

Algebra (Introduction)

Question Paper, Set 06

Time: 1 hour 30 minutes

Maximum marks: 50

Name: _____ Class: _____ Date: _____

1. Answer all 20 questions. The marks for each question are shown in brackets.
2. Show your working for the 2, 3 and 5 mark questions.
3. The key sheet and worked solutions are at the end of this paper.

1. Which of the following is a variable: 29 , -21 , $\frac{4}{7}$, c ? [1 mark]
2. From a , n , $-\frac{3}{4}$, q , 25 , $-\frac{2}{3}$, write (i) the variables (ii) the constants. [2 marks]
3. Write y as a product of a number and a variable. [1 mark]
4. Represent the following statements in symbolic form: (i) 45 more than c (ii) The subtraction of $6m$ from 15 [2 marks]
5. Represent the following statements in symbolic form: (i) 4 times b added to 9 times x (ii) Divide r by 19 (iii) 34 more than b (iv) The subtraction of $4x$ from 29 (v) 24 times y [5 marks]
6. Represent the following statements in symbolic form: (i) Half of t (ii) 12 less than half of b [2 marks]
7. Fill in the box: $\square \times yz = -yz$ [1 mark]
8. Simplify: (i) $1 \times xz$ (ii) $\frac{n}{1}$ (iii) $\frac{bc}{-1}$ [3 marks]
9. Which of the following are terms: $15b - x$, 30 , $8q - t$, $\frac{3n}{b}$, $-7mnp$? [1 mark]
10. Write $20xy$ as a product of its factors and name the factors. [2 marks]
11. Write the coefficient of z in (i) $2z$ (ii) $12pz$ (iii) $17cz$. [3 marks]
12. Write the coefficient of x in $-\frac{x}{8}$. [1 mark]
13. State whether the following are like (or) unlike terms. Give reason. (i) $-\frac{7}{5}np$, $12pn$ (ii) $-11py$, $-11yz$ [2 marks]
14. Group the like terms: $-8np$, $-8c$, $-6np$, $5r$, $-15np$, $-13c$, $15r$. [5 marks]
15. Add: $27np + 17np$. [1 mark]
16. Add: (i) $15z + 24z$ (ii) $2xy + 29xy$ [2 marks]
17. Simplify $11y + 18q + 5t + 4y + 3q + 17t$. [3 marks]
18. Simplify: (i) $-26a + 11a$ (ii) $-4a - 21a$ (iii) $3a - 22a$ [3 marks]

19. Simplify: (i) $-8xy + 18xy$ (ii) $4xy - 12xy$ (iii) $-15xy + 9xy$ (iv) $-14pr - 29pr$ (v) $20pr - 18pr$ [5 marks]

20. Simplify $8m - 20pr + 14y - 8pr - 10m + 18y - 15pr$. [5 marks]

Key sheet

Q	Answer
1	c
2	(i) a, n, q (ii) $-\frac{3}{4}, 25, -\frac{2}{3}$
3	$y = 1 \times y$
4	(i) $c + 45$, (ii) $15 - 6m$
5	(i) $9x + 4b$, (ii) $\frac{r}{19}$, (iii) $b + 34$, (iv) $29 - 4x$, (v) $24y$
6	(i) $\frac{t}{2}$, (ii) $\frac{b}{2} - 12$
7	-1
8	(i) xz , (ii) n , (iii) $-bc$
9	$30, \frac{3n}{b}, -7mnp$
10	$20xy = 20 \times x \times y$; factors $20, x, y$
11	(i) 2 , (ii) $12p$, (iii) $17c$
12	$-\frac{1}{8}$
13	(i) Like, (ii) Unlike
14	$-8np, -6np, -15np; -8c, -13c; 5r, 15r$
15	$44np$
16	(i) $39z$, (ii) $31xy$
17	$15y + 21q + 22t$
18	(i) $-15a$, (ii) $-25a$, (iii) $-19a$
19	(i) $10xy$, (ii) $-8xy$, (iii) $-6xy$, (iv) $-43pr$, (v) $2pr$
20	$-2m - 43pr + 32y$

Solutions

1. Which of the following is a variable: 29, -21 , $\frac{4}{7}$, c ? [1]

A variable (or literal) can take various numerical values. A constant has a fixed value.

