

## Topic 27: Solve exponential equations

1. Solve for x:

$$\left(\frac{1}{2}\right)^x = 8^{x+2}$$

2. Solve for x:

$$36^{2x} = 216^{x-1}$$

3. Solve for x and give the exact answer:

$$3^x = 5$$

4. Solve for x and give the exact answer:

$$2^{x-1} = 3$$

5. Solve for x and give the exact answer:

$$4^{2x-1} = 5^{x+3}$$

### Answers

1.

$$2^{-x} = 2^{3x+6}$$

$$-x = 3x + 6$$

$$-6 = 4x$$

$$x = \frac{-3}{2}$$

2.

$$6^{4x} = 6^{3x-3}$$

$$x = -3$$

3.

$$3^x = 5$$

$$x \ln 3 = \ln 5$$

$$x = \frac{\ln 5}{\ln 3}$$

4.

$$(x-1)\ln 2 = \ln 3$$

$$x-1 = \frac{\ln 3}{\ln 2}$$

$$x = 1 + \frac{\ln 3}{\ln 2}$$

5.

$$(2x-1)\ln 4 = (x+3)\ln 5$$

$$2x\ln 4 - \ln 4 = x\ln 5 + 3\ln 5$$

$$x\ln 16 - x\ln 5 = \ln 125 + \ln 4$$

$$x\ln \frac{16}{5} = \ln 500$$

$$x = \frac{\ln 500}{\ln \frac{16}{5}}$$