A1. Since the shortest side of the rectangle is 8, the maximum diameter of a circle inside of it is \(8\). The maximum radius is thus \(\frac{1}{2}(8) = 4\).

A2. The total angle degree sum for a convex pentagon is \(180n - 360 = 180(n-2)\) for \(n = 5\), so \(180(3) = 540\). Three angles sum to \(100^\circ + 90^\circ + 110^\circ = 300^\circ\), so the sum of the remaining two is \(540^\circ - 300^\circ = 240^\circ\). Their average measure is then \(\frac{1}{2}(240^\circ) = 120^\circ\).

A3. The perimeter of the rectangle is 14, and if the other side is length \(5\), then \(4+4+5+5 = 8+8\) is also the perimeter. So \(8+8 = 14\), \(2s = 14\), so \(s = 3\). The area is then \(3 \cdot 4 = 12\), and if the diagonal is \(d\), then \(3^2+4^2 = d^2\), so \(9+16 = 25 = d^2\), and \(d = \sqrt{25} = 5\).
A4. Taking a height perpendicular to one base, this splits the base into segments of length 1.

Applying the Pythagorean Theorem, \( l^2 + h^2 = 2^2 \), so \( l^2 + h^2 = 4 \), \( h^2 = 3 \), and \( h = \sqrt{3} \).

A5. The non-right angles are equal in measure, and sum to 90°, so they each must be 45°. Since the non-hypotenuse sides have the same length, if the hypotenuse has length \( c \), then \( s^2 + s^2 = c^2 \), so \( 2s^2 = c^2 \), and \( \sqrt{2s^2} = \sqrt{c^2} \), so \( c = s\sqrt{2} \).

A6. If the radius of the circle is \( r \), then the side of the square has length 2r.

So, the area of the square is \((2r)^2 = 4r^2\), and the area of the circle is \( \pi r^2 \), and the ratio asked for is \( \frac{\pi r^2}{4r^2} = \frac{\pi}{4} \) or \( \pi : 4 \).
If the radius of the circle is \( r \), its area is \( \pi r^2 \) and its circumference is \( 2\pi r \). To find these for the square, we need the side length of the square. If we draw the right triangle with hypotenuse \( r \) as in the picture, the other two sides have the same length, say \( a \), where \( 2a \) is the side length of the square. From the Pythagorean Theorem,

\[ a^2 + a^2 = r^2, \quad \text{so} \quad 2a^2 = r^2, \quad \text{so} \quad a\sqrt{2} = r, \quad \text{or} \quad a = \frac{r}{\sqrt{2}}. \]

The area of the square is now \( (2a)^2 = \left(\frac{2r}{\sqrt{2}}\right)^2 = 4r^2 \frac{r^2}{2} = 2r^2 \), so the ratio of the areas is \( \frac{\pi r^2}{2r^2} = \frac{\pi}{2} \) or \( \pi : 2 \). The perimeter of the square is \( 4 \left(\frac{2r}{\sqrt{2}}\right) = 4\sqrt{2}r \). Note \( \frac{2r}{\sqrt{2}} = \frac{(\sqrt{2})^2 r}{\sqrt{2}} = \sqrt{2} r \), so the perimeter is \( 4\left(\frac{2r}{\sqrt{2}}\right) = 4\sqrt{2}r \). The ratio of the circumference to the perimeter is now

\[ \frac{2\pi r}{4\sqrt{2}r} = \frac{\pi}{2\sqrt{2}} \quad \text{or} \quad \pi : 2\sqrt{2}. \]
(i) The segment on the bottom edge between the two heights has length $a$, since it must be the same as the top base edge. Since the total length of the bottom base is $b$, and two segments are length $c$ and $a$, the third must be $b-c-a$ (since $c+a+(b-c-a)=b$).

(ii) The left triangle has base $c$ and height $h$, so has area $\frac{1}{2}ch$. The triangle on the right has base $b-c-a$ and height $h$, so has area $\frac{1}{2}(b-c-a)h$.

(iii) The area of the trapezoid is the sum of the areas of the two triangles and the $a$-by-$h$ rectangle in the middle. That rectangle has area $ah$, so the total area is

$$\frac{1}{2}ch + \frac{1}{2}(b-c-a)h + ah = \frac{1}{2}ch + \frac{1}{2}(bh-ch-ah)+ah$$

$$= \frac{1}{2}ch + \frac{1}{2}bh - \frac{1}{2}ch - \frac{1}{2}ah + ah$$

$$= \frac{1}{2}bh - \frac{1}{2}ah + ah = \frac{1}{2}bh + \frac{1}{2}ah = \boxed{\frac{1}{2}(b+a)h}.$$