

Mastery Checklist

Properties of Complex Numbers

In order to prove Mastery for this concept you must be able complete the following all by **yourself**. No help from Notes, Partners or Teacher. Use all other problems to practice and test yourself with the following:

- Complete all of the "Challenge Problems"
(In order to be able to complete these try problems below)
 - Try #22-33 on "Set D" worksheet
 - Try Level ** on "Adding and Subtracting Complex Numbers"
 - Try # 11-20 on " Multiplying Complex Numbers
 - Try Level *** on "Dividing Complex Numbers"
 - Try any on "Operations with Complex Numbers"
- Create a Mind Map on Properties of Complex Numbers.

Challenge Problems:

1.) $3i^{13}\sqrt{-5} \cdot 2\sqrt{180} - (3 + 2i^{26})$

2.) $\frac{(3+6i)-(2+i)}{(3+i)(2+3i)(1-5i)}$

3.) $\frac{-5i^5(3i^{28}-2i^{15})+3i^{36}(5i^8)}{4i(2-5i)}$

4.) $(5 + i\sqrt{6})(5 - i\sqrt{180}) + 20i\sqrt{6}$

$$\begin{aligned}
1.) \quad & 3i^{13}\sqrt{-5} \cdot 2\sqrt{180} - (3 + 2i^{26}) \\
& = 3(i^4)^3 \cdot i \cdot i\sqrt{5} \cdot 2\sqrt{36 \cdot 5} - (3 + 2(i^4)^6 \cdot i^2) \\
& = 3 \cdot 2 \cdot i^2 \cdot 6\sqrt{25} - (3 + 2(-1)) \\
& = 36(-1)(5) - 1 \\
& = -180 - 1 \\
& = -181
\end{aligned}$$

$$\begin{aligned}
2.) \quad & \frac{(3+6i)-(2+i)}{(3+i)(2+3i)(1-5i)} = \frac{3+6i-2-i}{(6+9i+2i+6i^2)(1-5i)} \\
& = \frac{1+5i}{(6+11i-6)(1-5i)} \\
& = \frac{1+5i}{11i(1-5i)} \\
& = \frac{1+5i}{11i-55i^2} \\
& = \frac{55+11i}{55+275i-55i^2-11i} \\
& = \frac{3025-121i^2}{55+264i+55} \\
& = \frac{3037}{110+264i} \\
& = \frac{3037}{3037}
\end{aligned}$$

$$\begin{aligned}
3.) \quad & \frac{-5i^5(3i^{28}-2i^{15})+3i^{36}(5i^8)}{4i(2-5i)} = \frac{-5i(3-2(-1))+3(1)5(1)}{8i-20i^2} \\
& = \frac{-5i(3+2)+15}{8i+20} \\
& = \frac{-5i(5)+15}{20+8i} \cdot \frac{20-8i}{20-8i} \\
& = \frac{(15-25i)(20-8i)}{400-64i^2} \\
& = \frac{300-500i-125i+205i^2}{464} \\
& = \frac{95-625i}{464}
\end{aligned}$$

$$\begin{aligned} 3.) (5 + i\sqrt{6})(5 - i\sqrt{150}) + 20i\sqrt{6} &= 25 - 5 \cdot 5i\sqrt{6} + 5i\sqrt{6} - i^2\sqrt{900} + 20i\sqrt{6} \\ &= 25 - 25i\sqrt{6} + 5i\sqrt{6} + 30 + 20i\sqrt{6} \\ &= 75 - 20i\sqrt{6} + 20i\sqrt{6} \\ &= 75 \end{aligned}$$

Set D

Simplify the expression.

22. i (What does i equal?)

23. i^2

24. i^3

25. i^4

26. i^5

27. i^6

28. i^7

29. i^8

30. i^{10}

31. i^{12}

32. i^{20}

33. i^{30}

- 22. _____
- 23. _____
- 24. _____
- 25. _____
- 26. _____
- 27. _____
- 28. _____
- 29. _____
- 30. _____
- 31. _____
- 32. _____
- 33. _____

Set E

Perform the indicated operation.

34. $(3 + 2i) + (9 + i)$

35. $(9 + 2i) + (3 - i)$

36. $(-4 + i) + (i - 4)$

37. $(1 + i) + (7 - 4i)$

38. $(5 - 3i) - (-1 + i)$

39. $(2 - i) - (5 + i)$

40. $(1 - 3i) - (9 + i)$

41. $(-4 + 6i) - (-3 + 12i)$



Get Initials or Loose ALL Credit

- 34. _____
- 35. _____
- 36. _____
- 37. _____
- 38. _____
- 39. _____
- 40. _____
- 41. _____

Set F

Perform the indicated operation.

