

This tests a small part of the New Zealand Curriculum (NZC) algebra skills.

Teacher **APN**

Student **Answers**

NZC Level	Equations and expressions Achievement Objective (AO)	The part of the NZC AO being tested	Marking Guide	NZC Level
3	Record and interpret additive and simple multiplicative strategies using words, diagrams, and symbols, with an understanding of equality.	Interpret additive and simple multiplicative strategies using symbols	3 Achieved = 5 3 Merit = 10 3 Excellence = 15	
4	Form and solve simple linear equations	Working on algebraic manipulation skills that will help students do this.	4 Achieved = 20 4 Merit = 35 4 Excellence = 50	
5	Form and solve linear and simple quadratic equations	Working on algebraic manipulation skills that will help students do this.	5 Achieved = 60 5 Merit = 75 5 Excellence = 90	
6	Form and solve linear equations and in-equations, quadratic and simple exponential equations, and simultaneous equations with two unknowns.	Working with exponents.	6 Achieved = 95	
I estimate the number I got correct to be:			Total Points: Max 100	

Not Achieved	Achieved	Merit	Excellence
0 to 40	40 to 69	70 to 84	85 to 100

1. Simplify the following expressions (* represents multiplication) [NZC Level 3 and 4; 10 points]

- $a+a+a=3a$
- $2a+a=3a$
- $4c-2c=2c$
- $3a+a+2=4a+2$
- $2a+3b+5a+2b=7a+5b$
- $2a*3=6a$
- $3*4c=12c$
- $b-b=0$
- $2x-2x=0$
- $2b+3b+b=6b$

2. Explain these terms in your own words and give an example. [NZC Level 4 and 5; 10 points]

- Simplify **put the expression in its simplest form**, e.g. $a + a$ can be simplified to $2a$
- Evaluate **find the value of the expression**, e.g. if $x=1$, evaluate $x+2$, answer 3
- Like Terms **terms with the same combination of variables**, e.g. $2ab$ and $3ab$ are like terms
- Coefficient **the number in front of the variables**, e.g. $4x$, the coefficient of x is 4
- Constant Term **a term with no variables in it**, e.g. in $3x+5$ the constant term is 5
- Equation **an equation has an equals sign for example $x + 3 = 5$**
- Expression **an expression does not have an equals sign for example $x + 3$**
- Variable **a letter used to represent a number, which could be any value, for example x**
- Numeral **a number for example 6**
- Pro-numeral **a letter used to represent a number for example x**

3. Simplify the following expressions (* represents multiplication) [NZC Level 5 and 6; 10 points]

- $b*b = b^2$
- $2g*3g = 6g^2$
- $8*a*a = 8a^2$
- $2a*3a = 6a^2$
- $2*p^2*p^3 = 2p^5$
- $2ab*3bc = 6ab^2c$
- $a*a*a = a^3$
- $2a*3a*n = 6a^2n$
- $3z^2*2z = 6z^3$
- $(-3b)*(-6c) = 18bc$

4. Evaluate the following expressions when $x=3$ and $y=2$ [NZC Level 4; 10 points]

- $2x+y = 2*3+2 = 8$
- $3x = 3*3 = 9$
- $2x = 2*3 = 6$
- $3x-2y = 3*3-2*2=9-4=5$
- $x-y = 3 - 2 = 1$
- $y-x = 2 - 3 = -1$
- $2y-x = 2*2 - 3 = 4-3 = 1$
- $2(y-x) = 2(2-3)=2*-1 = -2$
- $(x+1)*(y-1) = (3+1)(2-1)=4*1=4$
- $0x + 0y = 0$

5. Evaluate the following expressions when $x=3$ and $y=2$ [NZC Level 5; 5 points]

- $2xy = 2*3*2 = 12$
- $3y^2 = 3*2*2 = 12$
- $3x^2 = 3*3*3 = 27$
- $y^2+1 = 2*2 + 1 = 5$
- $x^3 = 3*3*3 = 27$

