Today's Learning:

To multiply out brackets.

Multiplying Out Single Brackets

Take the term sitting outside the bracket and multiply it by each term inside the brackets. Remember, the sign in front of the term matters.

e.g. 1) $3(y + 9)$ **2)** $4p(p - 4)$ **3)** $-2e(3 - e)$

$= 3y + 27$ $= 4p^2 - 16p$ $= -6e + 2e^2$

4) $-(2 - q)$

$= -2 + q$

How do we multiply out the brackets:

$(y + 3)(y + 4)$

$y^2 + 4y + 3y + 12$

$= y^2 + 7y + 12$

Multiplying Out Brackets

Multiply each term in the first bracket by each term in the second bracket.

*remember the sign in front of the term matters

e.g. Multiply out and simplify:

1) $(y + 1)(y + 5)$ **2)** $(m + 4)(m - 2)$ **3)** $(p - 3)(p - 6)$

$= y^2 + 5y + y + 5$ $= m^2 - 2m + 4m - 8$ $= p^2 - 6p - 3p + 18$

$= y^2 + 6y + 5$ $= m^2 + 2m - 8$ $= p^2 - 9p + 18$

Starter

1) Solve the equation: $3c - 2 = 2c + 9$

$-2c \quad -2c$

$c - 2 = 9$

$+2 \quad +2$

$c = 11$

2) Evaluate $\frac{4}{7} \times \frac{8}{9} = \frac{32}{63}$

3) Without a calculator, evaluate $2 \times (-3) + 4 \times 2 - 3 - (-2)$

$= -6 + 8 - 3 + 2$

$= 1$

4) If $a = 3$ and $b = 7$, evaluate $2(a - b) + 2a^2$

$2(3 - 7) + 2 \times 9$

$= -8 + 18 = 10$

5) Write down the highest common factor of 15 and 33.

3

4) $(d + 2)^2$

$= (d + 2)(d + 2)$

$= d^2 + 2d + 2d + 4$

$= d^2 + 4d + 4$

5) $(w + 1)(w^2 + 2w - 4)$

$= w^3 + 2w^2 - 4w + w^2 + 2w - 4$

$= w^3 + 3w^2 - 2w - 4$

Today's Learning:

To factorise using single brackets.

Factorising

16/6/17

Factorising an expression means writing it as a product of its factors.

e.g. Factorise the following by taking out a common factor:

a) $3g + 9$ $=3(g+3)$

b) $24g + 16gf$ $=8g(3+2f)$

c) $14x^3 - 20x^2$ $=2x(7x^2-10x)$ $=2x^2(7x-10)$

d) $14e^3 - 20e^2 + 30e$ $=2e(7e^2-10e+15)$

Multiply out the following:

1) $(d + 3)(d - 3)$ $d^2-3d+3d-9$ $=d^2-9$

2) $(m + 5)(m - 5)$ $m^2-5m+5m-25$ $=m^2-25$

3) $(7 + y)(7 - y)$ $49-7y+7y-y^2$ $=49-y^2$

What do you notice?

Starter

1) Multiply out the brackets: $(e + 1)(e - 2)^2$ $=(e+1)(e-2)(e-2)$ $=(e^2-e-2)(e-2)$ $=e^3-e^2-2e-2e^2+2e+4$ $=e^3-3e^2+4$

2) Without a calculator, evaluate

a) $\frac{2}{5} + \frac{3}{4}$ $=\frac{8}{20}+\frac{15}{20}=\frac{23}{20}$

b) $\frac{2}{15} \times \frac{9}{16}$ $=\frac{18}{240}$ $=\frac{9}{120}$ $=\frac{3}{40}$ (160, 80)

3) Find the highest common factor of 24 and 32 8

4) Change the subject of the formula to F: $g = 3(F - 2) + 1$ $g-1=3(F-2)$ $\frac{g-1}{3}=F-2$ $\frac{g-1}{3}+2=F$

Today's Learning:

To practice factorising using difference of two squares and to factorise trinomials.

Difference of Two Squares

If you see 2 squared terms and one is negative, we can factorise using difference of two squares.

e.g. Factorise

a) $g^2 - 4$ $=(g+2)(g-2)$

b) $m^2 - r^2$ $=(m+r)(m-r)$

c) $4t^2 - 16y^2$ $=(2t+4y)(2t-4y)$

Sometimes we can take out a common factor before using difference of two squares.

$3y^2 - 75$

$= 3(y^2 - 25)$

$= 3(y+5)(y-5)$

Factorising Trinomals

A trinomial usually has an x^2 term, an x term and a number.

