CHAPTER P8

Solving Basic Equations

Multiple-Choice Old Exam Questions

43 questions • 5 topics • options A–E • two questions per page

Topic 1 | Linear and Rational Equations

Solving linear and rational equations, and finding a constant from a given solution • Questions 1–14

Q **1**

If $x = A$ is the solution of the equation $\frac{2x}{3} + \frac{1}{2}(x - 3) = \frac{x+1}{4}$, then $11A + 2 =$

A) 23

B) 27

C) 25

D) 24

E) 26

Q **2**

If $x = \frac{21}{11}$ is a solution of the equation $\frac{N}{3}x + \frac{1}{2}(x - 3) = \frac{1}{4}(x + 1)$, then N is equal to:

A) 2

B) 3

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

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

E) 4

Q
3

If $\frac{1}{2}$ is a solution of the equation $3x - \frac{kx}{2} = \frac{x+1}{3} - \frac{1}{4}$, then $k =$

A) 5

B) 6

C) $\frac{17}{3}$

D) $-\frac{17}{3}$

E) -4

Q
4

If $x = -4$ is a solution of the equation $\frac{2x+4}{3} + \frac{x}{2} = \frac{1}{4}x - \frac{a}{3}$, then a is

A) 7

B) $-1/7$

C) 15

D) $1/7$

E) -15

Q
5

The solution set of $\frac{3}{4}x - \frac{1}{2}x - 5 = \frac{1}{6}x + \frac{2}{3} - 2$ contains

A) only one positive integer

B) no real number

C) only one non-integer rational number

D) only one negative integer

E) infinitely many real numbers

Q
6

If $x = -10$ is a solution of the equation $\frac{3x+6}{10} - \frac{1}{2}x = \frac{2}{k}x + \frac{33}{k}$, then $k =$

A) 5

B) -5

C) $-\frac{65}{37}$

D) $\frac{65}{37}$

E) $-\frac{1}{5}$

Q
7

Solve the equation: $2x - \frac{x}{2} + \frac{x+1}{4} = 6x$

A) $x = \frac{1}{17}$

B) $x = -\frac{1}{17}$

C) $x = 17$

D) $x = \frac{1}{7}$

E) $x = -\frac{1}{7}$

Q
8

Solve the equation: $(x-1)(x+2) = (x-2)(x-3)$

A) $x = \frac{4}{3}$

B) $x = \frac{3}{4}$

C) $x = -\frac{4}{3}$

D) $x = 4$

E) $x = \frac{1}{3}$

Q
9

The solution of the linear equation $3x - \frac{5x}{2} = \frac{x+1}{3} - \frac{1}{6}$ is:

A) 1

B) 0

C) -1

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

E) $\frac{1}{3}$

Q
10

The solution set of the equation $\frac{1}{2}x + 2 - \frac{1}{3}x = \frac{10}{3}$ consists of

A) one negative even integer

B) one non-integer rational number

C) one positive even integer

D) one positive odd integer

E) no real number

Q
11

If $x = -\frac{5}{9}$ is the solution of the equation $\frac{2}{x} - 4 = 5 + \frac{k}{x}$, then $k =$

A) 7

B) 2

C) -2

D) 8

E) -3

Q
12

The sum of all the solutions of the equation $\frac{x-1}{x-2} - \frac{1}{x} + 1 = \frac{2x}{x-2}$ is

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

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

C) 1

D) -1

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

Q
13

Solve the equation: $\frac{3}{x+1} - \frac{1}{2} = \frac{1}{3x+3}$

A) $x = \frac{13}{3}$

B) $x = \frac{3}{13}$

C) $x = -\frac{13}{3}$

D) $x = 5$

E) $x = 1$

Q
14

Solve the equation: $\frac{1}{3-t} + \frac{4}{3+t} + \frac{15}{9-t^2} = 0$

A) $t = 10$

B) $t = -10$

C) $t = 3$

D) $t = -3$

E) no real solution

Topic 2 | Identities and Equations with No Solution

Identities, conditions that make an equation an identity, and equations with no real solution • Questions 15–22

Q **15**

Which one of the following equations is NOT an identity?

A) $\frac{x+2}{x+4} = \frac{1}{2}$

B) $6x - 5 = -3(1 - 2x) - 2$

C) $\frac{4}{4x^2+8} = \frac{-2}{-4-2x^2}$

D) $(x - 3)^2 = x^2 - 6x + 9$

E) $\frac{1}{3}x + 2 = \frac{x+6}{3}$

Q **16**

If the equation $18x - 12 = 3(kx - 4) - 6x$ is an identity, then the value of k is

A) -8

B) 5

C) 0

D) -7

E) 8

Q
17

If the equation $-3(x+2)+5(x+k)=2x-4$ is an identity, then k equals

A) $\frac{2}{5}$

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

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

D) 2

E) $-\frac{5}{2}$

Q
18

The equation $\frac{7x-12}{x^2-3x}-\frac{2}{x}=\frac{3}{x-3}$ has

A) no real solution.

