EXPRESSWALA ACADEMY

Algebra (Introduction)

Question Paper, Set 02

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: -13, 17, q, 30? [1 mark]

2. From $\frac{7}{8}$, p, r, a, $-\frac{1}{5}$, -4, write (i) the variables (ii) the constants. [2 marks]

3. Represent in symbolic form: the subtraction of x from a. [1 mark]

4. Represent the following statements in symbolic form: (i) 36 more than m (ii) a decreased by 52 [2 marks]

5. Represent the following statements in symbolic form: (i) 10 times x (ii) x decreased by 13 (iii) 48 more than p (iv) 8 times q added to 12 times t (v) 26 divided by z [5 marks]

6. Represent the following statements in symbolic form: (i) One third of z (ii) 10 less than half of x [2 marks]

7. Fill in the box: $\square \times x = x$ [1 mark]

8. Simplify: (i) $1 \times xy$ (ii) $\frac{mp}{1}$ (iii) $-1 \times mnp$ [3 marks]

9. Which of the following are terms: $15 - a$, $\frac{7}{x}$, 9, $\frac{10n}{t}$, $14 - b$? [1 mark]

10. Write 18 as a product of two factors in all possible ways. [2 marks]

11. Write the coefficient of t in (i) $-9t$ (ii) $18at$ (iii) $-9qt$. [3 marks]

12. Write the coefficient of n in $-\frac{n}{9}$. [1 mark]

13. State whether the following are like (or) unlike terms. Give reason. (i) $6z$, $-14z$ (ii) $-14mt$, $-14mn$ [2 marks]

14. Group the like terms: $8t$, $15t$, $-5t$, $14mn$, $-7z$, $15mn$, $8z$. [5 marks]

15. Find the sum of $28mn$ and $20mn$. [1 mark]

16. Add: (i) $21pr + 28pr$ (ii) $21a + 12a$ [2 marks]

17. Add the like terms: $2xz + 5 + 2 + 11xz$. [3 marks]

18. Simplify: (i) $10ac - 28ac$ (ii) $-6ac + 19ac$ (iii) $24ac - 4ac$ [3 marks]

19. Simplify: (i) $-17m + 15m$ (ii) $-25m - 11m$ (iii) $6m - 12m$ (iv) $29p - 2p$ (v) $-2p + 11p$ [5 marks]

20. Simplify $14xz - 3pq - 6r - 5pq - 10xz - 8r + 4pq$. [5 marks]

Key sheet

Q	Answer
1	q
2	(i) p, r, a (ii) $\frac{7}{8}$, $-\frac{1}{5}$, -4
3	$a - x$
4	(i) $m + 36$, (ii) $a - 52$
5	(i) $10x$, (ii) $x - 13$, (iii) $p + 48$, (iv) $12t + 8q$, (v) $\frac{26}{z}$
6	(i) $\frac{z}{3}$, (ii) $\frac{x}{2} - 10$
7	1
8	(i) xy, (ii) mp, (iii) $-mnp$
9	$\frac{7}{x}$, 9, $\frac{10n}{t}$
10	$18 = 1 \times 18 = 2 \times 9 = 3 \times 6$
11	(i) -9, (ii) $18a$, (iii) $-9q$
12	$-\frac{1}{9}$
13	(i) Like, (ii) Unlike
14	$8t$, $15t$, $-5t$; $14mn$, $15mn$; $-7z$, $8z$
15	$48mn$
16	(i) $49pr$, (ii) $33a$
17	$13xz + 7$
18	(i) $-18ac$, (ii) $13ac$, (iii) $20ac$
19	(i) $-2m$, (ii) $-36m$, (iii) $-6m$, (iv) $27p$, (v) $9p$
20	$4xz - 4pq - 14r$

Solutions

1. Which of the following is a variable: -13, 17, q, 30? [1]

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

17, 30 and -13 have fixed values, so they are constants.

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

Ans: q

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2. From $\frac{7}{8}$, p, r, a, $-\frac{1}{5}$, -4, write (i) the variables (ii) the constants. [2]

Variables can take various numerical values: p, r and a.

Constants have a fixed value: $\frac{7}{8}$, $-\frac{1}{5}$ and -4.

Ans: (i) p, r, a **(ii)** $\frac{7}{8}$, $-\frac{1}{5}$, -4

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3. Represent in symbolic form: the subtraction of x from a. [1]

Take x away from a.

$a - x$

Ans: $a - x$

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4. Represent the following statements in symbolic form: (i) 36 more than m (ii) a decreased by 52 [2]

(i) 36 more than m: add 36 to m. $m + 36$

(ii) Take 52 away from a. $a - 52$

Ans: (i) $m + 36$, **(ii)** $a - 52$

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5. Represent the following statements in symbolic form: (i) 10 times x (ii) x decreased by 13 (iii) 48 more than p (iv) 8 times q added to 12 times t (v) 26 divided by z [5]

(i) Multiply: $10 \times x = 10x$

(ii) Take 13 away from x. $x - 13$

(iii) 48 more than p: add 48 to p. $p + 48$

(iv) 8 times q is $8q$; 12 times t is $12t$. Add $8q$ to $12t$: $12t + 8q$

(v) 26 divided by z is $\frac{26}{z}$

Ans: (i) $10x$, **(ii)** $x - 13$, **(iii)** $p + 48$, **(iv)** $12t + 8q$, **(v)** $\frac{26}{z}$

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6. Represent the following statements in symbolic form: (i) One third of z (ii) 10 less than half of x [2]

(i) One third of z is $\frac{z}{3}$

(ii) Half of x is $\frac{x}{2}$. 10 less than it: take away 10. $\frac{x}{2} - 10$

Ans: (i) $\frac{z}{3}$, **(ii)** $\frac{x}{2} - 10$

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

Rule: $1 \times a = a$

So $1 \times x = x$: the box is 1.

