



Patterns and Algebraic Expressions

- 1** Simplify by combining like terms.

$$-9 - 7x + 3x$$

A $-10x - 9$

B $-7x - 9$

C $-7x + 3x - 9$

D $-4x - 9$

- 2** Simplify by combining like terms.

$$9x - 1 + 4x^2 - x$$

A $4x^2 + 8x - 1$

B $4x^2 + 9x - x - 1$

C $4x^2 + 9x - 1$

D $4x^2 + 10x - 1$

- 3** Simplify by combining like terms.

$$-5x^2 + 9 - 7x^2 + 2x^4 + 4x$$

A $2x^4 + 2x^2 + 4x + 9$

B $2x^4 - 5x^2 + 4x + 9$

C $2x^4 - 5x^2 - 7x^2 + 4x + 9$

D $2x^4 - 12x^2 + 4x + 9$

- 4** Simplify by combining like terms.

$$x - 9 - 8y + 2xy + 2xy$$

A $0xy + x - 8y - 9$

B $2xy + 2xy + x - 8y - 9$

C $2xy + x - 8y - 9$

D $4xy + x - 8y - 9$

- 5** Simplify by combining like terms.

$$-4x^2y^2 - 7x^2y^2 + 9x^2 + 2 - 5xy^2$$

A $-4x^2y^2 - 7x^2y^2 - 5xy^2 + 9x^2 + 2$

B $3x^2y^2 - 5xy^2 + 9x^2 + 2$

C $-4x^2y^2 - 5xy^2 + 9x^2 + 2$

D $-11x^2y^2 - 5xy^2 + 9x^2 + 2$

- 6** Which rule would create this pattern?

9, 7, 5, 3

A Start at 9 and subtract 2 for each term

B Start with 3 x 3. The next term is 4 x 4, and so on.

- 7** What is the value of this equation when $r=3$, $d=-3$, $b=-4$

$$-\frac{6r}{6d} + 3b$$

A -4

B $-11r$

C -108

D $-13r$

E -11

F $6r - -11$

- 8** What is the value of this equation when $b=5$, $z=2$, $d=4$

$$\frac{2b}{5z} + 5d$$

A 2

B $b^2 + 21$

C $-5b$

D $2b - 21$

E 70

F 21



Patterns and Algebraic Expressions

9 What rule turns each input into its output?

Input	Output
1	1
4	16
6	26
8	36
9	41

A

multiply by 3 then subtract 1

B

multiply by 5 then subtract 4

C

multiply by 2 then subtract 11

D

multiply by 5 then subtract 2

10 What rule turns each input into its output?

Input	Output
2	?
4	9
8	13
13	18
15	20

A

add 5

B

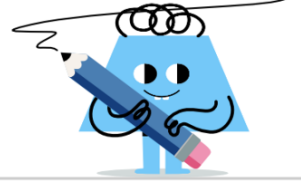
multiply by 9

C

add 6

D

multiply by 5



Patterns and Algebraic Expressions

- 11** What is the value of this equation when $r=2$, $p=3$, $x=4$

$$\frac{4r + 4x}{4p}$$

A	28	B	2
C	$r^4 + 2$	D	1
E	-52	F	$2r$

- 12** What is the value of this equation when $b=4$, $d=2$
- $$5(5b - 6d)$$

A	400	B	$40b$
C	104	D	92
E	$37b$	F	40

- 13** What is the value of this equation when $y=-5$, $p=-2$

$$(7y + 3p)^2$$

A	$187y$	B	$1,681y$
C	1,681	D	1,225
E	169	F	$y^7 + 1,681$

- 14** What is the value of this equation when $d=5$, $x=3$

$$\frac{6d^2}{5x}$$

A	$d^6 + 10$	B	1
C	195	D	165
E	-3	F	10

- 15** Choose the rule that describes this geometric pattern

3, 12, 48, 192

A Start at 7 and multiply by 4 for each term	B Start at 3 and multiply by 8 for each term
C Start at 3 and multiply by 4 for each term	D Start with 3 and 7. Add the prior two terms for each subsequent term
E Start at 3 and multiply by 1 for each term	F Start at 3 and multiply by 0 for each term

- 16** Choose the rule that describes this increasing pattern

3, 7, 11, 15

A Start with 3 and 7. Add the prior two terms for each subsequent term	B Start at -1 and add 4 for each term
C Start at 7 and add 4 for each term	D Start at 3 and add 0 for each term
E Start at 3 and add 2 for each term	F Start at 3 and add 4 for each term

- 17** Find the term that would be next in this increasing pattern

1, 5, 9, 13, ?

A	17	B	23	C	15
D	22	E	18	F	19

- 18** Find the term for $n=7$ in this increasing pattern (first term is $n=1$)

1, 7, 13, 19, 25

A	33	B	43	C	55
D	13	E	41	F	37



Patterns and Algebraic Expressions

19 Which numbers follow this pattern rule?

Start at 25 and subtract 6 for each term

A

4, 9, 16

B

25, 19, 13, 7

20 Which pair of terms are like terms?

$$5 + 7y - 8x - 6xy + xy$$

21 Which pair of terms are like terms?

$$8x + x - 7$$

22 Which pair of terms are like terms?

$$5 + 9x - 4x^2 + 2x^2$$

23 Which pair of terms are like terms?

$$-x^2y^2 - 2x^2y^2 - 9xy^2 + 6 - 9x$$

24 Find the correct equation that this pattern rule describes

Start at 2 and add 3 for each term

A $a_n = 2 + 6(n - 1)$

B $a_n = a_{n-2} + a_{n-1}$

C $a_n = 2 + 4(n - 1)$

D $a_n = 2 + 3(n - 1)$

E $a_n = 6 + 3(n - 1)$

F $a_n = 2 - 3(n - 1)$

25 What sequence, starting with $x = 1$, are these the first 3 terms of?

5, 6, 7

A

$$x + 5$$

B

$$x + 2$$

C

$$x + 4$$

D

$$x + 6$$

E

$$x + 3$$

26 Find the expression that best represents this sentence

Four less than five times n

A

$$5n \times 4$$

B

$$5n - 4$$

C

$$4n - 5$$

D

$$5n + 4$$

E

$$5(n - 4)$$



Patterns and Algebraic Expressions

27 Which function matches the values in the table?

x	g(x)
-4	-17
0	-9
2	-5
6	3

A

$$g(x) = 2x - 8$$

B

$$g(x) = 2x - 9$$

C

$$g(x) = x - 9$$

D

$$g(x) = 3x - 9$$

28 What rule turns each input into its output?

Input	Output
1	9
7	15
9	17
10	18
14	22

A

add 11

B

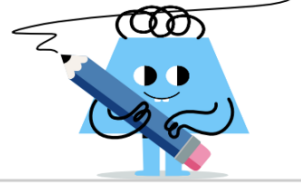
add 8

C

divide by 6

D

multiply by 9



Patterns and Algebraic Expressions

29 What rule turns each input into its output?

Input	Output
2	0
3	1
4	2
7	5
10	8

A

subtract 2

B

subtract 1

C

subtract 3

D

subtract 5

30 What rule turns each input into its output?

Input	Output
2	10
3	15
4	20
6	30
8	40

A

multiply by 5

B

divide by 10

C

multiply by 8

D

multiply by 10