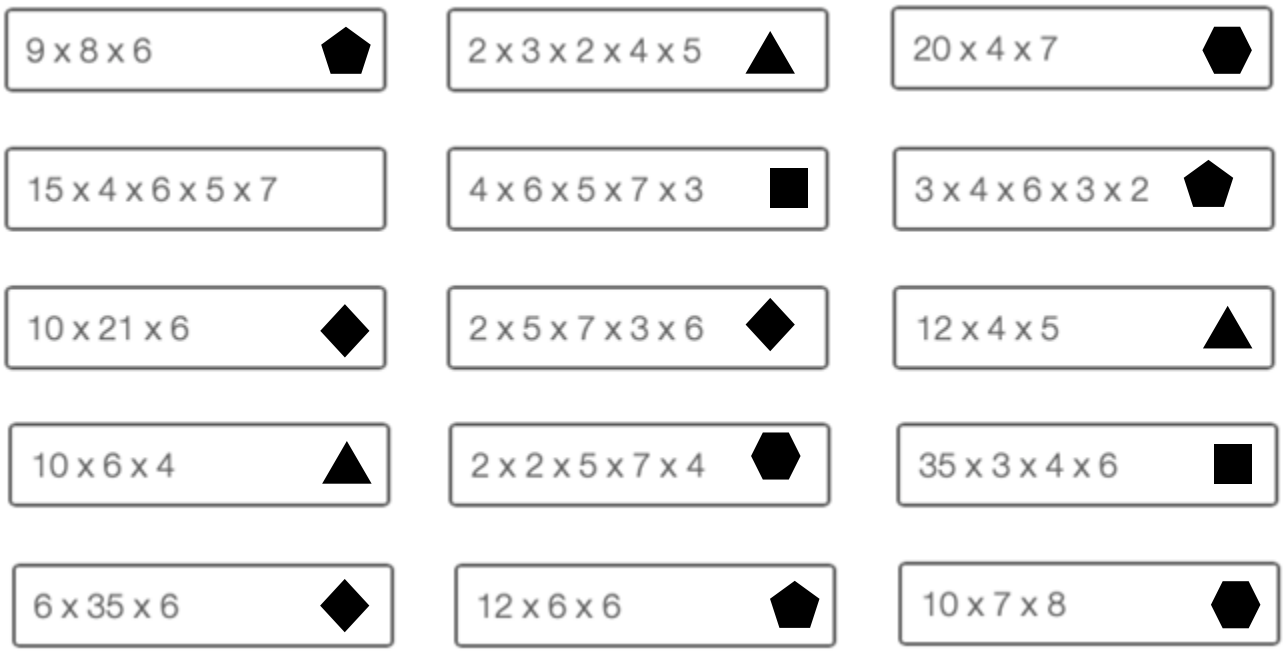
Expanding Solutions
Expanding

Expanding 1

1. 3 x 14 & (3 x 4) + (3 x 10)
2. 12 x 2 x 14 & 3 x 7 x 8 x 2 & 2 x 7 x 6 x 4
3. $4x + 20$
4. $2\frac{1}{6}$
5. 2 x 4 x 2 x 6
6. $2(6x + 3)$ & $6(2x + 1)$
7. $-6y - 3x$
8. $9x - 8$

Multiplication Matching



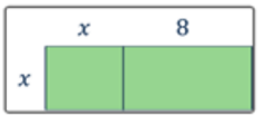
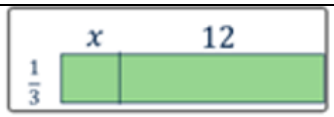
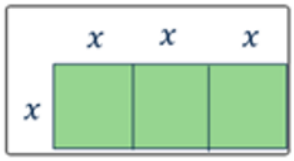
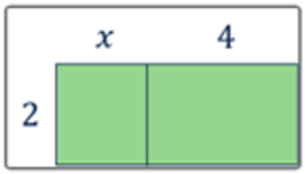
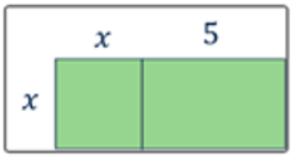
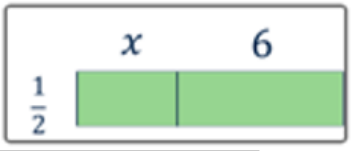
Did you find the odd one out?

Geometric Interpretations

Total	A	B	C	D	Total
81	9 x 9	9(3 + 6)	(9 x 3) + (9 x 6)	27 + 54	81
60	5 x 12	5 (4 + 8)	(5 x 4) + (5 x 8)	20 + 40	60
72	9 x 8	9 (3 + 5)	(9 x 3) + (9 x 5)	27 + 45	72
90	15 x 6	15 (4 + 2)	(15 x 4) + (15 x 2)	60 + 30	90
144	12 x 12	12 (+ 5)	(12 x 7) + (12 x 5)	84 + 60	144
36	3 x 12	3 (8 + 4)	(3 x 8) + (3 x 4)	24 + 12	36

Expanding Solutions

Match it up!

