Welcome Back to MYP Math 9!

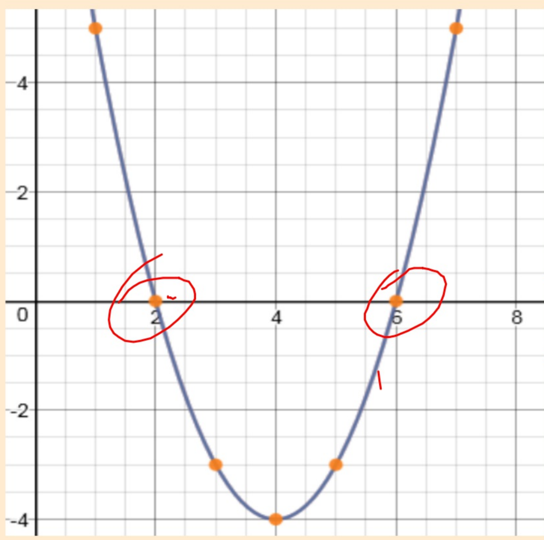
	Assignment Effort Grade (Circle One)	Comments (What was interesting or challenging?)
Monday Date: 3/12 Topic: 4CD Distribution	0 1 2	
Tuesday Date: 3/13 Topic: 9E Factoring Quadratics	0 1 2	
Wednesday Date: _____ Topic: ___________	0 1 2	
Thursday Date: _____ Topic: ___________	0 1 2	
Friday Date: _____ Topic: ___________	0 1 2	

What do you notice?
What do you wonder?

$$y = (x - 2)(x - 6)$$

$$y = x^2 - 8x + 12$$

x_1	y_1
0	12
1	5
2	0
3	−3
4	−4
5	−3
6	0
7	5



y = 0

Warm-up: Factor completely.

$x^2 + 11x + 30$

$(x+5)(x+6)$

Times Table - 12x12

	1	2	3	4	5	6	7	8	9	10	11	12
1	**1**	2	3	4	5	6	7	8	9	10	11	12
2	2	**4**	6	8	10	12	14	16	18	20	22	24
3	3	6	**9**	12	15	18	21	24	27	30	33	36
4	4	8	12	**16**	20	24	28	32	36	40	44	48
5	5	10	15	20	**25**	30	35	40	45	50	55	60
6	6	12	18	24	30	**36**	42	48	54	60	66	72
7	7	14	21	28	35	42	**49**	56	63	70	77	84
8	8	16	24	32	40	48	56	**64**	72	80	88	96
9	9	18	27	36	45	54	63	72	**81**	90	99	108
10	10	20	30	40	50	60	70	80	90	**100**	110	120
11	11	22	33	44	55	66	77	88	99	110	**121**	132
12	12	24	36	48	60	72	84	96	108	120	132	**144**

$18p^2 + 9p^1$

$9p^1 \quad 9p^1$

$9p(2p+1)$

$18p^2 + 9p$ ✓

Class Plan:

1. Warm-up

2. Solving Quadratics

A	EQUATIONS OF THE FORM $x^2 = k$
B	THE NULL FACTOR LAW
C	SOLUTION BY FACTORISATION

4. Practice (Review factoring)

A Chapter 9 REMOVING COMMON FACTORS

Example 1

Factorise by removing a common factor:

a $2x^2 + 3x$

b $-2x^2 - 6x$

A REMOVING COMMON FACTORS

Some quadratic trinomials can be factorised by removing the Highest Common Factor (HCF) of the terms in the expression. In fact, we should always look to remove the HCF before proceeding with any further factorisation.

When we remove a common factor, we write it in front of a set of brackets. The expression within the brackets is found using the reverse of the distributive law.

Example 1 — Self Tutor

Factorise by removing a common factor:

a $2x^2 + 3x$ **b** $-2x^2 - 6x$

a $2x^2 + 3x$ has HCF x

$\therefore \; 2x^2 + 3x = x(2x + 3)$

b $-2x^2 - 6x$ has HCF $-2x$

$\therefore \; -2x^2 - 6x = -2x(x + 3)$

Take a step back... ***Before writing anything...***

What could the value of *x* be...?