B) one positive odd integer solution only.

C) one negative odd integer solution only.

D) one positive even integer solution only.

E) one negative even integer solution only.

Q
19

Solve the equation: $\frac{1}{x} - \frac{2}{2x+1} = \frac{1}{2x^2+x}$

A) all real numbers except 0 and $-\frac{1}{2}$

B) no real solution

C) $x = 0$

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

E) all real numbers

Q
20

Solve the equation: $x^4 + 64 = 0$

A) No real solution

B) $x = \pm 2\sqrt{2}$

C) $x = 2\sqrt{2}$

D) $x = \pm 4$

E) $x = -4$

Q
21

The solution set of the equation $\frac{3}{x+4} = \frac{1}{x} + \frac{6x+12}{x(x+4)}$ contains:

A) No Solution

B) One positive integer

C) One negative integer

D) Two irrational numbers

E) One positive and one negative rational number.

Q
22

The solution set of $2 + \frac{5}{x-4} = \frac{x+1}{x-4}$ is:

A) $\emptyset$

B) $\{-4\}$

C) $\{0\}$

D) $\{4\}$

E) $\{2\}$

Topic 3 | Equations with Rational Exponents, Powers and Radicals

Solving equations that contain rational exponents, powers or radicals • Questions 23–30

Q **23**

The sum of all the real solutions of the equation $2(y-4)^{\frac{2}{3}}=8$ is

A) 8

B) 12

C) 16

D) 0

E) -4

Q **24**

The sum of the solution set of the equation $(x+1)^{\frac{2}{3}}=4$ is

A) -2

B) -9

C) 7

D) -7

E) 3

Q
25

Solve the equation: $2x^{5/3} + 64 = 0$

A) -8

B) 8

C) -32

D) 32

E) no real solution

Q
26

Solve the equation: $4(x+2)^5 = 1$

A) $x = -2 + \sqrt[5]{\frac{1}{4}}$

B) $x = -2 - \sqrt[5]{\frac{1}{4}}$

C) $x = 2 + \sqrt[5]{\frac{1}{4}}$

D) $x = -2 + \sqrt[5]{4}$

E) $x = -\frac{7}{4}$

Q
27

The product of all the solutions of the equation $6x^{\frac{2}{3}} - 24 = 0$ is:

A) -64

B) 64

C) -8

D) 24

E) -6

Q
28

The solution set of the equation $4x^{\frac{3}{4}} + 32 = 0$ contains:

A) no real solution.

B) one positive integer.

C) one negative integer.

D) two real solutions.

E) infinitely many real solutions.

Q
29

The sum of all the real solutions of the equation $3(x-2)^{\frac{4}{3}} = 48$ is

A) 2

B) -4

C) 0

D) 4

E) 8

Q
30

If $x > 1$, then $\sqrt[5]{(-x)^5} + \sqrt[6]{(\sqrt{x}-x)^6} =$

A) $-\sqrt{x}$

B) $-2x$

C) $2x$

D) $\sqrt{x}$

E) 0

Topic 4 | Solving for a Variable

Solving a formula or equation for one variable in terms of the others • Questions 31–38

