Name: _____

N.RN.A.2: Radicals and Rational Exponents 3

1 If x is a positive integer, $4x^{\frac{1}{2}}$ is equivalent to
1) $\frac{2}{x}$
2) $2x$
3) $4\sqrt{x}$
4) $4\frac{1}{x}$

2 The expression $x^{-\frac{2}{5}}$ is equivalent to
1) $-\sqrt[2]{x^5}$
2) $-\sqrt[5]{x^2}$
3) $\frac{1}{\sqrt[2]{x^5}}$
4) $\frac{1}{\sqrt[5]{x^2}}$

3 The expression $b^{-\frac{3}{2}}$, $b > 0$, is equivalent to
1) $\frac{1}{\left(\sqrt[3]{b}\right)^2}$
2) $\frac{1}{\left(\sqrt{b}\right)^3}$
3) $-\left(\sqrt{b}\right)^3$
4) $\left(\sqrt[3]{b}\right)^2$

4 When $b > 0$ and d is a positive integer, the expression $(3b)^{\frac{2}{d}}$ is equivalent to
1) $\frac{1}{\left(\sqrt[d]{3b}\right)^2}$
2) $\left(\sqrt{3b}\right)^d$
3) $\frac{1}{\sqrt{3b^d}}$
4) $\left(\sqrt[d]{3b}\right)^2$

5 If $n > 0$, the expression $\left(\frac{1}{n}\right)^{-\frac{2}{3}}$ is equal to
1) $-n^{\frac{2}{3}}$
2) $-n^{\frac{3}{2}}$
3) $\sqrt[3]{n^2}$
4) $\sqrt{n^3}$

6 Which expression is equivalent to $\left(9x^2y^6\right)^{-\frac{1}{2}}$?
1) $\frac{1}{3xy^3}$
2) $3xy^3$
3) $\frac{3}{xy^3}$
4) $\frac{xy^3}{3}$

7 The expression $\left(x^{\frac{1}{2}}y^{-\frac{2}{3}}\right)^{-6}$ is equivalent to
1) $\frac{y^4}{x^3}$
2) $\frac{x^3}{y^4}$
3) $\frac{1}{x^3y^4}$
4) x^3y^4

8 When simplified, the expression $\left(\frac{w^{-5}}{w^{-9}}\right)^{\frac{1}{2}}$ is equivalent to
1) w^{-7}
2) w^2
3) w^7
4) w^{14}

Name: _____

9 The expression $\left(\frac{m^2}{m^{\frac{1}{3}}}\right)^{-\frac{1}{2}}$ is equivalent to

1) $-\sqrt[6]{m^5}$
2) $\frac{1}{\sqrt[6]{m^5}}$
3) $-m^5\sqrt{m}$
4) $\frac{1}{m^5\sqrt{m}}$

10 The expression $(x^2-1)^{-\frac{2}{3}}$ is equivalent to

1) $\sqrt[3]{(x^2-1)^2}$
2) $\frac{1}{\sqrt[3]{(x^2-1)^2}}$
3) $\sqrt{(x^2-1)^3}$
4) $\frac{1}{\sqrt{(x^2-1)^3}}$

11 The volume of a soap bubble is represented by the equation $V = 0.094\sqrt{A^3}$, where A represents the surface area of the bubble. Which expression is also equivalent to V?

1) $0.094A^{\frac{3}{2}}$
2) $0.094A^{\frac{2}{3}}$
3) $0.094A^6$
4) $\left(0.094A^3\right)^{\frac{1}{2}}$

12 Which expression is equivalent to b in the equation $V = \sqrt{a^4 b^{\frac{1}{3}}}$?

1) $\frac{V^6}{a^{12}}$
2) $\frac{V^5}{a^7}$
3) $\frac{V^2}{a^4}$
4) $\frac{V}{a^2}$

13 The expression $\sqrt[3]{27a^{-6}b^3c^2}$ is equivalent to

1) $\frac{3bc^{\frac{2}{3}}}{a^2}$
2) $\frac{3b^9c^6}{a^{18}}$
3) $\frac{3b^6c^5}{a^3}$
4) $\frac{3b\sqrt[3]{3c^2}}{a^2}$

