

Do the following problems as indicated.

Find the value of the expression for the given replacement value.

$$1) \frac{x^2 - 10x + 5}{x^2 + 2x - 1}; x = 8$$

$$2) \frac{a^2}{1 - a^2}; a = 9$$

Find all values that make the expression undefined.

$$3) \frac{7y - 5}{y^2 - 81}$$

$$4) \frac{x^2 - 36}{x^2 + 8x + 12}$$

$$5) \frac{x^2 - 4}{x^2 - 9x + 18}$$

Simplify the expression.

$$6) \frac{2x + 3}{10x^2 + 19x + 6}$$

$$7) \frac{y^2 + 9y + 18}{y^2 + 15y + 54}$$

$$8) \frac{11x^2 + 33x^3}{4x + 12x^2}$$

$$9) \frac{y^3 - 125}{y - 5}$$

$$10) \frac{4 + \frac{2}{x}}{\frac{x}{4} + \frac{1}{8}}$$

$$11) \frac{\frac{1}{k+2}}{\frac{3}{k^2-4}}$$

$$12) \frac{\frac{9}{a} + 9}{\frac{9}{a} - 9}$$

$$13) \frac{\frac{9t^2 - 36s^2}{st}}{\frac{3}{t} - \frac{6}{s}}$$

$$14) \frac{\frac{4}{7r-1} - 4}{\frac{4}{7r-1} + 4}$$

Perform indicated operations. Simplify, if possible.

$$15) \frac{x^3 + 1}{x^3 - x^2 + x} \cdot \frac{7x}{-56x - 56}$$

$$16) \frac{x^2 - 18x + 81}{8x - 72} \div \frac{4x - 36}{32}$$

$$17) \frac{x^2 + 14x + 45}{x^2 + 7x + 10} \cdot \frac{x^2 + 8x + 12}{x^2 + 15x + 54}$$

$$18) \frac{a^2 - w^2}{a + w} \div \frac{a}{a^2 + aw}$$

$$19) \frac{x^2 + 14x + 49}{x^2 + 15x + 56} \cdot \frac{x^2 + 8x}{x^2 + 5x - 14}$$

$$20) \frac{z^2 + 10z + 24}{z^2 + 12z + 32} \div \frac{z^2 + 6z}{z^2 + 18z + 80}$$

Perform indicated operations. Simplify if possible.

$$21) \frac{5x}{x-8} - \frac{40}{x-8}$$

$$22) \frac{x^2 - 18x + 80}{x^2 - 6x + 8} \cdot \frac{x^2 - 11x + 18}{x^2 - 21x + 110}$$

Perform indicated operations. Simplify if possible.

$$23) \frac{9y^2}{y-1} + \frac{-9y}{y-1}$$

$$24) \frac{10x-4}{x^2+6x+8} - \frac{9x-6}{x^2+6x+8}$$

$$25) \frac{2}{x+4} + \frac{9}{5x+20}$$

$$26) \frac{8}{5x-35} + \frac{x}{x^2-49}$$

$$27) \frac{8}{x} + \frac{9}{x-7}$$

$$28) \frac{3}{x+4} - \frac{6}{x-4}$$

$$29) \frac{3}{y^2-3y+2} + \frac{7}{y^2-1}$$

$$30) \frac{x}{x^2-16} - \frac{5}{x^2+5x+4}$$

$$31) \frac{x+1}{x^2+5x-14} + \frac{5x-2}{x^2-7x+10}$$

$$32) \frac{2}{x^2-3x+2} + \frac{5}{x^2-1}$$

$$33) \frac{5x}{x+1} + \frac{6}{x-1} - \frac{10}{x^2-1}$$

Solve the equation.

$$34) 1 + \frac{1}{x} = \frac{6}{x^2}$$

$$35) \frac{9}{y+5} - \frac{5}{y-5} = \frac{6}{y^2-25}$$

$$36) \frac{2}{t} = \frac{t}{5t-12}$$

$$37) \frac{1}{x+7} + \frac{5}{x+6} = \frac{-1}{x^2+13x+42}$$

Solve the problem.

38) Five divided by the difference of a number and 8 equals the quotient of 10 and the sum of the number and 12. Find the number.

39) The ratio of the weight of an object on Earth to an object on Planet X is 5 to 9. If a person weighs 120 pounds on Earth, find his weight on Planet X. (Round to the nearest whole number, if necessary.)

40) A painter can finish painting a house in 4 hours. Her assistant takes 6 hours to finish the same job. How long would it take for them to complete the job if they were working together?

41) A car travels 400 miles on level terrain in the same amount of time it travels 160 miles on mountainous terrain. If the rate of the car is 30 miles per hour less in the mountains than on level ground, find its rate in the mountains.

42) A boat moves 8 kilometers upstream in the same amount of time it moves 18 kilometers downstream. If the rate of the current is 5 kilometers per hour, find the rate of the boat in still water.

43) Jim can run 5 miles per hour on level ground on a still day. One windy day, he runs 15 miles with the wind, and in the same amount of time runs 7 miles against the wind. What is the rate of the wind?

Answer Key

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- 1) $-\frac{11}{79}$
- 2) $-\frac{81}{80}$
- 3) $y = 9, y = -9$
- 4) $x = -6, x = -2$
- 5) $x = 3, x = 6$
- 6) $\frac{1}{5x + 2}$
- 7) $\frac{y + 3}{y + 9}$
- 8) $\frac{11x}{4}$
- 9) $y^2 + 5y + 25$
- 10) $\frac{16}{x}$
- 11) $\frac{k - 2}{3}$
- 12) $\frac{1 + a}{1 - a}$
- 13) $3s + 6t$
- 14) $\frac{2 - 7r}{7r}$
- 15) $-\frac{1}{8}$
- 16) 1
- 17) 1
- 18) $a^2 - w^2$
- 19) $\frac{x}{x - 2}$
- 20) $\frac{z + 10}{z}$
- 21) 5
- 22) $\frac{(x - 8)(x - 9)}{(x - 4)(x - 11)}$
- 23) $9y$
- 24) $\frac{1}{x + 4}$
- 25) $\frac{19}{5(x + 4)}$
- 26) $\frac{13x + 56}{5(x + 7)(x - 7)}$
- 27) $\frac{17x - 56}{x(x - 7)}$
- 28) $\frac{-3x - 36}{(x + 4)(x - 4)}$
- 29) $\frac{10y - 11}{(y - 1)(y + 1)(y - 2)}$
- 30) $\frac{x^2 - 4x + 20}{(x - 4)(x + 4)(x + 1)}$
- 31) $\frac{6x^2 + 29x - 19}{(x - 2)(x + 7)(x - 5)}$
- 32) $\frac{7x - 8}{(x - 1)(x + 1)(x - 2)}$
- 33) $\frac{5x - 4}{x - 1}$
- 34) $-3, 2$
- 35) 19
- 36) $t = 4, 6$
- 37) $x = -7$
- 38) 28
- 39) 216 pounds
- 40) $2\frac{2}{5}$ hours
- 41) 20 mph
- 42) 13 kilometers per hour
- 43) $1\frac{9}{11}$ mph