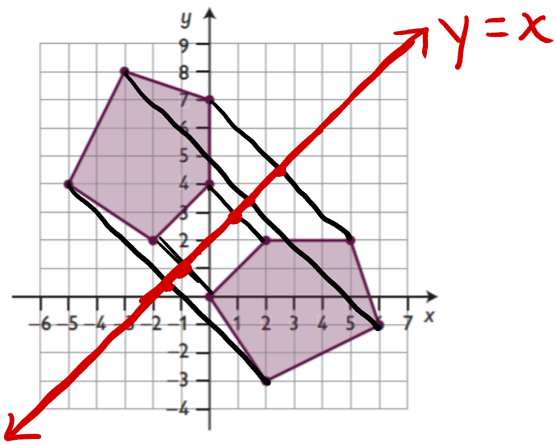
H Math 2
Midterm Review (Unit 1-4)

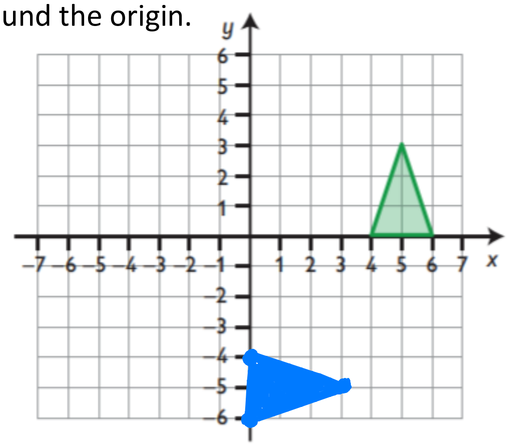
Key

Unit 1 Material:

1) Draw in the line of reflection for the following:

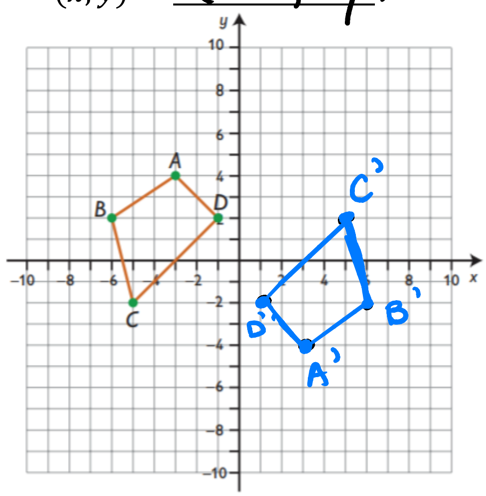


2) Rotate the following figure 90° clockwise around the origin.



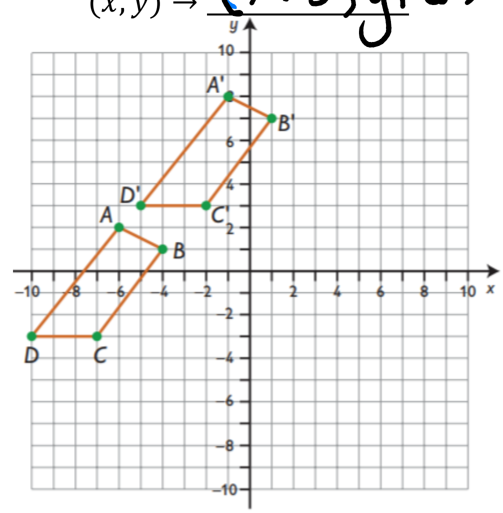
3) Rotate the figure ABCD 180° around the origin.

$(x, y) \rightarrow$ $(-x, -y)$

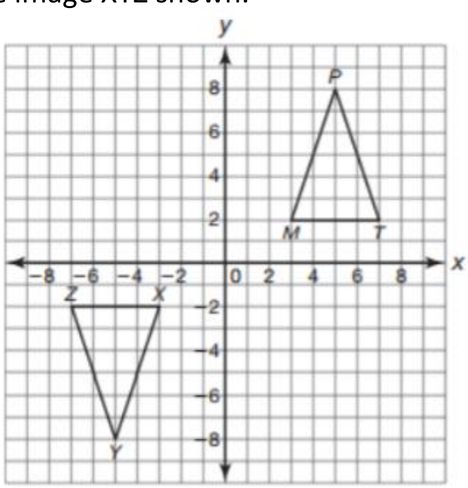


4) Describe the translation that is shown.