42. $i(1 + i)$

43. $i(2 - i)$

44. $-i(5 + 2i)$

45. $3i(1 - 2i)$

46. $2i(6 + i)$

47. $-8i(6 + i)$

48. $(3 + i)(2 + i)$

49. $(2 + 7i)(4 + 2i)$

50. $(1 + 4i)(2 + i)$

51. $(9 - 10i)(-8 + 3i)$

52. $(-7 - i)(3 + 2i)$

53. $(-14 + 6i)(1 - i)$



Get Initials or Loose ALL Credit

- 42. _____
- 43. _____
- 44. _____
- 45. _____
- 46. _____
- 47. _____
- 48. _____
- 49. _____
- 50. _____
- 51. _____
- 52. _____
- 53. _____



Get Initials or Loose ALL Credit

Set D

Simplify the expression.

22. i (What does i equal?) 23. $i^2 = (-1)^2 = -1$ 24. $i^3 = i^2 \cdot i = -1 \cdot i = -i$
 25. $i^4 = (i^2)^2 = (-1)^2 = 1$ 26. $i^5 = i^4 \cdot i = 1 \cdot i = i$ 27. $i^6 = i^4 \cdot i^2 = 1 \cdot (-1) = -1$
 28. $i^7 = i^4 \cdot i^3 = 1 \cdot (-i) = -i$ 29. $i^8 = i^4 \cdot i^4 = 1 \cdot 1 = 1$ 30. $i^{10} = i^4 \cdot i^4 \cdot i^2 = 1 \cdot 1 \cdot (-1) = -1$
 31. $i^{12} = (i^4)^3 = (1)^3 = 1$ 32. $i^{20} = (i^4)^5 = (1)^5 = 1$ 33. $i^{30} = (i^4)^7 \cdot i^2 = (1)^7 \cdot (-1) = -1$

22. $\sqrt{-1}$
 23. -1
 24. $-\sqrt{-1}$
 25. 1
 26. $-\sqrt{-1}$
 27. -1
 28. $-\sqrt{-1}$
 29. 1
 30. -1
 31. 1
 32. 1
 33. -1

Set E

Perform the indicated operation.

34. $(3+2i) + (9+i) = 12+3i$ 35. $(9+2i) + (3-i) = 12+i$
 36. $(-4+i) + (i-4) = -8+2i$ 37. $(1+i) + (7-4i) = 8-3i$
 38. $(5-3i) + (-1+i) = 4-2i$ 39. $(2-i) + (5+i) = 7$
 40. $(1-3i) + (9+i) = 10-2i$ 41. $(-4+6i) + (3-12i) = -1-6i$

Get Initials or Loose ALL Credit

34. $12+3i$
 35. $12+i$
 36. $-8+2i$
 37. $8-3i$
 38. $6-4i$
 39. $-3-2i$
 40. $-8-4i$
 41. $-1-6i$

Set F

Perform the indicated operation.

42. $i(1+i) = i + i^2 = i - 1 = -1+i$ 43. $i(2-i) = 2i - i^2 = 2i + 1 = 1+2i$ 44. $-i(5+2i) = -5i - 2i^2 = -5i + 2 = 2-5i$
 45. $3i(1-2i) = 3i - 6i^2 = 3i + 6 = 6+3i$ 46. $2i(6+i) = 12i + 2i^2 = 12i - 2 = -2+12i$ 47. $-8i(6+i) = -48i - 8i^2 = -48i + 8 = 8-48i$
 48. $(3+i)(2+i) = 6 + 3i + 2i + i^2 = 5 + 5i$ 49. $(2+7i)(4+2i) = 8 + 4i + 28i + 14i^2 = -6 + 32i$ 50. $(1+4i)(2+i) = 2 + i + 8i + 4i^2 = -2 + 9i$
 51. $(9-10i)(-8+3i) = -72 + 27i + 80i - 30i^2 = -72 + 107i + 30 = -42 + 107i$ 52. $(-7-i)(3+2i) = -21 - 14i - 3i - 2i^2 = -21 - 17i + 2 = -19 - 17i$ 53. $(-14+6i)(1-i) = -14 + 14i + 6i - 6i^2 = -14 + 20i + 6 = -8 + 20i$

42. $-1+i$
 43. $1+2i$
 44. $2-5i$
 45. $6+3i$
 46. $-2+12i$
 47. $8-48i$
 48. $5+5i$
 49. $-6+32i$
 50. $-2+9i$
 51. $-42+107i$
 52. $-19-17i$
 53. $-8+20i$

Get Initials or Loose ALL Credit

Intermediate Algebra Skill

Adding and Subtracting Complex Numbers

Level * 1-9

Level ** 10-20

Simplify.

