

Pick up a bell ringer and hw tracker

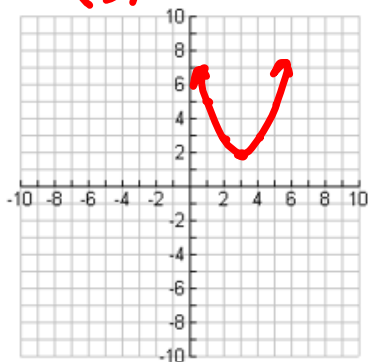
Monday 11/5

Graph the following functions and describe the transformations from the parent function.

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

Transformations:

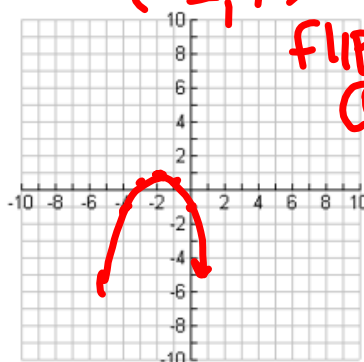
$(3, 2) \rightarrow 3 \uparrow 2$



2. $f(x) = -\frac{1}{2}(x+2)^2 + 1$

Transformations:

$(-2, 1) \leftarrow 2 \uparrow 1$
 flip down
 compression




$$\sqrt{16} = 4$$

$$\begin{aligned} \sqrt{40} &= \\ \sqrt{4 \cdot 10} & \\ = 2\sqrt{10} & \end{aligned}$$

$$\begin{aligned} \sqrt{40} &= 2\sqrt{10} \\ \swarrow & \quad \searrow \\ 2 & \quad 10 \end{aligned}$$

$$\sqrt{-16} =$$

$$\sqrt{-40} =$$

$$i^2 = -1$$
$$i = \sqrt{-1}$$


$$i \cdot i = i^2 = -1$$

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

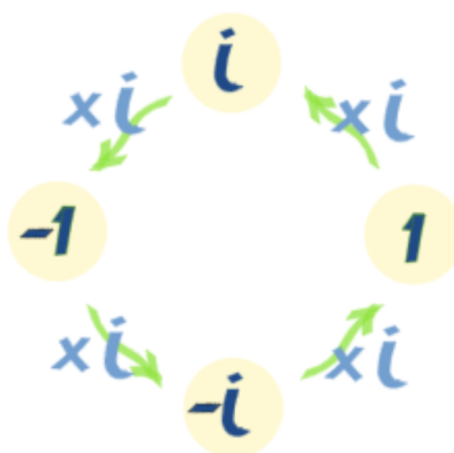
$$\sqrt{-40} =$$
$$\sqrt{4} \cdot \sqrt{10} \cdot \sqrt{-1}$$
$$2i\sqrt{10}$$

$$1 \times i = i$$

$$i \times i = i^2 = -1$$

$$-1 \times i = -i$$

$$-i \times i = -i^2 = -(-1) = 1$$



Examples of Imaginary Numbers

<u>i</u>	<u>12.38i</u>	<u>-i</u>	<u>3i/4</u>	<u>0.01i</u>	<u>-i/2</u>
----------	---------------	-----------	-------------	--------------	-------------

~

Complex numbers...

$$a + bi$$

The diagram shows the expression $a + bi$ with handwritten annotations. The letter a is underlined in blue, and a blue wavy arrow points from the text "Real Part" to it. The letter b is underlined in yellow, and a yellow wavy arrow points from the text "Imaginary Part" to it. The letter i is underlined in blue, and a blue wavy arrow points from the text " $\sqrt{-1}$ " to it.

Real #s

 2
 -10
 $\frac{3}{4}$
 $\cdot 168$
 π
 $\sqrt{2}$

Imaginary #s

 i
 $2i$
 $\frac{2i}{5}$
 $\cdot 37i$

Complex #s

 $2 + i$
 $-10 + 2i$
 $a + bi$
 $5 + 20i$
 $\infty + \infty i$
 $b - \underline{10}i$

Name: _____ Hr: _____

Complex Numbers

Express each number in terms of i , and simplify.

