

Algebra (Introduction)

Question Paper, Set 08

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: 15, -22 , x , 6? [1 mark]
2. From p , -10 , -14 , m , q , -7 , write (i) the variables (ii) the constants. [2 marks]
3. Represent in symbolic form: the subtraction of t from y . [1 mark]
4. Represent the following statements in symbolic form: (i) b decreased by 56 (ii) 33 divided by n [2 marks]
5. Represent the following statements in symbolic form: (i) 2 times n added to 9 times m (ii) 31 divided by z (iii) The subtraction of $7a$ from 16 (iv) m decreased by 39 (v) 4 times y [5 marks]
6. Represent the following statements in symbolic form: (i) 7 less than half of q (ii) 14 less than one third of c [2 marks]
7. Fill in the box: $\frac{c}{\square} = -c$ [1 mark]
8. Simplify: (i) $1 \times yz$ (ii) $0 \times z$ (iii) $\frac{r}{1}$ [3 marks]
9. Which of the following are terms: $\frac{9}{c}$, $13qr$, $m + r$, -28 , $b + 14$? [1 mark]
10. Write 45 as a product of two factors in all possible ways. [2 marks]
11. Write the coefficient of n in (i) $4n$ (ii) $3np$ (iii) $-6ny$. [3 marks]
12. Write the coefficient of np in $-\frac{np}{5}$. [1 mark]
13. State whether the following are like (or) unlike terms. Give reason. (i) $\frac{3}{2}x$, $\frac{3}{2}q$ (ii) $4pqt$, $-13pqt$ [2 marks]
14. Group the like terms: $-9b$, $13bc$, $-10b$, $-9mn$, $6mn$, $-11bc$, $-4mn$, $4b$. [5 marks]
15. Simplify $14x + 7x$. [1 mark]
16. Add: (i) $25ac + 10ac$ (ii) $25z + 29z$ [2 marks]
17. Simplify $15xy + 4 + 14xy + 10$. [3 marks]
18. Simplify: (i) $5np - 29np$ (ii) $-27np - 10np$ (iii) $-22np + 6np$ [3 marks]

19. Simplify: (i) $-16n - 28n$ (ii) $26n - 18n$ (iii) $-4n + 6n$ (iv) $-22a + 12a$ (v) $23a - 27a$ [5 marks]

20. Simplify $14xy - 7bc - 2mp - 9xy - 2mp - 17bc + 5bc$. [5 marks]

Key sheet

Q	Answer
1	x
2	(i) p, m, q (ii) $-10, -14, -7$
3	$y - t$
4	(i) $b - 56$, (ii) $\frac{33}{n}$
5	(i) $9m + 2n$, (ii) $\frac{31}{z}$, (iii) $16 - 7a$, (iv) $m - 39$, (v) $4y$
6	(i) $\frac{a}{2} - 7$, (ii) $\frac{c}{3} - 14$
7	-1
8	(i) yz , (ii) 0 , (iii) r
9	$\frac{9}{c}, 13qr, -28$
10	$45 = 1 \times 45 = 3 \times 15 = 5 \times 9$
11	(i) 4 , (ii) $3p$, (iii) $-6y$
12	$-\frac{1}{5}$
13	(i) Unlike, (ii) Like
14	$13bc, -11bc; -9mn, 6mn, -4mn; -9b, -10b, 4b$
15	$21x$
16	(i) $35ac$, (ii) $54z$
17	$29xy + 14$
18	(i) $-24np$, (ii) $-37np$, (iii) $-16np$
19	(i) $-44n$, (ii) $8n$, (iii) $2n$, (iv) $-10a$, (v) $-4a$
20	$5xy - 19bc - 4mp$

Solutions

1. Which of the following is a variable: 15, -22 , x , 6? [1]

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

15, -22 and 6 have fixed values, so they are constants.

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

Ans: x

2. From p , -10 , -14 , m , q , -7 , write (i) the variables (ii) the constants. [2]

Variables can take various numerical values: p , m and q .

Constants have a fixed value: -10 , -14 and -7 .

Ans: (i) p , m , q (ii) -10 , -14 , -7

3. Represent in symbolic form: the subtraction of t from y . [1]

Take t away from y .

$$y - t$$

Ans: $y - t$

4. Represent the following statements in symbolic form: (i) b decreased by 56 (ii) 33 divided by n [2]

(i) Take 56 away from b . $b - 56$

(ii) 33 divided by n is $\frac{33}{n}$

Ans: (i) $b - 56$, (ii) $\frac{33}{n}$

5. Represent the following statements in symbolic form: (i) 2 times n added to 9 times m (ii) 31 divided by z (iii) The subtraction of $7a$ from 16 (iv) m decreased by 39 (v) 4 times y [5]

(i) 2 times n is $2n$; 9 times m is $9m$. Add $2n$ to $9m$: $9m + 2n$

(ii) 31 divided by z is $\frac{31}{z}$

(iii) Take $7a$ away from 16. $16 - 7a$

(iv) Take 39 away from m . $m - 39$

(v) Multiply: $4 \times y = 4y$

Ans: (i) $9m + 2n$, (ii) $\frac{31}{z}$, (iii) $16 - 7a$, (iv) $m - 39$, (v) $4y$

6. Represent the following statements in symbolic form: (i) 7 less than half of q (ii) 14 less than one third of c [2]

(i) Half of q is $\frac{q}{2}$. 7 less than it: take away 7. $\frac{q}{2} - 7$

(ii) One third of c is $\frac{c}{3}$. 14 less than it: take away 14. $\frac{c}{3} - 14$

Ans: (i) $\frac{q}{2} - 7$, (ii) $\frac{c}{3} - 14$

7. Fill in the box: $\frac{c}{\square} = -c$ [1]

Rule: $\frac{a}{-1} = -a$

So $\frac{c}{-1} = -c$: the box is -1 .