Now show using solving methods.

$$x^2 + 3 = 39$$

$$x = \pm 6$$

$$-3 \quad -3$$

$$\sqrt{x^2} = \sqrt{36}$$

$$x = 6 \text{ and } -6$$

A EQUATIONS OF THE FORM $x^2 = k$

Example 1 **Self Tutor**

Solve for x:

a $x^2 + 3 = 6$

$-3 \quad -3$

$\sqrt{x^2} = \sqrt{3}$

$x = \pm\sqrt{3}$

SOLUTIONS

Example 1 — Self Tutor

Solve for x:

a $x^2 + 3 = 6$ **b** $3 - 2x^2 = 7$

a $x^2 + 3 = 6$

$\therefore \quad x^2 = 3$ {subtracting 3 from both sides}

$\therefore \quad x = \pm\sqrt{3}$

no real ans.

b $3 - 2x^2 = 7$

$\therefore \quad -2x^2 = 4$ {subtracting 3 from both sides}

$\therefore \quad x^2 = -2$ {dividing both sides by -2}

which has no real solutions as x^2 cannot be < 0.

What do we know about the product of zero?

In other words...how can two factors multiply to equal zero?

$$a \cdot b = 0$$

One ***or*** both factors **MUST** be zero!

Take a step back... ***Before writing anything...***

What could the value of *x* be...?

Now show using solving methods.

$$(x-2)(x-1)=0$$

$$(2-2)(2-1)=0 \qquad \boxed{x=1,2}$$

$$(1-2)(1-1)=0$$

Solving from Factored Form...

B

THE NULL FACTOR LAW

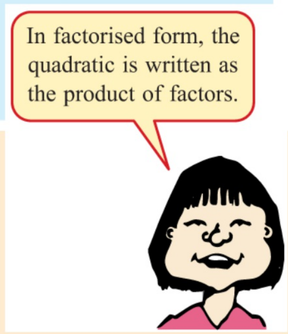
For quadratic equations which are not of the form $x^2 = k$, we need an alternative method of solution.

If a quadratic equation is given in **factorised form** then we can use the **Null Factor law**.

The **Null Factor law** states that:

When the product of two or more numbers is zero, then *at least one* of them must be zero.

So, if $ab = 0$ then $a = 0$ or $b = 0$.



B THE NULL FACTOR LAW

Example 3

Solve for x using the Null Factor law:

a $2x(x-4)=0$

b $(x+3)(2x-5)=0$

$x+3=0$

$-3 \quad -3$

$x=-3$

OR

$2x-5=0$

$\frac{2x}{2}=\frac{5}{2}$

$x=2.5$

B THE NULL FACTOR LAW

Example 3 Self T

Solve for x using the Null Factor law:

a $2x(x-4)=0$

b $(x+3)(2x-5)=0$

a
$$2x(x-4)=0$$
$$\therefore\ 2x=0 \text{ or } x-4=0$$
$$\therefore\ x=0 \text{ or } 4$$

b
$$(x+3)(2x-5)=0$$
$$\therefore\ x+3=0 \text{ or } 2x-5=0$$
$$\therefore\ x=-3 \text{ or } 2x=5$$
$$\therefore\ x=-3 \text{ or } \frac{5}{2}$$

C SOLUTION BY FACTORISATION

To solve quadratic equations which are not in factorised form, we use the following procedure:

Step 1: If necessary, rearrange the equation so one side is **zero**.

Step 2: **Fully factorise** the other side (usually the LHS).

Step 3: Use the **Null Factor law**: if $ab = 0$ then $a = 0$ or $b = 0$.

Step 4: **Solve** the resulting linear equations.

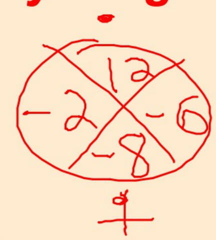
To factorise the quadratic, we use the techniques we learnt in **Chapter 9**. We first take out any common factors, then recognise the type of factorisation required. We look for:

- **Difference of two squares** $x^2 - a^2 = (x+a)(x-a)$
- **Perfect squares** $x^2 + 2ax + a^2 = (x+a)^2$ or $x^2 - 2ax + a^2 = (x-a)^2$
- **Sum and product method** $x^2 + bx + c = (x+p)(x+q)$ where $p + q = b$ and $pq = c$
- **Splitting the x-term** $ax^2 + bx + c$, $a \neq 0$
  - Find numbers p and q whose sum is b and whose product is ac.
  - Replace bx by $px + qx$.
  - Complete the factorisation.

Take a step back... ***Before writing anything...***

What could the value of *x* be...?