14 The expression $\sqrt[4]{16x^2y^7}$ is equivalent to

1) $2x^{\frac{1}{2}}y^{\frac{7}{4}}$
2) $2x^8y^{28}$
3) $4x^{\frac{1}{2}}y^{\frac{7}{4}}$
4) $4x^8y^{28}$

15 The expression $\sqrt[4]{16a^6b^4}$ is equivalent to

1) $2a^2b$
2) $2a^{\frac{3}{2}}b$
3) $4a^2b$
4) $4a^{\frac{3}{2}}b$

Name: _____

16 The expression $\sqrt[4]{81x^2y^5}$ is equivalent to

1) $3x^{\frac{1}{2}}y^{\frac{5}{4}}$
2) $3x^{\frac{1}{2}}y^{\frac{4}{5}}$
3) $9xy^{\frac{5}{2}}$
4) $9xy^{\frac{2}{5}}$

17 Which expression is equivalent to $\left(\sqrt{a^2b^{\frac{1}{2}}}\right)^{-1}$?

1) $a^{-2}b^{-\frac{1}{2}}$
2) $-ab^{\frac{1}{4}}$
3) $-ab^2$
4) $\dfrac{1}{ab^{\frac{1}{4}}}$

18 When simplified, the expression $\left(\sqrt[3]{m^4}\right)\left(m^{-\frac{1}{2}}\right)$ is equivalent to

1) $\sqrt[3]{m^{-2}}$
2) $\sqrt[4]{m^3}$
3) $\sqrt[5]{m^{-4}}$
4) $\sqrt[6]{m^5}$

19 What does $\left(\dfrac{-54x^9}{y^4}\right)^{\frac{2}{3}}$ equal?

1) $\dfrac{9ix^6\sqrt[3]{4}}{y\sqrt[3]{y^2}}$
2) $\dfrac{9ix^6\sqrt[3]{4}}{y^2\sqrt[3]{y^2}}$
3) $\dfrac{9x^6\sqrt[3]{4}}{y\sqrt[3]{y}}$
4) $\dfrac{9x^6\sqrt[3]{4}}{y^2\sqrt[3]{y^2}}$

20 For $x \neq 0$, which expressions are equivalent to one divided by the sixth root of x?

I. $\dfrac{\sqrt[6]{x}}{\sqrt[3]{x}}$ II. $\dfrac{x^{\frac{1}{6}}}{x^{\frac{1}{3}}}$ III. $x^{\frac{-1}{6}}$

1) I and II, only
2) I and III, only
3) II and III, only
4) I, II, and III

21 Simplify: $\sqrt{a^{\frac{1}{2}}}$

22 Simplify: $\left(\sqrt{a^6}\right)^{\frac{1}{2}}$

23 Simplify: $(16a^4b^5 - 8a^6b^3)^{\frac{1}{3}}$

24 Simplify the expression $\left(m^6\right)^{-\frac{2}{3}}$ and write your answer using a positive exponent.

25 Given the equal terms $\sqrt[3]{x^5}$ and $y^{\frac{5}{6}}$, determine and state y, in terms of x.

N.RN.A.2: Radicals and Rational Exponents 3
Answer Section

1 ANS: 3 REF: 060208b

2 ANS: 4

$$x^{-\frac{2}{5}} = \frac{1}{x^{\frac{2}{5}}} = \frac{1}{\sqrt[5]{x^2}}$$

REF: 011118a2

3 ANS: 2

$$b^{-\frac{3}{2}} = \frac{1}{b^{\frac{3}{2}}} = \frac{1}{(\sqrt{b})^3}$$

REF: 010413b

4 ANS: 4 REF: 061601aii

5 ANS: 3

$$\left(\frac{1}{n}\right)^{-\frac{2}{3}} = (n^{-1})^{-\frac{2}{3}} = n^{\frac{2}{3}} = \sqrt[3]{n^2}$$

