

Transformation Reference Sheet

State the transformation from the original graph.

Translations:Original: $y = x^2$

$$y = x^2 + 3$$

Vertical shift up 3



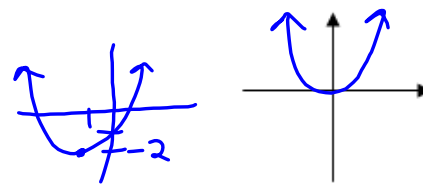
$$y = (x - 4)^2$$

horizontal shift right 4.



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

- horiz shift left 1
- vertical shift down 2



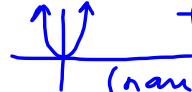
Rule: $f(x) \pm c$ vertical translation c ($+$ up, $-$ down)
 $f(x \pm c)$ horizontal translation c ($+$ left, $-$ right)

Oct 8-7:36 PM

Vertical Stretch & Compression:Original: $y = x^2$

$$y = 2x^2$$

vertical stretch factor of 2
(narrower than parent)

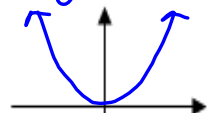


$$y = \frac{x^2}{2}$$

vertical compression w/ factor of $1/2$

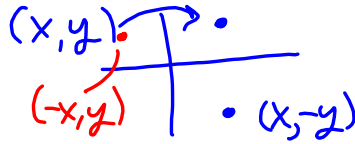
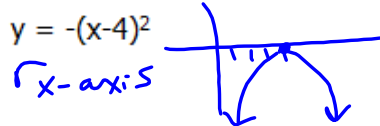


Rule: $a f(x)$ vertical stretch $a > 1$
 (factor = a)
 vertical compression $0 < a < 1$

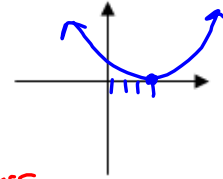
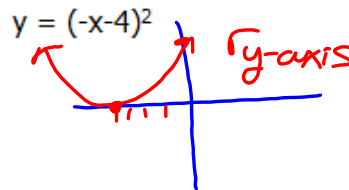
$$y = x^2$$


(wider than parent)

Oct 6-10:24 AM

Reflections:Original: $y = (x-4)^2$ 

Rule: $-f(x)$ $\rightarrow$ x-axis
 $f(-x)$ $\rightarrow$ y-axis



Describe a sequence of transformations that will transform the graph of the function f into the function g .

1. $f(x) = x^2 + 4$ to $g(x) = (x + 3)^2 + 1$

vert. shift down 3
 horiz shift left 3

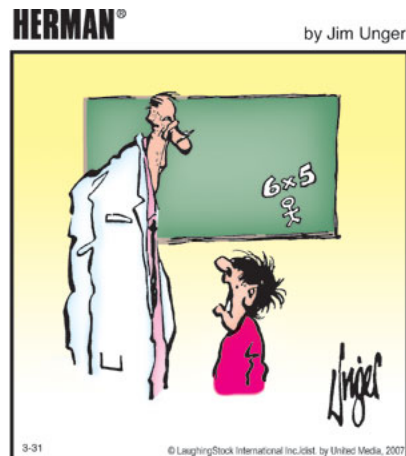
2. $f(x) = x^2$ to $g(x) = 2(x - 1)^2 + 3$

2: vert. stretch w/ factor of 2
 $x-1$: horiz shift right 1
 $+3$: vert. shift up 3

Oct 6-10:25 AM

Complex Numbers

Mini Quiz 1 No Calc Wednesday
 GH3 Due Thursday



"When I said 2×4 equals 5,
 I meant after taxes!"