1) $(-i) + (6i)$

2) $(-6i) - (6i)$

3) $(-4i) - (5i)$

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

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

6) $(3i) + (4i)$

7) $(-6 - 2i) + (6 - 5i)$

8) $(-5 + 3i) - (4 - 5i)$

9) $(5 + 6i) + (2 - 7i)$

10) $(6 - 8i) - (4i) + 7$

11) $(3 - 4i) - (-5 + 7i)$

12) $(5 + 3i) - (-2 - 5i)$

13) $(5 - 6i) + (5i) + (7 + 6i)$

14) $(-7 + 7i) - (-7 - 3i) + (-7 - 8i)$

15) $(-4 - 7i) - (4 + 5i) - (2 - i)$

16) $(-1 + i) - (-7 + 4i) - 5$

17) $(-1 + 6i) + (5 - 2i) - (8i)$

18) $(1 + 6i) + (6 - 2i) - (-7 + 5i)$

19) $(-5 + 7i) - (-6 + i) - (-6 + 5i)$

20) $(-8 + 6i) + (6 - 6i) + (7 + 6i)$

Answers to Adding and Subtracting Complex Numbers

1) $5i$

5) $3i$

9) $7 - i$

13) $12 + 5i$

17) $4 - 4i$

2) $-12i$

6) $7i$

10) $13 - 12i$

14) $-7 + 2i$

18) $14 - i$

3) $-9i$

7) $-7i$

11) $8 - 11i$

15) $-10 - 11i$

19) $7 + i$

4) $3 + 2i$

8) $-9 + 8i$

12) $7 + 8i$

16) $1 - 3i$

20) $5 + 6i$

Multiplying Complex Numbers

Simplify.

1) $(-4i)^3$

2) $(i)(2i)(-7i)$

3) $(3i)(-2 + 6i)$

4) $(-2i)^3$

5) $(6i)(-4i)$

6) $(-8i)^2$

7) $(-3 + 5i)(-5 + 7i)$

8) $(5 - 3i)(-8 + 5i)$

9) $(5 + 5i)(-3 - 7i)$

10) $(-7 - 4i)(-6 - 6i)$

11) $(-5 + 4i)(-2 + 2i)$

12) $5(-i)(-4 + 6i)$

13) $(1 + 4i)(3 + 6i)$

14) $(i)(6i)(4 + 6i)$

15) $(7i)(6i)(-3 - 5i)$

16) $(-2 - 3i)(7 + 7i)$

17) $(1 + 3i)(-4 - 7i)(6 - 5i)$

18) $(7 + 3i)(-7 + 5i)(-8 - 4i)$

19) $(2 - 6i)(7 + 7i)(3 + 3i)$

20) $(-4i)(-8 - 8i)(1 - 8i)$

Answers to Multiplying Complex Numbers

1) $64i$

5) 24

9) $20 - 50i$

13) $-21 + 18i$

17) $7 - 199i$

2) $14i$

6) -64

10) $18 + 66i$

14) $-24 - 36i$

18) $568 + 144i$

3) $-18 - 6i$

7) $-20 - 46i$

11) $2 - 18i$

15) $126 + 210i$

19) $252 + 84i$

4) $8i$

8) $-25 + 49i$

12) $30 + 20i$

16) $7 - 35i$

20) $224 + 288i$

Intermediate Algebra Skill

Dividing Complex Numbers

Simplify.

