Radicals Practice

Name: _____ Date: _____

Question 1

Simplify

I. $\sqrt{16x^2}$ II. $\sqrt{(-7x)^2}$ III. $\sqrt{(8-x)^2}$ IV. $\sqrt{x^2+16x+64}$ V. $\sqrt{x^{22}}$

Question 2

Simplify

I. $\sqrt{144}$ II. $\sqrt{\frac{36}{49}}$ III. $-\sqrt{100}$ IV. $\sqrt{0.0016}$

Question 3

Find the function value

I. $f(x) = \sqrt{5x+10}$

$f(2) = \sqrt{5(2)+10}$

$f(3) = \sqrt{5(3)+10}$

$f(7) = \sqrt{5(7)+10}$

Radicals Practice

Question 4

Simplify

I. $\sqrt[3]{-1}$

II. $-\sqrt[3]{64}$

III. $\sqrt[3]{-64x^3}$

Question 5

Simplify

I. $-\sqrt[4]{256}$

II. $\sqrt[6]{x^6}$

III. $\sqrt[5]{\frac{-1}{32}}$

IV. $\sqrt[4]{(6x)^4}$

V. $\sqrt[12]{(-10)^{12}}$

Question 6

Simplify

I. $\sqrt{(x-2)^8}$

II. $\sqrt{(x+2)^{10}}$

Question 7

Determine the domain

I. $f(x) = \sqrt[5]{2x+7}$

II. $f(x) = \sqrt{x+8}$

III. $f(x) = \sqrt[3]{2x-6}$

IV. $f(x) = -\sqrt[6]{5x+2}$

V. $f(x) = 9 + \sqrt[6]{x^6}$

Radicals Practice

Question 8

Convert to radical form

I. $x^{1/3}$ II. $36^{1/5}$ III. $x^{5/6}$ IV. $(9x^6)^{3/2}$

Question 9

Convert to exponent form

I. $\sqrt[3]{18}$ II. $\sqrt[5]{x^4}$ III. $\sqrt{24}$ IV. $\sqrt[7]{x^3y^2z^3}$ V. $\left(\sqrt[6]{2x^5y}\right)^7$ VI. $\dfrac{3x}{\sqrt[5]{y^2}}$

Question 10

Convert to radical form

I. $6^{-1/3}$ II. $\left(\dfrac{1}{15}\right)^{-3/4}$ III. $\dfrac{8x}{y^{-3/5}}$ IV. $\left(\dfrac{2xy}{3z}\right)^{-5/6}$

