Craigieburn Secondary College

Best Practice – BP#1 – Exponents and Surds

AusVELS 9.5 Students are able to simplify algebraic products using index laws and fluently apply negative indices.

Q: Simplify the following:

a) $16^{\frac{3}{4}}$

b) $4^{-\frac{5}{2}}$

c) $\dfrac{1}{25^{-2}}$

Step 1	To simplify $16^{\frac{3}{4}}$, apply the following index laws ➢ Rule: $(a^m)^n = a^{mn}$ and rewrite it ➢ Rules: $a^{\frac{1}{q}} = \sqrt[q]{a}$ $a^{\frac{p}{q}} = (a^p)^{\frac{1}{q}} = \sqrt[q]{a^p}$ $a^{\frac{p}{q}} = (a^{\frac{1}{q}})^p = (\sqrt[q]{a})^p$ ➢ then simplify	$16^{\frac{3}{4}} = (16^{\frac{1}{4}})^3$ $= (\sqrt[4]{16})^3$ $= 2^3$ $= 8$
Step 2	To simplify $4^{-\frac{5}{2}}$, apply the following index laws ➢ Rule: $a^{-m} = \dfrac{1}{a^m}$ and rewrite it ➢ Rules: $(a^m)^n = a^{mn}$ $a^{\frac{1}{q}} = \sqrt[q]{a}$	$4^{-\frac{5}{2}} = \dfrac{1}{4^{\frac{5}{2}}}$ $= \dfrac{1}{(4^{\frac{1}{2}})^5}$ $= \dfrac{1}{\sqrt{4}^5}$ $= \dfrac{1}{2^5}$

	$a^{\frac{p}{q}} = (a^p)^{\frac{1}{q}} = \sqrt[q]{a^p}$ $a^{\frac{p}{q}} = (a^{\frac{1}{q}})^p = (\sqrt[q]{a})^p$ ➢ then simplify	$= \frac{1}{32}$
Step 3	$\frac{1}{25^{-2}}$ To simplify , apply the following index laws ➢ Rule: $\frac{1}{a^{-m}} = a^m$ and rewrite it ➢ then simplify	$\frac{1}{25^{-2}} = 25^2 = 625$