-21 , 29 and $\frac{4}{7}$ have fixed values, so they are constants.

c can take various values, so it is the variable.

Ans: c

2. From a , n , $-\frac{3}{4}$, q , 25, $-\frac{2}{3}$, write (i) the variables (ii) the constants. [2]

Variables can take various numerical values: a , n and q .

Constants have a fixed value: $-\frac{3}{4}$, 25 and $-\frac{2}{3}$.

Ans: (i) a , n , q (ii) $-\frac{3}{4}$, 25, $-\frac{2}{3}$

3. Write y as a product of a number and a variable. [1]

$$y = 1 \times y$$

Ans: $y = 1 \times y$

4. Represent the following statements in symbolic form: (i) 45 more than c (ii) The subtraction of $6m$ from 15 [2]

(i) 45 more than c : add 45 to c . $c + 45$

(ii) Take $6m$ away from 15. $15 - 6m$

Ans: (i) $c + 45$, (ii) $15 - 6m$

5. Represent the following statements in symbolic form: (i) 4 times b added to 9 times x (ii) Divide r by 19 (iii) 34 more than b (iv) The subtraction of $4x$ from 29 (v) 24 times y [5]

(i) 4 times b is $4b$; 9 times x is $9x$. Add $4b$ to $9x$: $9x + 4b$

(ii) r divided by 19 is $\frac{r}{19}$

(iii) 34 more than b : add 34 to b . $b + 34$

(iv) Take $4x$ away from 29. $29 - 4x$

(v) Multiply: $24 \times y = 24y$

Ans: (i) $9x + 4b$, (ii) $\frac{r}{19}$, (iii) $b + 34$, (iv) $29 - 4x$, (v) $24y$

6. Represent the following statements in symbolic form: (i) Half of t (ii) 12 less than half of b [2]

(i) Half of t is $\frac{t}{2}$

(ii) Half of b is $\frac{b}{2}$. 12 less than it: take away 12. $\frac{b}{2} - 12$

Ans: (i) $\frac{t}{2}$, (ii) $\frac{b}{2} - 12$

7. Fill in the box: $\square \times yz = -yz$ [1]

Rule: $-1 \times a = -a$

So $-1 \times yz = -yz$: the box is -1 .

Ans: -1

8. Simplify: (i) $1 \times xz$ (ii) $\frac{n}{1}$ (iii) $\frac{bc}{-1}$ [3]

(i) Rule $1 \times a = a$, so $1 \times xz = xz$

(ii) Rule $\frac{a}{1} = a$, so $\frac{n}{1} = n$

(iii) Rule $\frac{a}{-1} = -a$, so $\frac{bc}{-1} = -bc$

Ans: (i) xz , (ii) n , (iii) $-bc$

9. Which of the following are terms: $15b - x$, 30 , $8q - t$, $\frac{3n}{b}$, $-7mnp$? [1]

A term is made from constants and variables by multiplication (or) division only.

$15b - x$ and $8q - t$ use $+$ (or) $-$, so they are not terms.

Terms: 30 , $\frac{3n}{b}$ and $-7mnp$.

Ans: 30 , $\frac{3n}{b}$, $-7mnp$

10. Write $20xy$ as a product of its factors and name the factors. [2]

$$20xy = 20 \times x \times y$$

Each numerical (or) literal value in the product is a factor: 20 , x , y .

Ans: $20xy = 20 \times x \times y$; factors $20, x, y$

11. Write the coefficient of z in (i) $2z$ (ii) $12pz$ (iii) $17cz$. [3]

(i) $2z = 2 \times z$, so the coefficient is 2 .

(ii) $12pz = 12p \times z$, so the coefficient is $12p$.

(iii) $17cz = 17c \times z$, so the coefficient is $17c$.