Radicals Practice

Question 11

Simplify

I. $\sqrt[9]{y^3}$

II. $\left(\sqrt[7]{xy}\right)^{14}$

III. $\sqrt{\sqrt[5]{x}}$

IV. $\sqrt[3]{\sqrt[4]{xy}}$

V. $\sqrt[4]{(xy)^{12}}$

Question 12

Multiply

I. $\sqrt{10}\ \sqrt{3}$

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

III. $\sqrt{5x}\ \sqrt{6y}$

IV. $\sqrt[5]{9x^2}\ \sqrt[5]{2x}$

V. $\sqrt[3]{9x^2}\ \sqrt[3]{2y}$

VI. $\sqrt[4]{y-1}\ \sqrt[4]{y^2+y+1}$

VII. $\sqrt{\frac{7x}{6}}\ \sqrt{\frac{5}{y}}$

Radicals Practice

Question 13

Simplify

I. $\sqrt{12}$

II. $\sqrt{300}$

III. $\sqrt{36x^4y}$

IV. $\sqrt[3]{-32x^6}$

V. $\sqrt[5]{-32x^7y^{11}}$

VI. $\sqrt{x^5y^6z^{10}}$

Question 14

Multiply

I. $\sqrt{10}\ \sqrt{5}$

II. $\sqrt{24x^5}\ \sqrt{24x^5}$

III. $3\sqrt{5x^7} \cdot 2\sqrt{15x^3}$

IV. $\sqrt[5]{x^3(y-z)^4}\ \sqrt[5]{x^7(y-z)^4}$

Radicals Practice

Question 15

Simplify

I. $\sqrt{\frac{49}{100}}$

II. $\sqrt{\frac{25x^5}{y^6}}$

III. $\sqrt[3]{\frac{27x^4}{8y^3}}$

Question 16

Divide

I. $\frac{\sqrt{18x}}{\sqrt{2x}}$

II. $\frac{\sqrt[3]{189y^5z^7}}{\sqrt[3]{7y^2z^2}}$

III. $\frac{\sqrt[3]{y^3 - z^3}}{\sqrt[3]{y - z}}$

Question 17

Rationalize the numerator

I. $\sqrt{\frac{2}{3}}$

II. $\sqrt[3]{\frac{7x}{3y}}$

Radicals Practice

Question 18

Rationalize the denominator

I. $\sqrt{\frac{2}{3}}$

II. $\sqrt[3]{\frac{7x}{3y}}$

Question 19

Solve

I. $7\sqrt{3} + 4\sqrt{3}$

II. $7\sqrt{3} - 4\sqrt{3}$

III. $5\sqrt{12} + 16\sqrt{27}$

IV. $\sqrt{4x-4} + \sqrt{x-1}$

V. $\sqrt[3]{6x^4} - \sqrt[3]{48x}$

Radicals Practice

Question 20

Multiply

I. $\sqrt{2}\left(5+\sqrt{2}\right)$

II. $\left(\sqrt{7}-\sqrt{2}\right)\left(\sqrt{2}+\sqrt{5}\right)$

III. $\left(\sqrt{3}-\sqrt{2}\right)^2$

Question 21

Rationalize the numerator

I. $\dfrac{\sqrt{5}+1}{4}$

II. $\dfrac{\sqrt{x+y}-\sqrt{x}}{y}$

Radicals Practice

Question 22

Rationalize the denominator

I. $\dfrac{6}{3 - \sqrt{2}}$

Question 23

Solve

I. $\sqrt[10]{x}\ \sqrt[5]{x^2}$

II. $\sqrt{2x^3y^3}\ \sqrt[3]{4xy^2}$

III. $\dfrac{\sqrt[3]{x^2}}{\sqrt[4]{x}}$

IV. $\dfrac{\sqrt[4]{(5+3x)^3}}{\sqrt[3]{(5+3x)^2}}$

Radicals Practice

V. $\sqrt[4]{x^2y}\left(\sqrt[3]{x^2y} - \sqrt[5]{x^2y^2}\right)$

VI. $\left(x - \sqrt[4]{y^3}\right)\left(3x - \sqrt[5]{y}\right)$

Question 24

Solve

I. $\sqrt{5x+1} = 6$

II. $\sqrt{x+5} - 4 = 1$

III. $6\sqrt{x} = x$

IV. $\sqrt[3]{x-2} = 3$

V. $2y^{1/2} - 13 = 7$

