CHAPTER P7

Rational Expressions

Multiple-Choice Old Exam Questions

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

Topic 1 | Domains, Radicals and Basic Statements

Finding domains, rationalizing denominators, and simple applications and statements • Questions 1–12

Q **1**

The domain of the expression $\frac{x+1}{x^2-x-2}$ is

A) $\{x \mid x \neq -1,\ x \neq 2\}$

B) $\{x \mid x \neq -1,\ x \neq 1\}$

C) $\{x \mid x \neq 2\}$

D) $\{x \mid x \neq -2\}$

E) $\{x \mid x \neq -1\}$

Q **2**

The domain of the expression $\frac{(x-2)(x-4)}{x^2-5x+4}$ is

A) $(-\infty, 1) \cup (1, 4) \cup (4, \infty)$

B) $(-\infty, 2) \cup (2, 4) \cup (4, \infty)$

C) $(-\infty, 1) \cup (1, \infty)$

D) $(-\infty, 2) \cup (2, \infty)$

E) $(-\infty, 0) \cup (0, \infty)$

Q
3

The domain of the expression $\frac{x^2+5x+4}{(x+4)^3-9x-36}$ is

A) $(-\infty, -7) \cup (-7, -4) \cup (-4, -1) \cup (-1, \infty)$

B) $(-\infty, -7) \cup (-7, \infty)$

C) $(-\infty, -4) \cup (-4, -1) \cup (-1, \infty)$

D) $(-\infty, -7) \cup (-7, -1) \cup (-1, \infty)$

E) $(-\infty, -7) \cup (-7, -4) \cup (-4, \infty)$

Q
4

The domain of the expression $\frac{(x-2)(x+2)}{(x-2)(x-3)}$ is:

A) $\{x \mid x \neq 2 \text{ and } x \neq 3\}$

B) $\{x \mid x \neq 3\}$

C) $\{x \mid x \neq 2 \text{ and } x \neq -2\}$

D) $\{x \mid x \neq 2\}$

E) $(-\infty, \infty)$

Q
5

The domain of the expression $\frac{\sqrt{x}}{x^2+x-2}$ is

A) $(-\infty, \infty)$

B) $(-2, 0) \cup (1, \infty)$

C) $[0, 1) \cup (1, \infty)$

D) $(-2, 0) \cup (0, \infty)$

E) $(0, 2) \cup (2, \infty)$

Q
6

The expression $\frac{2}{2-\sqrt{8}}$ simplifies to

A) $-1-\sqrt{2}$

B) $1-\sqrt{2}$

C) $-1+\sqrt{2}$

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

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

Q
7

When the denominator is rationalized, $\frac{\sqrt{3}-\sqrt{2}}{2\sqrt{3}+3\sqrt{2}} =$

A) $\frac{5\sqrt{6}}{6} - 2$

B) $\frac{5\sqrt{6}}{6} + 2$

C) $-\frac{5\sqrt{6}}{6} - 12$

D) $-\frac{5\sqrt{6}}{6} + 12$

E) $-\frac{5\sqrt{6}}{6} + 2$

Q
8

If $A = \sqrt{18} + \sqrt{32} - \sqrt{8}$, then $\frac{1}{A-7} =$

A) $5\sqrt{2} + 7$

B) $9\sqrt{2} - 7$

C) $7\sqrt{2} + 5$

D) $7\sqrt{2} - 5$

E) $9\sqrt{2} + 5$

Q
9

The expression $\frac{y^2-1}{\sqrt{y}+1}$ simplifies to

A) $(y-1)(\sqrt{y}-1)$

B) $y(\sqrt{y}-1)$

C) $(y+1)(\sqrt{y}+1)$

D) $(y+1)(\sqrt{y}-1)$

E) $(y-1)(\sqrt{y}+1)$

Q
10

If $x < y$, then $\frac{x-y}{\sqrt{x^2-2xy+y^2}} =$

A) -1

B) 1

C) $x-y$

D) $y-x$

E) 0

Q
11

$R = \frac{1}{\frac{1}{R_1}+\frac{1}{R_2}}$. If $R_1 = 0.2$ ohms and $R_2 = 0.8$ ohms, then $R =$

A) 0.16 ohms

B) 16 ohms

C) 6 ohms

D) 32 ohms

E) 160 ohms

Q
12

Which one of the following statements is TRUE?