1) $\frac{5}{-5i}$

3) $-\frac{2}{i}$

5) $\frac{4+i}{8i}$

7) $\frac{9+i}{-7i}$

9) $\frac{2i}{3-9i}$

11) $\frac{5i}{6+8i}$

13) $\frac{-1+5i}{-8-7i}$

15) $\frac{4+i}{2-5i}$

17) $\frac{-3-9i}{5-8i}$

19) $\frac{-3-2i}{-10-3i}$

2) $\frac{1}{-2i}$

4) $\frac{7}{4i}$

6) $\frac{-5-i}{-10i}$

8) $\frac{6-6i}{-4i}$

10) $\frac{i}{2-3i}$

12) $\frac{10}{10+5i}$

14) $\frac{-2-9i}{-2+7i}$

16) $\frac{5-6i}{-5+10i}$

18) $\frac{4+i}{8+9i}$

20) $\frac{3+9i}{-6-6i}$

Level * FB

Level ** 9-12

Level *** 13-20

Answers to Dividing Complex Numbers

1) i

5) $\frac{1}{8} - \frac{i}{2}$

9) $-\frac{1}{5} + \frac{i}{15}$

13) $-\frac{27}{113} - \frac{47i}{113}$

17) $\frac{57}{89} - \frac{69i}{89}$

2) $\frac{i}{2}$

6) $\frac{1}{10} - \frac{i}{2}$

10) $-\frac{3}{13} + \frac{2i}{13}$

14) $-\frac{59}{53} + \frac{32i}{53}$

18) $\frac{41}{145} - \frac{28i}{145}$

3) $2i$

7) $-\frac{1}{7} + \frac{9i}{7}$

11) $\frac{2}{5} + \frac{3i}{10}$

15) $\frac{3}{29} + \frac{22i}{29}$

19) $\frac{36 + 11i}{109}$

4) $-\frac{7i}{4}$

8) $\frac{3}{2} + \frac{3i}{2}$

12) $\frac{4}{5} - \frac{2i}{5}$

16) $-\frac{17}{25} - \frac{4i}{25}$

20) $\frac{-2 - i}{2}$

correct
#2 answer!

Challenge Problems:

1.) $3i^{13}\sqrt{-5} \cdot 2\sqrt{180} - (3 + 2i^{26})$

2.) $\frac{(3+6i)-(2+i)}{(3+i)(2+3i)(1-5i)}$

3.) $\frac{-5i^5(3i^{28}-2i^{15})+3i^{36}(5i^8)}{4i(2-5i)}$

4.) $(5 + i\sqrt{6})(5 - i\sqrt{180}) + 20i\sqrt{6}$

$$\begin{aligned}
 1.) \quad & 3i^{13}\sqrt{-5} \cdot 2\sqrt{180} - (3 + 2i^{26}) \\
 & = 3(i^4)^3 \cdot i \cdot i\sqrt{5} \cdot 2\sqrt{36 \cdot 5} - (3 + 2(i^4)^6 \cdot i^2) \\
 & = 3 \cdot 2 \cdot i^2 \cdot 6\sqrt{25} - (3 + 2(-1)) \\
 & = 36(-1)(5) - 1 \\
 & = -180 - 1 \\
 & = -181
 \end{aligned}$$

$$\begin{aligned}
 2.) \quad & \frac{(3+6i)-(2+i)}{(3+i)(2+3i)(1-5i)} = \frac{3+6i-2-i}{(6+9i+2i+6i^2)(1-5i)} \\
 & = \frac{1+5i}{(6+11i-6)(1-5i)} = \frac{1+5i}{(3+11i)(1-5i)} \\
 & = \frac{1+5i}{11i(1-5i)} \\
 & = \frac{1+5i}{11i-55i^2} \\
 & = \frac{1+5i}{11i-55i^2} \cdot \frac{55-11i}{55-11i} \\
 & = \frac{55+11i}{55+275i-55i^2-11i} \\
 & = \frac{3025-121i^2}{55+264i+55} \\
 & = \frac{3037}{110+264i} \\
 & = \frac{3037}{3037}
 \end{aligned}$$

$$\begin{aligned}
 & = \frac{1+5i}{(6+11i-6)(1-5i)} \\
 & = \frac{1+5i}{(3+11i)(1-5i)} \\
 & = \frac{1+5i}{(58-4i)(1-5i)} \\
 & = \frac{1+5i}{58-4i} \cdot \frac{58+4i}{58+4i} \\
 & = \frac{290i+58+4i+20i^2}{3364-232i-232i+16i^2} \\
 & = \frac{294i+38}{3348}
 \end{aligned}$$

$$\begin{aligned}
 3.) \quad & \frac{-5i^5(3i^{28}-2i^{15})+3i^{36}(5i^8)}{4i(2-5i)} = \frac{-5i(3-2(-1))+3(1)5(1)}{8i-20i^2} \\
 & = \frac{-5i(3+2)+15}{8i+20} \\
 & = \frac{-5i(5)+15}{20+8i} \cdot \frac{20-8i}{20-8i} \\
 & = \frac{(15-25i)(20-8i)}{400-64i^2} \\
 & = \frac{300-500i-125i+205i^2}{464} \\
 & = \frac{95-625i}{464}
 \end{aligned}$$

Operations with Complex Numbers

Simplify.