VI. $\sqrt{x} = -2$

VII. $3 + \sqrt{5-x} = x$

Radicals Practice

Question 25

Solve

I. $\sqrt{3x+4} = \sqrt{4x+3}$

II. $3(4-x)^{1/4} = 6^{1/4}$

III. $\sqrt{20-x} + 8 = \sqrt{9-x} + 11$

IV. $\sqrt{x+2} + \sqrt{3x+4} = 2$

Radicals Practice

Name: **Key** Date: _____

Question 1

Simplify

I. $\sqrt{16x^2} \rightarrow \sqrt{(4x)^2} \rightarrow |4x| \rightarrow 4|x|$

II. $\sqrt{(-7x)^2} \rightarrow |-7x| \rightarrow 7|x|$

III. $\sqrt{(8-x)^2} \rightarrow |8-x|$

IV. $\sqrt{x^2+16x+64} \rightarrow \sqrt{(x+8)^2} \rightarrow |x+8|$

V. $\sqrt{x^{22}} \rightarrow \sqrt{(x^{11})^2} \rightarrow |x^{11}|$

Question 2

Simplify

I. $\sqrt{144} \rightarrow 12$

II. $\sqrt{\frac{36}{49}} \rightarrow \frac{\sqrt{36}}{\sqrt{49}} \rightarrow \frac{6}{7}$

III. $-\sqrt{100} \rightarrow -10$

IV. $\sqrt{0.0016} \rightarrow 0.04$

Question 3

Find the function value

I. $f(x) = \sqrt{5x+10}$

$f(2) = \sqrt{5(2)+10} = \sqrt{20} = \sqrt{4 \cdot 5} = \sqrt{4} \cdot \sqrt{5} = 2\sqrt{5}$

$f(3) = \sqrt{5(3)+10} = \sqrt{25} = 5$

$f(7) = \sqrt{5(7)+10} = \sqrt{45} = \sqrt{9 \cdot 5} = \sqrt{9} \cdot \sqrt{5} = 3\sqrt{5}$

Radicals Practice

Question 4

Simplify

I. $\sqrt[3]{-1}$ → -1

II. $-\sqrt[3]{64}$ → -4

III. $\sqrt[3]{-64x^3}$ → $-4x$

Question 5

Simplify

I. $-\sqrt[4]{256}$ → -4

II. $\sqrt[6]{x^6}$ → $|x|$

III. $\sqrt[5]{\frac{-1}{32}}$ → $\sqrt[5]{\left(\frac{-1}{2}\right)^5}$ → $\frac{-1}{2}$

IV. $\sqrt[4]{(6x)^4}$ → $|6x|$ → $6|x|$

V. $\sqrt[12]{(-10)^{12}}$ → $|-10|$ → 10

Question 6

Simplify

I. $\sqrt{(x-2)^8}$ → $\sqrt{((x-2)^4)^2}$ → $(x-2)^4$

II. $\sqrt{(x+2)^{10}}$ → $\sqrt{((x+2)^5)^2}$ → $(x+2)^5$

Question 7

Determine the domain

I. $f(x) = \sqrt[5]{2x+7}$ → odd index → $(-\infty, \infty)$

II. $f(x) = \sqrt{x+8}$ → even index → $x+8 \geq 0$ → $x \geq -8$ → $[-8, \infty)$

III. $f(x) = \sqrt[3]{2x-6}$ → odd index → $(-\infty, \infty)$

IV. $f(x) = -\sqrt[6]{5x+2}$ → even index → $5x+2 \geq 0$ → $x \geq -2/5$ → $[-2/5, \infty)$

V. $f(x) = 9 + \sqrt[6]{x^6}$ → $(-\infty, \infty)$

Radicals Practice

Question 8

Convert to radical form

I. $x^{1/3}$ → $\sqrt[3]{x}$

II. $36^{1/5}$ → $\sqrt[5]{36}$

III. $x^{5/6}$ → $\sqrt[6]{x^5}$

IV. $(9x^6)^{3/2}$ → $\sqrt[2]{(9x^6)^3}$ → $\sqrt[2]{9^3 \cdot x^{18}}$ → $\sqrt[2]{9^3} \cdot \sqrt[2]{x^{18}}$ → $\left(\sqrt[2]{9}\right)^3 \cdot x^9$ → $3^3 \cdot x^9$ → $27x^9$