$(x, y) \rightarrow$ $(x+5, y+6)$

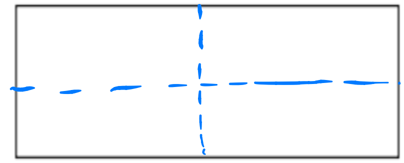


5) Describe the sequence of transformations with the fewest steps required to move the figure PMT to the image XYZ shown.



Rotation 180°

6) a. Draw all the lines of symmetry of this rectangle.

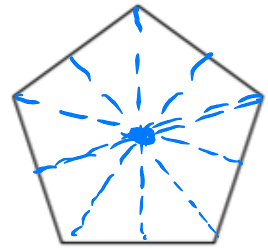


2 lines of symmetry

b. What is the rotational symmetry of this rectangle ?

180°, 360°

7) a. Draw all the lines of symmetry of this regular pentagon.



5 lines of symmetry

b. What is the rotational symmetry of this regular pentagon?

$\frac{360°}{5} = 72°$; 72°, 144°, 216°, 288°, 360°

8) a. Draw all the lines of symmetry of this regular parallelogram.

None

b. What is the rotational symmetry of this regular parallelogram?

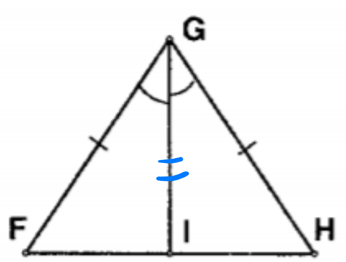
180°, 360°

Unit 2 Material:

State if the two triangles are congruent. If they are state the reasoning and the congruence statement.

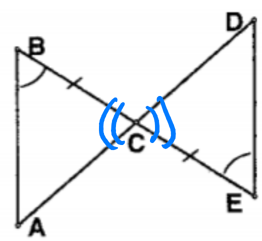
1) △ FGI ≅△ HGI

by SAS



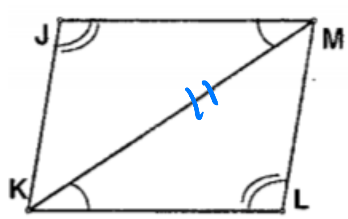
2) △ BCA ≅△ ECD

by ASA



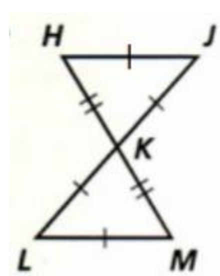
3) △ KJM ≅△ MLK

by AAS



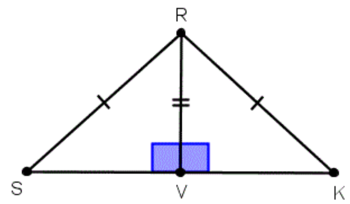
4) △ JKH ≅△ LKM

by SSS



5) $\triangle$ SRV $\cong \triangle$ KRV

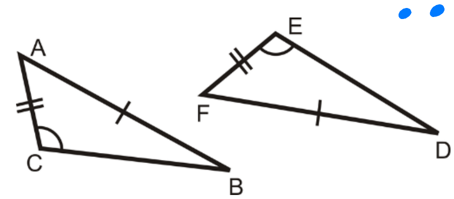
by HL



6) $\triangle$ CAB $\cong \triangle$ EFD

by NONE

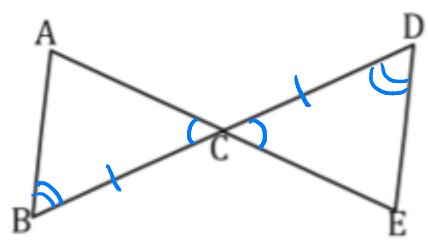
SSA
∴ can not prove △s ≅



Complete the triangle congruence proofs.