1) $i + 6i$

2) $3 + 4 + 6i$

3) $3i + i$

4) $-8i - 7i$

5) $-1 - 8i - 4 - i$

6) $7 + i + 4 + 4$

7) $-3 + 6i - (-5 - 3i) - 8i$

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

9) $4i(-2 - 8i)$

10) $5i \cdot -i$

11) $5i \cdot i \cdot -2i$

12) $-4i \cdot 5i$

13) $(-2 - i)(4 + i)$

14) $(7 - 6i)(-8 + 3i)$

15) $7i \cdot 3i(-8 - 6i)$

16) $(4 - 5i)(4 + i)$

Operations with Complex Numbers

Simplify.

1) $i + 6i$

$7i$

2) $3 + 4 + 6i$

$7 + 6i$

3) $3i + i$

$4i$

4) $-8i - 7i$

$-15i$

5) $-1 - 8i - 4 - i$

$-5 - 9i$

6) $7 + i + 4 + 4$

$15 + i$

7) $-3 + 6i - (-5 - 3i) - 8i$

$2 + i$

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

$4 + i$

9) $4i(-2 - 8i)$

$32 - 8i$

10) $5i \cdot -i$

5

11) $5i \cdot i \cdot -2i$

$10i$

12) $-4i \cdot 5i$

20

13) $(-2 - i)(4 + i)$

$-7 - 6i$

14) $(7 - 6i)(-8 + 3i)$

$-38 + 69i$

15) $7i \cdot 3i(-8 - 6i)$

$168 + 126i$

16) $(4 - 5i)(4 + i)$

$21 - 16i$

17) $(2 - 4i)(-6 + 4i)$

18) $(-3 + 2i)(-6 - 8i)$

19) $(8 - 6i)(-4 - 4i)$

20) $(1 - 7i)^2$

21) $6(-7 + 6i)(-4 + 2i)$

22) $(-2 - 2i)(-4 - 3i)(7 + 8i)$

23) $5i + 7i \cdot i$

24) $(6i)^3$

25) $6i \cdot -4i + 8$

26) $-6(4 - 6i)$

27) $(8 - 3i)^2$

28) $3 + 7i - 3i - 4$

29) $-3i \cdot 6i - 3(-7 + 6i)$

30) $-6i(8 - 6i)(-8 - 8i)$

Critical thinking questions:

31) How are the following problems different?

Simplify: $(2 + x)(3 - 2x)$

Simplify: $(2 + i)(3 - 2i)$

32) How are the following problems different?

Simplify: $2 + x - (3 - 2x)$

Simplify: $2 + i - (3 - 2i)$

$$17) (2 - 4i)(-6 + 4i)$$
$$4 + 32i$$

$$18) (-3 + 2i)(-6 - 8i)$$
$$34 + 12i$$

$$19) (8 - 6i)(-4 - 4i)$$
$$-56 - 8i$$

$$20) (1 - 7i)^2$$
$$-48 - 14i$$

$$21) 6(-7 + 6i)(-4 + 2i)$$
$$96 - 228i$$

$$22) (-2 - 2i)(-4 - 3i)(7 + 8i)$$
$$-98 + 114i$$

$$23) 5i + 7i \cdot i$$
$$-7 + 5i$$

$$24) (6i)^3$$
$$-216i$$

$$25) 6i \cdot -4i + 8$$
$$32$$

$$26) -6(4 - 6i)$$
$$-24 + 36i$$

$$27) (8 - 3i)^2$$
$$55 - 48i$$

$$28) 3 + 7i - 3i - 4$$
$$-1 + 4i$$

$$29) -3i \cdot 6i - 3(-7 + 6i)$$
$$39 - 18i$$

$$30) -6i(8 - 6i)(-8 - 8i)$$
$$-96 + 672i$$

Critical thinking questions:

31) How are the following problems different?

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

$i^2 = -1$ so it leads to a few more steps

32) How are the following problems different?

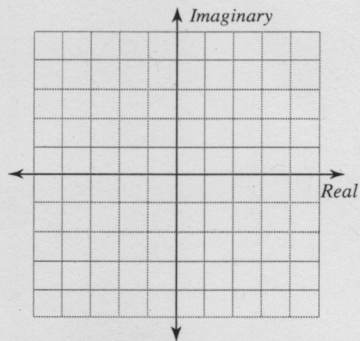
Simplify: $2 + x - (3 - 2x)$
Simplify: $2 + i - (3 - 2i)$

There is no difference.

