

Exercises with Answers (For answers see Appendix A)

Exercises 20-36 will help to review basic arithmetic operations using integers, rational numbers (fractions), decimals.

Ex.1 Fill in blanks using the following words: ‘variable’, ‘algebraic expression’, ‘number(s)’ as appropriate.

$3x + 2$, y^2 , $\frac{a+bc}{2}$, $(-2a+1)^3$ are examples of _____.

Ψ x, y, a, b, c are examples of _____ but also examples of _____.

Variables represent _____.

If we know the value of x , we can evaluate $3x + 2$, and as a result we get a _____.

Ex.2 How are the following expressions read?

a) a^2

b) a^3

c) a^{12}

d) 2^m

e) $-y$

f) cd

g) $a-b$

h) $\frac{2}{5}x$

Ex.3 Rewrite the following expressions, inserting a multiplication sign whenever multiplication is implied. Whenever there is no operation of multiplication, clearly say so using the phrase “there is no multiplication performed in this expression”.

a) $7n$

b) $-5km$

c) $-x-y$

d) $-x(-y)$

e) $\frac{3x}{2}$

f) $2x-yz+w(-t)$

Ex.4 The operation that is indicated in the algebraic expression $a+b$ is, of course, addition. Name the operation that is to be performed in the following algebraic expressions.

a) ab

b) $\frac{q}{s}$

c) x^5

d) $3 \div x$

e) $3-x$

f) $3(-x)$

Ex.5 In the following expressions parentheses are needed. Explain why they are needed.

a) $x+(-b)$

b) $\left(\frac{m}{n}\right)^8$

c) $3b(-c)$

d) $(-a)^4$

e) $y(-x)$

f) $a \div (-b)$

Ex.6 Determine which expression is raised to the n-th power.

a) $(-s)^n$

b) $-s^n$

c) $(st)^n$

- d) st^n e) $\frac{x^n}{y}$ f) $\left(\frac{x}{y}\right)^n$
g) $x(st)^n$ h) $xy - s^n$ i) $x(y - s)^n$

Ex.7 Fill in the blanks.

- a) It is customary to write _____ instead of $1 \cdot x$.
b) It is customary to write _____ instead of $-1 \cdot x$.
c) When one writes ab , it is understood that the operation that is to be performed is _____.

Ex.8 Fill in the blanks with numbers to make the statement true.

- a) _____ $\cdot x = x$
b) _____ $\cdot x = -x$
c) _____ $\cdot x = 0$

Ex.9 Write an algebraic expression representing the opposite number of (do not remove parentheses).

- a) $-x$ b) $\frac{x^3}{y}$
c) $-\frac{x^3}{y}$ d) $\frac{-x^3}{-y}$

Ex.10 Use the letter y to represent a number and write the following phrases as algebraic expressions.

- a) Half of a number
b) Three fourths of a number
c) A quantity increased by 5
d) A number subtracted from v
e) A quantity squared
f) Three more than a number
g) A number decreased by x
h) The product of x and a number
i) A number doubled

Ex.11 Write the following phrases as algebraic expressions. Remember to place parentheses when needed (place them only when needed). Do not simplify.

- a) The sum of a and $-b$
b) The difference of a and $-b$
c) The product of a and $-b$
d) The opposite of C
f) The opposite of $-C$

- g) The opposite of $\frac{-a}{-b}$
- h) The product of v , $-t$, and $-p$
- i) The quotient of c and $-B$
- j) $-x$ raised to m -th power
- k) $\frac{x}{y}$ raised to m -th power

Ex.12 Give your answer in the form of an algebraic expression.

- a) Carlos is x years old at this moment. How old will Carlos be in 10 years?
- b) The items in a store cost x dollars. What is the price of each item, if after a discount, its price was reduced to two thirds of the original one?
- c) You have x dollars to divide equally among 3 kids. How much will each child get?
- d) You have \$100 to divide equally among x kids. How much will each child get?
- e) There are 30 books on each shelf. How many books are on x shelves?
- f) There are x students in a classroom. How many students are still in the classroom, if 3 students leave?

Ex.13 Let d be a variable representing the distance driven by a car, and let t represent the time it took to drive that distance. Write the following phrase as an algebraic expression: The distance divided by time.

Ex.14 Let m be a variable representing the mass of a given body, and let a represent its acceleration. Use m and a to write the following phrase as an algebraic expression: The product of the mass of a body and its acceleration.

Ex.15 Let h be a variable representing the height of a triangle, and b represent the base of the triangle. Use h and b to write the following statement as an algebraic expression: One half of the product of the base of a triangle and its height.

Ex.16 Let $x = 3$. Rewrite the expression replacing the variable with its value and evaluate, if possible. If evaluation is not possible, explain why it is not possible.

- a) $x + 5$
- b) $x - 2$
- c) $\frac{x}{3}$
- d) $4x$
- e) x^2
- f) $\frac{6}{x}$

Ex.17 If $x = 0$ the following expression cannot be evaluated: $\frac{1}{x}$. Why not? Can $\frac{1}{x-5}$ be evaluated when $x = 0$? What if $x = 5$? Find another example of an algebraic expression and a value of a variable(s) for which evaluation is not possible.