Ans: -1

8. Simplify: (i) $1 \times yz$ (ii) $0 \times z$ (iii) $\frac{r}{1}$ [3]

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

(ii) Rule $0 \times a = 0$, so $0 \times z = 0$

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

Ans: (i) yz , (ii) 0 , (iii) r

9. Which of the following are terms: $\frac{9}{c}$, $13qr$, $m + r$, -28 , $b + 14$? [1]

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

$m + r$ and $b + 14$ use $+$ (or) $-$, so they are not terms.

Terms: $\frac{9}{c}$, $13qr$ and -28 .

Ans: $\frac{9}{c}$, $13qr$, -28

10. Write 45 as a product of two factors in all possible ways. [2]

$$45 = 1 \times 45$$

$$45 = 3 \times 15$$

$$45 = 5 \times 9$$

So the factors of 45 are 1, 3, 5, 9, 15 and 45.

Ans: $45 = 1 \times 45 = 3 \times 15 = 5 \times 9$

11. Write the coefficient of n in (i) $4n$ (ii) $3np$ (iii) $-6ny$. [3]

(i) $4n = 4 \times n$, so the coefficient is 4.

(ii) $3np = 3p \times n$, so the coefficient is $3p$.

(iii) $-6ny = -6y \times n$, so the coefficient is $-6y$.

Ans: (i) 4, (ii) $3p$, (iii) $-6y$

12. Write the coefficient of np in $-\frac{np}{5}$. [1]

$$-\frac{np}{5} = -\frac{1}{5} \times np$$

So the coefficient of np is $-\frac{1}{5}$.

Ans: $-\frac{1}{5}$

13. State whether the following are like (or) unlike terms. Give reason. (i) $\frac{3}{2}x$, $\frac{3}{2}q$ (ii) $4pqt$, $-13pqt$ [2]

(i) $\frac{3}{2}x$ has literal factors x , $\frac{3}{2}q$ has literal factors q : different, so unlike terms.

(ii) $4pqt$, $-13pqt$: the same literal factors pqt , so like terms.

Ans: (i) Unlike, (ii) Like

14. Group the like terms: $-9b$, $13bc$, $-10b$, $-9mn$, $6mn$, $-11bc$, $-4mn$, $4b$. [5]

Like terms have the same literal factors.

Literal factor bc : $13bc$ and $-11bc$.

Literal factor mn : $-9mn$, $6mn$ and $-4mn$.

Literal factor b : $-9b$, $-10b$ and $4b$.

Ans: $13bc$, $-11bc$; $-9mn$, $6mn$, $-4mn$; $-9b$, $-10b$, $4b$

15. Simplify $14x + 7x$. [1]

$$\begin{aligned}14x + 7x &= (14 + 7)x \\ &= 21x\end{aligned}$$

Ans: $21x$

16. Add: (i) $25ac + 10ac$ (ii) $25z + 29z$ [2]

$$\begin{aligned}\text{(i)} \quad 25ac + 10ac &= (25 + 10)ac = 35ac \\ \text{(ii)} \quad 25z + 29z &= (25 + 29)z = 54z\end{aligned}$$

Ans: (i) $35ac$, (ii) $54z$

17. Simplify $15xy + 4 + 14xy + 10$. [3]

Letter terms together, numbers together.

$$\begin{aligned}15xy + 4 + 14xy + 10 &= (15xy + 14xy) + (4 + 10) \\ &= (15 + 14)xy + (4 + 10) \\ &= 29xy + 14\end{aligned}$$

Ans: $29xy + 14$

18. Simplify: (i) $5np - 29np$ (ii) $-27np - 10np$ (iii) $-22np + 6np$ [3]

$$\begin{aligned}\text{(i)} \quad 5np - 29np &= (5 - 29)np = -24np \\ \text{(ii)} \quad -27np - 10np &= (-27 - 10)np = -37np \\ \text{(iii)} \quad -22np + 6np &= (-22 + 6)np = -16np\end{aligned}$$

Ans: (i) $-24np$, (ii) $-37np$, (iii) $-16np$

19. Simplify: (i) $-16n - 28n$ (ii) $26n - 18n$ (iii) $-4n + 6n$ (iv) $-22a + 12a$ (v) $23a - 27a$ [5]

$$\begin{aligned}\text{(i)} \quad -16n - 28n &= (-16 - 28)n = -44n \\ \text{(ii)} \quad 26n - 18n &= (26 - 18)n = 8n \\ \text{(iii)} \quad -4n + 6n &= (-4 + 6)n = 2n \\ \text{(iv)} \quad -22a + 12a &= (-22 + 12)a = -10a \\ \text{(v)} \quad 23a - 27a &= (23 - 27)a = -4a\end{aligned}$$

Ans: (i) $-44n$, (ii) $8n$, (iii) $2n$, (iv) $-10a$, (v) $-4a$

20. Simplify $14xy - 7bc - 2mp - 9xy - 2mp - 17bc + 5bc$. [5]

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

$$\begin{aligned}14xy - 7bc - 2mp - 9xy - 2mp - 17bc + 5bc &= (14xy - 9xy) + (-7bc - 17bc + 5bc) + (-2mp - 2mp) \\ &= (14 - 9)xy + (-7 - 17 + 5)bc + (-2 - 2)mp \\ &= 5xy - 19bc - 4mp\end{aligned}$$

Ans: $5xy - 19bc - 4mp$