Now show using solving methods.



$$x^2 - 8x + 12 = 0$$

$$(x-2)(x-6)=0$$

FACTORS ≠ ANS

$$x = 2, 6$$

Times Table - 12x12

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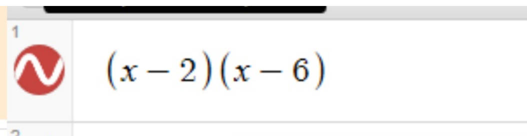
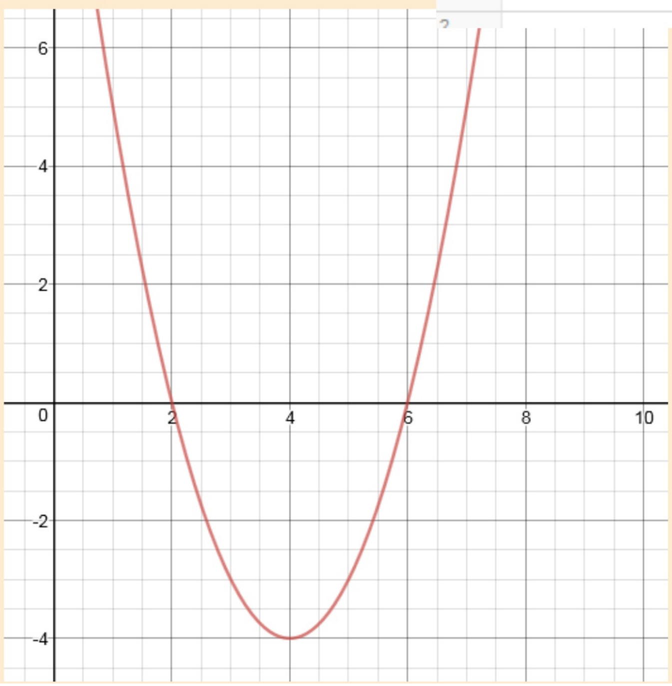
$$x^2 - 8x + 12 = 0$$





From Desmos...

Exercises...

Front side:

Solving Practice

Solve each equation by taking square roots.

1) $b^2 = 81$

2) $m^2 = 4$

3) $n^2 = 25$

4) $p^2 = 64$

5) $x^2 + 10 = 19$

6) $n^2 - 3 = 6$

7) $n^2 - 9 = 91$

8) $x^2 + 5 = 41$

Back side:

Factoring Review

Factor the common factor out of each expression.

17) $56n^3 + 21$

18) $7x^2 - x$

19) $8p^5 + 32p^4$

20) $63v^4 - 90v^2$

Exercises...

Solve each equation by taking square roots.

1) $b^2 = 81$

2) $m^2 = 4$

3) $n^2 = 25$

4) $p^2 = 64$

5) $x^2 + 10 = 19$

6) $n^2 - 3 = 6$

7) $n^2 - 9 = 91$

8) $x^2 + 5 = 41$

Exercises...

Solve each equation by factoring.

9) $(n+8)(n-7)=0$

10) $(x+3)(x-7)=0$

11) $x(x-6)=0$

12) $(a-6)(7a+1)=0$

13) $n^2+7n=0$

14) $x^2+5x=0$

15) $p^2+9p+18=0$

16) $x^2-10x+16=0$

Exercises...

Factor the common factor out of each expression.

17) $56n^3 + 21$

18) $7x^2 - x$

19) $8p^5 + 32p^4$

20) $63v^4 - 90v^2$

Exercises...

Factor each completely.

21) $x^2 + 11x + 30$

22) $b^2 - 64$

23) $n^2 + 5n - 50$

24) $v^2 - 13v + 40$

Solutions

1) $\{9, -9\}$	2) $\{2, -2\}$	3) $\{5, -5\}$	4) $\{8, -8\}$
5) $\{3, -3\}$	6) $\{3, -3\}$	7) $\{10, -10\}$	8) $\{6, -6\}$
9) $\{-8, 7\}$	10) $\{-3, 7\}$	11) $\{6, 0\}$	12) $\left\{6, -\frac{1}{7}\right\}$
13) $\{-7, 0\}$	14) $\{-5, 0\}$	15) $\{-6, -3\}$	16) $\{2, 8\}$
17) $7(8n^3 + 3)$	18) $x(7x - 1)$	19) $8p^4(p + 4)$	20) $9v^2(7v^2 - 10)$
21) $(x + 5)(x + 6)$	22) $(b + 8)(b - 8)$	23) $(n - 5)(n + 10)$	24) $(v - 8)(v - 5)$