Ex.18 Let $x = 0$. Rewrite the expression replacing the variable with its value and evaluate, if possible. If evaluation is not possible, explain why it is not possible.

a) $3x$

b) $x - 2$

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

d) $\frac{x}{7}$

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

f) $\frac{0}{x}$

Ex.19 Let $x = 2$. Rewrite the expression replacing the variable with its value and evaluate, if possible. If evaluation is not possible, explain why it is not possible.

a) 3^x

b) x^3

c) x^x

Ex.20 Evaluate $-A$, if

a) $A = 2$

b) $A = -2$

Ex.21 Substitute $x = 6$ in the following expressions and then evaluate, if possible. If not possible, write “undefined”.

a) $x - 8$

b) $-10 - x$

c) $-4 + x$

d) $x - 6$

e) $-2 + x - 6$

Ex.22 Substitute $x = -2$ in the following expressions and then evaluate, if possible. If not possible, write “undefined”.

a) $2 + x$

b) $2 - x$

c) $-2 - x$

d) $-5 - x + 4$

e) $6 + x - 10 - x$

Ex.23 Substitute $x = 10$ in the following expressions and then evaluate, if possible. If not possible, write “undefined”.

a) $3x$

b) $-5x$

c) $\frac{-200}{x}$

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

e) $-5 \div x$

f) x^4

Ex.24 Substitute $x = -12$ in the following expressions and then evaluate, if possible. If not possible, write “undefined”.

a) $-1000x$

b) $\frac{x}{6}$

c) $-5x$

d) $\frac{6}{x+12}$

e) $-24 \div x$

f) x^2

Ex.25 Substitute $x = \frac{2}{3}$ in the following expressions and then evaluate, if possible. If not possible, write “undefined”.

a) $\frac{5}{3} + x$

b) $x + \frac{1}{5}$

c) $-x + \frac{2}{7}$

d) $-\frac{5}{12} - x$

e) $2 + x$

f) $-x - 3$

Ex.26 Substitute $x = -\frac{3}{5}$ in the following expressions and then evaluate, if possible. If not possible, write “undefined”.

a) $\frac{3}{10} - x$

b) $-\frac{1}{7} - x$

c) $2\frac{1}{5} + x$

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

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

Ex.27 Substitute $x = \frac{2}{7}$ in the following expressions and then evaluate, if possible. If not possible, write “undefined”.

a) $2x$

b) $-7x$

c) $-\frac{14}{3}x$

d) $\frac{5}{28} \div x$

e) $\frac{5}{x}$

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

Ex.28 Substitute $x = -\frac{3}{4}$ in the following expressions and then evaluate, if possible. If not possible, write “undefined”.

a) x^2

b) $\frac{4}{3}x$

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

d) $-1\frac{1}{8} \div x$

e) $\frac{x}{-3}$

f) $\frac{0}{x}$

Ex.29 Substitute $x=0.2$ in the following expressions and then evaluate, if possible. If not possible, write “undefined”.

a) $x+3.21$

b) $35.01-x$

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

d) $-40x$

e) $0.3x$

f) $\frac{-x}{0.04}$

Ex.30 Substitute $x=-0.6$ in the following expressions and then evaluate, if possible. If not possible, write “undefined”.

a) $-x-4.5$

b) $-2.7-x$

c) $\frac{1.2}{-x}$

d) $-600x$

e) $0.001x$

f) x^3

Ex 31 Substitute $x=-1.5$ in the following expressions and then evaluate, if possible. If not possible, write “undefined”.

a) $x-0.08$

b) $-3-x+0.4$

c) $x \div 0.15$

d) $-0.2x$

e) $\frac{-30}{x}$

Ex.32 If possible, evaluate $x+y$, if

a) $x = \frac{3}{5}, y = \frac{2}{3}$

b) $x = \frac{2}{7}, y = -\frac{9}{14}$

c) $x = -0.2, y = -1.08$

Ex.33 If possible, evaluate $x-y$, if

a) $x = \frac{3}{5}, y = \frac{2}{3}$

- b) $x = \frac{2}{7}, y = -\frac{9}{14}$
c) $x = -0.2, y = -1.08$

Ex.34 If possible, evaluate xy , if

- a) $x = \frac{2}{11}, y = \frac{22}{9}$
b) $x = -4, y = -\frac{9}{10}$
c) $x = -.2, y = 0.01$

Ex.35 If possible, evaluate $\frac{x}{y}$, if

- a) $x = \frac{2}{11}, y = \frac{22}{9}$
b) $x = -4, y = -\frac{9}{10}$
c) $x = -0.2, y = 0.01$

Ex.36 If possible, evaluate $(-x)^m$ if

- a) $x = 10, m = 7$
b) $x = -2, m = 4$
c) $x = \frac{1}{2}, m = 3$
d) $x = -0.1, m = 5$

Ex.37 Use the letter x to represent a number and write the following statements as algebraic expressions. Then evaluate each expression when $x = -\frac{1}{2}$.

- a) A number doubled
b) Three fourth of a number
c) A number raised to the second power

Ex.38 Evaluate $-t$, when $t = 1, t = -1$

Based on your results, which of the following are true?

- a) $-t$ is always positive
b) $-t$ is always negative
c) $-t$ may be positive or negative depending on the value of t