7) Given: $\overline{AE}$ *bisects* $\overline{BD}$, $\angle B \cong \angle D$

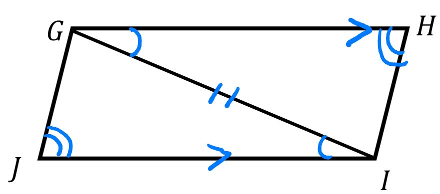
Prove: $\Delta ABC \cong \Delta ECD$



Statements	Reasons
A 1. $\angle B \cong \angle D$	1. Given
2. $\overline{AE}$ bisects $\overline{BD}$	2. Given
S 3. $\overline{BC} \cong \overline{DC}$	3. Defn. of segment bisector
A 4. $\angle BCA \cong \angle DCE$	4. Vertical $\angle$s are $\cong$
5. $\Delta ABC \cong \Delta ECD$	5. ASA

8) Given: $\overline{GH} \parallel \overline{IJ}$, $\angle H \cong \angle J$

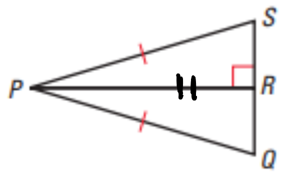
Prove: $\overline{JG} \cong \overline{HI}$



Subgoal: $\Delta GJI \cong \Delta IHG$ by AAS

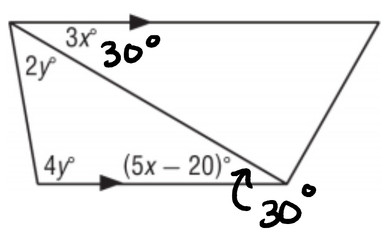
Statements	Reasons
A 1. $\angle H \cong \angle J$	1. Given
2. $\overline{GH} \parallel \overline{IJ}$	2. Given
A 3. $\angle HGI \cong \angle JIG$	3. Alternate Interior $\angle$s are $\cong$
S 4. $\overline{GI} \cong \overline{IG}$	4. Reflexive Prop.
5. $\Delta GJI \cong \Delta IHG$	5. AAS
6. $\overline{JG} \cong \overline{HI}$	6. CPCTC

9) Given: $\overline{PR} \perp \overline{SQ}$, $\overline{PQ} \cong \overline{PS}$
Prove: R is the midpoint of $\overline{SQ}$



Statements	Reasons
1. $\overline{PR} \perp \overline{SQ}$	1. Given
2. $\angle PRS$ & $\angle PRQ$ are right $\angle$s	2. Defn. of perpendicular
3. $\triangle PRS$ & $\triangle PRQ$ are right $\triangle$s	3. Defn. of right $\triangle$s
4. $\overline{PQ} \cong \overline{PS}$	4. Given
5. $\overline{PR} \cong \overline{PR}$	5. Reflexive Property
6. $\triangle PRS \cong \triangle PRQ$	6. HL
7. $\overline{SR} \cong \overline{QR}$	7. CPCTC
8. R is the midpt. of $\overline{SQ}$	8. Defn. of midpoint

10) Find the value of the variable(s) in each figure. Explain your reasoning.



Alt. int. $\angle$s

$3x = 5x - 20$

$-2x = -20$

$x = 10$

Same-side int $\angle$s

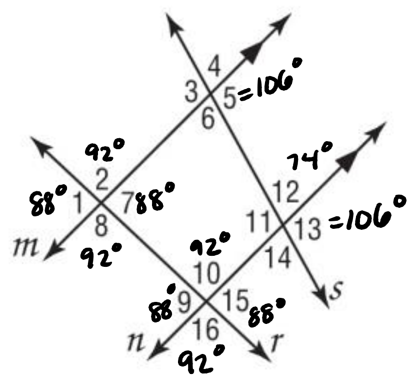
$30° + 2y + 4y = 180°$

$6y = 180°$

$\boxed{y = 30}$

11) In the figure, m∠2 = 92° and m∠12 = 74°. Find the measure of each angle.

