School Name
Mathematics Test 2017

Year 9 **Basic Algebra Skills** Non Calculator

Skills and Knowledge Assessed:

- Simplify algebraic expressions involving the four operations (ACMNA192)
- Extend and apply the distributive law to the expansion of algebraic expressions (ACMNA190)
- Factorise algebraic expressions by identifying numerical factors (ACMNA191)

Name_____

Section 1 Short Answer Section

Write all working and answers in the spaces provided on this test paper.

1. Simplify $7a \times 2v$.

   .....

2. Simplify $6u \times 5u$.

   .....

3. Simplify $-9pq \times 5s$.

   .....

4. Simplify $7m + 8d + 3d + 5m$.

   .....

5. Simplify $18w - 2e - 6w + 3e$.

   .....

6. Simplify $9y - 4y^2 - 7y^2 - 5y$.

   .....

7. Simplify $\frac{48pt^2}{6pt}$.

   .....

8. Given that $q = 5$ find the value of $q^2 - 5q + 1$.

   .....

9. Simplify $-8t \times 5t^2q + 4t^3 \times 3q + 3tq \times 8qt$.

……

10. Simplify $\dfrac{35h^2g^3}{-7gh^2}$.

……

11. Simplify $\dfrac{36ab^3c}{24a^3bc}$.

……

12. Given that $a = -3$ and $b = -6$, find the value of $2a^2 - b^2$.

……

13. Given that $p = 21$, $q = -7$ and $r = -3$, find the value of $\dfrac{4rq}{p^2}$.

……

14. Simplify, $5s^4 \times 2s^3$.

……

15. Expand $3(2e - 5g)$.

……

16. Expand $7r(5r - 2r^2)$.

……

17. Simplify completely $\dfrac{16ad^2 \times 10b^2d}{5ab \times 14b^2}$.

……

……

18. If $y = 4x - 6$ complete the table of values for x and y.

x	-1	0	1	2
y				

19. Expand and simplify $8y - 3z + 4(2y - 3z)$.

……

……

20. Expand and simplify $3m(4a - 2m) - 5a(2a + m)$.

……

……

21. Simplify, leaving your answer as an index: $\dfrac{15^8 \times 15^6}{15^7}$.

……

22. Simplify $\dfrac{12k^5g^3}{5h^6} \times \dfrac{25gh^3}{4k^3}$.

……

……

23. Factorise $4z^2 - 12xz$.

……

24. Factorise $18q^3p^2 - 24q^2p^3$.

……

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Section 2 Multiple Choice Section

Mark all your answers on the accompanying multiple choice answer sheet, not on this test paper. You may do any working out on this test paper. Calculators are allowed for this section.

1. $a \times a \times a \times b \times b \times b \times b = ?$

   A. $3a + 4b$ B. ab^7 C. $a^3 b^4$ D. $12ab$

2. Which of the following is not the same as $4s - 3$?

   A. $s + s + s + s - 3$
   B. $4s + 3 - 6$
   C. $3s + s - 3$
   D. $2s + 2s + 4 - 1$

3. Which of these statements is the same as the algebraic expression $2(f + g)$?

   A. Double f and add g
   B. Twice the sum of f and g
   C. The sum of f and twice g
   D. The sum of twice f and g

4. Simplify $4e + 7e - e = ?$

   A. $10e$ B. $10e^2$ C. $11e$ D. $11e^2$

5. Simplify $6r \times 7r$.

   A. $13r$ B. $13r^2$ C. $42r$ D. $42r^2$

6. When $s = 12$ and $p = 3$, what is the value of $\frac{s+6}{p}$.

A. 3 B. 6 C. 9 D. 12

7. Which expression is equal to $36m^2n^3$?

A. $6mn^2 \times 6mn$ B. $4mn \times 9n^2$ C. $3mn^2 \times 12m$ D. $\frac{72m^3n^3}{2mn}$

8. If $x = -2$, $y = 2$ and $z = 5$, find the value of $2x^2 - xyz$.

A. –12 B. 12 C. 28 D. 36

9. Let *n* be an odd number.

Which is an expression for the sum of the next three consecutive odd numbers after (but not including) *n*.