Question 9

Convert to exponent form

I. $\sqrt[3]{18}$ → $18^{1/3}$

II. $\sqrt[5]{x^4}$ → $x^{4/5}$

III. $\sqrt{24}$ → $24^{1/2}$

IV. $\sqrt[7]{x^3y^2z^3}$ → $(x^3y^2z^3)^{1/7}$

V. $\left(\sqrt[6]{2x^5y}\right)^7$ → $(2x^5y)^{7/6}$

VI. $\dfrac{3x}{\sqrt[5]{y^2}}$ → $\dfrac{3x}{y^{2/5}}$

Question 10

Convert to radical form

I. $6^{-1/3}$ → $\dfrac{1}{6^{1/3}}$ → $\dfrac{1}{\sqrt[3]{6}}$

II. $\left(\dfrac{1}{15}\right)^{-3/4}$ → $\left(\dfrac{15}{1}\right)^{3/4}$ → $\sqrt[4]{15^3}$

III. $\dfrac{8x}{y^{-3/5}}$ → $8xy^{3/5}$ → $8x\sqrt[5]{y^3}$

IV. $\left(\dfrac{2xy}{3z}\right)^{-5/6}$ → $\left(\dfrac{3z}{2xy}\right)^{5/6}$ → $\sqrt[6]{\left(\dfrac{3z}{2xy}\right)^5}$

Radicals Practice

Question 11

Simplify

I. $\sqrt[9]{y^3} \rightarrow y^{3/9} \rightarrow y^{1/3} \rightarrow \sqrt[3]{y}$

II. $\left(\sqrt[7]{xy}\right)^{14} \rightarrow (xy)^{14/7} \rightarrow (xy)^{2/1} \rightarrow (xy)^2 \rightarrow x^2y^2$

III. $\sqrt{\sqrt[5]{x}} \rightarrow (x^{1/5})^{1/2} \rightarrow x^{1/10} \rightarrow \sqrt[10]{x}$

IV. $\sqrt[3]{\sqrt[4]{xy}} \rightarrow ((xy)^{1/4})^{1/3} \rightarrow (xy)^{1/12} \rightarrow \sqrt[12]{xy}$

V. $\sqrt[4]{(xy)^{12}} \rightarrow (xy)^{12/4} \rightarrow (xy)^3 \rightarrow x^3y^3$

Question 12

Multiply

I. $\sqrt{10}\sqrt{3} \rightarrow \sqrt{10 \cdot 3} \rightarrow \sqrt{30}$

II. $\sqrt[3]{2}\sqrt[3]{3} \rightarrow \sqrt[3]{2 \cdot 3} \rightarrow \sqrt[3]{6}$

III. $\sqrt{5x}\sqrt{6y} \rightarrow \sqrt{5x \cdot 6y} \rightarrow \sqrt{30xy}$

IV. $\sqrt[5]{9x^2}\sqrt[5]{2x} \rightarrow \sqrt[5]{9x^2 \cdot 2x} \rightarrow \sqrt[5]{18x^3}$

V. $\sqrt[3]{9x^2}\sqrt[3]{2y} \rightarrow \sqrt[3]{9x^2 \cdot 2y} \rightarrow \sqrt[3]{18x^2y}$

VI. $\sqrt[4]{y-1}\sqrt[4]{y^2+y+1} \rightarrow \sqrt[4]{(y-1)(y^2+y+1)} \rightarrow \sqrt[4]{y^3-1}$

VII. $\sqrt{\frac{7x}{6}}\sqrt{\frac{5}{y}} \rightarrow \sqrt{\frac{7x}{6} \cdot \frac{5}{y}} \rightarrow \sqrt{\frac{35x}{6y}}$

Radicals Practice

Question 13

Simplify

I. $\sqrt{12} \rightarrow \sqrt{4 \cdot 3} \rightarrow \sqrt{4}\sqrt{3} \rightarrow 2\sqrt{3}$

II. $\sqrt{300} \rightarrow \sqrt{100 \cdot 3} \rightarrow \sqrt{100}\sqrt{3} \rightarrow 10\sqrt{3}$

III. $\sqrt{36x^4y} \rightarrow \sqrt{36}\sqrt{(x^2)^2}\sqrt{y} \rightarrow 6x^2\sqrt{y}$

IV. $\sqrt[3]{-32x^6} \rightarrow \sqrt[3]{-8 \cdot 4 \cdot (x^2)^3} \rightarrow -2x^2\sqrt[3]{4}$

V. $\sqrt[5]{-32x^7y^{11}} \rightarrow \sqrt[5]{-32 \cdot x^5 \cdot x^2 \cdot y^5 \cdot y^5 \cdot y} \rightarrow -2xy^2\sqrt[5]{x^2y}$

