

Solve the equation

$$3^{x+1} = \frac{27^x}{9}$$

[5]

Find  $x$  given that

$$\frac{5^x}{25^{x-1}} = \sqrt{5}$$

[6]

Solve the equation

$$27x^{-\frac{1}{2}} = 125x$$

[5]

Solve the equation

$$\frac{16^x}{2^{x-1}} = 2^{\frac{1}{2}}$$

[6]

Solve the simultaneous equations

$$4x - 3y = 11$$

and  $27^x \times 9^{y+3} = 3\sqrt{3}$

[9]

Solve the equation

$$\frac{81^{3-x}}{27^{2x+1}} = 3$$

[6]

Solve

$$\frac{27^x}{3^{x-1}} = 3\sqrt{3}$$

[6]

Solve the equation

$$4^{3x-2} = \frac{1}{2\sqrt{2}}$$



Solve the equation

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

**a** Given that  $y = 2^x$ , express each of the following in terms of  $y$ .

**i**  $2^{x+2}$

**ii**  $4^x$

**b** Hence, or otherwise, find the value of  $x$  for which

$$4^x - 2^{x+2} = 0.$$

Solve the simultaneous equations

$$4^{2x} = 2^{y-1}$$

$$9^{4x} = 3^{y+1}$$

**a** Given that  $y = 3^x$  express  $3^{2x+2}$  in terms of  $y$ .

**b** Hence, or otherwise, solve the equation

$$3^{2x+2} - 10(3^x) + 1 = 0.$$