Which Is Greater?

IN05-V1 · storyboard · IN05 Which is greater? Fractions, roots and big powers. Read each picture with its sentences.

Picture 1

Which is larger, $\frac{9}{11}$ or $\frac{5}{6}$?

$9 \times 6 = 54, \quad 5 \times 11 = 55$ each top times the other bottom

$$\frac{9}{11} < \frac{5}{6}$$

1. Which is larger, 9 elevenths or 5 sixths?
2. Multiply each top by the other bottom: 9 times 6 is 54, and 5 times 11 is 55.
3. 54 is less than 55, so 9 elevenths is less than 5 sixths.

Picture 2

Which is larger, $6\sqrt{2}$ or $2\sqrt{3}$?

$(6\sqrt{2})^2 = 72, \quad (2\sqrt{3})^2 = 12$ both positive: square them

$$6\sqrt{2} > 2\sqrt{3}$$

4. Which is larger, 6 root 2, or 2 root 3?
5. Both are positive, so square them: 6 root 2 squared is 36 times 2, which is 72, and 2 root 3 squared is 4 times 3, which is 12.
6. 72 is more than 12, so 6 root 2 is larger.

Picture 3

Which is larger, 2^{500} or 3^{300}?

$$2^{500} = (2^5)^{100} = 32^{100}$$

$$3^{300} = (3^3)^{100} = 27^{100}$$

$$\boxed{2^{500} > 3^{300}}$$ 32 > 27

7. Which is larger, 2 to the 500, or 3 to the 300?
8. 500 and 300 are both multiples of 100.
9. 2 to the 500 is 2 to the 5, to the power 100: that is 32 to the 100.
10. And 3 to the 300 is 3 to the 3, to the power 100: 27 to the 100.
11. 32 is bigger than 27, so 2 to the 500 is larger.

Picture 4

Trap $5^{100} \; ? \; 4^{125}$

$\times \; 5 > 4, \text{ so } 5^{100}$

$\checkmark \quad 625^{25} < 1024^{25}$

12. Watch for the trap: don't compare the base alone.
13. With the same exponent, 5 to the 100 is 625 to the 25, and 4 to the 125 is 1024 to the 25.
14. So 4 to the 125 is larger.