VI. $\sqrt{x^5y^6z^{10}} \rightarrow \sqrt{x^2 \cdot x^2 \cdot x \cdot y^2 \cdot y^2 \cdot y^2 \cdot z^2 \cdot z^2 \cdot z^2 \cdot z^2 \cdot z^2} \rightarrow x^2y^3z^5\sqrt{x}$

Question 14

Multiply

I. $\sqrt{10}\sqrt{5} \rightarrow \sqrt{50} \rightarrow \sqrt{25 \cdot 2} \rightarrow \sqrt{25}\sqrt{2} \rightarrow 5\sqrt{2}$

II. $\sqrt{24x^5}\sqrt{24x^5} \rightarrow \sqrt{24 \cdot 24 \cdot x^5 \cdot x^5} \rightarrow \sqrt{(24)^2x^{10}} \rightarrow 24x^5$

III. $3\sqrt{5x^7} \cdot 2\sqrt{15x^3} \rightarrow 6\sqrt{75x^{10}} \rightarrow 6\sqrt{25 \cdot 3 \cdot x^{10}} \rightarrow 6 \cdot 5 \cdot x^5\sqrt{3} \rightarrow 30x^5\sqrt{3}$

IV. $\sqrt[5]{x^3(y-z)^4}\sqrt[5]{x^7(y-z)^4} \rightarrow \sqrt[5]{x^{10}(y-z)^8} \rightarrow \sqrt[5]{x^{10}(y-z)^5(y-z)^3} \rightarrow x^2(y-z)\sqrt[5]{(y-z)^3}$

Radicals Practice

Question 15

Simplify

I. $\sqrt{\frac{49}{100}} \rightarrow \frac{\sqrt{49}}{\sqrt{100}} \rightarrow \frac{7}{10}$

II. $\sqrt{\frac{25x^5}{y^6}} \rightarrow \frac{\sqrt{25x^5}}{\sqrt{y^6}} \rightarrow \frac{\sqrt{25 \cdot x^2 \cdot x^2 \cdot x}}{\sqrt{y^6}} \rightarrow \frac{5x^2\sqrt{x}}{y^3}$

III. $\sqrt[3]{\frac{27x^4}{8y^3}} \rightarrow \frac{\sqrt[3]{27x^4}}{\sqrt[3]{8y^3}} \rightarrow \frac{\sqrt[3]{27 \cdot x^3 \cdot x}}{\sqrt[3]{8y^3}} \rightarrow \frac{3x\sqrt[3]{x}}{2y}$

Question 16

Divide

I. $\frac{\sqrt{18x}}{\sqrt{2x}} \rightarrow \sqrt{\frac{18x}{2x}} \rightarrow \sqrt{9} \rightarrow 3$

II. $\frac{\sqrt[3]{189y^5z^7}}{\sqrt[3]{7y^2z^2}} \rightarrow \sqrt[3]{\frac{189y^5z^7}{7y^2z^2}} \rightarrow \sqrt[3]{27y^3z^5} \rightarrow 3yz\sqrt[3]{z^2}$

III. $\frac{\sqrt[3]{y^3 - z^3}}{\sqrt[3]{y - z}} \rightarrow \frac{\sqrt[3]{(y - z)(y^2 + yz + z^2)}}{\sqrt[3]{y - z}} \rightarrow \sqrt[3]{\frac{(y - z)(y^2 + yz + z^2)}{y - z}} \rightarrow \sqrt[3]{y^2 + yz + z^2}$