Ans: (i) 2 , (ii) $12p$, (iii) $17c$

12. Write the coefficient of x in $-\frac{x}{8}$. [1]

$$-\frac{x}{8} = -\frac{1}{8} \times x$$

So the coefficient of x is $-\frac{1}{8}$.

Ans: $-\frac{1}{8}$

13. State whether the following are like (or) unlike terms. Give reason. (i) $-\frac{7}{5}np$, $12pn$ (ii) $-11py$, $-11yz$ [2]

(i) $-\frac{7}{5}np$, $12pn$: the same literal factors np ($pn = np$), so like terms.

(ii) $-11py$ has literal factors py , $-11yz$ has literal factors yz : different, so unlike terms.

Ans: (i) Like, (ii) Unlike

14. Group the like terms: $-8np$, $-8c$, $-6np$, $5r$, $-15np$, $-13c$, $15r$. [5]

Like terms have the same literal factors.

Literal factor np : $-8np$, $-6np$ and $-15np$.

Literal factor c : $-8c$ and $-13c$.

Literal factor r : $5r$ and $15r$.

Ans: $-8np$, $-6np$, $-15np$; $-8c$, $-13c$; $5r$, $15r$

15. Add: $27np + 17np$. [1]

$$\begin{aligned} 27np + 17np &= (27 + 17)np \\ &= 44np \end{aligned}$$

Ans: $44np$

16. Add: (i) $15z + 24z$ (ii) $2xy + 29xy$ [2]

$$\begin{aligned} \text{(i)} \quad 15z + 24z &= (15 + 24)z = 39z \\ \text{(ii)} \quad 2xy + 29xy &= (2 + 29)xy = 31xy \end{aligned}$$

Ans: (i) $39z$, (ii) $31xy$

17. Simplify $11y + 18q + 5t + 4y + 3q + 17t$. [3]

Bring the like terms together and add.

$$\begin{aligned} 11y + 18q + 5t + 4y + 3q + 17t &= (11y + 4y) + (18q + 3q) + (5t + 17t) \\ &= (11 + 4)y + (18 + 3)q + (5 + 17)t \\ &= 15y + 21q + 22t \end{aligned}$$

Ans: $15y + 21q + 22t$

18. Simplify: (i) $-26a + 11a$ (ii) $-4a - 21a$ (iii) $3a - 22a$ [3]

$$\begin{aligned} \text{(i)} \quad -26a + 11a &= (-26 + 11)a = -15a \\ \text{(ii)} \quad -4a - 21a &= (-4 - 21)a = -25a \\ \text{(iii)} \quad 3a - 22a &= (3 - 22)a = -19a \end{aligned}$$

Ans: (i) $-15a$, (ii) $-25a$, (iii) $-19a$

19. Simplify: (i) $-8xy + 18xy$ (ii) $4xy - 12xy$ (iii) $-15xy + 9xy$ (iv) $-14pr - 29pr$ (v) $20pr - 18pr$ [5]

$$\begin{aligned} \text{(i)} \quad -8xy + 18xy &= (-8 + 18)xy = 10xy \\ \text{(ii)} \quad 4xy - 12xy &= (4 - 12)xy = -8xy \\ \text{(iii)} \quad -15xy + 9xy &= (-15 + 9)xy = -6xy \\ \text{(iv)} \quad -14pr - 29pr &= (-14 - 29)pr = -43pr \\ \text{(v)} \quad 20pr - 18pr &= (20 - 18)pr = 2pr \end{aligned}$$

Ans: (i) $10xy$, (ii) $-8xy$, (iii) $-6xy$, (iv) $-43pr$, (v) $2pr$

20. Simplify $8m - 20pr + 14y - 8pr - 10m + 18y - 15pr$. [5]

Bring the like terms together, then add (or) subtract the numbers.

$$\begin{aligned} 8m - 20pr + 14y - 8pr - 10m + 18y - 15pr &= (8m - 10m) + (-20pr - 8pr - 15pr) + (14y + 18y) \\ &= (8 - 10)m + (-20 - 8 - 15)pr + (14 + 18)y \\ &= -2m - 43pr + 32y \end{aligned}$$

Ans: $-2m - 43pr + 32y$