Add eight to x, then multiply by x		$x(x+8)$
Add twelve to x, then divide by three		$\frac{1}{3}(x+12)$
Square x, then multiply by three		$3x^2$
Add four to x then, multiply by two		$2x+8$
Add five to x then. multiply by x		$x(x+5)$
Halve x, then add three		$\frac{x+6}{2}$

Odd one out

$3(2x + 3y) - (x - y)$ $\quad$ $x(x + 4) + 6(x + 3)$

$2(x + 4) + x(x + 4)$ $\quad$ $x(x - 6) + 2(x - 6)$

Expanding 2

1. $2y^2 - 3y$
2. $6x^3y - 4x^5$
3. $11x - 5$
4. $6\sqrt{2} - 8$
5. $y(y + 4)$ & $y^2 + 4y$
6. $6(2x + 8)$ *or* $(12x + 48)$ cm^2
7. $3a - 4t - 2$
8. $\frac{7a^2 - 52a}{24}$

Expanding Solutions

Double Brackets

Dealing with Negativity

2. -168
2. -162
3. 24
4. - 40
5. $7a^2$
6. $18ab^2$
7. $168a^3$
8. With an EVEN number of negative numbers then value will be positive.

   With an ODD number of negative numbers then value will be negative.

Expanding 1

1. Negative because there are an odd number of negative numbers
2. 2 x 3 x 17 x 2 x 2, (20 + 4) (10 + 7), 20(10 + 7) + 4(10 + 7)
3. $3\sqrt{3} - 18$
4. $x^2 + 7x + 10$
5. $x^2 + 4x - 12$
6. $4\sqrt{2} + 5$
7. $x^4 + 8x^2 + 12$
8. $x^2 + 3x^3 + 7x^2 + 21$

What's gone wrong?

1. Correct
2. $x^2 + 5x + 6$
3. $x^2 - x - 20$
4. -7
5. $\frac{2x^2 + 3x + 12}{4x}$
6. $x^2 + 4x + 4$

Expand and Simplify

$x^2 + 6x - 16$	$x^2 + 6x + 9$	$x^2 + 6x + 8$	$x^2 + 9$
$x^2 + 7x + 12$	$x^2 - 9x + 8$	$x^2 - 5x + 12$	$x^2 - 8x + 14$
$9 - x^2$	$-x^2 + 6x + 36$	$x^2 + 10x + 28$	$x^2 + x - 12$

The four expressions left to simplify to $2x^2 + 7x + 41$

Expanding Solutions

Quadratic Puzzles

1. $x^2 - 8x + 16$
2. $2x^2 + 5x + 3$
3. $3x^2 + 4x - 15$
4. $4x^2 - 2x - 12$
5. $6x^2 - x - 12$
6. $25x^2 - 4$

Note that the **product** of the diagonals give identical results (this might be useful to know at a later point).

Expanding 2

1. $2x^2 - x - 6$
2. $3x^2 + 13x + 12$
3. $2x^2 + 6x + 45$
4. $7 - 4\sqrt{3}$
5. $\frac{x^2+2x-9}{x(x+3)}$
6. $x^6 - 49$
7. $12x^3 + 14x^2 - 5x - 6$
8. $\frac{5x^2-6x+4}{3x(x+2)}$

More Brackets

The story so far

2. $6x^2 - x - 15$
2. $x^2 + 6x + 5$
3. $6ax - 8a^2 - 2a + 6x + 6$
5. $3x^3 - 6x^2 - 45x$
5. $3\frac{8}{9}$
6. $7\sqrt{5} - 9$
7. $8x^2 - 2x + 24$
8. $3x^2 + 4x - 4$

Have a look…

There will be 8 terms in the un-simplified expression $x^3 + 2x^2 + 3x^2 + 6x + 2x + 4$

They simplify to become $x^3 + 5x^2 + 8x + 4$

Getting Bigger…

The following explains the solution

A. $(x+2)(x+2)(x+2)$	B. $(x+3)(x+2)(x+1)$	C. $(x+5)(x-1)(x+2)$
$= (x+2)(x^2+4x+4)$	$= (x+3)(x^2+3x+2)$	$= (x+5)(x^2+x-2)$
$= x^3+4x^2+4x+2x^2+8x+8$	$= x^3+3x^2+2x+3x^2+9x+6$	$= x^3+x^2-2x+5x^2+5x-10$
$= x^3+6x^2+12x+8$	$= x^3+6x^2+11x+8$	$= x^3+6x^2+3x-10$

Because x is a side length we know that x is positive. Therefore A is the greatest as $12x + 8$ is larger than $11x + 8$ and $3x - 10$.

Expanding Solutions

Expanding Cubic Solutions

Note the pattern in the co-efficients which are in **bold**

$$(x+1)^4 = \mathbf{1} + \mathbf{4}x + \mathbf{6}x^2 + \mathbf{4}x^3 + \mathbf{1}x^4$$

$$(1+x)^5 = \mathbf{1} + \mathbf{5}x + \mathbf{10}x^2 + \mathbf{10}x^3 + \mathbf{5}x^4 + \mathbf{1}x^5$$

$$(1+x)^6 = \mathbf{1} + \mathbf{6}x + \mathbf{15}x^2 + \mathbf{20}x^3 + \mathbf{15}x^4 + \mathbf{6}x^5 + \mathbf{1}x^6$$

Pascal's Triangle

You should see that the pattern in the coefficients in the expansions form Pascal's Triangle.

Summary and review

1. $x^2 + \frac{1}{9}x - \frac{2}{27}$
2. $x^3 + 6x^2 + 11x + 6$
3. $x^3 + x^2 - 8x - 12$
4. $2\sqrt{3} - 4$
5. $x^3 - 12x^2 + 48x - 64$
6. $x^5 + x^4 - 4x - 4$
7. $y = 6 \quad b = 24$
8. $\frac{2x^3+3x^2-7x-14}{(x+3)(2x+1)}$