Ans: 1

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8. Simplify: (i) $1 \times xy$ (ii) $\frac{mp}{1}$ (iii) $-1 \times mnp$ [3]

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

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

(iii) Rule $-1 \times a = -a$, so $-1 \times mnp = -mnp$

Ans: (i) xy, (ii) mp, (iii) $-mnp$

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9. Which of the following are terms: $15 - a$, $\frac{7}{x}$, 9, $\frac{10n}{t}$, $14 - b$? [1]

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

$15 - a$ and $14 - b$ use $+$ (or) $-$, so they are not terms.

Terms: $\frac{7}{x}$, 9 and $\frac{10n}{t}$.

Ans: $\frac{7}{x}$, 9, $\frac{10n}{t}$

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10. Write 18 as a product of two factors in all possible ways. [2]

$18 = 1 \times 18$

$18 = 2 \times 9$

$18 = 3 \times 6$

So the factors of 18 are 1, 2, 3, 6, 9 and 18.

Ans: $18 = 1 \times 18 = 2 \times 9 = 3 \times 6$

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11. Write the coefficient of t in (i) $-9t$ (ii) $18at$ (iii) $-9qt$. [3]

(i) $-9t = -9 \times t$, so the coefficient is -9.

(ii) $18at = 18a \times t$, so the coefficient is $18a$.

(iii) $-9qt = -9q \times t$, so the coefficient is $-9q$.

Ans: (i) -9, (ii) $18a$, (iii) $-9q$

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12. Write the coefficient of n in $-\frac{n}{9}$. [1]

$-\frac{n}{9} = -\frac{1}{9} \times n$

So the coefficient of n is $-\frac{1}{9}$.

Ans: $-\frac{1}{9}$

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13. State whether the following are like (or) unlike terms. Give reason. (i) $6z$, $-14z$ (ii) $-14mt$, $-14mn$ [2]

(i) $6z$, $-14z$: the same literal factors z, so like terms.

(ii) $-14mt$ has literal factors mt, $-14mn$ has literal factors mn: different, so unlike terms.

Ans: (i) Like, (ii) Unlike

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14. Group the like terms: $8t$, $15t$, $-5t$, $14mn$, $-7z$, $15mn$, $8z$. [5]

Like terms have the same literal factors.

Literal factor t: $8t$, $15t$ and $-5t$.

Literal factor mn: $14mn$ and $15mn$.

Literal factor z: $-7z$ and $8z$.

Ans: $8t$, $15t$, $-5t$; $14mn$, $15mn$; $-7z$, $8z$

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15. Find the sum of $28mn$ and $20mn$. [1]

$28mn + 20mn = (28 + 20)mn$

$= 48mn$

Ans: $48mn$

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16. Add: (i) $21pr + 28pr$ (ii) $21a + 12a$ [2]

(i) $21pr + 28pr = (21 + 28)pr = 49pr$

(ii) $21a + 12a = (21 + 12)a = 33a$

Ans: (i) $49pr$**, (ii)** $33a$

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17. Add the like terms: $2xz + 5 + 2 + 11xz$. [3]

Letter terms together, numbers together.

$2xz + 5 + 2 + 11xz = (2xz + 11xz) + (5 + 2)$

$= (2 + 11)xz + (5 + 2)$

$= 13xz + 7$

Ans: $13xz + 7$

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18. Simplify: (i) $10ac - 28ac$ (ii) $-6ac + 19ac$ (iii) $24ac - 4ac$ [3]

(i) $10ac - 28ac = (10 - 28)ac = -18ac$

(ii) $-6ac + 19ac = (-6 + 19)ac = 13ac$

(iii) $24ac - 4ac = (24 - 4)ac = 20ac$

Ans: (i) $-18ac$**, (ii)** $13ac$**, (iii)** $20ac$

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19. Simplify: (i) $-17m + 15m$ (ii) $-25m - 11m$ (iii) $6m - 12m$ (iv) $29p - 2p$ (v) $-2p + 11p$ [5]

(i) $-17m + 15m = (-17 + 15)m = -2m$

(ii) $-25m - 11m = (-25 - 11)m = -36m$

(iii) $6m - 12m = (6 - 12)m = -6m$

(iv) $29p - 2p = (29 - 2)p = 27p$

(v) $-2p + 11p = (-2 + 11)p = 9p$

Ans: (i) $-2m$**, (ii)** $-36m$**, (iii)** $-6m$**, (iv)** $27p$**, (v)** $9p$

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20. Simplify $14xz - 3pq - 6r - 5pq - 10xz - 8r + 4pq$. [5]

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

$14xz - 3pq - 6r - 5pq - 10xz - 8r + 4pq = (14xz - 10xz) + (-3pq - 5pq + 4pq) + (-6r - 8r)$

$= (14 - 10)xz + (-3 - 5 + 4)pq + (-6 - 8)r$

$= 4xz - 4pq - 14r$

Ans: $4xz - 4pq - 14r$