

Name: KEY

Date:

Grade 9 TEST Algebraic Expansion & Simplification

Grade: /20

Cubed Binomial  $(a + b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$

Perfect Squares  $(a \pm b)^2 = a^2 \pm 2ab + b^2$

Difference of Squares  $a^2 - b^2 = (a + b)(a - b)$

Directions: Show your work for credit. Circle your final answer.

1. The following table shows incorrect expansions. For each identify and explain the mistake(s).

	Mistake(s) made	Correct expansion
$(x + 2)^2 = (x + 2)(x + 2)$ $= 2x + 2x + 2x + 4$ $= 6x + 4$	$x * x = x^2$	$x^2 + 4x + 4$
$(x - 3)^2 = (x - 3)(x - 3)$ $= x^2 - 9$	$-3x - 3x = -6x$ $-3 * -3 = 9$	$x^2 - 6x + 9$

Show your work for credit:

**(Total 2 marks)**

2. The algebraic expansion of several expressions is shown below:

	Expanded Expressions		Factorized Expressions
<b>A</b>	$2x^2 + 8x + 8$	<b>1</b>	$(3x - 1)(3x + 1)$
<b>B</b>	$x^2 - x - 12$	<b>2</b>	$(1 + 7x)(1 + 7x)$
<b>C</b>	$9x^2 - 1$	<b>3</b>	$2(x + 2)^2$
<b>D</b>	$3x^2 + 12x + 9$	<b>4</b>	$3(x + 1)(x + 3)$
<b>E</b>	$1 + 14x + 49x^2$	<b>5</b>	$(x - 4)(x + 3)$

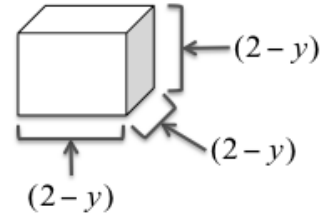
Fill out the table by matching each expanded expression to its correct factorization:

<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>
3	5	1	4	2

Show your work for credit:

**(Total 5 marks)**

3. The side length of a cube is given by the expression  $(2 - y)$ .  
Find the volume of the cube in terms of  $y$  and simplify your answer.  
*Hint: for a cube  $Volume = side \times side \times side$*



$$8 - 12y + 6y^2 - y^3$$

**(Total 3 marks)**

4. Expand and simplify the following expressions. Circle your final answer.

(a)  $-2x^2(4x - 1)$

$$-8x^3 + 2x^2$$

(b)  $x(x - 2) - 3x(x + 1)$

$$-2x^2 - 5x$$

(c)  $-x(4x - 2)^2$

$$-16x^3 + 16x^2 - 4x$$

(d)  $(7x - 1)(7x + 1)$

$$49x^2 - 1$$

**(Total 4 points)**

5. Expand and simplify the following expressions. Circle your final answer.

*Hint: to expand use distribution (FOIL) or the formula  $(a + b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$*

(a)  $3(3a + 3b)(a + b)(a + b)$

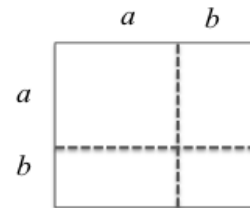
$$9a^3 + 27a^2b + 27ab^2 + 9b^3$$

(b)  $(2x + y)^3$

$$8x^3 + 12x^2y + 6xy^2 + y^3$$

**(Total 2 points)**

6. Explain how to use the figure to show  $(a + b)^2 = a^2 + 2ab + b^2$



*The areas of the 4 figures add up to the area of the whole*

$$a^2 + ab + ab + b^2 = (a + b)^2$$

**(Total 2 points)**

7. Expand and simplify the binomial  $(a + b)^4$

*Hint:  $(a + b)^4 = (a + b)(a + b)^3$*

$$a^4 + 4a^3b + 6a^2b^2 + 4ab^3 + b^4$$

**(Total 2 points)**

8. Bonus: What is the value of  $5 \times (-1 + 2) \times (3 - 4) \times (-5 + 6) \times \dots \times (999 - 1000)$ ?

*Hint: the 3 dots means that the pattern above continues the same way until 1000.*

$$5 \times (-1 + 2) \times (3 - 4) \times (-5 + 6) \times \dots \times (999 - 1000) = 5(1)(-1)(1) \dots (-1) = 5$$

**(Total 1 point)**