Warm Up

Simplify.

5) $(4i)(-3i)(-1+3i)$

$-12i^2(-1+3i)$

$12(-1+3i)$

$\boxed{-12+36i}$

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

$\boxed{49i^2} - 9 + 18i$

$-49 - 9 + 18i$

$\boxed{-58+18i}$

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Division

(25) $\frac{-1}{5i} \cdot \frac{i}{i} = \frac{-i}{5i^2} = \frac{-i}{-5} = \boxed{\frac{1}{5}}$

(23) $\frac{7-6i}{i} \cdot \frac{i}{i} = \frac{7i-6i^2}{i^2}$

$\frac{6+7i}{-1} = \boxed{-6-7i}$

$\frac{6}{-1} + \frac{7i}{-1}$

$\frac{(2+3i)}{2i} \cdot \frac{i}{i} = \frac{2i+3i^2}{2i^2}$

$= \frac{2i+3(-1)}{2(-1)} = \frac{2i-3}{-2} =$

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

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

2 terms in denom.

★ mult. by conj.

$(a+bi)(a-bi)$

$a^2 - b^2 i^2$

$\boxed{a^2+b^2}$

$\frac{5(-6-10i)}{136}$

$\frac{-30-50i}{136}$

$\boxed{\frac{-15-25i}{68}}$

★ $(-6+10i)(-6-10i)$

$36+60i-60i-100i^2$

$36+100$

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

$\frac{3+6i}{1^2+(-2)^2} = \frac{3+6i}{1+4} = \frac{3+6i}{5}$

OR → $\boxed{\frac{3}{5} + \frac{6i}{5}}$

(19) $\frac{7-4i}{-9-6i} \frac{(-9+6i)}{(-9+6i)} = \frac{-39+78i}{117}$

Scratch work

$D(-9-6i)(-9+6i) = (-9)^2 + (6)^2 = 81+36 = 117$

$N(7-4i)(-9+6i) = -63 + 42i + 36i - 24i^2$

$= -63 + 78i + 24$

$= -39 + 78i$

$$\frac{1+3i}{2-5i}\frac{(2+5i)}{(2+5i)} = \frac{-13+11i}{29}$$

$$= \frac{-13}{29} + \frac{11i}{29}$$

Scratch Work

$(1+3i)(2+5i)$

$2+5i+6i+15i^2$

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

$$= \frac{2i}{2} = \boxed{i}$$

Simplifying Complex Numbers.

$i = i$

$i^2 = -1$

$i^3 = -i$

$i^4 = 1$

$\rightarrow 5\boxed{i^4} + 3\boxed{i^{17}} - 2\boxed{i^{112}}$

- Divide exp. by 4
- Replace exp. w/ $\boxed{R}$
- Eval + Simp.

$5\boxed{i^0} + 3\boxed{i^1} - 2\boxed{i^0}$

$5\cdot 1 + 3i - 2\cdot 1$

$\boxed{3+3i}$

$4\overline{)4}$ 1 R0, $\frac{4}{0}$

$4\overline{)17}$ 4 R1, $\frac{16}{1}$

$4\overline{)112}$ 28 R0, $\frac{8}{32}$

Ex $-i^{41} + 7i^{13} - 3i^{1024}$

$\boxed{-i^1 + 7i^1} - 3i^0$

$\boxed{-3+6i}$

Multiply (Using the same properties as polys)

Ex $(5+3i)(2i)(7-i)$

$10i + 6i^2$

$10i - 6$

$(-6+10i)(7-i)$ FOIL

$-42 + 6i + 70i - 10i^2$

$\boxed{-32+76i}$

Be Careful!

$(2+3i)+(1-2i) \neq (2+3i)(1-2i)$

Combine w/ addition multiply

Dividing Complex Numbers

1. No i's are allowed in denom.
2. To simplify:

A. $\frac{\sim}{1\text{ term}} \cdot i$ mult by i if you only have 1 term in the denom.

$\frac{7+2i}{5i} \cdot i$

B. $\frac{\sim}{2\text{ terms}} \cdot \text{conj}$ Multiply by the conjugate:

* $(a+bi)$ & $(a-bi)$ are conj.
* $(a+bi)(a-bi) = a^2+b^2$

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

3. Simplify & write in standard form $(a+bi)$

* The part with i is second.

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

12) $(7-8i)^2$

13) $\dfrac{1-5i}{12-12i}$

14) $\dfrac{5-4i}{-10+12i}$

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Solving complex number equations.

1) Write the equation so that both sides are in standard form.

2) Set the set a1 = a2 and b1 = b2.

3) Solve for x and y.

Solving Equations

Two complex numbers are equal if their real parts are equal and the imaginary parts are equal.

Example: $2x-4yi=8+12i$

$2x-4yi=8+12i$

$2x=8$ *and* $-4yi=12i$

so $x=4$ *and* $y=-3$

Ex 1:

Ex 2:

Jan 10-12:14 PM

Factoring

Jan 22-8:10 AM

FACTOR (GCF)

1. $3x^2 + 27x$
2. $10xy - 25x$
3. $16a^2b^3 + 12ab^2$

Jan 22-8:10 AM

FACTOR (TRINOMIAL)

1. $x^2 + 7x + 12$
2. $x^2 + 8x - 9$
3. $x^2 - 3x - 18$
4. $x^2 - 10x + 21$

Jan 22-8:10 AM

Scratch Work

$5(b^2-4b-60)$

$5(b+6)(b-10)$

1	60
2	30
3	20
4	15
5	12
6	10

$5b^2 - 20b - 300$

Current Problem

$x^2 - 9x + 20$

Old Problem

Factor by grouping:

1. $10x^3 - 35x^2 - 6x + 21$
2. $9x^3 + 9x^2 - 7x - 7$
3. $x^3 + 5x^2 - 8x - 40$

Jan 22-8:11 AM

Factor difference of perfect squares:

1. x^2-100
2. $64x^2 - 169$
3. $121 - 81x^2$

Jan 22-8:11 AM

FACTORING SUM & DIFFERENCE OF CUBES

SOP SMS

Same-Opposite-Positive Square-Multiply-Square

$x^3 + 8$

Jan 22-8:11 AM

Factor Sum & Difference of Cubes

1. $(x^3 + 27)$
2. $(x^3 - 64)$
3. $(8x^3 + 27)$
4. $(125 - x^3)$

Jan 22-8:11 AM

GCF

1) $15a^2b - 10ab^2$

3) $8a^4b^4 - 28a^3b^3 + 4a^2b^2$

Jan 8-8:58 AM

$x^2 + bx + c$

5) $x^2 - 3x - 10$ 6) $y^2 + 20y + 96$ 7) $x^2 + 2x + 1$ 8) $n^2 + 6n + 9$

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$ax^2 + bx + c$

9) $4a^2 + a - 3$ 11) $6x^2 + 19x + 3$ 13) $5x^2 - 9x - 2$

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Difference of squares

15) $c^2 - 49$ 17) $144 - 25n^2$ 19) $36x^2 - 121y^2$

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Sum & differences of cubes

20) $x^3 + 8$ 22) $64x^3 + 125$

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Grouping

24) $21 - 7t + 3r - rt$ 28) $x^2 - xd + 7x - 7d$

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Multi – step (hint: take out GCF first)

32) $2y^2 - 242$

33) $b^4 - 81$

34) $r^3 + 3r^2 - 54r$

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