Welcome MYP 9 Mathematics!

(Reflect & turn in last weeks)

	Assignment Effort Grade (Circle One)	Comments (What was interesting or challenging?)
Monday Date: 3/26 Topic: No HW - Real Life Assessment on Friday	0 1 2	
Tuesday Date: ______ Topic: ____________	0 1 2	
Wednesday Date: ______ Topic: ____________	0 1 2	
Thursday Date: ______ Topic: ____________	0 1 2	
Friday Date: ______	0 1 2	

Class Plan:

1. Warm-up
2. Solving Practice
3. Unit 6 Polynomials Review

Warm-up: Expand the quadratic.

$$(x+3)^2$$

$= 2x+6$

$= x+9$

$= x^2+6$

$= x^2+9$

$= 9x^2$

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

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

x^2+6x+9

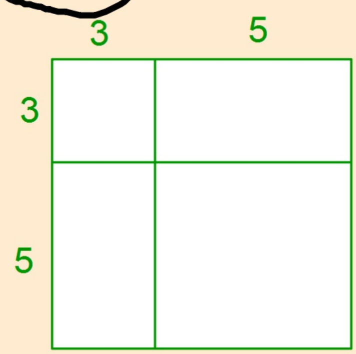
(common misconception from 6.1 quiz)

OPENING PROBLEM

Anton thinks that to find the square of the sum of two numbers, you can just square each of the numbers, then add the results.

Things to think about:

- **a** Does $(5+3)^2 = 5^2 + 3^2$?
- **b** Can you explain why Anton is incorrect?



Example: Solve the equation.

$$x^2 + 6x - 1 = 0$$

$+1 \quad +1$

$x^2 + 6x + 9 = 1 + 9$

$(x+3)(x+3) = 10$

$\sqrt{(x+3)^2} = \sqrt{10}$

$x + 3 = \pm\sqrt{10}$

$-3 \quad -3$

$x = -3 \pm \sqrt{10}$

We will learn another method!

Example: Solve the equation. $\sqrt{8} = \sqrt{4 \cdot 2}$

$$x^2 + 4x - 4 = 0$$

$$x^2 + 4x = 4$$

$$x^2 + 4x + 4 = 4 + 4$$

$$(x+2)(x+2) = 8$$

$$\sqrt{(x+2)^2} = \sqrt{8}$$

$$x + 2 = \pm\sqrt{8}$$

$$x + 2 = \pm 2\sqrt{2}$$

$$-2 \qquad -2$$

$$x = -2 \pm 2\sqrt{2}$$

We will learn another method!

D COMPLETING THE SQUARE

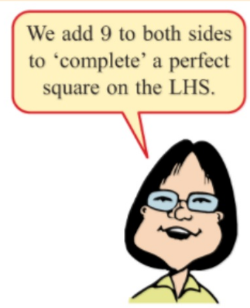
Factorising quadratic expressions can be very difficult, and we have generally only dealt with cases where the factorisation involves integers.

Quadratic equations such as $x^2 + 6x - 1 = 0$ have solutions which are *irrational*. They cannot be written as a fraction in the form $\frac{p}{q}$ where p, q are integers.

Quadratic equations like this cannot readily be solved by factorisation, so instead we use a method called **completing the square**. This involves use of the perfect square factorisations $x^2+2ax+a^2 = (x+a)^2$ or $x^2 - 2ax + a^2 = (x - a)^2$.

Consider the following method for solving $x^2 + 6x - 1 = 0$:

$$x^2 + 6x - 1 = 0$$
$$\therefore\ x^2 + 6x = 1$$
$$\therefore\ x^2 + 6x + 9 = 1 + 9$$
$$\therefore\ (x + 3)^2 = 10$$
$$\therefore\ x + 3 = \pm\sqrt{10}$$
$$\therefore\ x = -3 \pm \sqrt{10}$$



The hardest part of this process is knowing that we need to add 9 to both sides to complete the square.

From our previous study of perfect squares, we observe that:

$$\underbrace{(x+4)^2 = x^2 + 8x + 4^2}_{4 \text{ is half of } 8} \qquad \underbrace{(x-5)^2 = x^2 - 10x + (-5)^2}_{-5 \text{ is half of } -10} \qquad \underbrace{(x+6)^2 = x^2 + 12x + 6^2}_{6 \text{ is half of } 12}$$

So, the number we must add to both sides is found by **halving the coefficient of x, then squaring this value**.