$x^2 + 5x + 4$ (+ to make +5; x to make +4)

$(x+1)(x+4)$

$x \times x = x^2$

$x^2 + 4x + 1x + 4$

4: 1,4; 2,2

e.g. Factorise the following:

1) $m^2 + 6m + 8$

$= (m+4)(m+2)$

8: 1,8; 4,2

2) $g^2 + 12g + 20$

$= (g+10)(g+2)$

20: 10,2; 1,20; 4,5

3) $t^2 - 9t + 20$

$= (t-4)(t-5)$

20: 2,10; 1,20; 4,5

4) $q^2 - 13q + 30$

$= (q-3)(q-10)$

30: 2,15; 3,10; 30,1; 5,6

5) $m^2 - 5m - 50$

$(m-10)(m+5)$

50: 10,5; 50,1; 2,25

6) $R^2 + R - 20$

$= (R+5)(R-4)$

20: 2,10; 20,1; 4,5

Starter

1) Solve for g: $3g + 5 = 7g - 11$

$-3g \quad -3g$

$5 = 4g - 11$

$+11 \quad +11$

$16 = 4g$

$g = 4$

2) Solve for m: $\frac{4m}{7} = 2$

$4m = 14$

$m = \frac{14}{4} = \frac{7}{2}$

3) Find a fifth of 238

$238 \div 5 = 47.6$

4) Factorise the expression $r^2 - 49$

$(r-7)(r+7)$

Factorise the following:

1) $t^2 + 3t - 4$ $(t+4)(t-1)$

2) $y^2 + 5y + 6$ $(y+3)(y+2)$

3) $m^2 - 7m + 10$ $(m-5)(m-2)$

4) $a^2 + a - 6$ $(a+3)(a-2)$

5) $m^2 + m - 20$ $(m-4)(m+5)$

6) $b^2 + 10b + 16$ $(b+2)(b+8)$

7) $c^2 - 8c + 16$ $(c-4)(c-4)$

8) $m^2 + m - 6$ $(m-2)(m+3)$

7) $3f^2 - 14f - 24$

$(3f\ 3)(f\ 8)$

$3f^2\ 24f\ 3f\ 24$

24

4, 6

2, 12

24, 1

3, 8

$(3f+4)(f-6)$

8) $6m^2 + 5m - 4$

$(6m\ 1)(m\ 4)$

$6m^2\ 24m\ m\ 4$

$(6m\ 2)(m\ 2)$

$6m^2\ 12m\ 2m\ 4$

4

2, 2

1, 4

$(3m+4)(2m-1)$

Starter

1) Solve the equation: $3g - 2 = 4 - g$

$+g\ \ +g$

$4g - 2 = 4$

$4g = 6$

$g = \frac{6}{4} = \frac{3}{2}$

2) Find a quarter of 17

4.25

3) Without a calculator, find $\frac{3}{4} \div \frac{1}{2}$ $= \frac{3}{4} \times \frac{2}{1} = \frac{6}{4}$

4) Calculate 0.5 x 7 without a calculator.

3.5 $= \frac{3}{2}$

Factorising Expressions

To factorise any expression, look for

- A common factor
- Difference of two squares
- Trinomial to factorise

e.g. Factorise fully:

a) $3k^2 - 27$

$= 3(k^2 - 9)$

$= 3(k+3)(k-3)$

b) $4c^2 + 36c + 56$

$= 2(2c^2 + 18c + 28)$

$= 4(c^2 + 9c + 14)$

$= 4(c+2)(c+7)$

14

1, 14

2, 7

Starter

Fully factorise the following expressions:

1) $3c^2 - 3c - 6$

2) $2m^2 - 32$

3) $3d^3 - 3d$

4) $4e^2 + 19e - 5$

5) $6e^2 - 9e - 6$

6) $4g^3 - 400g$

7) $6g^2 + 8g - 8$

Today's Learning:

To learn to write expressions in completed square form.

Completing the Square

Sometimes we want to write a trinomial as a squared bracket plus or minus a number, ie. $(x + a)^2 + b$.

e.g. $x^2 + 4x + 3 = (x + 2)^2 - 1$ ← completed square form

Later, this will make sketching these graphs easier.

e.g. Write these trinomials in completed square form:

a) $x^2 + 8x + 7$ (half this number)

$(x+4)^2 - 9$

$(x+4)^2 = (x+4)(x+4) = x^2+4x+4x+16$

b) $x^2 - 2x + 1$ (half)

$(x-1)^2$

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

c) $x^2+6x+11$

$(x+3)^2+2$

$(x+3)(x+3) = x^2+3x+3x+9$

Write the following in completed square form...

1) $x^2 - 14x + 40$ $(x-7)^2-9$

2) $x^2 + 6x - 10$ $(x+3)^2-19$

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

4) $x^2 - 4x - 10$ $(x-2)^2-14$

5) $x^2 - 10x + 50$ $(x-5)^2+25$

6) $x^2 - 10x + 3$ $(x-5)^2-22$

7) $x^2 + 18x + 17$ $(x+9)^2-64$

8) $x^2 - 6x + 2$ $(x-3)^2-7$

9) $x^2 + 26x + 40$ $(x+13)^2-129$

10) $x^2 + 2x + 10$ $(x+1)^2+9$