11/21 Warm-Up : Simplify the expressions

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

$5-8i$

$7-2i-2-6i$

$5-8i$

4. $6i-(14-i)+(5-3i)$

$6i-14+i+5-3i$

$4i-9$

$\boxed{-9+4i}$

$a+bi$

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$p(t)=-t^4+72t^2+225$

$0=-(t^4-72t^2-225)$

-225, $1 \cdot -225$, $3 \cdot -75$

$0=-(t^4+3t^2-75t^2-225)$

$0=-[t^2(t^2+3)-75(t^2+3)]$

$0=-(t^2-75)(t^2+3)$

⑥ $81x^4=3x$

$81x^4-3x=0$

$3x(27x^3-1)=0$

a^3-b^3

Diff of cubes

$(a^3-b^3)=(a-b)(a^2+ab+b^2)$

$a=3x$ $b=1$

$3x(3x-1)(9x^2+3x+1)=0$

$x=0$ $x=\frac{1}{3}$ Quadratic formula

Nov 22-10:42 AM

⑧ $x^4-16x^2=x^2+18$

$-x^2$ $-x^2$

$x^4-17x^2-18=0$

18: $1 \cdot 18$, $2 \cdot 9$, $3 \cdot 6$

$x^4+1x^2-18x^2-18=0$

$x^2(x^2+1)-18(x^2+1)=0$

$(x^2-18)(x^2+1)=0$

$x^2-18=0$ $x^2+1=0$

$\sqrt{x^2}=\sqrt{18}$ $9 \cdot 2$ $\sqrt{x^2}=\sqrt{-1}$

$x=\pm 3\sqrt{2}$ $x=\pm i$

⑨ $4x^4+35x^2-9=0$

a·c 36: $1 \cdot 36$, $2 \cdot 18$, $3 \cdot 12$, $4 \cdot 9$, $6 \cdot 6$

$4x^4-x^2+36x^2-9=0$

$x^2(4x^2-1)+9(4x^2-1)=0$

$(x^2+9)(4x^2-1)=0$

$(x^2+9)(2x-1)(2x+1)=0$

$x=\pm 3i$ $x=\frac{1}{2}$ $x=-\frac{1}{2}$

$4x^2-1=0$

$\frac{4x^2}{4}=\frac{1}{4}$

$\sqrt{x^2}=\sqrt{\frac{1}{4}}=\pm\frac{1}{2}$

Nov 21-10:40 AM

⑦ $2x^3-16x^2-40x=0$

$2x(x^2-8x-20)=0$

$2x(x-10)(x+2)=0$

$2x=0$ $x-10=0$ $x+2=0$

$\boxed{x=0}$ $\boxed{x=10}$ $\boxed{x=-2}$

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Multiplying Complex Numbers

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

$i^2 = -1$
$i^3 = -i$
$i^4 = 1$

$i^5 = i$
$i^6 = -1$
$i^7 = -i$
$i^8 = 1$

$i^{24} = 1$
$i^{25} = i$

$i^{40} = 1$

$i^{63} = -i$
$i^{64} = 1$

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Simplify the expressions. Final answers must be in a + bi form.

8. $(2-4i)(-5-3i)$

$-10-6i+20i+12i^2$
$12(-1)$
$-10+14i-12$
$\boxed{-22+14i}$

$(a+b)^2$
$\cancel{a^2+b^2}$

9. $(6-2i)^2$

$32-24i$

$(6-2i)(6-2i)$
$36-12i-12i+4i^2$
$36-24i+4(-1)$
$36-24i-4$

10. $(1+7i)(9+3i)-(4+2i)$

$-16+64i$

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Simplify the expressions. Final answers must be in a + bi form.

8. $(2-4i)(-5-3i)$

9. $(6-2i)^2$

10. $(1+7i)(9+3i)-(4+2i)$

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Complex Conjugates

Two complex numbers in the form of a + bi and a - bi are called complex conjugates. The product of two conjugates is always a real number.

11. $(8+i)(8-i)$

$64-\cancel{8i}+\cancel{8i}-i^2$
$64-(-1)$
65

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

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Complex Conjugates

Two complex numbers in the form of a + bi and a - bi are called complex conjugates. The product of two conjugates is always a real number.

11. $(8+i)(8-i)$

$64 + \cancel{8i} - \cancel{8i} - i^2$ $-(-1)$ $+1$

65

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

$25 + 20i - 20i - 16i^2$ $-16(-1)$ $+16$

41

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Dividing Complex Numbers

***Watch out!** "i" can not be in the denominator of a complex number.

- **If the denominator is a monomial:** Multiply top and bottom by "i"
- **If the denominator is a binomial:** Multiply top and bottom by the conjugate.

15. $\frac{28-8i}{4i}\cdot\frac{i}{i} = \frac{28i+8}{-4} = \frac{8+28i}{-4}$

$4i^2 \to -4$

$\frac{8}{-4} + \frac{28i}{-4}$

$\boxed{-2-7i}$

16. $\frac{-8-2i}{6i}$

19. $\frac{7+3i}{2+i}\cdot\frac{(2-i)}{(2-i)} = \frac{14-7i+6i-3i^2}{4-2i+2i-i^2}$ (-1) $-(-1)$

$\frac{14-i+3}{5} = \frac{17-i}{5}$

20. $\frac{1+8i}{2-4i}\cdot\frac{(2+4i)}{(2+4i)}$

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Dividing Complex Numbers

***Watch out!** "i" can not be in the denominator of a complex number.

- **If the denominator is a monomial:** Multiply top and bottom by "i"
- **If the denominator is a binomial:** Multiply top and bottom by the conjugate.

15. $\frac{(28-8i)}{4i}\cdot\frac{i}{i} = \frac{28i - 8i^2}{4i^2}$ $+8$ $4(-1)$

$\frac{8+28i}{-4}$

$\frac{8}{-4} + \frac{28}{-4}i$

$\boxed{-2-7i}$

16. $\frac{(-8-2i)}{(6i)}\cdot\frac{(i)}{(i)} = \frac{-8i-2i^2}{6i^2}$ $-2(-1)$ $6(-1)$

$\frac{2-8i}{-6}$

$\frac{2}{-6} - \frac{8i}{-6}$

$\boxed{-\frac{1}{3} + \frac{4}{3}i}$

19. $\frac{7+3i}{2+i}$

multiply complex conjugate of denominator

$\frac{(7+3i)}{(2+i)}\cdot\frac{(2-i)}{(2-i)}$

$\frac{14-7i+6i-3i^2}{4-2i+2i-\cancel{i^2}}$ $+3$ $+1$

$\frac{17-i}{5}$

$\frac{17}{5} - \frac{1}{5}i$

20. $\frac{1+8i}{2-4i}$

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

$\frac{2+4i+16i+\cancel{32i^2}}{4+8i-8i-\cancel{16i^2}}$ -32 $+16$

$\frac{-30+20i}{20}$

$-\frac{30}{20} + \frac{20}{20}i$

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

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

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

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Complex Numbers Scavenger Hunt
Attempt #2

This time for a grade :) :) :)

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