15. $\frac{2}{(4+3\sqrt{2})} \cdot \frac{(4-3\sqrt{2})}{(4-3\sqrt{2})}$ FOIL

$$\frac{8-6\sqrt{2}}{16-9\sqrt{4}} = \frac{8-6\sqrt{2}}{-2}$$

$16-18$

$\frac{8}{-2} \quad \frac{-6\sqrt{2}}{-2}$

$-4+3\sqrt{2}$

1.) $5\sqrt{15} \cdot 3\sqrt{20}$

$15\sqrt{15 \cdot 20}$

$\longrightarrow 15\sqrt{300}$

$15\sqrt{\overset{10}{\cancel{100}} \cdot 3}$

$150\sqrt{3}$

16.) $\frac{3}{(3-\sqrt{5})} \cdot \frac{(3+\sqrt{5})}{(3+\sqrt{5})}$

$$\frac{9+3\sqrt{5}}{9-5}$$

$$\frac{9+3\sqrt{5}}{4}$$

12.) $(3\sqrt{3}+\sqrt{5})(4\sqrt{2}+\sqrt{5})$

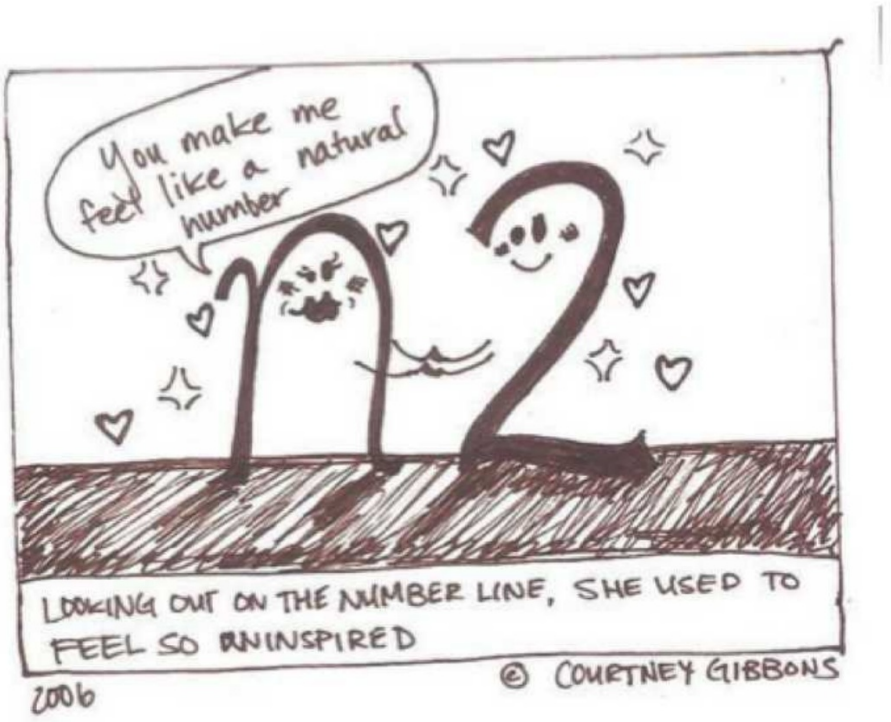
$12\sqrt{6}+3\sqrt{15}+4\sqrt{10}+5$

20.) $\frac{\sqrt[5]{3}}{\sqrt[5]{8}} \cdot \frac{\sqrt[5]{4}}{\sqrt[5]{4}} = \frac{\sqrt[5]{12}}{2}$

17.) $\frac{2}{\sqrt[3]{2}} \cdot \frac{\sqrt[3]{4}}{\sqrt[3]{4}} = \frac{2\sqrt[3]{4}}{\sqrt[3]{8}}$

$= \frac{\cancel{2}\sqrt[3]{4}}{\cancel{2}}$

A2 Simplifying nth Roots with Variables



ex: Simplify. If no real value exists, write "nonreal."

a) $\sqrt[3]{40} = \sqrt[3]{8} \cdot \sqrt[3]{5}$

$= 2\sqrt[3]{5}$

b) $-\sqrt[4]{162}$ $\quad -\sqrt[4]{81}\sqrt[4]{2} = -3\sqrt[4]{2}$

c) $\sqrt[5]{-250} = -\sqrt[5]{250}$

ex: Simplify. If no real value exists, write "nonreal."

