CHAPTER P4

Rational Exponents and Radicals

Multiple-Choice Old Exam Questions

34 questions • 3 topics • options A–E • two questions per page

Topic 1 | Rational Exponents

Simplifying and evaluating expressions with rational and negative exponents • Questions 1–14

Q **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) $\frac{x^5}{y}$

Q **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) $\sqrt[9]{x}$

Q
3

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

Q
4

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

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

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

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

D) 2

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

Q
5

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

Q
6

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

Q
7

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

Q
8

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) $-2/3$

Q
9

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

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

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

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

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

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

Q
10

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

E) 7

Q
11

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

B) 3

C) 4

D) 6

E) 7

Q
12

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

A) 10

B) 22

C) -10

D) 6

E) 16

Q
13

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

E) 6

Q
14

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

Topic 2 | Radicals: Simplifying and Combining

Simplifying, adding and subtracting radicals with numbers and variables • Questions 15–28

Q **15**

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

Q **16**

$$\sqrt{12}\left(\sqrt{50} - \sqrt{18}\right) =$$

A) $4\sqrt{6}$

B) $2\sqrt{3}$

C) $3\sqrt{2}$

D) $9\sqrt{6}$

E) $2\sqrt{6}$

Q
17

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

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

Q
18

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

Q
19

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

Q
20

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

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

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

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

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

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

Q
21

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

Q
22

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) $13/8$

Q
23

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

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

Q
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

E) 10

Q
25

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

A) -5

B) 5

C) 11

D) -11

E) 1

Q
26

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

B) 3

C) 5

D) 6

E) 2

Q
27

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

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

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

C) $-7x^2y^2\sqrt{3xy}$

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

E) $7x^2y^2\sqrt{3xy}$

Q
28

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

Topic 3 | Absolute Value, Rationalizing and Statements

Radicals and absolute value, rationalizing denominators, and true statements about radicals • Questions 29–34

Q **29**

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

A) $|x-y|$

B) $|x+y|$

C) $x-y$

D) $x+y$

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

Q **30**

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

A) 7

B) $-2x-3$

C) $2x+3$

D) 3

E) $2x+7$

Q
31

$\left(\sqrt{2}+\sqrt[3]{16}\right)^2$ 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) $2+2\cdot\sqrt[5]{32}+\sqrt[9]{16}$

Q
32

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

A) $2+\sqrt{3}$

B) $2-\sqrt{3}$

C) $\sqrt{3}-2$

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

E) $\sqrt{3}+1$

Q
33

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

Q
34

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 $a,\ b \neq 0$

Answer Key

"Original" shows the question number in the source worksheet.

Q	Original	Ans.	Value
1	1	**A**	$\frac{1}{x^5y}$
2	2	**A**	$\sqrt[6]{x}$
3	5	**A**	$\frac{xy^4}{8}$
4	7	**A**	$\frac{5}{4}$
5	8	**A**	19
6	9	**A**	25
7	10	**A**	-2
8	11	**A**	$4/9$
9	21	**A**	$\frac{10}{y^{3/2}x^{1/8}}$
10	23	**D**	5
11	25	**A**	5
12	28	**A**	10
13	30	**D**	7
14	31	**B**	1
15	3	**A**	32
16	4	**A**	$4\sqrt{6}$
17	6	**A**	$2x^2y^4z^2\sqrt[3]{2x^2yz^2}$
18	12	**A**	$-7xy^2\sqrt[3]{2xy}$
19	13	**A**	1.8
20	14	**A**	$2-2\sqrt{3}$
21	15	**A**	$-1-\sqrt{3}+2\sqrt[3]{12}$
22	16	**A**	$-13/8$
23	20	**A**	$-14x^3y^3\sqrt[3]{2y}$
24	24	**D**	8
25	26	**A**	-5
26	27	**A**	4
27	29	**A**	$-x^2y^2\sqrt{3xy}$
28	34	**D**	$-2x^2y\sqrt{xy}$
29	17	**A**	$\lvert x-y\rvert$
30	18	**A**	7
31	19	**A**	$2+4\cdot\sqrt[6]{32}+4\cdot\sqrt[3]{4}$
32	22	**A**	$2+\sqrt{3}$
33	32	**D**	$-\sqrt{2}+\sqrt{3}$
34	33	**A**	$\lvert a^2\rvert = a^2$ for any real number a