1. $\sqrt{-36} = 6i$
 $\sqrt{36} \cdot \sqrt{-1}$

2. $\sqrt{-100}$
 $i\sqrt{100}$
 $10i$

3. $-\sqrt{-81} = -9i$
 $\sqrt{81} \cdot \sqrt{-1}$

4. $2\sqrt{-49}$

5. $-2\sqrt{-3}$
 $-2i\sqrt{3}$

6. $3\sqrt{-11}$

7. $\sqrt{-\frac{1}{4}} = \frac{i}{2}$
 $\frac{\sqrt{1}}{\sqrt{4}} = \frac{1i}{2}$

8. $\sqrt{-\frac{16}{25}}$

9. $\sqrt{-20} = 2i\sqrt{5}$

10. $\sqrt{-28}$

11. $-\sqrt{-10}$

12. $2\sqrt{-75}$

13. $5\sqrt{-8}$

$\sqrt{28} = 2i\sqrt{7}$

Write each number in terms of i , perform the indicated operation, and write the answer in the form $a+bi$.

14. $\sqrt{-64} + \sqrt{-36}$
 $8i + 6i$
 $= 14i$

15. $3\sqrt{-4} + \sqrt{-121}$

16. $\sqrt{-100} - \sqrt{-9}$

Simplify the following complex numbers. Write your answer in the form $a+bi$.

17. $(2-7i)+(-5-2i)$
 $2-7i-5-2i$
 $-3-9i$

18. $(-4+5i)+(-3+i)$

19. $(-2+4i)(6-3i)$
 $-2+4i-6+3i$
 $-8+7i$

20. $(2-i)(-5+8i)$

21. $(-4-3i)(9-3i)$

22. $(-2-7i)(-5-9i)$

$2-i-5+8i$
 $-3+7i$

23. $(4i)(7i)$

$$28i^2$$

$$28(-1)$$

$$= -28$$

24. $(8i)(7+5i)$

$$56i + 40i^2$$

$$+ 40(-1)$$

$$56i - 40$$

$$-40 + 56i$$

25. $(-5i)(3-7i)$

26. $(-3i+1)(4+3i)$

$$-3i + 1 \quad 13-9i$$

4	$12i$	4
$+3i$	$-9i^2$	$+3i$

Factor!

30. x^2+25

$$(x+5i)(x-5i)$$

$$x^2 - 25i^2$$

$$= x^2 + 25$$

Solve.

34. $a^2 = -9$

$$\sqrt{a^2} = \sqrt{-9}$$

$$a = \pm i\sqrt{3}$$

27. $(-7+4i)(1-2i)$

$$-7 + 14i + 4i - 8i^2$$

$$-7 + 18i - 8(-1)$$

$$-7 + 18i + 8$$

$$1 + 18i$$

28. $(5-3i)^2$

29. $(4+3i)^2$

$$(4+3i)(4+3i)$$

31. $9x^2+4$

$$(3x+2i)(3x-2i)$$

32. $2x^2+32$

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

$$= 2(x+4i)(x-4i)$$

$$-16i^2$$

$$-16(-1)$$

33. $3x^2+108$

35. $\frac{x^2}{36} = -1$

36. $x^2+36=117$

$$\sqrt{x^2} = \sqrt{81}$$

$$x = \pm 9$$

37. $0 = 64 - 4k^2$

38. $9p^2 = 12p - 11$

$$9p^2 - 12p + 11 = 0$$

$$\frac{12 \pm \sqrt{(-12)^2 - 4(9)(11)}}{2(9)}$$

39. $3a^2 + 9 = 7a$

40. $z^2 = -2x^2$

41. $4k^2 + 3 = -4k$

$$\frac{12 \pm \sqrt{-252}}{18}$$

$$\frac{12 \pm 6i\sqrt{7}}{18}$$

$$\frac{2 \pm i\sqrt{7}}{3}$$

$$252 = 6i\sqrt{7}$$

$$(a^2 + 9)$$

$$(4x^2 + 25)$$

$$(9x^2 + 100)$$

$$(a + 3i)(a - 3i)$$

$$(2x + 5i)(2x - 5i)$$

$$(3x + 10i)(3x - 10i)$$

$$a^2 - \cancel{3i} + \cancel{3i} - \underbrace{9i^2}_{-9(-1)} = a^2 + 9$$

$$6i^2 = -6$$

$$\begin{array}{l} 6(-1) \\ -10i^2 = 10 \\ -10(-1) \end{array}$$

$$3i^2 = -3$$

$$-16i^2 = 16$$

Complex Numbers ws due Friday