a. m∠10 = 92°
b. m∠8 = 92°
c. m∠9 = 88°
d. m∠5 = 106°
d. m∠11 = 106°
f. m∠13 = 106°



12) In the isosceles trapezoid $ABCD$, the length of $\overline{AC}$ is represented by $6b - 2$ and the length of $\overline{BD}$ is represented by $4b + 2$. Find b and the length of $\overline{AC}$.

Diagonals of an isosceles trapezoid are congruent.

$6b - 2 = 4b + 2$

$6b - 4b = 2 + 2$

$2b = 4$

$\boxed{b = 2}$

$\overline{AC} = 6b - 2$

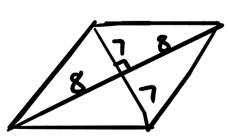
$= 6(2) - 2$

$= 12 - 2$

$= \boxed{10}$

13) The lengths of the diagonals of a rhombus are 14 and 16. Find the measure of the length of the side of a rhombus.

Diagonals of a rhombus are $\perp$.



$7^2 + 8^2 = c^2$

$11 = c^2$

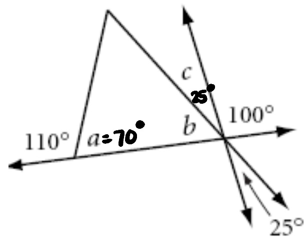
$\boxed{10.6 \approx \sqrt{113} = c}$

Determine the measure of each angle.

14) $a =$ 70°

$b =$ 55°

$c =$ 25°



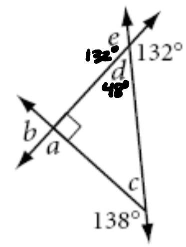
15) $a =$ 90°

$b =$ 90°

$c =$ 42°

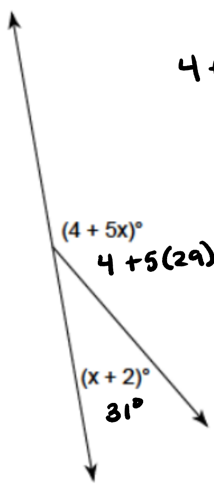
$d =$ 48°

$e =$ 132°



Write and solve an equation to find the missing angle measures.

16)



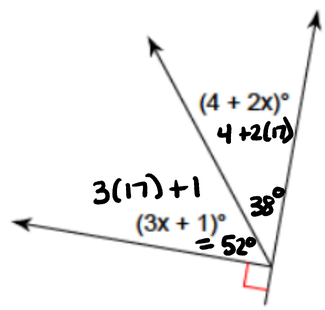
$4+5x+x+2 = 180°$

$6x+6 = 180°$

$\frac{\cancel{6}x}{\cancel{6}} = \frac{174}{6}$

$\boxed{x = 29}$

17)



$4+2x+3x+1 = 90°$

$5x+5 = 90$

$5x = 85$

$\boxed{x = 17}$

Unit 3 Material:

Find the recursive and explicit rule from the following tables.

1)

x	-3	-2	-1	0	1	2
$h(x)$	12	7	4	3	4	7

Quadratic

−3 −1 +1 +3

+2 +2 +2

Recursive:

$f(-3) = 12$; $f(x) = f(x-1) + 2x - 1$

Explicit: $f(x) = x^2 + 3$

2)

x	-3	-2	-1	0	1	2
$g(x)$	-4	-1	2	5	8	11

Linear

+3 +3 +3

Recursive:

$f(-3) = -4$; $f(x) = f(x-1) + 3$

Explicit:

$f(x) = 3x + 5$

3)

x	1	2	3	4	5	6
$f(x)$	2	8	32	128	512	2048

Exponential

·4 ·4

Recursive:

$f(1) = 2$; $f(x) = f(x-1) \cdot 4$

Explicit: $f(x) = 2(4)^{x-1}$

4)

x 0	1	2	3	4	5
$f(x)$	3	8	15	24	35

Quadratic

1 4 9 16 25

+1 +3 +5 +7 +9 +11

Recursive:

$f(1) = 3$; $f(x) = f(x-1) + 2x + 1$

Explicit: $f(x) = x^2 + 2x$

5) Quadratic

x	0	1	2	3	4	5	6	7
y			11	5	3	5	11	21
	−18	−14	−10	−6	−2	+2	+6	+10
						+4	+4	+4

vertex

Recursive:

add a line to the previous term

$f(2) = 11$

$f(x) = f(x-1) + 4x - 18$

Explicit:

$f(x) = 2(x-4)^2 + 3$

vertex form

6)

x	1	2	3	4	5
y	6	3	1.5	0.75	0.375

$\cdot \frac{1}{2}$ $\cdot \frac{1}{2}$

Exponential

Recursive:

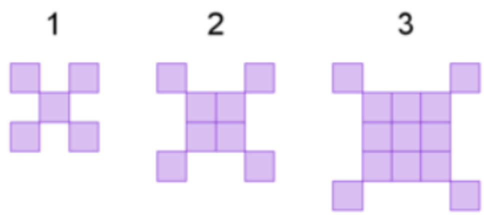
$f(1) = 6$; $f(x) = f(x-1) \cdot \frac{1}{2}$

Explicit:

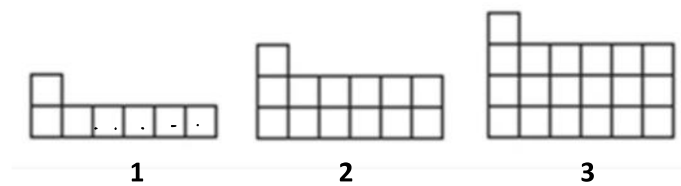
$f(x) = 6\left(\frac{1}{2}\right)^{x-1}$

Find then explicit rule from the following diagrams.

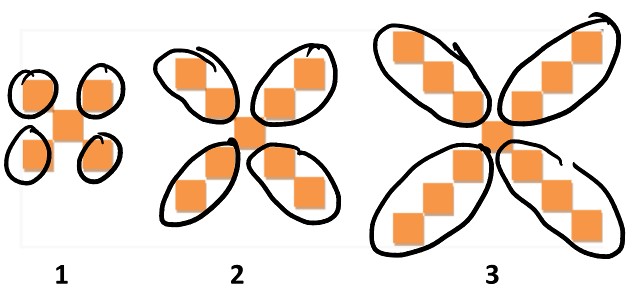
7) $f(x) = x^2 + 4$



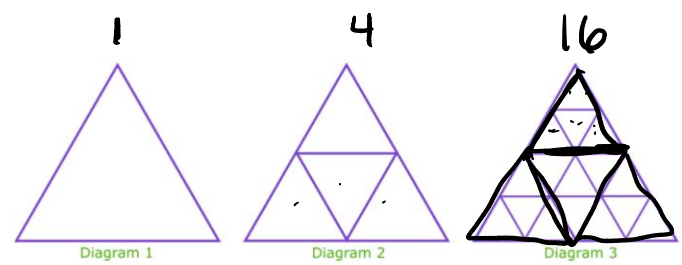
8) $f(x) = 6x + 1$



9) $f(x) = 4x + 1$

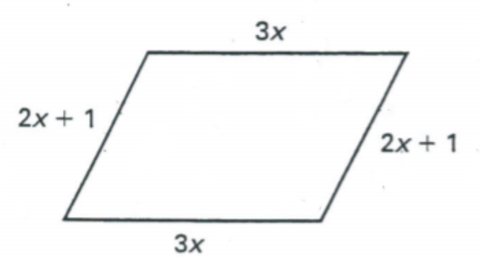


10) $f(x) = 1(4)^{x-1}$

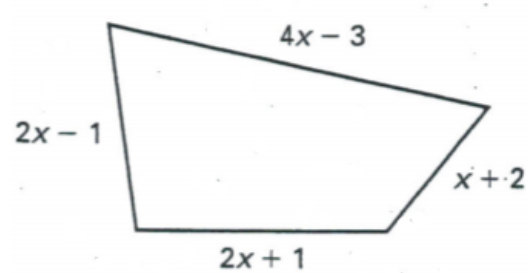


Write a polynomial that represents the perimeter of the figure.