d) $\frac{5}{\sqrt[3]{25}} \cdot \frac{\sqrt[3]{5}}{\sqrt[3]{5}}$

$$\frac{5\sqrt[3]{5}}{5}$$

$$\sqrt[3]{5}$$

Simplifying nth Roots Involving Variables

$\sqrt[3]{8}$

2

$x^2 \cdot x^3 = x^5$

ex: Simplify. Assume all variables are positive.

a) $\sqrt[3]{x^4}$ $= \sqrt[3]{x^3} \cdot \sqrt[3]{x^1}$

$x\sqrt[3]{x}$

ex: Simplify. Assume all variables are positive.

b) $\sqrt[5]{x^{22}} = \sqrt[5]{x^5 \cdot x^5 \cdot x^5 \cdot x^5 \cdot x^2}$

$= x^4\sqrt[5]{x^2}$ $\quad \sqrt[5]{x^{20} \cdot x^2} = x^4\sqrt[5]{x^2}$

c) $\sqrt[7]{x^{17}} = \sqrt[7]{x^{14} \cdot x^3} = x^2\sqrt[7]{x^3}$

d) $\sqrt[9]{x^{21}} = \sqrt[9]{x^{18} \cdot x^3} = x^2\sqrt[9]{x^3}$

$\sqrt[4]{x^4} = x$

$\sqrt[4]{x^8} = x^2$

ex: Simplify. Assume all variables are positive.

e) $\sqrt[3]{16x^4y^6z^2}$ $y^2\sqrt[3]{8\cdot 2\cdot x^3\cdot x^1 z^2}$

$2xy^2\sqrt[3]{2xz^2}$

f) $\sqrt[5]{-96xy^{10}z^{14}}$ $=-\sqrt[5]{32\cdot 3xy^{10}z^{10}z^4}$

$-2y^2z^2\sqrt[5]{3xz^4}$

ex: Simplify. Assume all variables are positive.

g) $\sqrt[2]{x} = \sqrt{x}$

$\sqrt{16} = 4$

h) $\sqrt[2]{x^4} = x^2$

$\sqrt[2]{2^4} = 2^2$

i) $\sqrt[2]{x^6}$

x^3

ex: Simplify. Assume all variables are positive.

j) $\sqrt[4]{x^8} = x^2$

k) $\sqrt[4]{x^5} = \sqrt[4]{x^4 \cdot x^1} = x^1\sqrt[4]{x}$

ex: Simplify. Assume all variables are positive.

l) $\sqrt[6]{x^6y^{12}z^{20}}$ $= xy^2\sqrt[6]{z^{18}z^2} = xy^2z^3\sqrt[6]{z^2}$

m) $\sqrt[4]{48x^3y^{12}z^{24}}$ $y^3z^6\sqrt[4]{16\cdot 3x^3}$

$2y^3z^6\sqrt[4]{3x^3}$

ex: Simplify. Assume all variables are positive.

n) $\sqrt{200x^3y^4z}$ $= y^2\sqrt{100 \cdot 2x^2 \cdot x^1 z}$

$= 10xy^2\sqrt{2xz}$

$\sqrt{x^2} = x$

$\sqrt{x^4} = x^2$

o) $\sqrt[3]{-16xy^3z^{10}}$

$-y\sqrt[3]{8 \cdot 2xz^9 \cdot z^1}$

$-2yz^3\sqrt[3]{2xz}$

Review

Simplify.

$\sqrt[4]{-81}$

nonreal

$\sqrt[3]{-81}$

$-\sqrt[3]{27 \cdot 3}$

$-3\sqrt[3]{3}$

Review

Simplify.

$$\frac{10}{\sqrt[5]{-16}}$$

$$\frac{10}{-\sqrt[5]{16}} \cdot \frac{\sqrt[5]{2}}{\sqrt[5]{2}}$$

$$\frac{10\sqrt[5]{2}}{-2} = -5\sqrt[5]{2}$$

Review

Between which two consecutive integers does the expression lie?

$$\sqrt[3]{-7}$$

Review

Between which two consecutive ~~integers~~ does the expression lie?

$$\sqrt[3]{2}$$

$$\sqrt[3]{1} < \sqrt[3]{2} < \sqrt[3]{8}$$

$$\boxed{1, 2}$$

$1^4 = 1$

$2^4 = 16$

$3^4 = 81$

$4^4 = 256$

$\sqrt[4]{40}$

$\sqrt[4]{16} < \sqrt[4]{40} < \sqrt[4]{81}$

$\sqrt[4]{16} \rightarrow 2$

$\sqrt[4]{81} \rightarrow 3$