6. Evaluate the following expressions when $x=-3$ and $y=-2$ [NZC Level 4 and 5; 5 points]

- $2x+y = 2*-3 -2 = -6 -2 = -8$
- $3x-2y = 3*-3 - 2*-2 = -9 + 4 = -5$
- $4y-x = 4*-2 + 3 = -8+3 = -5$
- $3y+x = 3*-2 -3 = -6-3 = -9$
- $y^2 = (-2)*(-2) = 4$

7. Use the Distributive Law to expand. The rule is $a(b+c)=ab+ac$. [NZC Level 4 and 5; 10 points]

- $4(x+1) = 4x + 4$
- $6(x-2) = 6x - 12$
- $2(2x+1) = 4x + 2$
- $3(2x-2) = 6x - 6$
- $4x(x+1) = 4x^2 + 4x$
- $6a(x-2a) = 6ax - 12a^2$
- $2a(2a+1) = 4a^2 + 2a$
- $3x(2x-2) = 6x^2 - 6x$

i. $-2x(x+1) = -2x^2 - 2x$

j. $-3x(x-1) = -3x^2 + 3x$

8. Expand and simplify by collecting like terms [NZC Level 4 and 5; 10 points; 2 points each]

a. $2 + 3(x+2) = 2 + 3x + 6 = 3x + 8$

b. $12(y+3) + 3(3+y) = 12y + 36 + 9 + 3y = 15y + 45$

c. $4(x+7) + 11(2+x) = 4x + 28 + 22 + 11x = 15x + 50$

d. $3(x+1) - 2(x-1) = 3x + 3 - 2x + 2 = x + 5$

e. $2x(x+2) - x^2 = 2x^2 + 4x - x^2 = x^2 + 4x$

9. Expand and simplify using the distributive law $(a+b)(c+d) = ac+ad+bc+bd$ [NZC Level 5 and 6; 10 points]

a. $(a+b)(c+d) = ac+ad+bc+bd$

b. $(s+1)(s+2) = s^2+2s+s+2 = s^2+3s+2$

c. $(x+1)(x+2) = x^2+3x+2$

d. $(x-1)(x+3) = x^2+2x-3$

e. $x^2(x^4+y) = x^6+x^2y$

f. $(x+4)(x+5) = x^2+9x+20$

g. $(2x+1)(x-3) = 2x^2-5x-3$

h. $(3x-1)(2x-4) = 6x^2-14x+4$

i. $(a+b)(a-b) = a^2-b^2$

j. $(x+2)^2 = x^2+4x+4$

10. Factorise the following expressions [NZC Level 4, 5 and 6; 10 points]

a. $3a+3b = 3(a+b)$

b. $3a+6b = 3(a+2b)$

c. $3a+3b+3c = 3(a+b+c)$

d. $20x+10 = 10(2x+1)$

e. $30y+15 = 15(2y+1)$

f. $2a-10 = 2(a-5)$

g. $2ab-ac = a(2b-c)$

h. $x^2+3x+2 = (x+1)(x+2)$

i. $x^2+4x+4 = (x+2)(x+2) = (x+2)^2$

j. $x^2+10x+25 = (x+5)(x+5) = (x+5)^2$

11. Form an expression for the perimeter of the following shapes [NZC Level 4; 6 points; 2 points each]

a. A square with sides x in length $x+x+x+x = 4x$

b. A rectangle with the base 2cm longer than the height $2(x+2+x) = 4x+4$

c. A triangle with sides of three consecutive whole number lengths, 1cm apart. For example 4cm, 5cm and 6cm. Let one of the side lengths equal x . $x+x+1+x+2 = 3x+3$ (where x is the shortest side)

12. Form an expression for the area of the following shapes [NZC Level 5; 4 points; 2 points each]

a. A square with sides x in length x^2

b. A rectangle with the base 2cm longer than the height $x(x+2) = x^2 + 2x$