The perimeter of one square is 748 cm and that of another is 336 cm. Find the perimeter and the diagonal of a square which is equal in area to these two.

Solution:

The formula for the perimeter of a square is: $P = 4a$, where a is the length of the side

The formula for the area of a square is: $A = a^2$
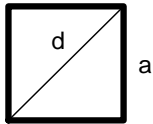
For the first square:

$$a = \frac{748}{4} = 187 cm \quad \text{and} \quad A = 187^2 = 34969 \ cm^2$$

For the second square:

$$a = \frac{336}{4} = 84 cm \quad \text{and} \quad A = 84^2 = 7056 \ cm^2$$

If a square is equal in area to these two, then its area is:

$$A = 34969 + 7056 = 42025 \ cm^2$$

And the length of its sides are :

$$a = \sqrt{A} = \sqrt{42025} = 205 \ cm$$

So the perimeter of a square is:

$$P = 4 \cdot 205 = 820 \ cm$$

The diagonal of a square is:

$$d = \sqrt{a^2 + a^2} = a\sqrt{2} = 205\sqrt{2} \ cm \approx 290 \ cm$$

Answer: the perimeter is $820 \ cm$ and the diagonal is $205\sqrt{2} \ cm$