A) $\sqrt{A+B} = \sqrt{A} + \sqrt{B}$, for any positive real numbers A and B

B) $(A+B)^3 = (A+B)(A^2+AB+B^2)$, for any real numbers A and B

C) $\frac{A}{B+C} = \frac{A}{C} + \frac{A}{B}$, for any real numbers A, B and C

D) $7^{100} + 7^{101} = 8 \times 7^{100}$

E) $\sqrt[4]{A^4} = A$, for any real number A

Topic 2 | Operations with Rational Expressions

Adding, subtracting, multiplying and dividing rational expressions • Questions 13–28

Q **13**

$$\frac{2y}{5-y}+\frac{10}{y-4}\div\frac{y^2-25}{y^2+y-20}=$$

A) -2

B) 2

C) $\frac{2y}{(y-5)(y+5)(y-4)}$

D) $\frac{2y+10}{y-5}$

E) $\frac{y+5}{(y-5)(y-4)}$

Q **14**

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

A) $\frac{1}{x(x+1)}$

B) $\frac{-2}{x^2-1}$

C) $\frac{1}{x^2-1}$

D) $\frac{1}{x-1}$

E) $\frac{1}{x+1}$

Q
15

$$x - \frac{x^2 - 4}{x^2 + 2x + 4} \div \frac{x^2 - 2x}{x^3 - 8} =$$

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

B) $\frac{x}{4}$

C) $\frac{4}{x-2}$

D) $\frac{x-2}{8}$

E) $\frac{4}{x+2}$

Q
16

$$\left(\frac{a^2 + 2ab + b^2}{a^2 - b^2}\right) \div \left(\frac{a^2 - ab - 2b^2}{2a^2 - ab - b^2}\right) =$$

A) $\frac{2a+b}{a-2b}$

B) $\frac{a-2b}{2a+b}$

C) $\frac{a+b}{a-b}$

D) $\frac{a-b}{a+b}$

E) -1

Q
17

The expression $\frac{x}{x^2-5x+6}+\frac{1}{2-x}$ simplifies to

A) $\frac{3}{(x-2)(x-3)}$

B) $\frac{-3}{(x-2)(x-3)}$

C) $\frac{2x-3}{(x-2)(x-3)}$

D) $\frac{2x+3}{(x-2)(x-3)}$

E) $\frac{3-2x}{(x-2)(x-3)}$

Q
18

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

A) $\frac{1}{x}$

B) $\frac{2}{x(x+1)^2}$

C) 1

D) $\frac{x+1}{x-3}$

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

Q
19

$$\frac{x^2-2x-15}{x^2-6x+5} \div \frac{x^2-x-12}{x^2-1} - \frac{1}{x-4} =$$

A) $\frac{x}{x-4}$

B) $\frac{x}{x+1}$

C) $\frac{x}{x-1}$

D) $\frac{x+1}{x-5}$

E) $\frac{1}{x-4}$

Q
20

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

A) $\frac{3x+1}{2x+1}$

B) $\frac{3x-1}{2x+1}$

C) $\frac{3x+1}{x-2}$

D) $\frac{3x-1}{x-2}$

E) $\frac{2x+1}{x-2}$

Q
21

The expression $\frac{x}{x+2} - \frac{x}{x-4} \div \frac{x^2-4}{x^2-6x+8}$ simplifies to

A) 0

B) $4x$

C) $-\frac{5x}{x+2}$

D) $-\frac{6x}{(x+2)^2}$

E) $\frac{x}{(x+2)^2}$

Q
22

The expression $\frac{3x}{x^2+x-12} - \frac{x}{x^2-16}$ simplifies to

A) $\frac{x(2x-9)}{(x-3)(x+4)(x-4)}$

B) $\frac{x(x-9)}{(x-3)(x+4)(x-4)}$

C) $\frac{x(x+9)}{(x-3)(x+4)(x-4)}$

D) $\frac{2x+9}{(x+4)(x-4)}$

E) $\frac{2x-9}{(x+4)(x-4)}$

Q
23

The expression $\frac{x^2-36y^2}{x^2-12xy+36y^2} \div \frac{x^2+2xy+y^2}{x^2-5xy-6y^2}$ simplifies to

