P4: Rational exponents and Radicals

1. If $x, y > 0$, then $\sqrt[4]{\frac{x^{-4}}{81y^8}}\left(\frac{\sqrt{3}x^{-2}}{(\sqrt{y})^{-1}}\right)^2 =$

A) $\frac{1}{x^5y}$

B) $\frac{\sqrt{y}}{x^2}$

C) $\frac{1}{xy^5}$

D) x^5y

E) $\frac{x^5}{y}$

2. If $x > 0$, then the expression $\frac{\sqrt[3]{x^2}\sqrt{\sqrt{x}}}{\sqrt[4]{x^3}}$, simplifies to

(A) $\sqrt[6]{x}$

B) $\sqrt[4]{x}$

C) $\sqrt[3]{x}$

D) $\sqrt[8]{x}$

E) $\sqrt[9]{x}$

3. If $A = \sqrt{32} - \sqrt{18}, B = \sqrt[3]{54} + \sqrt[3]{-16}$, and $C = \sqrt[12]{(-5)^{12}} + \sqrt[9]{(-3)^9}$ then $(AB)^{3C} =$

A) 32

B) 28

C) -30

D) 30

E) 36

4. $\sqrt{12}(\sqrt{50} - \sqrt{18}) =$

A) $4\sqrt{6}$

B) $2\sqrt{3}$

C) $3\sqrt{2}$

D) $9\sqrt{6}$

E) $2\sqrt{6}$

5. If $x \geq 0$ and $y \geq 0$, then $\left(\frac{x^{1/2}y^2}{2y^{1/4}}\right)^4 \cdot \left(\frac{4x^{-2}y^{-4}}{y^2}\right)^{1/2} =$

A) $\frac{xy^4}{8}$

B) $\frac{x^2y^3}{8}$

C) $\frac{x^2y^4}{8}$

D) $\frac{yx^4}{8}$

E) $\frac{xy^2}{8}$

6. $\sqrt[3]{\frac{16(x^5y^7z)^2}{x^2yz^{-6}}} =$

A) $2x^2y^4z^2\sqrt[3]{2x^2yz^2}$

B) $2x^3y^2z^4\sqrt[3]{x^2yz^2}$

C) $4x^2y^4z^2\sqrt[3]{2x^2yz^2}$

D) $2x^2y^2z^3\sqrt[3]{x^2yz^2}$

E) $x^2y^3z^4\sqrt[3]{x^2yz^2}$

7. $\left(\frac{-8}{27}\right)^{-2/3} - 2^{1/6}\left(-32^{1/6}\right) - 3(-3)^0 =$

A) $\frac{5}{4}$

B) $\frac{3}{2}$

C) $\frac{7}{2}$

D) 2

E) $\frac{29}{4}$

8. If $\sqrt[5]{x^4} \cdot \sqrt[10]{x} = \sqrt[m]{x^n}$, then $m + n =$

A) 19

B) 17

C) 15

D) 16

E) 18

9. If $t - 3x = 3$, then $\left(\frac{125^x}{5^t}\right)^{-\frac{2}{3}} =$

A) 25

B) 1

C) $\frac{1}{25}$

D) 5

E) 125

10. If $x > 0, y > 0$ and $\frac{(y^2)^{-1/2}}{(4^{-1}x^2y^4)^{1/2}} = Kx^Ry^S$, then $K + R + S =$

A) -2

B) -3

C) 0

D) -4

E) 1

11.The expression $\left(\frac{-2^4\cdot(3^{-2}\cdot 2^{-1})^2\cdot(2\pi)^0}{3^{-7}\cdot(-2)^5}\right)^{-2/3} =$

A) $4/9$

B) $9/4$

C) $3/2$

D) $2/3$

E) $-2/3$

12.The expression $\sqrt[3]{54x^4y^7} - 5y\sqrt[3]{16x^4y^4}$ simplifies to:

A) $-7xy^2\sqrt[3]{2xy}$

B) $-2xy\sqrt[3]{2xy}$

C) $-13xy^2\sqrt[3]{2xy}$

D) $7xy^2\sqrt[3]{2xy}$

E) $13xy^2\sqrt[3]{2xy}$

13.The expression $\sqrt[3]{\sqrt{64}} - \sqrt[5]{0.00032}$ is equal to

A) 1.8

B) 1.98

C) 1.9998

D) 7.8

E) 6.4

14.$\frac{1}{|\sqrt{3}-2|} - \frac{9}{\sqrt{3}} =$

A) $2 - 2\sqrt{3}$

B) $-2 + 4\sqrt{3}$

C) $2 - 4\sqrt{3}$

D) $-2 - 2\sqrt{3}$

E) $-2 - 4\sqrt{3}$

15.If $M = \frac{2}{1+\sqrt{3}-\sqrt{12}}$ and $N = 8 \cdot \sqrt[3]{\frac{3}{16}}$, then $M + N =$

A) $-1 - \sqrt{3} + 2\sqrt[3]{12}$

B) $-2 - \sqrt{3} + \sqrt[3]{6}$

C) $2 - \sqrt{3} + 2\sqrt[3]{12}$

D) $-1 - \sqrt{3} + \sqrt[3]{3}$

E) $2 - \sqrt{3} + \sqrt[3]{6}$

16.The expression $\frac{8 \div [(2)(4)] + 10\sqrt{1.44}}{(-32)^{\frac{3}{5}}} =$