REF: 080807b

6 ANS: 1 REF: 011306a2

7 ANS: 1

$$\left(x^{\frac{1}{2}} y^{-\frac{2}{3}}\right)^{-6} = x^{-3} y^4 = \frac{y^4}{x^3}$$

REF: 081611a2

8 ANS: 2

$$\left(\frac{w^{-5}}{w^{-9}}\right)^{\frac{1}{2}} = (w^4)^{\frac{1}{2}} = w^2$$

REF: 081011a2

9 ANS: 2

$$\left(m^{\frac{5}{3}}\right)^{-\frac{1}{2}} = m^{-\frac{5}{6}} = \frac{1}{\sqrt[6]{m^5}}$$

REF: 011707aii

10 ANS: 2 REF: 061011a2

11 ANS: 1

$0.094\sqrt{A^3} = 0.094(A^3)^{\frac{1}{2}} = 0.094\,A^{\frac{3}{2}}$

REF: 060708b

12 ANS: 1 REF: 011015b

13 ANS: 1

$\sqrt[3]{27a^{-6}b^3c^2} = 3a^{-2}bc^{\frac{2}{3}} = \dfrac{3bc^{\frac{2}{3}}}{a^2}$

REF: 011606a2

14 ANS: 1

$\sqrt[4]{16x^2y^7} = 16^{\frac{1}{4}}x^{\frac{2}{4}}y^{\frac{7}{4}} = 2x^{\frac{1}{2}}y^{\frac{7}{4}}$

REF: 061107a2

15 ANS: 2

$\sqrt[4]{16a^6b^4} = (16a^6b^4)^{\frac{1}{4}} = 16^{\frac{1}{4}} \cdot (a^6)^{\frac{1}{4}} \cdot (b^4)^{\frac{1}{4}} = 2a^{\frac{6}{4}}b^1 = 2a^{\frac{3}{2}}b$

REF: 060419b

16 ANS: 1

$\sqrt[4]{81x^2y^5} = 81^{\frac{1}{4}}x^{\frac{2}{4}}y^{\frac{5}{4}} = 3x^{\frac{1}{2}}y^{\frac{5}{4}}$

REF: 081504a2

17 ANS: 4

$(\sqrt{a^2b^{\frac{1}{2}}})^{-1} = \dfrac{1}{\sqrt{a^2b^{\frac{1}{2}}}} = \dfrac{1}{(a^2b^{\frac{1}{2}})^{\frac{1}{2}}} = \dfrac{1}{ab^{\frac{1}{4}}}$

REF: 060912b

18 ANS: 4

$(\sqrt[3]{m^4})(m^{-\frac{1}{2}}) = m^{\frac{4}{3}} \cdot m^{-\frac{1}{2}} = m^{\frac{5}{6}} = \sqrt[6]{m^5}$

REF: 010617b

19 ANS: 4

$\left(\dfrac{-54x^9}{y^4}\right)^{\frac{2}{3}} = \dfrac{(2\cdot -27)^{\frac{2}{3}}x^{\frac{18}{3}}}{y^{\frac{8}{3}}} = \dfrac{2^{\frac{2}{3}}\cdot 9x^6}{y^2\cdot y^{\frac{2}{3}}} = \dfrac{9x^6\sqrt[3]{4}}{y^2\sqrt[3]{y^2}}$

REF: 081723aii

20 ANS: 4 REF: 061716aii

21 ANS:
$\sqrt[4]{a}$

REF: 099414al

22 ANS:
$a\sqrt{a}$

REF: 119411al

23 ANS:
$2ab\sqrt[3]{2ab^2 - a^3}$

REF: 069812al

24 ANS:
$\frac{1}{m^4}$

REF: 010824b

25 ANS:
$\left(x^{\frac{5}{3}}\right)^{\frac{6}{5}} = \left(y^{\frac{5}{6}}\right)^{\frac{6}{5}}$

$x^2 = y$

REF: 011730aii