A) $\frac{x+6y}{x+y}$

B) $\frac{x+6y}{x-y}$

C) $\frac{x+y}{(x-6y)^2}$

D) $(x-6y)^2$

E) $\frac{x-y}{x-6y}$

Q
24

$$\frac{x-7}{x-2}+\frac{5}{x^2+2x+4} \div \frac{x^2-4x+4}{x^3-8} =$$

A) 1

B) -1

C) $\frac{x+1}{x-2}$

D) $\frac{x}{x-2}$

E) $\frac{1}{x-2}$

Q
25

$$\left[1-\frac{5x-7}{x^2-1}\right]\div\frac{x-3}{x^2-1}=$$

A) $x+3$

B) $x-3$

C) $x-1$

D) $x+2$

E) $x-2$

Q
26

If $\frac{x^2+8x+16}{x^2+2x-3}\div\frac{x+4}{x-1}=\frac{x+a}{x+b}$, then $a+b=$

A) 7

B) 1

C) 12

D) -7

E) 5

Q
27

If $\left(\frac{3}{2-x}+\frac{x-1}{x^2-x-2}\right)\div\frac{x^2-4}{3x+3}=\frac{A}{(x-B)^2}$, then $A+B=$

A) -4

B) 4

C) -8

D) 8

E) 0

Q
28

$$\frac{x-1}{3}-\frac{2x^2-5x+2}{x^3-8}\cdot\frac{x^2+2x+4}{6x-3}=$$

A) $\frac{x-1}{2x-1}$

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

C) $\frac{x}{3}$

D) $\frac{x-1}{3}$

E) $\frac{x-2}{2x-1}$

Topic 3 | Complex Fractions, Negative Exponents and LCD

Simplifying complex fractions and expressions with negative exponents, and finding a least common denominator • Questions 29–45

Q 29

The expression $\dfrac{\frac{1-t}{1+t}-\frac{1+t}{1-t}}{\frac{1}{1+t}-\frac{1}{1-t}}$ simplifies to

A) 2

B) -2

C) -1

D) 1

E) 0

Q 30

$$\frac{3(x^2+3)^{-1/3}-2x^2(x^2+3)^{-4/3}}{(x^2+3)^{-4/3}}=$$

A) x^2+9

B) x^2+3

C) x^2-3

D) $3x^2+9$

E) $5x^2+9$

Q
31

$$y - \frac{\frac{y}{x} - \frac{x}{y}}{\frac{1}{y} - \frac{1}{x}} =$$

A) $2y + x$

B) $x - y$

C) x

D) $\frac{1}{y}$

E) y

Q
32

$$\frac{x+y}{x-y} \cdot \frac{x^{-1}y - xy^{-1}}{x^{-1} + y^{-1}} =$$

A) $-x - y$

B) $-x + y$

C) $x + y$

D) $x - y$

E) -1

Q
33

$$1-\frac{1}{1-\frac{1}{1-x}}=$$

A) $\frac{1}{x}$

B) $-\frac{1}{x}$

C) $\frac{1}{x-1}$

D) $\frac{1}{1-x}$

E) $\frac{2}{x}$

Q
34

$$\frac{1}{2+\frac{3}{1+\frac{4}{x}}}=$$

A) $(x+4)/(5x+8)$

B) $(x+4)/(3x+8)$

C) $(x+4)/(2x+3)$

D) $x/(2x+11)$

E) $x/(2x+3)$

Q
35

$$\frac{x^{-1}-y^{-1}}{x^{-2}y^{-2}} \div \frac{x^{-2}-y^{-2}}{x^{-3}y^{-3}} =$$

A) $\frac{1}{x+y}$

B) $\frac{x}{x+y}$

C) $\frac{y}{x+y}$

D) $\frac{xy}{x+y}$

E) $xy(x+y)$

Q
36

The expression $\frac{\frac{1+x}{1-x}-\frac{1-x}{1+x}}{\frac{1}{1+x}-\frac{1}{1-x}}$ simplifies to

A) -2

B) 2

C) $2/x$

D) $\frac{1}{1-x}$

E) $\frac{1}{1+x}$

Q
37

The expression $\left(x-1-\frac{6}{x}\right)\div\left(1+\frac{2}{x}-\frac{15}{x^2}\right)$ simplifies to

A) $\frac{x(x+2)}{x+5}$

B) $\frac{x+2}{x+5}$

C) $\frac{x+5}{x+2}$

D) $\frac{x(x+5)}{x+2}$

E) $5/2$

Q
38

The expression $\frac{\frac{x+4}{x}-\frac{3}{x-2}}{\frac{x}{x-2}+\frac{1}{x}}$ simplifies to

A) $\frac{x^2-x-8}{x^2+x-2}$

B) $\frac{x^2+x-8}{x^2+x-2}$

C) $\frac{x^2-x-8}{x^2+x+2}$

D) $\frac{x^2+x+8}{x^2-x+2}$

E) $\frac{x^2-x+8}{x^2-x+2}$

Q
39

The expression $\dfrac{m-\dfrac{8-4m}{m^2-4}}{\dfrac{1}{m+2}}$ simplifies to:

A) m^2+2m+4

B) m^2-2m+4

C) m^2+4m+4

D) m^2-4m+4

E) m^2+2m-4

Q
40

If $\dfrac{x-\dfrac{8}{x-2}}{x-\dfrac{x+10}{x-2}}=\dfrac{x-a}{x-b}$, then $a+b=$

A) 9

B) 18

C) 2

D) 10

E) 12

Q
41

The expression $\frac{x^{-1}y-xy^{-1}}{x^{-1}-y^{-1}}$ simplifies to:

A) $x+y$

B) $\frac{y+x}{xy}$

C) $y-x$

D) $\frac{xy}{x+y}$

E) 1

Q
42

If $\frac{1-\frac{3}{x+4}}{\frac{1}{x+4}+\frac{x}{3}}=\frac{ax+3}{x+b}$, then $a+b=$

A) 2

B) 3

C) 1

D) 4

E) 6

Q
43

$$\frac{ab^{-1} - ba^{-1}}{a^{-1} - b^{-1}} =$$

A) $\frac{1}{a-b}$

B) $a + b$

C) $a - b$

D) $-a - b$

E) ab

Q
44

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

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

B) x^2y^2

C) $-\frac{1}{xy}$

D) xy

E) $-x^2y^2$

Q
45

The Least Common Denominator (LCD) of the expression $\frac{p}{2p^2-9p-5} - \frac{2p}{6p^2-p-2}$ is:

A) $(2p+1)(p-5)(3p-2)$

B) $(2p+1)^2(p-5)(3p-2)$

C) $(2p+1)(p+5)(3p-2)$

D) $(2p+1)(p-5)(3p+2)$

E) $(2p+1)(p-5)(3p-2)^2$

Answer Key

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

Q	Original	Ans.	Value
1	9	**A**	$\{x \mid x \neq -1,\ x \neq 2\}$
2	12	**A**	$(-\infty, 1) \cup (1, 4) \cup (4, \infty)$
3	17	**A**	$(-\infty, -7) \cup (-7, -4) \cup (-4, -1) \cup (-1, \infty)$
4	32	**A**	$\{x \mid x \neq 2 \text{ and } x \neq 3\}$
5	41	**C**	$[0, 1) \cup (1, \infty)$
6	1	**A**	$-1 - \sqrt{2}$
7	8	**A**	$\frac{5\sqrt{6}}{6} - 2$
8	45	**A**	$5\sqrt{2} + 7$
9	37	**D**	$(y + 1)(\sqrt{y} - 1)$
10	35	**A**	-1
11	40	**A**	0.16 ohms
12	42	**D**	$7^{100} + 7^{101} = 8 \times 7^{100}$
13	2	**A**	-2
14	5	**A**	$\frac{1}{x(x+1)}$
15	7	**A**	$\frac{4}{x}$
16	10	**A**	$\frac{2a+b}{a-2b}$
17	11	**A**	$\frac{3}{(x-2)(x-3)}$
18	13	**A**	$\frac{1}{x}$
19	16	**A**	$\frac{x}{x-4}$
20	19	**A**	$\frac{3x+1}{2x+1}$
21	22	**A**	0
22	24	**A**	$\frac{x(2x-9)}{(x-3)(x+4)(x-4)}$
23	26	**A**	$\frac{x+6y}{x+y}$
24	31	**A**	1
25	33	**E**	$x - 2$
26	36	**A**	7
27	38	**A**	-4
28	43	**B**	$\frac{x-2}{3}$
29	3	**A**	2
30	4	**A**	$x^2 + 9$
31	6	**A**	$2y + x$
32	14	**A**	$-x - y$

Q	Original	Ans.	Value
33	15	**A**	$\frac{1}{x}$
34	18	**A**	$(x+4)/(5x+8)$
35	20	**A**	$\frac{1}{x+y}$
36	21	**A**	-2
37	23	**A**	$\frac{x(x+2)}{x+5}$
38	25	**A**	$\frac{x^2-x-8}{x^2+x-2}$
39	28	**A**	m^2+2m+4
40	29	**A**	9
41	30	**A**	$x+y$
42	34	**B**	3
43	39	**D**	$-a-b$
44	44	**A**	$\frac{1}{x^2y^2}$
45	27	**A**	$(2p+1)(p-5)(3p-2)$