A) $-13/8$

B) $-7/2$

C) -14

D) $7/2$

E) $13/8$

17.The expression $\sqrt{(x+y)^2-4xy}$ is equal to

A) $|x-y|$

B) $|x+y|$

C) $x-y$

D) $x+y$

E) $x+y-2\sqrt{xy}$

18. If $-5<x<-2$, then the expression $\left||x+5|+|x-2|+\sqrt{x^2}+\sqrt[3]{x^3}\right|$ simplifies to

A) 7

B) $-2x-3$

C) $2x+3$

D) 3

E) $2x+7$

19. $(\sqrt{2}+\sqrt[3]{16})^2$ is equal to

A) $2+4\cdot\sqrt[6]{32}+4\cdot\sqrt[3]{4}$

B) $2+\sqrt[6]{16}$

C) $2+4\cdot\sqrt[6]{4}+4\cdot\sqrt[3]{4}$

D) $2+\sqrt[3]{256}$

E) $2+2\cdot\sqrt[5]{32}+\sqrt[9]{16}$

20. $xy^2\sqrt[3]{16x^6y^4}-4x^2y\sqrt[3]{128x^3y^7}=$

A) $-14x^3y^3\sqrt[3]{2y}$

B) $-16x^2y^3\sqrt[3]{2x^2y}$

C) $-4x^2y^3\sqrt[3]{2x}$

D) $-3x^2y^2\sqrt[3]{2xy}$

E) $-12x^3y^2\sqrt[3]{2x^2y}$

21. $\left(\frac{25^4x^3}{y^2}\right)^{\frac{1}{8}}\left(\frac{4^2y^{-5}}{x^2}\right)^{\frac{1}{4}}$, where $x > 0$ and $y > 0$, simplifies to:

A) $\frac{10}{y^{\frac{3}{2}}x^{\frac{1}{8}}}$

B) $\frac{10y^{\frac{3}{2}}}{x^{\frac{1}{8}}}$

C) $\frac{10x^{\frac{7}{8}}}{y^{\frac{3}{2}}}$

D) $10x^{\frac{3}{2}}y^{\frac{1}{8}}$

E) $\frac{10}{y^{\frac{7}{8}}x^{\frac{3}{2}}}$

22. $\frac{1}{\sqrt[3]{\sqrt{(\sqrt{3}-2)^6}}} =$

A) $2+\sqrt{3}$

23. Let $x > 0$ and $y > 0$. If $\left(2x^{-\frac{1}{2}}y^2\right)^3\left(\frac{1}{2}x^{\frac{1}{4}}y^{-1}\right)^2 = mx^py^q$, then $m + p + q =$

A) 3

B) 8

C) 6

D) 5

24. Let x, y and z be positive real numbers. If $\sqrt{72x^5y^5z} - x^2y\sqrt{8xy^3z} = kx^my^n\sqrt{2xyz}$, then $k + m + n =$

A) 9

B) 11

C) 12

(D) 8

25. If $\left(\frac{x^2 y^{-\frac{1}{3}}}{x^{\frac{n}{3}} y^{\frac{1}{3}}}\right)^3 = \frac{x}{y^2}$, then $n =$

A) 5

26. $(\sqrt[3]{3} - 2)(\sqrt[3]{9} + 2\sqrt[3]{3} + 4) =$

A) -5

27. Let $x > 0$ and $y > 0$. If $3xy\sqrt[4]{32xy^6} - 4\sqrt[4]{2x^5y^{10}} = 2xy^m\sqrt[4]{2xy^n}$, then $m + n =$

A) 4

28. $9\left(-\frac{27}{64}\right)^{-\frac{2}{3}} - \frac{6}{5} \div \frac{1}{5} =$

A) 10

29. Let $x > 0, y > 0$. Then $x\sqrt{27x^3y^5} - 4y^2\sqrt{3x^5y} =$

A) $5x^2y^2\sqrt{3xy}$

A) $-x^2y^2\sqrt{3xy}$

30. If $\frac{8(x^n)^{-1}(x^{-1}y^3)^2}{(2x)^2(xy^2)^{-1}} = \frac{2y^m}{x^2}$, then $m + n =$

A) -3

B) 0

C) -7

D) 7

31. If $x, y > 0$, and $\left(\frac{x}{x+y}\right)^{1/2}\left(\frac{x}{x+y}\right)^{-1} = \frac{(x+y)^a}{x^b}$, then $a + b =$

A) 2

B) 1

C) 0

D) 4

E) 8

32. The expression $\frac{2}{2\sqrt{3}-\sqrt{2}+\sqrt{18}}$ simplifies to

A) $-\sqrt{2} - \sqrt{3}$

B) $\sqrt{2} - \sqrt{3}$

C) $\sqrt{2} + \sqrt{3}$

D) $-\sqrt{2} + \sqrt{3}$

E) $2\sqrt{2} - 2\sqrt{3}$

33. Which one of the following statements is TRUE?

A) $|a^2| = a^2$ for any real number a

B) $(a+b)^{-1} = a^{-1} + b^{-1}$ for any real numbers $a, b \neq 0$

C) $\sqrt{a^2+b^2} = a + b$ for any real numbers $a, b \neq 0$

D) $\sqrt{a+b} = \sqrt{a} + \sqrt{b}$ for any real numbers $a, b > 0$

E) $\frac{1}{a} + \frac{1}{b} = \frac{1}{a+b}$ for any real numbers $a, b \neq 0$

34. If $x > 0$ and $y > 0$, then $x^2\sqrt{4xy^3} - 2y\sqrt{(-2)^2x^5y} =$

A) $x^2y\sqrt{xy}$

B) $2x^2y\sqrt{xy}$

C) $6x^2y\sqrt{xy}$

D) $-2x^2y\sqrt{xy}$

E) $-x^2y\sqrt{xy}$