In the above example, the coefficient of x is 6, so half the coefficient of x is 3. We therefore add $3^2 = 9$ to both sides of the equation.

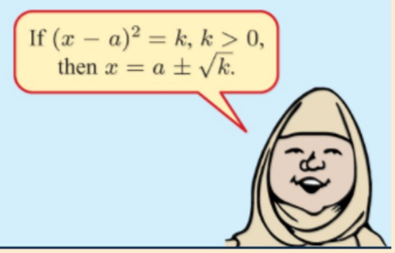
Example 8

Solve for x by completing the square. Leave your answers in simplest radical form:

a $x^2 + 4x - 4 = 0$ **b** $x^2 - x - 7 = 0$

a
$$x^2 + 4x - 4 = 0$$
$$\therefore\ x^2 + 4x = 4 \quad \text{\{moving the constant term to the RHS\}}$$
$$\therefore\ x^2 + 4x + 2^2 = 4 + 2^2 \quad \text{\{adding } (\tfrac{4}{2})^2 = 2^2 \text{ to both sides\}}$$
$$\therefore\ (x+2)^2 = 8$$
$$\therefore\ x + 2 = \pm\sqrt{8}$$
$$\therefore\ x = -2 \pm 2\sqrt{2}$$

b
$$x^2 - x - 7 = 0$$
$$\therefore\ x^2 - x = 7 \quad \text{\{moving the constant term to the RHS\}}$$
$$\therefore\ x^2 - x + (\tfrac{1}{2})^2 = 7 + (\tfrac{1}{2})^2 \quad \text{\{adding } (\tfrac{-1}{2})^2 = (\tfrac{1}{2})^2 \text{ to both sides\}}$$
$$\therefore\ (x - \tfrac{1}{2})^2 = 7 + \tfrac{1}{4}$$
$$\therefore\ (x - \tfrac{1}{2})^2 = \tfrac{29}{4}$$
$$\therefore\ x - \tfrac{1}{2} = \pm\sqrt{\tfrac{29}{4}}$$
$$\therefore\ x = \tfrac{1}{2} \pm \tfrac{\sqrt{29}}{2}$$
$$\therefore\ x = \frac{1 \pm \sqrt{29}}{2}$$



Example 7 **Self Tutor**

For each equation:

i Find the number which must be added to both sides of the equation to create a perfect square on the LHS.

ii Write the equation in the form $(x+p)^2 = k$.

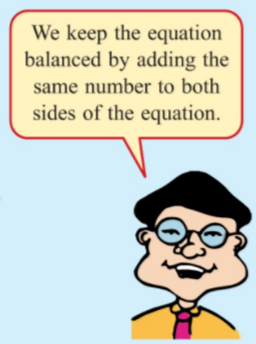
a $x^2 + 2x = 6$ **b** $x^2 - 8x = -3$

a **i** In $x^2 + 2x = 6$, half the coefficient of x is $\frac{2}{2} = 1$.
So, we add 1^2 to both sides.

ii The equation becomes $x^2 + 2x + 1^2 = 6 + 1^2$

$\therefore\ (x+1)^2 = 6 + 1$

$\therefore\ (x+1)^2 = 7$



b **i** In $x^2 - 8x = -3$, half the coefficient of x is $\frac{-8}{2} = -4$.
So, we add $(-4)^2 = 4^2$ to both sides.

ii The equation becomes $x^2 - 8x + 4^2 = -3 + 4^2$

$\therefore\ (x-4)^2 = -3 + 16$

$\therefore\ (x-4)^2 = 13$

Unit 6: Polynomials (Quadratics)

Do:

1. Look over Quiz 6.1
2. Unit 6 Review Worksheet

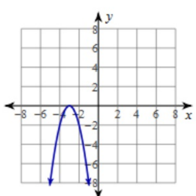
Done?
Look over sections:
4AB
9ABCDE
18ABCD

Unit 6: Polynomials (Quadratics)

Do: Unit 6 Review Worksheet

Answers to Unit 6: Polynomials Review

1)



