Westminster Kingsway
central London's College

Quadratic Equations

GCSE MATHS

Name: _____

Teacher: _____

Learning objectives

By the end this pack you will be able to:

1) Multiply out the product of two brackets
2) Factorise quadratic equations

Starter: Expand the brackets, and match up each answer

4(a + b)		2y - 16
5(y - 4)		4a + 4b
3(8 + t)		5y - 20
2(y - 8)		9p + 9t
5(x + 9)		24 + 3t
7(2a + b)		4p + 8
12(5d + 3)		45 + 5x
9(p + t)		60d + 36

Fill in the missing blocks in the table above

EXPANDING DOUBLE BRACKETS

1. Write down <u>three</u> algebraic expressions for the areas of each of the rectangles below. The first one has been done for you.

(a)

	x	3
x	x^2	$3x$
2	$2x$	6

$(x + 2)(x + 3)$

$x^2 + 3x + 2x + 6$

$x^2 + 5x + 6$

(b)

	x	5
x		
4		

(c)

	x	3
x		
4		

2. Write 2 more expressions for the areas of the rectangles below:

(a)

	x	3
x		
1		

$(x + 1)(x + 3)$

(b)

	x	
x		

$(x + 6)(x + 7)$

(c)

$(x + 4)(x + 7)$

3. Expand the brackets below:

a. $(x + 5)(x + 8)$ b. $(x + 7)(x + 2)$ c. $(x + 9)(x + 3)$

4. Write four algebraic expressions for the areas of each of the squares below

(a)

	x	3
x	x^2	$3x$
3	$3x$	9

$(x + 3)(x + 3)$

$(x + 3)^2$

$x^2 + 3x + 3x + 9$

$x^2 + 6x + 9$

(b)

	x	2
x		
2		

(c)

$(x + 4)^2$

5. Expand the brackets below

a. $(x + 6)^2$ b. $(x + 9)^2$ c. $(x + 10)^2$

6. Complete the grids and fill in the blank spaces below. The first one has been done for you.

(a)

	x	- 3
x	x^2	$-3x$
5	$5x$	-15

$(x + 5)(x - 3)$

$x^2 - 3x + 5x - 15$

$x^2 + 2x - 15$

(b)

	x	- 5
x		
4		

(c)

	x	- 3
x		
- 4		

For each of the following, select the correct pair of equivalent expressions.

7. $(x - 4)(x + 9)$

A	B	C
$x^2 - 4x + 9x - 36$ $x^2 - 13x - 36$	$x^2 - 4x + 9x - 36$ $x^2 - 5x - 36$	$x^2 - 4x + 9x - 36$ $x^2 + 5x - 36$

8. $(x - 5)(x - 3)$

A	B	C
$x^2 - 5x - 3x + 15$ $x^2 - 2x + 15$	$x^2 - 5x - 3x + 15$ $x^2 - 8x + 15$	$x^2 - 5x - 3x - 15$ $x^2 - 8x - 15$

9. $(x - 5)^2$

A	B	C
$x^2 - 5x - 5x + 25$ $x^2 - 10x + 25$	$x^2 + 25$	$x^2 - 5x - 5x - 25$ $x^2 - 10x - 25$

10. Expand and simplify

a. $(x - 1)(x + 3)$ b. $(x - 4)(x + 5)$ c. $(x - 3)(x - 2)$

d. $(x + 8)^2$ e. $(x - 9)^2$ f. $(x - 6)(x + 6)$

EXTENSION SHEET

1. Complete the grids below and fill in the blank spaces. The first one has been done for you.

(a)

	$2x$	3
$3x$	$6x^2$	$9x$
1	$2x$	3

(b)

	$3x$	5
$4x$		
2		

(c)

	$5x$	-2
$3x$		
4		

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

$6x^2 + 2x + 9x + 3$

$6x^2 + 11x + 3$

Select the correct pair of equivalent expressions.

2. $(2x + 3)(3x + 4)$

A	B	C
$5x^2 + 8x + 9x + 12$	$6x^2 + 8x + 9x + 12$	$6x^2 + 3x + 4x + 12$
$5x^2 + 17x + 12$	$6x^2 + 17x + 12$	$6x^2 + 7x + 12$

3. $(2x - 3)(3x - 4)$

A	B	C
$6x^2 - 8x - 9x - 12$	$6x^2 - 8x - 9x + 12$	$6x^2 - 8x - 9x + 12$
$6x^2 - 17x - 12$	$6x^2 - x + 12$	$6x^2 - 17x + 12$

Expand 2 brackets Complete the array

$(x+2)(x+2)$	$(x+2)(x-2)$	$(x-2)(x-2)$
$(x+3)(x+3)$	$(x+3)(x-3)$	$(x-3)(x-3)$
$(x+4)(x+4)$	$(x+4)(x-4)$	$(x-4)(x-4)$

$(x+a)(x+a)$	$(x+a)(x-a)$	$(x-a)(x-a)$
$(2x+2)(2x+2)$	$(2x+2)(2x-2)$	$(2x-2)(2x-2)$
$(2x+2)(3x+2)$	$(2x+2)(3x-2)$	$(2x-2)(3x-2)$

Extension $(2t-3)^2$ =

Finding factors and factorising

Expression	**Product c**	**Sum b**	**Possible Factors**	**Thinking about the Signs**	**Factorised (x + ?)(x + ?)**
$x^2 - 3x + 2$	+ 2	- 3			
$x^2 - x - 56$					
$x^2 + 8x + 12$					
$x^2 + 4x - 21$					
$x^2 + 14x + 40$					
$x^2 - 9x - 10$					
$x^2 - 36$					

Extension

Equation	Factorising	Using the quadratic formula	Completing the square
$x^2+3x-4=0$			
$x^2-20x+100=0$			
$x^2-11x+4=-6$			
$x^2+5x-23=-9$			

Homework Exam Questions

Q1.

(a) Factorise fully $9x^2 - 6xy$

.....

(2)

(b) Expand $4(x + 2)$

.....

(1)

(c) Expand and simplify $(x - 5)(x + 3)$

.....

(2)

(d) Expand and simplify $(2x - 3)(3x - 1)$

.....

(2)

(Total for Question is 7 marks)

Q2.

(a) Expand and simplify $(p + 9)(p – 4)$

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(2)

(b) Solve $\frac{5w-8}{3} = 4w + 2$

$w =$ . . . . . .

(3)

(c) Factorise completely $8x^3y^5 – 12x^4y^2$

.....

(2)

(c) Factorise completely $8x^3y^5 – 12x^4y^2$

.....

(2)

(Total for question is 9 marks)