Name: _____

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

1 The expression $4^{\frac{1}{2}} \cdot 2^3$ is equal to

1) $4^{\frac{3}{2}}$
2) $8^{\frac{3}{2}}$
3) 16
4) 4

2 The expression $9^{\frac{3}{2}} \bullet 27^{\frac{1}{2}}$ is equivalent to

1) 3^2
2) $3^{\frac{9}{2}}$
3) 243^2
4) $243^{\frac{3}{4}}$

3 Which number is the largest?

1) $\left(\frac{1}{4}\right)^{-1}$
2) $\left(\frac{1}{4}\right)^{0}$
3) $\left(\frac{1}{4}\right)^{\frac{1}{2}}$
4) $\left(\frac{1}{4}\right)^{2}$

4 Determine the exact value of $\left(\frac{27}{64}\right)^{-\frac{2}{3}}$ as a fraction in simplest form.

5 The expression $\frac{3^{\frac{1}{3}}}{3^{-\frac{2}{3}}}$ is equivalent to

1) 1
2) $\sqrt{3}$
3) 3
4) $\frac{1}{\sqrt[3]{3}}$

6 The value of $\left(\frac{3^0}{27^{\frac{2}{3}}}\right)^{-1}$ is

1) –9
2) 9
3) $-\frac{1}{9}$
4) $\frac{1}{9}$

7 If $\left(a^x\right)^{\frac{2}{3}} = \frac{1}{a^2}$, what is the value of x?

1) 1
2) 2
3) –3
4) –1

Name: _____

8 If $f(x) = x^{-\frac{3}{2}}$, then $f\left(\frac{1}{4}\right)$ is equal to

1) 8
2) –2
3) $-\frac{1}{8}$
4) –4

9 What is the value of $4x^{\frac{1}{2}} + x^0 + x^{-\frac{1}{4}}$ when $x = 16$?

1) $7\frac{1}{2}$
2) $9\frac{1}{2}$
3) $16\frac{1}{2}$
4) $17\frac{1}{2}$

10 Find the value of $(x+2)^0 + (x+1)^{-\frac{2}{3}}$ when $x = 7$.

11 Evaluate the expression $(x+3)^{\frac{1}{2}} + (x-3)^0 + (x+2)^{-\frac{2}{3}}$ when $x = 6$.

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

1) $\frac{2}{x}$
2) $2x$
3) $4\sqrt{x}$
4) $4\frac{1}{x}$

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

14 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) $\frac{1}{\sqrt[5]{x^2}}$

15 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) $\left(\sqrt[3]{b}\right)^2$

Name: _____

16 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) $\sqrt{n^3}$

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

18 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}

19 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) $\frac{1}{\sqrt{(x^2-1)^3}}$

20 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) $\frac{xy^3}{3}$

21 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) $\frac{V}{a^2}$

22 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) $\frac{3b\sqrt[3]{3c^2}}{a^2}$

Name: _____

23 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) $4x^8y^{28}$

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

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

25 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) $9xy^{\frac{2}{5}}$

26 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) $\frac{1}{ab^{\frac{1}{4}}}$

27 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

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

1 ANS: 3

$4^{\frac{1}{2}} \cdot 2^3 = \sqrt{4} \cdot 8 = 16$

REF: 080601b

2 ANS: 2

$9^{\frac{3}{2}} \bullet 27^{\frac{1}{2}} = \left(3^2\right)^{\frac{3}{2}} \bullet (3^3)^{\frac{1}{2}} = 3^3 \bullet 3^{\frac{3}{2}} = 3^{\frac{9}{2}}$

REF: 011707a2

3 ANS: 1 REF: 061002b

4 ANS:

$\left(\frac{27}{64}\right)^{-\frac{2}{3}} = \left(\frac{64}{27}\right)^{\frac{2}{3}} = \left(\frac{4}{3}\right)^2 = \frac{16}{9}$

REF: 011729a2

5 ANS: 3

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

REF: 080218b

6 ANS: 2

$(\frac{3^0}{27^{\frac{2}{3}}})^{-1} = \frac{27^{\frac{2}{3}}}{3^0} = 3^2 = 9$

REF: 010217b

7 ANS: 3

$$a^{\frac{2x}{3}} = \frac{1}{a^2}$$

$$a^{\frac{2x}{3}} \cdot a^2 = 1$$

$$a^{\frac{2x}{3}+2} = 1$$

$$a^{\frac{2x}{3}+2} = a^0$$

$$\frac{2x}{3} + 2 = 0$$

$$\frac{2x}{3} = -2$$

$$2x = -6$$

$$x = -3$$

REF: 060516b

8 ANS: 1

$$f(\frac{1}{4}) = (\frac{1}{4})^{-\frac{3}{2}} = 4^{\frac{3}{2}} = 8$$

REF: 060602b

9 ANS: 4

$$f(16) = 4(16)^{\frac{1}{2}} + 16^0 + 16^{-\frac{1}{4}}$$

$$= 4(4) + 1 + \frac{1}{2}$$

$$= 17\frac{1}{2}$$

REF: 081503a2

10 ANS:

1.25. $(7+2)^0 + (7+1)^{-\frac{2}{3}} = 1 + 8^{-\frac{2}{3}} = 1 + (\frac{1}{8})^{\frac{2}{3}} = 1 + \frac{1^{\frac{2}{3}}}{8^{\frac{2}{3}}} = 1\frac{1}{4}$

REF: 080322b

11 ANS:

4.25. $(6+3)^{\frac{1}{2}} + (6-3)^0 + (6+2)^{-\frac{2}{3}} = 9^{\frac{1}{2}} + 3^0 + 8^{-\frac{2}{3}} = 3 + 1 + \frac{1}{4} = 4\frac{1}{4}$

REF: 080921b

12 ANS: 3 REF: 060208b

13 ANS: 1

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

REF: 060708b

14 ANS: 4

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

REF: 011118a2

15 ANS: 2

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

REF: 010413b

16 ANS: 3

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

REF: 080807b

17 ANS:

$\dfrac{1}{m^4}$

REF: 010824b

18 ANS: 2

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

REF: 081011a2

19 ANS: 2 REF: 061011a2

20 ANS: 1 REF: 011306a2

21 ANS: 1 REF: 011015b

22 ANS: 1

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

REF: 011606a2

23 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

24 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

25 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

26 ANS: 4

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

REF: 060912b

27 ANS: 1

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

REF: 081611a2