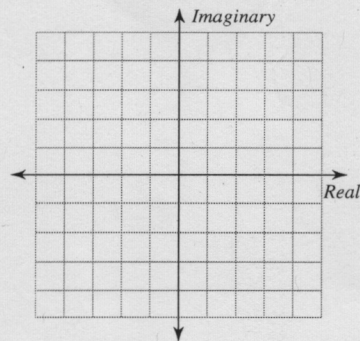
Graphing a Complex Number

Graph each number in the complex plane.

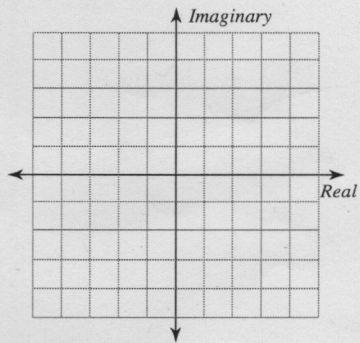
1) $-3 + 2i$



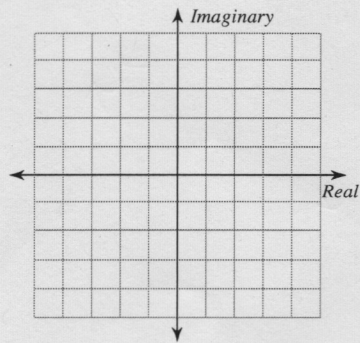
2) $3i$



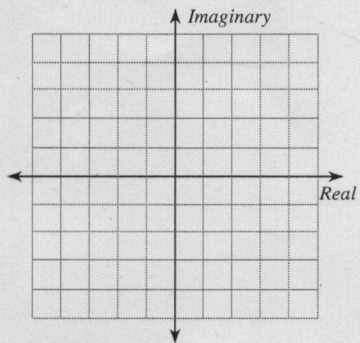
3) $5 - i$



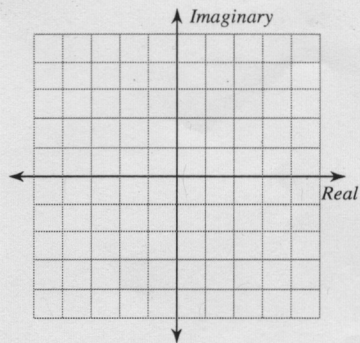
4) $3 + 5i$



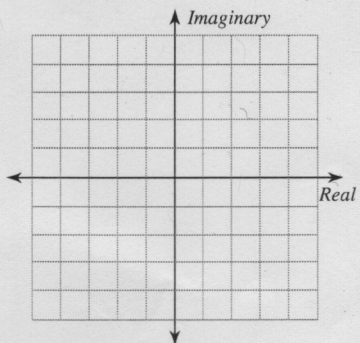
5) $-1 - 3i$



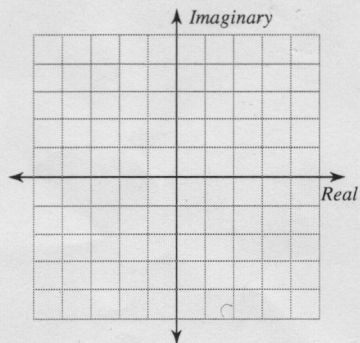
6) $2 - i$



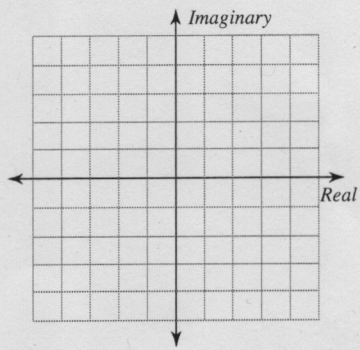
7) $-4 - 4i$



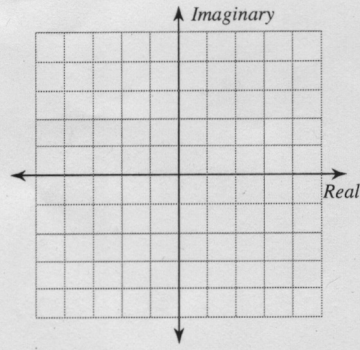
8) $5 + i$



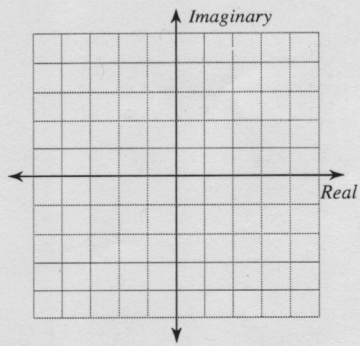
9) $1 + 4i$



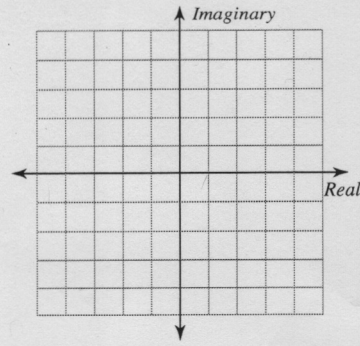
10) $-2 + 3i$



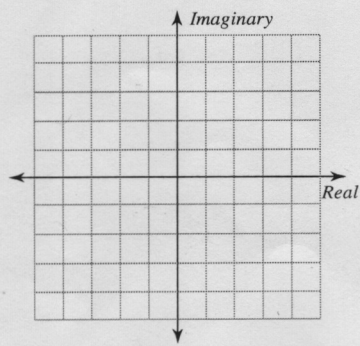
11) $-4 - 3i$