Q **31**

If $x = (5x - 2)(2y - 1)$, then $x =$

A) $\frac{1-2y}{3-5y}$

B) $\frac{1-2y}{3+5y}$

C) $\frac{1+2y}{3-5y}$

D) $\frac{1+2y}{3+5y}$

E) $-\frac{1+2y}{3+5y}$

Q **32**

If $\frac{1}{w} = \frac{1}{x} + \frac{1}{y}$, then $x =$

A) $\frac{wy}{y-w}$

B) $\frac{wy}{w-y}$

C) $w - y$

D) $y - w$

E) $\frac{w-y}{wy}$

Q
33

If $t = \frac{-ax}{a-x-t}$, $a \neq t$, then the value of $3x + 1$ is equal to

A) $-3t + 1$

B) $t + 3a$

C) $3t - 1$

D) $t - 3a$

E) $3at + 1$

Q
34

If $\frac{1}{y} = \frac{1}{m} + \frac{1}{x} + \frac{1}{t}$, then $x =$

A) $\frac{mty}{mt-ty-my}$

B) $\frac{mty}{mt+ty-my}$

C) $-\frac{mt+ty-my}{mty}$

D) $-\frac{mt-ty-my}{mty}$

E) $y - m - t$

Q
35

If $y - b = m(x - a)$, then x is equal to

A) $\frac{y-b+ma}{m}$

B) $my - ba + a$

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

D) $y - b + ma$

E) $\frac{m+ay-ab}{y-b}$

Q
36

If $(a + c)x + x^2 = (x + a)^2$, then $x =$

A) $\frac{a^2}{c-a}$

B) $\frac{a^2}{3a+c}$

C) $\frac{a^2}{a+c}$

D) $\frac{a^2+2a}{a+c}$

E) $\frac{a^2}{3c-a}$

Q
37

If $\frac{a}{2a+5} = 3b - 1$, then $a =$

A) $\frac{5+15b}{6b+3}$

B) $\frac{5-15b}{6b+3}$

C) $\frac{5+15b}{6b-3}$

D) $\frac{15b-5}{6b-3}$

E) $\frac{5-15b}{6b-3}$

Q
38

If $x^2 - 2xy - 3y^2 = 4$ and $x^2 - y^2 = 6$, then $\frac{x-3y}{x-y} =$

A) $\frac{1}{6}$

B) 6

C) 24

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

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

Topic 5 | Word Problems and Geometry

Setting up and solving equations from word problems and from a figure • Questions 39–43

Q
39

The length of a rectangle is 3 feet more than twice the width. If the perimeter of the rectangle is 60 feet, then the length of the rectangle is:

A) 21

B) 25

C) 19

D) 17

E) 23

Q
40

If the difference between 5 times a number and 7 is equal to the sum of the number and 3, then the number is

A) $\frac{5}{2}$

B) $\frac{5}{3}$

C) -3

D) -8

E) -1

Q
41

In the adjacent figure, the area of the big rectangle is 24 cm^2. The area of the shaded region is

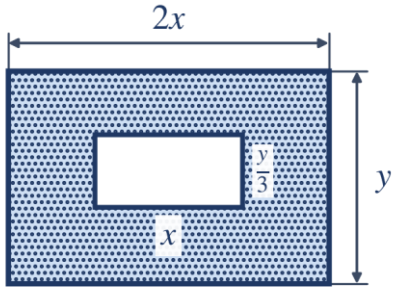
A) 20 cm^2

B) 10 cm^2

C) 6 cm^2

D) 15 cm^2

E) 16 cm^2



Q
42

A puzzle piece in the shape of a triangle has perimeter 40 cm. If two sides of the triangle are each twice as long as the shortest side, then the length of the shortest side is equal to

A) 8 cm

B) 5 cm

C) 10 cm

D) 12 cm

E) 13 cm

Q
43

If the difference between the squares of two consecutive natural numbers is 27 and x is the smaller number, then $2x - 1$ is equal to

A) 24

B) 28

C) 25

D) 29

E) 27

Answer Key

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

Q	Original	Ans.	Value
1	3	**A**	23
2	4	**A**	2
3	6	**A**	5
4	16	**A**	7
5	17	**A**	only one positive integer
6	22	**A**	5
7	24	**A**	$x = \frac{1}{17}$
8	25	**A**	$x = \frac{4}{3}$
9	35	**A**	1
10	36	**C**	one positive even integer
11	42	**A**	7
12	9	**A**	$\frac{1}{2}$
13	26	**A**	$x = \frac{13}{3}$
14	27	**A**	$t = 10$
15	20	**A**	$\frac{x+2}{x+4} = \frac{1}{2}$
16	21	**E**	8
17	23	**A**	$\frac{2}{5}$
18	1	**A**	no real solution.
19	28	**A**	all real numbers except 0 and $-\frac{1}{2}$
20	31	**A**	No real solution
21	32	**A**	No Solution
22	33	**A**	$\emptyset$
23	2	**A**	8
24	7	**A**	-2
25	29	**A**	-8
26	30	**A**	$x = -2 + \sqrt[5]{\frac{1}{4}}$
27	34	**A**	-64
28	37	**A**	no real solution.
29	40	**D**	4
30	43	**A**	$-\sqrt{x}$
31	5	**A**	$\frac{1-2y}{3-5y}$
32	8	**A**	$\frac{wy}{y-w}$

Q	Original	Ans.	Value
33	14	**A**	$-3t+1$
34	15	**A**	$\frac{mty}{mt-ty-my}$
35	18	**A**	$\frac{y-b+ma}{m}$
36	19	**A**	$\frac{a^2}{c-a}$
37	39	**E**	$\frac{5-15b}{6b-3}$
38	41	**D**	$\frac{2}{3}$
39	10	**A**	21
40	11	**A**	$\frac{5}{2}$
41	12	**A**	20 cm^2
42	13	**A**	8 cm
43	38	**C**	25