11) Perimeter: $10x + 2$



12) Perimeter: $9x - 1$



$$\begin{array}{r} 2x+1 \\ 2x-1 \\ x+2 \\ 4x-3 \\ \hline 9x-1 \end{array}$$

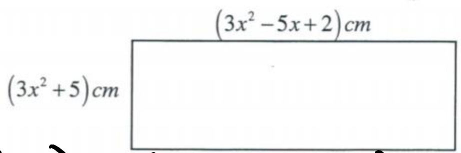
Write a polynomial that represents the area perimeter of each rectangle.

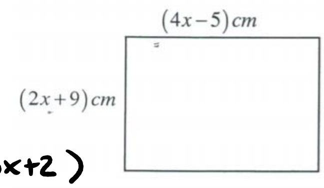
13) Area: $9x^4 - 15x^3 + 21x^2 - 25x + 10$

Perimeter: $12x^2 - 10x + 14$

14) Area: $8x^2 + 26x - 45$

Perimeter: $12x + 8$





$A = (4x-5)(2x+9)$
$= 8x^2 + 36x - 10x - 45$
$= 8x^2 + 26x - 45$

$P = 2(4x-5) + 2(2x+9)$
$8x - 10$
$4x + 18$
$12x + 8$

$P = 2(3x^2+5) + 2(3x^2 - 5x + 2)$
$= 6x^2 + 10 + 6x^2 - 10x + 4$
$= 12x^2 - 10x + 14$

$A = (3x^2+5)(3x^2-5x+2)$
$= 9x^4 - 15x^3 + 6x^2$
$+ 15x^2 - 25x + 10$
$9x^4 - 15x^3 + 21x^2 - 25x + 10$

Perform the indicated operation, then classify each polynomial.

15) $(x-4)^2 =$

$\boxed{x^2 - 8x + 16}$

Quadratic Trinomial

16) $3x(x - 4y) - 5x(x^2 - 2y)$

$3x^2 - 12xy - 5x^3 + 10xy$

$\boxed{-5x^3 + 3x^2 - 2xy}$

Cubic Trinomial

17) $\frac{6x^9y^8}{8x^5y^7} = \boxed{\frac{3}{4}x^4y}$

Quintic Monomial

18) $5(x+2) + (4x-5) - 1$

$5x + 10 + 4x - 5 - 1$

$\boxed{9x + 4}$ Linear Binomial

19) $(3x^2 - 4x + 2) - (2x^2 - 5x + 2)$

$3x^2 - 4x + \cancel{2}$
$-2x^2 + 5x - \cancel{2}$

$\boxed{x^2 + x}$ Quadratic Binomial

20) $(x^2 - 3x - 1)(x^2 + 2x - 5)$

$x^4 + 2x^3 - 5x^2$
$-3x^3 - 6x^2 + 15x$
$-x^2 - 2x + 5$

Quartic Polynomial

$\boxed{x^4 - x^3 - 12x^2 - 7x + 5}$

21) $(x+1)^7 =$

$\boxed{x^7 + 7x^6 + 21x^5 + 35x^4 + 35x^3 + 21x^2 + 7x + 1}$

1
1 1
1 2 1
1 3 3 1
1 4 6 4 1
1 5 10 10 5 1
1 6 15 20 15 6 1
1 7 21 35 35 21 7 1

22) $(3x-2)^4$

$4 \cdot 27 \cdot -2$ $\quad 6 \cdot 9 \cdot 4$ $\quad 4 \cdot 3 \cdot -8$

$1(3x)^4(-2)^{\cancel{0}} + 4(3x)^3(-2)^1 + 6(3x)^2(-2)^2 + 4(3x)^1(-2)^3 + 1(3x)^{\cancel{0}}(-2)^4$