Question 17

Rationalize the numerator

I. $\sqrt{\frac{2}{3}} \rightarrow \sqrt{\frac{2}{3} \cdot \frac{2}{2}} \rightarrow \sqrt{\frac{4}{6}} \rightarrow \frac{\sqrt{4}}{\sqrt{6}} \rightarrow \frac{2}{\sqrt{6}}$

II. $\sqrt[3]{\frac{7x}{3y}} \rightarrow \sqrt[3]{\frac{7x}{3y} \cdot \frac{49x^2}{49x^2}} \rightarrow \sqrt[3]{\frac{343x^3}{147x^2y}} \rightarrow \frac{7x}{\sqrt[3]{147x^2y}}$

Radicals Practice

Question 18

Rationalize the denominator

I. $\sqrt{\frac{2}{3}} \rightarrow \sqrt{\frac{2}{3} \cdot \frac{3}{3}} \rightarrow \sqrt{\frac{6}{9}} \rightarrow \frac{\sqrt{6}}{\sqrt{9}} \rightarrow \frac{\sqrt{6}}{3}$

II. $\sqrt[3]{\frac{7x}{3y}} \rightarrow \sqrt[3]{\frac{7x}{3y} \cdot \frac{9y^2}{9y^2}} \rightarrow \sqrt[3]{\frac{63xy^2}{27y^3}} \rightarrow \frac{\sqrt[3]{63xy^2}}{3y}$

Question 19

Solve

I. $7\sqrt{3} + 4\sqrt{3} \rightarrow (7+4)\sqrt{3} \rightarrow 11\sqrt{3}$

II. $7\sqrt{3} - 4\sqrt{3} \rightarrow (7+-4)\sqrt{3} \rightarrow 3\sqrt{3}$

III. $5\sqrt{12} + 16\sqrt{27} \rightarrow 5\sqrt{4 \cdot 3} + 16\sqrt{9 \cdot 3} \rightarrow 10\sqrt{3} + 48\sqrt{3}$

$\downarrow$

$58\sqrt{3} \leftarrow (10+48)\sqrt{3}$

IV. $\sqrt{4x-4} + \sqrt{x-1} \rightarrow \sqrt{4(x-1)} + \sqrt{x-1} \rightarrow 2\sqrt{x-1} + \sqrt{x-1}$

$\downarrow$

$3\sqrt{x-1} \leftarrow (2+1)\sqrt{x-1}$

V. $\sqrt[3]{6x^4} - \sqrt[3]{48x} \rightarrow \sqrt[3]{6 \cdot x^3 \cdot x} - \sqrt[3]{8 \cdot 6 \cdot x} \rightarrow x\sqrt[3]{6x} - 2\sqrt[3]{6x}$

$\downarrow$

$(x-2)\sqrt[3]{6x} \leftarrow (x+-2)\sqrt[3]{6x}$

Radicals Practice

Question 20

Multiply

I. $\sqrt{2}\left(5+\sqrt{2}\right) \rightarrow \sqrt{2}\cdot 5+\sqrt{2}\cdot\sqrt{2} \rightarrow 5\sqrt{2}+2$

II. $\left(\sqrt{7}-\sqrt{2}\right)\left(\sqrt{2}+\sqrt{5}\right) \rightarrow \sqrt{14}+\sqrt{35}-2-\sqrt{10}$

III. $\left(\sqrt{3}-\sqrt{2}\right)^2 \rightarrow \left(\sqrt{3}-\sqrt{2}\right)\left(\sqrt{3}-\sqrt{2}\right) \rightarrow 3-\sqrt{6}-\sqrt{6}+2$

$\downarrow$

$5-2\sqrt{6}$

Question 21

Rationalize the numerator

I. $\dfrac{\sqrt{5}+1}{4} \rightarrow \dfrac{\sqrt{5}+1}{4}\cdot\dfrac{\sqrt{5}-1}{\sqrt{5}-1} \rightarrow \dfrac{5-1}{4\left(\sqrt{5}-1\right)}$

