Risp 35: Index Triples

ϕ = 1.618033989...

e = 2.718281828...

π = 3.141592654...

How many different numbers can you make by replacing the squares below with ϕ, e and π in some order? (No repeats!)

$$(\square^{\square})^{\square}$$

Without using a calculator, try to place these numbers in order of size.
If k = (largest of these numbers/smallest of these numbers),
to which of these powers of 10 would you guess k is closest?

1, 10, 100, 1000, 10 000

Now check your answers with a calculator.

Can you find three distinct numbers a, b, c so that

$$a^{(b^c)} = c^{(a^b)}\ ?$$

Can you find three distinct numbers a, b, c so that

$$a^{(b^c)} = c^{(a^b)} = b^{(c^a)}\ ?$$

How many of the following six numbers can be equal
if a, b and c are all distinct?

$$a^{(b^c)} \quad c^{(a^b)} \quad b^{(c^a)}$$

$$a^{(c^b)} \quad c^{(b^a)} \quad b^{(a^c)}$$

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