$\boxed{81x^4 - 216x^3 + 216x^2 - 96x + 16}$

Unit 4 Material:

Complete the square to put each of the following equations into vertex form:

1) $f(x) = x^2 + 8x + 10$

$= (x^2 + 8x + 16) + 10 - 16$

$\boxed{f(x) = (x+4)^2 - 6}$

2) $g(x) = x^2 - 5x - 3$

$= \left(x^2 - 5x + \frac{25}{4}\right) - 3 - \frac{25}{4}$

$= \left(x - \frac{5}{2}\right)^2 - \frac{12}{4} - \frac{25}{4}$

$\boxed{g(x) = \left(x - \frac{5}{2}\right)^2 - \frac{37}{4}}$

2) $h(x) = 4x^2 + 16x - 15$

$= (4x^2 + 16x + 16) - 15 - 16$

$= 4(x^2 + 4x + 4) - 31$

$\boxed{h(x) = 4(x+2)^2 - 31}$

4) $k(x) = \frac{1}{3}x^2 + 6x - 12$

$= \left(\frac{1}{3}x^2 + 6x + 27\right) - 12 - 27$

$= \frac{1}{3}(x^2 + 18x + 81) - 39$

$\boxed{k(x) = \frac{1}{3}(x+9)^2 - 39}$

Given one form of the quadratic, find the other two forms (if possible). Make a table and graph each of the following equations on the grids provided. (Include at least two accurate points on either side of the line of symmetry.)

5) Vertex Form: $y = 2(x-1)^2 - 3$

Standard Form: $y = 2x^2 - 4x - 1$

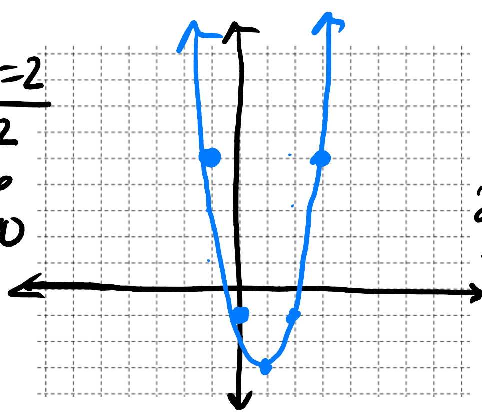
$2(x-1)(x-1) - 3$

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

$2x^2 - 4x + 2 - 3$

$2x^2 - 4x - 1$

a=1	a=2
+1	+2
+3	+6
+5	+10



Vertex: $(1, -3)$

Axis of Symmetry: $x = 1$

Transformations from $y = x^2$:

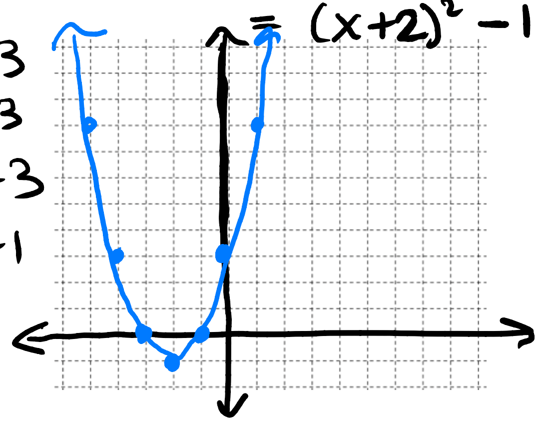
- vertical stretch by 2
- shift right 1 down 3

6) Vertex Form: $y = (x+2)^2 - 1$

Standard Form: $y = x^2 + 4x + 3$

$= (x^2 + 4x + 4) + 3 - 4$

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



Vertex: $(-2, -1)$

Axis of Symmetry: $x = -2$

Transformations from $y = x^2$:

shift left 2 down 1