is \(4\sqrt{120} \approx 43.8\) in, so 44 in is the smallest possible integer value for the perimeter.

5. If \(x > 15\), then 35 = \(|x + 10| + |15 - x| = x + 10 - (15 - x) = 2x - 5\) and \(x = 20\).
   If \(-10 < x < 15\) then 35 = \(|x + 10| + |15 - x| = x + 10 + 15 - x = 25\) which is impossible.
   Finally, if \(x < -10\) then 35 = \(|x + 10| + |15 - x| = -(x + 10) + 15 - x = -2x + 5\) and \(x = -15\).

6. Let \(x\), \(y\) and \(z\) be the weight of a pat, a pot and a put, respectively. So \(x + y = 20\), or \(x = 20 - y\).
   Hence \(2x + y + z = 47\) \(\Rightarrow 2(20 - y) + y + z = 47 \Rightarrow -y + z = 7\) \(\Rightarrow 2z = 26\) and \(z = 13\).

7. If Sam takes \(x\) hours to do the job, then Pat takes \(3x/2\) hours. In one hour they do \(1/3\) of the job, so we have \(\frac{1}{3} = \frac{1}{x} + \frac{2}{3x} \Rightarrow x = 3 + 2 = 5\) hours.

8. If two corner squares are shaded, there are 2 possibilities. If one corner square is shaded, there are 3 possibilities. If no corner squares are shaded, there are 3 possibilities. Thus there are 8 possible distinct patterns.