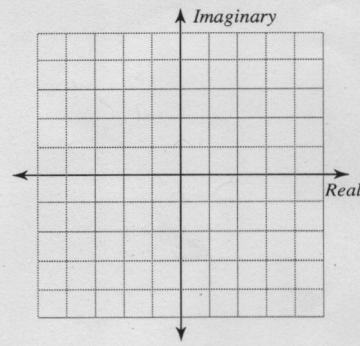
12) $4 - 5i$



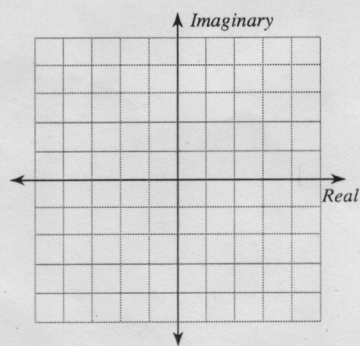
13) $-2i$



14) $3 + i$

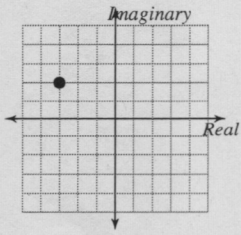


15) $-5 + 2i$

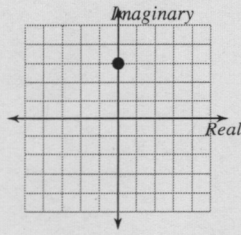


Answers to Graphing a Complex Number

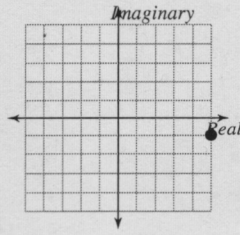
1)



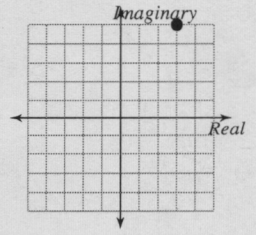
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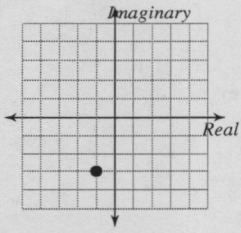
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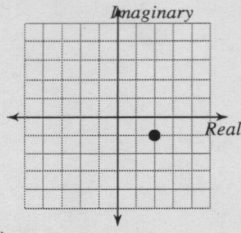
4)



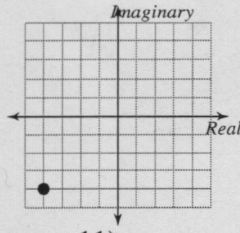
5)



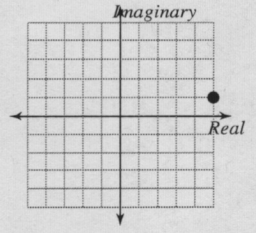
6)



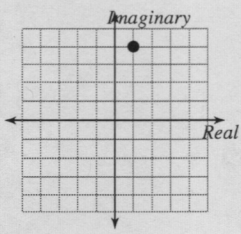
7)



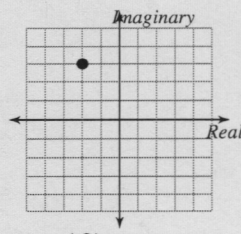
8)



