

## Exponential Equations

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In an exponential equation the variable is in the exponent (index). An exponential equation in which each side can be expressed in terms of the **same base** can be solved using the property: if  $b^x = b^y$ , then  $x = y$  (where  $b > 0$  and  $b \neq 1$ ) ie if the bases are the same, set the exponents equal.

Solve the following equations to find  $x$ .

a.  $3^x = 81$

b.  $25^x = 5$

c.  $2^x = \frac{1}{2}$

d.  $5^{2x} = \frac{1}{25}$

e.  $10^{1-x} = 10^4$

f.  $4^{2x} + 1 = 65$

g.  $7^{2x+1} = 7^{3x-2}$

h.  $3^{2x-1} = 27$

i.  $5^{3x-8} = 25^{2x}$

j.  $3^{2x-1} = 27^x$

k.  $3^2 \times 3^x = 27^x$

l.  $2^{x-1} = \frac{1}{4}$

m.  $9(3^x) = 27^{x-1}$

n.  $8^{x-2} = \sqrt{8}$

o.  $k^{x+1} = (\sqrt{k})(k^{2x})$

p.  $4^{x+1} = \frac{1}{64}$

q.  $3^{x^2-3x} = 81$

r.  $4^{2x^2+2x} = 8$

### Extension

Solve  $3^x - 3^{2-x} = 8$