<http://www.taxguru.net/comix/herman2007034072931.jpg>

Sep 30-1:17 PM

Imaginary Unit

$$i = \sqrt{-1}$$

$$i^2 = -1$$

$$i^3 = -i$$

$$i^4 = 1$$

$a + bi \rightarrow$ standard form of a complex #,
 $a, b \in \mathbb{R}, i = \sqrt{-1}$

Sep 30-1:36 PM

In Groups of 4

Work together. Stop after #4 and #7. We will go over.

$$1) (-11 + 4i) + (6 + 8i) = \underline{-5 + 12i}$$

$$\sqrt{-16} = \sqrt{-1} \cdot \sqrt{16} = i\sqrt{16} = 4i$$

Oct 1-10:24 AM

Write in the form $a + bi$:

1. $(-11 + 4i) + (6 + 8i)$

$$= -5 + 12i$$

2. $(3 + \sqrt{-16}) + (2 + \sqrt{-25})$

$$= 3 + 4i + 2 + 5i$$

$$= 5 + 9i$$

Sep 30-1:37 PM

3. $7i(2 - 5i)$

$$14i - 35i^2$$

$$= 14i + 35$$

$$= 35 + 14i$$

4. $(-4 + i)(3 - 2i)$

$$= -12 + 8i + 3i - 2i^2$$

$$= -10 + 11i$$

Sep 30-1:37 PM

$$\begin{aligned}
 5. \quad & (1 + \sqrt{-4})(3 - \sqrt{-16}) \\
 & = (1 + 2i)(3 - 4i) \\
 & = 3 - 4i + 6i - 8i^2 \quad \rightarrow = 11 + 2i
 \end{aligned}$$

6. ^{conjugates} $(a + bi)(a - bi)$

$$\begin{aligned}
 & = a^2 - abi + abi - b^2 i^2 \quad (-1) \\
 & = a^2 + b^2
 \end{aligned}$$

$$\begin{aligned}
 7. \quad & (a + bi)^2 = (a + bi)(a + bi) \\
 & = a^2 + 2abi + b^2 i^2 \\
 & = a^2 - b^2 + 2abi \\
 & \underbrace{\hspace{1cm}} + \underbrace{\hspace{1cm}} \\
 & \text{Real} \quad \quad \text{imaginary}
 \end{aligned}$$

Sep 30-1:38 PM

$$\begin{aligned}
 8. \quad & \frac{1}{2+i} \cdot \frac{2-i}{2-i} = \frac{2-i^2}{4-2i+2i-i^2} + \frac{1}{2} \\
 & = \frac{2+1}{5} = \frac{1+2i}{5} \quad \left(\frac{1}{5} + \frac{2}{5}i \right)
 \end{aligned}$$

$$\begin{aligned}
 & \frac{1}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{2}}{2} \\
 & \text{conjugate} \\
 & \frac{1}{1+\sqrt{2}} \cdot \frac{1-\sqrt{2}}{1-\sqrt{2}}
 \end{aligned}$$

$$9. \quad \frac{5-3i}{4+3i}$$

Sep 30-1:38 PM

$$8. \quad \frac{i}{2+i} \cdot \frac{2-i}{2-i} = \frac{2i-i^2}{4-i^2} = \frac{2i+1}{5} = \underbrace{\frac{1}{5}}_{\text{Real}} + \underbrace{\frac{2}{5}i}_{\text{imaginary}}$$

$$9. \quad \frac{5-3i}{4+3i} \cdot \frac{4-3i}{4-3i} = \frac{20-15i-12i+9i^2}{16-9i^2}$$

$$= \frac{11-27i}{25} = \frac{11}{25} - \frac{27}{25}i$$

Sep 30-1:38 PM

$$10. \quad \frac{\sqrt{2}}{3-2i} \cdot \frac{3+2i}{3+2i} = \frac{3\sqrt{2}}{13} + \frac{2\sqrt{2}}{13}i$$

$$11. \quad \frac{4+i}{2-i\sqrt{3}} \cdot \frac{2+i\sqrt{3}}{2+i\sqrt{3}} = \frac{8+2i+4i\sqrt{3}-\sqrt{3}}{4+3}$$

$$= \frac{8-\sqrt{3}}{7} + \frac{2+\sqrt{3}}{7}i$$

Sep 14-8:42 AM

Homework: pp. 202 - 203:

4, 10

16 - 60 by 4's

Graded due Thursday!!

Oct 4-12:13 PM

Oct 10-9:02 PM