2) $f(x) = x^3 + 3x^2 - 16x - 48$

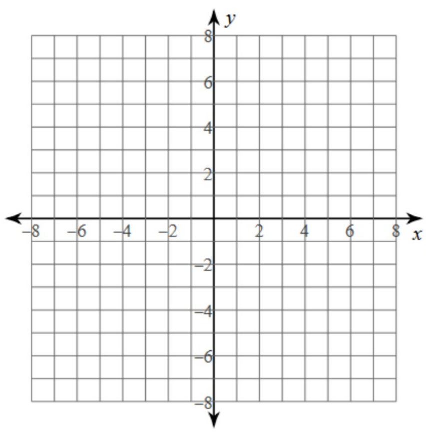
3) $f(x) = x^3 + 6x^2 + 5x$

4) $30n^3 + 25n^2$
5) $14n^2 + 16n + 2$
6) $16x^2 - 56x + 49$
7) $64 + 16x + x^2$
8) $n^2 - 1$
9) $16x^8 - 24x^4 + 9$
10) $20x^3 + 22x^2 - 42x + 12$
11) $21n^3 + 62n^2 + 51n + 10$
12) $(m - 10)(m + 5)$
13) $x(x + 7)(x + 2)$
14) $x(x - 9)$
15) $v(v + 8)(v - 2)$
16) $(v + 6)(v - 4)$
17) $(x - 5)(x + 7)$
18) $2(v - 4)(v - 2)$
19) $p^2(p + 4)$
20) $x(x + 4)(x - 1) = 0$
21) $x(x - 2)(x + 4) = 0$
22) $\{2i, -2i\}$
23) $\{i\sqrt{3}, -i\sqrt{3}\}$
24) $\{8, 0\}$
25) $\{-6, 6\}$
26) $\{-3\}$
27) $\{8, -2\}$
28) $\{-1, -11\}$
29) $\{2 + 3\sqrt{2}, 2 - 3\sqrt{2}\}$
30) $\{6 + 2\sqrt{3}, 6 - 2\sqrt{3}\}$
31) $\{19, -5\}$
32) $\{0, 4, -4\}$
33) $\{0, -1, -4\}$

Graphing Polynomials

Sketch the graph of each function. Solve for critical points (y-int, x-ints, and vertex)

1) $f(x) = -2x^2 - 12x - 18$



Writing Equations of Polynomials

Write a polynomial function given x-intercepts (a=1).

2) $4, \quad -4, \quad -3$

Writing Equations of Polynomials

Write a polynomial function given x-intercepts (a=1).

3) $-5, \quad -1, \quad 0$

Expand (factored to general form)

Find each product (expand).

4) $5n^2(6n+5)$

5) $(7n+1)(2n+2)$

6) $(4x-7)^2$

7) $(8+x)^2$

8) $(n+1)(n-1)$

9) $(4x^4-3)^2$

10) $(5x-2)(4x^2+6x-6)$

11) $(7n+2)(3n^2+8n+5)$

Factor (general to factored form)

Factor each completely.

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

13) $x^3 + 9x^2 + 14x$

14) $x^2 - 9x$

15) $v^3 + 6v^2 - 16v$

16) $v^2 + 2v - 24$

17) $x^2 + 2x - 35$

Factor (general to factored form)

18) $2v^2 - 12v + 16$

19) $p^3 + 4p^2$

20) $x^3 + 3x^2 - 4x = 0$

21) $x^3 + 2x^2 - 8x = 0$

Solve each equation (x-intercepts)

Solve each equation.

22) $8n^2 = -32$

23) $3m^2 = -9$

24) $b^2 - 8b = 0$

25) $n^2 - 36 = 0$

26) $x^2 + 6x + 9 = 0$

27) $k^2 - 6k - 16 = 0$

Solve each equation (x-intercepts)

28) $n^2 + 12n + 11 = 0$

29) $x^2 - 4x - 14 = 0$

30) $r^2 - 12r + 24 = 0$

31) $p^2 - 14p - 95 = 0$

32) $x^3 - 16x = 0$

33) $x^3 + 5x^2 + 4x = 0$

Exercises...

Study for Unit Test Wednesday!