A. $n + 3$ B. $2n + 6$ C. $3n + 6$ D. $3n + 12$

10. $-3a(2a - 4b) =$

A. $6a^2 - 12ab$ B. $12ab - 6a^2$

C. $9a^2 - 12ab$ D. $12ab - 9a^2$

11. Which of the following is **not** a factor of $8a^2 - 12ab$?

A. $2a$ B. $4a$ C. $8a$ D. $2a - 3b$

12. Factorise $-16cd - 8d^2$.

A. $-8d(2c + d)$ B. $-8d(2c - d)$ C. $8d(2c - d)$ D. $-8(2c + d^2)$

13. Expand and simplify $2w(3w-2)+6(3w-2)$.

A. $6w^2-22w-12$ B. $6w^2-14w-12$

C. $6w^2+14w-12$ D. $6w^2+22w-12$

14. When $8a^2b-12ab^2$ is fully factorised, the result is:

A. $4ab(2a-3b)$ B. $4a(2a-3)$ C. $4a^2b(2-3b)$ D. $8a^2(b-2b^2)$

15. Factorise fully: $45s^3r^2-18s^4r$.

A. $3s^3r(15r-3s)$ B. $9s^3r(5r-2s)$

C. $-9s^3r(5r+2s)$ D. $9s^2r(5rs-2s)$

16. Michael completed the table below for the equation $y=8-3x$.

x	–2	0	1	3
y	14	8	5	1

Which y value is incorrect?

A. $y=14$ B. $y=8$ C. $y=5$ D. $y=1$

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Multiple Choice Answer Sheet

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Completely fill the response oval representing the most correct answer.

1. A ⬭ B ⬭ C ⬭ D ⬭
2. A ⬭ B ⬭ C ⬭ D ⬭
3. A ⬭ B ⬭ C ⬭ D ⬭
4. A ⬭ B ⬭ C ⬭ D ⬭
5. A ⬭ B ⬭ C ⬭ D ⬭
6. A ⬭ B ⬭ C ⬭ D ⬭
7. A ⬭ B ⬭ C ⬭ D ⬭
8. A ⬭ B ⬭ C ⬭ D ⬭
9. A ⬭ B ⬭ C ⬭ D ⬭
10. A ⬭ B ⬭ C ⬭ D ⬭
11. A ⬭ B ⬭ C ⬭ D ⬭
12. A ⬭ B ⬭ C ⬭ D ⬭
13. A ⬭ B ⬭ C ⬭ D ⬭
14. A ⬭ B ⬭ C ⬭ D ⬭
15. A ⬭ B ⬭ C ⬭ D ⬭
16. A ⬭ B ⬭ C ⬭ D ⬭

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Year 9 — *Basic Algebra Skills* — Non Calculator Section

ANSWERS

Question	Working and Answer
1.	$7a \times 2v = \mathbf{14av}$
2.	$6u \times 5u = \mathbf{30u^2}$
3.	$-9pq \times 5s = \mathbf{-45pqs}$
4.	$7m + 8d + 3d + 5m = \mathbf{12m + 11d}$
5.	$18w - 2e - 6w + 3e = \mathbf{12w + e}$
6.	$9y - 4y^2 - 7y^2 - 5y = \mathbf{4y - 11y^2}$
7.	$\frac{48pt^2}{6pt} = \mathbf{8t}$
8.	$q = 5$ $q^2 - 5q + 1 = 5^2 - 5 \times 5 + 1$ $= 25 - 25 + 1$ $= \mathbf{1}$
9.	$-8t \times 5t^2q + 4t^3 \times 3q + 3tq \times 8qt = -40t^3q + 12t^3q + 24t^2q^2$ $= \mathbf{24t^2q^2 - 28t^3q}$

