

# Index issues

## Problem

$\sqrt{x}$  or  $x^{\frac{1}{2}}$ ? Whichever we prefer, we need to be comfortable working with indices and roots in either form.

Below is a series of equations, for which you should think about the following questions.



For what values of  $x$  and  $y$  do these statements make sense?

What are the possible values for the expressions?

$$(1) (xy)^{\frac{1}{2}} = x^{\frac{1}{2}}y^{\frac{1}{2}}$$

$$(2) (xy)^{\frac{5}{3}} = x^{\frac{5}{3}}y^{\frac{5}{3}}$$

$$(3) (xy)^{\frac{2}{3}} = x^{\frac{2}{3}}y^{\frac{2}{3}}$$

$$(4) (xy)^{-\frac{1}{2}} = x^{-\frac{1}{2}}y^{-\frac{1}{2}}$$

$$(5) (xy)^{\frac{1}{2}} = x^{\frac{1}{3}}y^{\frac{2}{3}}$$

$$(6) (xy)^{-2} = x^2y^2$$

$$(7) \left(\frac{x}{y}\right)^{-\frac{1}{3}} = x^{-\frac{1}{3}}y^{\frac{1}{3}}$$

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