$\downarrow$

$\dfrac{4}{4\left(\sqrt{5}-1\right)} \leftarrow \dfrac{1}{\sqrt{5}-1}$

II. $\dfrac{\sqrt{x+y}-\sqrt{x}}{y} \rightarrow \dfrac{\sqrt{x+y}-\sqrt{x}}{y}\cdot\dfrac{\sqrt{x+y}+\sqrt{x}}{\sqrt{x+y}+\sqrt{x}} \rightarrow \dfrac{x+y-x}{y\left(\sqrt{x+y}+\sqrt{x}\right)}$

$\downarrow$

$\dfrac{y}{y\left(\sqrt{x+y}+\sqrt{x}\right)} \leftarrow \dfrac{1}{\sqrt{x+y}+\sqrt{x}}$

Radicals Practice

Question 22

Rationalize the denominator

I. $\dfrac{6}{3-\sqrt{2}} \rightarrow \dfrac{6}{3-\sqrt{2}} \cdot \dfrac{3+\sqrt{2}}{3+\sqrt{2}} \rightarrow \dfrac{18+6\sqrt{2}}{9-2}$

$\downarrow$

$\dfrac{18+6\sqrt{2}}{7}$

Question 23

Solve

I. $\sqrt[10]{x}\ \sqrt[5]{x^2} \rightarrow x^{1/10} \cdot x^{2/5} \rightarrow x^{1/2} \rightarrow \sqrt{x}$

II. $\sqrt{2x^3y^3}\ \sqrt[3]{4xy^2} \rightarrow (2x^3y^3)^{1/2} \cdot (4xy^2)^{1/3} \rightarrow (2x^3y^3)^{3/6} \cdot (4xy^2)^{2/6} \rightarrow ((2x^3y^3)^3 \cdot (4xy^2)^2)^{1/6}$

$\downarrow$

$\sqrt[6]{64x^6y^{12} \cdot 2x^5y} \leftarrow \sqrt[6]{128x^{11}y^{13}} \leftarrow \sqrt[6]{8x^9y^9 \cdot 16x^2y^4} \leftarrow ((8x^9y^9) \cdot (16x^2y^4))^{1/6}$

$\downarrow$

$2xy^2\sqrt[6]{2x^5y}$

III. $\dfrac{\sqrt[3]{x^2}}{\sqrt[4]{x}} \rightarrow x^{2/3} / x^{1/4} \rightarrow x^{5/12} \rightarrow \sqrt[12]{x^5}$

IV. $\dfrac{\sqrt[4]{(5+3x)^3}}{\sqrt[3]{(5+3x)^2}} \rightarrow (5+3x)^{3/4} / (5+3x)^{2/3} \rightarrow (5+3x)^{1/12} \rightarrow \sqrt[12]{5+3x}$

Radicals Practice

V. $\sqrt[4]{x^2y}\left(\sqrt[3]{x^2y} - \sqrt[5]{x^2y^2}\right) \rightarrow (x^2y)^{1/4}\left((x^2y)^{1/3} - (x^2y^2)^{1/5}\right) \rightarrow (x^{2/4}y^{1/4})(x^{2/3}y^{1/3} - x^{2/5}y^{2/5})$

$\downarrow$

$x \cdot x^{2/12}y^{7/12} - x^{18/20}y^{13/20} \leftarrow x^{14/12}y^{7/12} - x^{18/20}y^{13/20} \leftarrow x^{7/6}y^{7/12} - x^{9/10}y^{13/20}$

$\downarrow$

$x(x^2y^7)^{1/12} - (x^{18}y^{13})^{1/20} \rightarrow x\sqrt[12]{x^2y^7} - \sqrt[20]{x^{18}y^{13}}$

VI. $\left(x - \sqrt[4]{y^3}\right)\left(3x - \sqrt[5]{y}\right) \rightarrow (x - y^{3/4})(3x - y^{1/5}) \rightarrow 3x^2 - xy^{1/5} - 3xy^{3/4} + y^{19/20}$