Question	Working and Answer
10.	$\frac{35h^2g^3}{-7gh^2} = \mathbf{-5g^2}$
11.	$\frac{36ab^3c}{24a^3bc} = \frac{\mathbf{3b^2}}{\mathbf{2a^2}}$
12.	$a = -3$ and $b = -6$ $2a^2 - b^2 = 2(-3)^2 - (-6)^2$ $= 2 \times 9 - 36$ $= 18 - 36$ $= \mathbf{-18}$
13.	$p = 42,\ q = -7$ and $r = -3,$ $\frac{4rq}{p^2} = \frac{4 \times -3 \times -7}{21^2}$ $= \frac{4 \times 21}{21 \times 21}$ $= \frac{\mathbf{4}}{\mathbf{21}}$
14.	$5s^4 \times 2s^3 = \mathbf{10s^7}$
15.	$3(2e - 5g) = \mathbf{6e - 15g}$
16.	$7r(5r - 2r^2) = \mathbf{35r^2 - 14r^3}$
17.	$\frac{16ad^2 \times 10b^2d}{5ab \times 14b^2} = \frac{160ab^2d^3}{70ab^3}$ $= \frac{\mathbf{16d^3}}{\mathbf{7b}}$
18.	x: -1, 0, 1, 2 $y = 4x - 6$: **-10**, **-6**, **-2**, **2**
19.	$8y - 3z + 4(2y - 3z) = 8y - 3z + 8y - 12z$ $= \mathbf{16y - 15z}$

Question	Working and Answer
20.	$3m(4a-2m)-5a(2a+m) = 12am-6m^2-10a^2-5am$ $= \mathbf{7am-6m^2-10a^2}$.
21.	$\dfrac{15^8\times 15^6}{15^7} = \dfrac{15^{14}}{15^7}$ $= \mathbf{15^7}$
22.	$\dfrac{12k^5g^3}{5h^6}\times\dfrac{25gh^3}{4k^3} = \dfrac{3k^5g^3}{h^6}\times\dfrac{5gh^3}{k^3}$ $= \dfrac{15k^5g^4h^3}{h^6k^3}$ $= \mathbf{\dfrac{15k^2g^4}{h^3}}$
23.	$4z^2-12xz = \mathbf{4z(z-3x)}$
24.	$18q^3p^2-24q^2p^3 = \mathbf{6q^2p^2(3q-4p)}$

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ANSWERS

Question	Working	M C Answer
1.	$a \times a \times a \times b \times b \times b \times b = a^3 b^4$	**C**
2.	$2s + 2s + 4 - 1 = 4s + 3 \neq 4s - 3$	**D**
3.	The sum of f and $g = f + g$. Twice this becomes $2(f + g)$.	**B**
4.	$4e + 7e - e = 11e$ -e = $10e$	**A**
5.	$6r \times 7r. = 42r^2$	**D**
6.	When $s = 12$ and $p = 3$, $\frac{s+6}{p} = \frac{12+6}{3}$ $= \frac{18}{3}$ $= 6.$	**B**
7.	$6mn^2 \times 6mn = 36\, m^2 n^3$	**A**
8.	If $x = -2$, $y = 2$ and $z = 5$, $2x^2 - xyz = 2(-2)^2 - (-2) \times 2 \times 5$ $= 2 \times 4 - (-20)$ $= 8 + 20$ $= 28$	**C**

9.	n is the odd number The next consective odd number is $n + 2$, followed by $n + 4$ and $n + 6$. Sum of the next 3 numbers = $n + 2 + n + 4 + n + 6 = 3n + 12$	**D**
10.	$-3a(2a - 4b) = -6a^2 + 12ab = 12ab - 6a^2$	**B**
11.	$8a^2 - 12ab = 4a(2a - 3b)$ $= 2a \times 2(2a - 3b)$ So $8a$ is not a factor.	**C**
12.	$-16cd - 8d^2 = -8d(2c + d)$	**A**
13.	$2w(3w - 2) + 6(3w - 2) = 6w^2 - 4w + 18w - 12$ $= 6w^2 + 14w - 12$	**C**
14.	$8a^2b - 12ab^2 = 4ab(2a - 3b)$	**A**
15.	$45s^3r^2 - 18s^4r = 9s^3r(5r - 2s)$	**B**
16.	Substituting $x = 3$ into $y = 8 - 3x$ gives $y = 8 - 3 \times 3$ $= 8 - 9$ $= -1$ So the value of $y = 1$ is incorrect	**D**

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Multiple Choice Answer Sheet

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Completely fill the response oval representing the most correct answer.