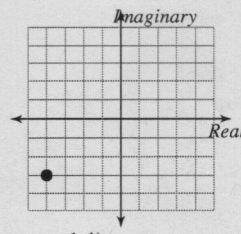
9)



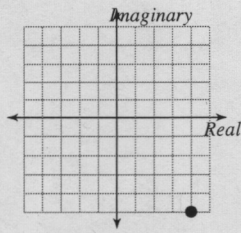
10)



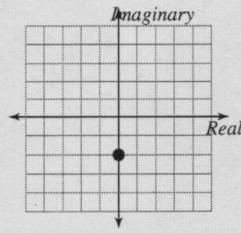
11)



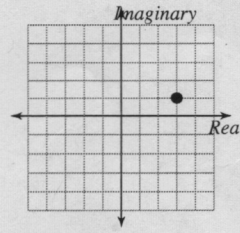
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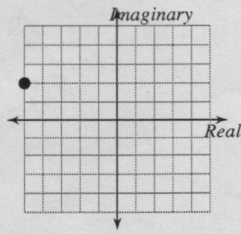
13)



14)



15)



Mind Map

Properties of Complex Numbers

Task 1:

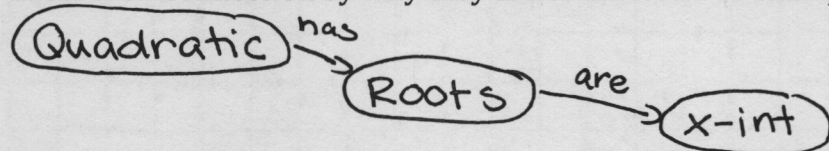
Review your notes/Quick Check/Unit 4 Test and write down all key ideas/concepts/vocabulary/examples for LT: 4A

Task 2:

Group and Connect all your concepts together

Task 3:

Label each Connection by why they are connected. For example:



Task 4:

Add in examples and visuals where they fit.

Task 5:

Review Checklist below and make sure that your Mind Map contains everything you need.

- Contains all of these Concepts/Vocabulary

Complex Numbers

Subtracting

Adding

Real Numbers

Multiplying

Dividing

Imaginary Numbers

Roots

Operations

Complex Conjugate

Discriminant

Distribute

Complex Conjugate Theorem

- All Connections are labeled
- Contains Example Problems
- Contains Visuals
- Review Mind Map on the Backside and see if you need to adjust or add anything.

Complex Numbers

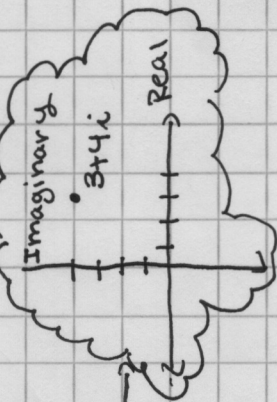
Operations

Adding \rightarrow combine like terms

Ex: $3+2i+6+4i=9+6i$

Subtracting \rightarrow remember to distribute negative then combine like terms

Ex: $3i-(6+2i)$
 $3i-6-2i=-3-i$



Divide \rightarrow remember to multiply top and bottom by the conjugate of the denominator

Ex: $\frac{6+2i}{1+i} \cdot \frac{1-i}{1-i}$

$\frac{6+2i-6i-2i^2}{1-i^2} = \frac{6-4i-2i^2}{1-(-1)}$

$\frac{6-4i-2(-1)}{1+1} = \frac{6-4i+2}{2} = \frac{8-4i}{2} = 4-2i$

Multiply \rightarrow Double Distribute

Ex: $(3+2i)(6+4i)$

$18+12i+12i+8i^2$

$18+24i-8$

$10+24i$

Properties of

How to Graph

$i^2 = -1$

$i^3 = -i$

$i^4 = 1$

Remember \rightarrow you simplify

Roots

Types of

- Real #** \rightarrow made of Irrational
- Imaginary** \rightarrow $i^2 = -1$
- Rational**
- Irrational**

Property

- Complex Conjugate Theorem** \rightarrow If $3-2i$ is a Root of $f(x)$ then $3+2i$ is a Root as well
- discriminant** $b^2-4ac < 0$

can work for

Break down exponent to mult. of 4

$i^5 = (i^4)^1 \cdot i^1 = 1 \cdot i = i$

$i^6 = (i^4)^1 \cdot i^2 = 1 \cdot (-1) = -1$

$i^7 = (i^4)^1 \cdot i^3 = 1 \cdot (-i) = -i$

$i^8 = (i^4)^2 = 1 \cdot 1 = 1$

What is missing?
How can you make it better?