Example

Complete the following:

Copy and complete these products of radicals:

$\sqrt{25} \times \sqrt{4} = 5 \times 2 = 10$ $\quad\quad$ $\sqrt{25 \times 4} = \sqrt{100} = 10$

$\sqrt{16} \times \sqrt{9} = 4 \times 3 = 12$ $\quad\quad$ $\sqrt{16 \times 9} = \sqrt{144} = 12$

$\sqrt{4} \times \sqrt{36} = 2 \times 6 = 12$ $\quad\quad$ $\sqrt{4 \times 36} = \sqrt{144} = 12$

$\sqrt{100} \times \sqrt{9} = 10 \times 3 = 30$ $\quad\quad$ $\sqrt{100 \times 9} = \sqrt{900} = 30$

$$\sqrt{a} \times \sqrt{b} = \sqrt{ab}$$

Radical Notation

Lesson objectives

- I know how to switch from an entire radical to a mixed radical
- I know how to switch from a mixed radical to an entire radical

1.1 Lesson objectives | Teachers' notes | Lesson notes

Nelson Page 167 #s 1, 4 & 6 (simplify to mixed radicals)

Operations with Radicals

Radical: a square, cube or higher root, such as $\sqrt{4}=2$ or $\sqrt[3]{27}=3$; $\sqrt{\ }$ is called the radical symbol.

Entire Radical: a radical without coefficient; for example $\sqrt{12}$

Mixed Radical: a radical with coefficient other than 1; for example $2\sqrt{3}$

Radicals as a Product

We saw in the warm up that we can factor the term under the radical to take the root of each factor.

Example: $\sqrt{81}=\sqrt{9\times 9}=\left(\sqrt{9}\right)\left(\sqrt{9}\right)$

$=(3)(3)$

$=9$

Mixed Radicals

- We use the idea of changing to the product to change an entire radical to a mixed radical.
- When we look to factor we want to factor to values which are perfect squares.

For example, if we are factoring 18, we could do 3 x 6 or 2 x 9.

We need to ask ourselves which option has a square root that we know! Since we know the square root of 9, we choose to factor 18 to 2 x 9.

Example

Express each of these as a mixed radical in its lowest terms

a) $\sqrt{45}$ b) $\sqrt{32}$ c) $\sqrt{75}$ d) $\sqrt{128}$

$= \sqrt{9 \times 5}$ $= \sqrt{16 \times 2}$ $= \sqrt{25 \times 3}$ $= \sqrt{64 \times 2}$

$= \sqrt{9} \times \sqrt{5}$ $= \sqrt{16} \times \sqrt{2}$ $= \sqrt{25} \times \sqrt{3}$ $= \sqrt{64} \times \sqrt{2}$

$= 3\sqrt{5}$ $= 4\sqrt{2}$ $= 5\sqrt{3}$ $= 8\sqrt{2}$

From Mixed Radicals to Entire Radicals

- To convert from mixed radicals to entire radicals we need to put the coefficient "back" under the radical sign.

- To do this we square the coefficient and write it as a multiple of the value already under the radical.

Example: $4\sqrt{3} = \sqrt{(4^2)(3)} = \sqrt{16(3)} = \sqrt{48}$

Example

Convert each to entire radicals

a) $3\sqrt{2}$

$= \sqrt{3^2 \times 2}$

$= \sqrt{9 \times 2}$

$= \sqrt{18}$

b) $5\sqrt{3}$

$= \sqrt{5^2 \times 3}$

$= \sqrt{25 \times 3}$

$= \sqrt{75}$

c) $7\sqrt{2}$

$= \sqrt{7^2 \times 2}$

$= \sqrt{49 \times 2}$

$= \sqrt{98}$