$\downarrow$

$3x^2 - x\sqrt[5]{y} - 3x\sqrt[4]{y^3} + \sqrt[20]{y^{19}}$

Question 24

Solve

I. $\sqrt{5x+1} = 6 \rightarrow \left(\sqrt{5x+1}\right)^2 = 6^2 \rightarrow 5x+1 = 36 \rightarrow x = 7$

II. $\sqrt{x+5} - 4 = 1 \rightarrow \left(\sqrt{x+5}\right)^2 = 5^2 \rightarrow x+5 = 25 \rightarrow x = 20$

III. $6\sqrt{x} = x \rightarrow \left(6\sqrt{x}\right)^2 = x^2 \rightarrow 36x = x^2 \rightarrow 0 = x^2 - 36x \rightarrow 0 = x(x-36) \rightarrow \begin{matrix} x = 0 \\ x = 36 \end{matrix}$

IV. $\sqrt[3]{x-2} = 3 \rightarrow \left(\sqrt[3]{x-2}\right)^3 = 3^3 \rightarrow x - 2 = 27 \rightarrow x = 29$

V. $2y^{1/2} - 13 = 7 \rightarrow 2y^{1/2} = 20 \rightarrow y^{1/2} = 10 \rightarrow (y^{1/2})^2 = 10^2 \rightarrow y = 100$

VI. $\sqrt{x} = -2 \rightarrow$ no solution

VII. $3 + \sqrt{5-x} = x \rightarrow \sqrt{5-x} = x - 3 \rightarrow \left(\sqrt{5-x}\right)^2 = (x-3)^2 \rightarrow 5 - x = x^2 - 6x + 9$

$\downarrow$

$5 = x^2 - 5x + 9 \leftarrow 0 = x^2 - 5x + 4 \leftarrow \begin{matrix} x = 4 \\ \text{not true } \cancel{x = 1} \end{matrix}$

Radicals Practice

Question 25

Solve

I. $\sqrt{3x+4} = \sqrt{4x+3} \rightarrow \left(\sqrt{3x+4}\right)^2 = \left(\sqrt{4x+3}\right)^2 \rightarrow 3x+4 = 4x+3$

$\downarrow$

$x = 1$

II. $3(4-x)^{1/4} = 6^{1/4} \rightarrow (3(4-x)^{1/4})^4 = (6^{1/4})^4 \rightarrow 81(4-x) = 6 \rightarrow 324 - 81x = 6 \rightarrow x = 106/27$

III. $\sqrt{20-x} + 8 = \sqrt{9-x} + 11 \rightarrow \sqrt{20-x} = \sqrt{9-x} + 3$

$\downarrow$

$\left(\sqrt{20-x}\right)^2 = \left(\sqrt{9-x} + 3\right)^2$

$\downarrow$

$20 - x = -x + 18 + 6\sqrt{-x+9}$

$\downarrow$

$(2)^2 = \left(6\sqrt{-x+9}\right)^2 \leftarrow 2 = 6\sqrt{-x+9}$

$\downarrow$

$4 = 36(-x+9) \rightarrow 4 = -36x + 324 \rightarrow 80/9 = x$

IV. $\sqrt{x+2} + \sqrt{3x+4} = 2 \rightarrow \sqrt{x+2} = 2 - \sqrt{3x+4} \rightarrow \left(\sqrt{x+2}\right)^2 = \left(2 - \sqrt{3x+4}\right)^2$

$\downarrow$

$(-2x-6)^2 = \left(-4\sqrt{3x+4}\right)^2 \leftarrow -2x - 6 = -4\sqrt{3x+4} \leftarrow x + 2 = 3x + 8 - 4\sqrt{3x+4}$

$\downarrow$

$4x^2 + 24x + 36 = 48x + 64 \rightarrow 4x^2 - 24x - 28 = 0$

$\downarrow$

not true ~~$x = 7$~~

$x = -1$