

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

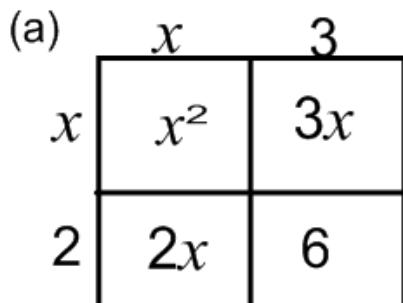
Starter: Expand the brackets, and match up each answer

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

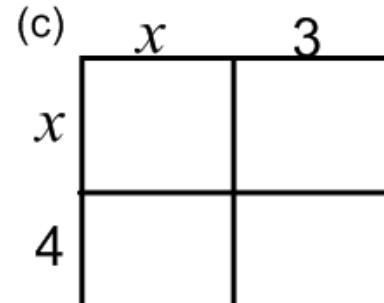
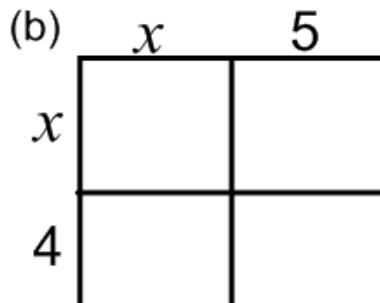
Fill in the missing blocks in the table above

EXPANDING DOUBLE BRACKETS

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



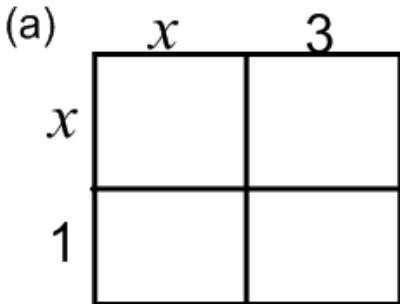
$$\underline{(x + 2)(x + 3)}$$



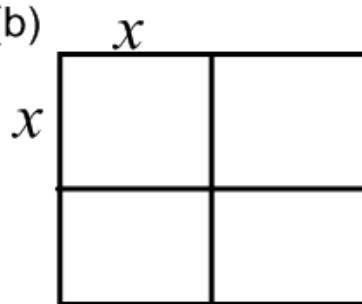
$$\underline{x^2 + 3x + 2x + 6}$$

$$\underline{x^2 + 5x + 6}$$

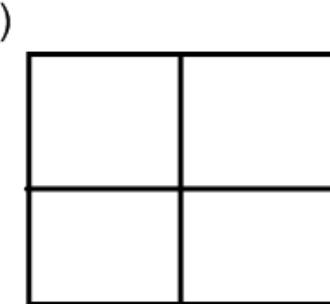
2. Write 2 more expressions for the areas of the rectangles below:



$$\underline{(x + 1)(x + 3)}$$



$$\underline{(x + 6)(x + 7)}$$



$$\underline{(x + 4)(x + 7)}$$

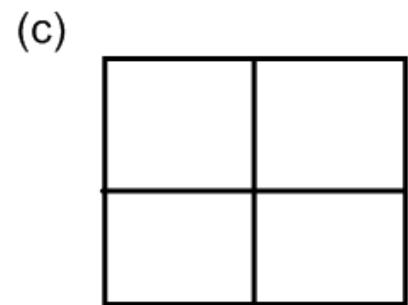
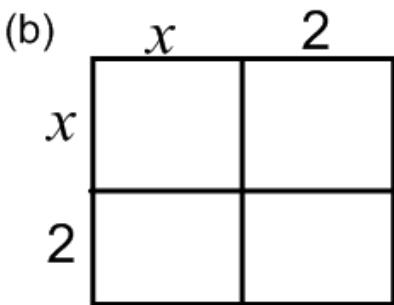
3. Expand the brackets below:

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
3	$3x$



$$\frac{(x + 3)(x + 3)}{ }$$

$$\frac{(x + 3)^2}{ }$$

$$\frac{x^2 + 3x + 3x + 9}{ }$$

$$\frac{x^2 + 6x + 9}{ }$$

$$\frac{(x + 4)^2}{ }$$

$$\frac{\quad}{ }$$

5. Expand the brackets below

a. $(x + 6)^2$

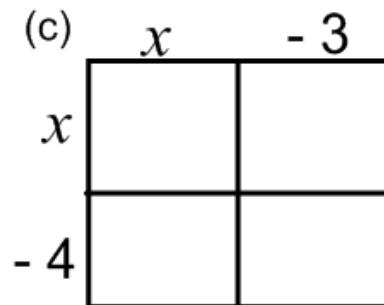
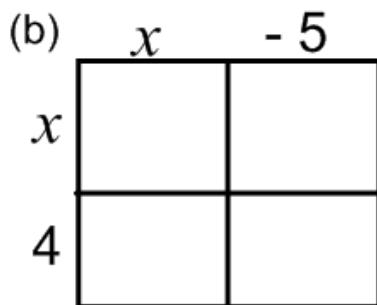
b. $(x + 9)^2$

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
5	$-3x$



$$\frac{(x + 5)(x - 3)}{ }$$

$$\frac{\quad}{ }$$

$$\frac{\quad}{ }$$

$$\frac{x^2 - 3x + 5x - 15}{ }$$

$$\frac{\quad}{ }$$

$$\frac{\quad}{ }$$

$$\frac{x^2 + 2x - 15}{ }$$

$$\frac{\quad}{ }$$

$$\frac{\quad}{ }$$

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

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

A

$$x^2 - 4x + 9x - 36$$

$$x^2 - 13x - 36$$

B

$$x^2 - 4x + 9x - 36$$

$$x^2 - 5x - 36$$

C

$$x^2 - 4x + 9x - 36$$

$$x^2 + 5x - 36$$

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

A

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

$$x^2 - 2x + 15$$

B

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

$$x^2 - 8x + 15$$

C

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

$$x^2 - 8x - 15$$

9. $(x - 5)^2$

A

$$x^2 - 5x - 5x + 25$$

$$x^2 - 10x + 25$$

B

$$x^2 + 25$$

C

$$x^2 - 5x - 5x - 25$$

$$x^2 - 10x - 25$$

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

$$\frac{(2x + 3)(3x + 1)}{}$$

(b)

	$3x$	5
4x		
2		

$$\frac{6x^2 + 2x + 9x + 3}{}$$

$$\frac{6x^2 + 11x + 3}{}$$

(c)

	$5x$	- 2
3x		
4		

$$\frac{\quad}{}$$

$$\frac{\quad}{}$$

$$\frac{\quad}{}$$

Select the correct pair of equivalent expressions.

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

A

$$5x^2 + 8x + 9x + 12$$

$$5x^2 + 17x + 12$$

B

$$6x^2 + 8x + 9x + 12$$

$$6x^2 + 17x + 12$$

C

$$6x^2 + 3x + 4x + 12$$

$$6x^2 + 7x + 12$$

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

A

$$6x^2 - 8x - 9x - 12$$

$$6x^2 - 17x - 12$$

B

$$6x^2 - 8x - 9x + 12$$

$$6x^2 - x + 12$$

C

$$6x^2 - 8x - 9x + 12$$

$$6x^2 - 17x + 12$$

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 $(p + 9)(p - 4)$

..... (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)