Number Sense, Quadratics, Matrices Review Day 2

Name_____

Warm Up:

1. What is the complex conjugate of -2 – 3i?

2. What is the product of (4 + 3i) and (-7 – 3i)?

3. One of the roots or the quadratic equation $x^2 – 4x + 5 = 0$ is 2 + i. What is the other root?

Guided Notes:

Manipulate Complex Numbers

Complex numbers are any numbers of the form _____ , where __ and _____ are real numbers and ___ is an _ _____ number whose square equals___.

Conjugates are the _____ real number and the _____ operation of the _____ unit.

Example: What is the complex conjugate of 8 -3i?

You should now be able to do #1 from the warm up.

Complex Conjugates of expressions with complex number in denominator:

Cannot have complex numbers in the _____, so you _____ the problem by the

_____ _____ of the _____.

Example: $\frac{4}{3 – 5i}$

Adding and Subtracting Complex Numbers

When adding and subtracting complex numbers, _____ like terms like you are adding

_____ _____ _____ .

Example: (8i) + (7 + 3i) – (6i)

Multiplying Complex Numbers

When multiplying Complex numbers, multiply the numbers using _____,

_____. Simplify by _____.

Remember: _____ and _____.

You should be able to do Warm Up # 2 now.

Complex Roots

Complex roots – when you have a quadratic equation that _____ the

_____.

When you are solving a quadratic equation by the quadratic formula and get a _____ under the _____ _____.

Example: What are the roots to the equation $x^2 + 2x + 12$?

Using Matrices to Organize Data and Solve Problems

Adding and Subtracting Matrices – can only add or subtract matrices of the _____ _____ dimensions.

Add/Subtract _____ elements from the matrices being added/subtracted.

Example: $\begin{bmatrix} -3 & 8 \\ 1 & 6 \end{bmatrix} - \begin{bmatrix} 2 & 11 \\ 4 & -7 \end{bmatrix} =$

Multiplying Matrices – use your _____to do matrix multiplication.

Can only multiply matrices where the _____ of the first matrix are the same as the _____ of the second matrix.

Example: $\begin{bmatrix} 3 & 2 \\ 6 & 5 \\ 1 & -9 \end{bmatrix} \cdot \begin{bmatrix} -5 & 2 \\ 4 & 11 \end{bmatrix} =$

Determinant of a matrix

The formula for calculating the determinant of a 2 x 2 matrix is:

The determinant of a 3 x 3 can be calculated by hand, but the preferred method is to use_____ on a graphing calculator.

Example: Using a calculator with matrix operations, find the determinant of:

$$\begin{bmatrix} -5 & 5 & -2 \\ 5 & -2 & 4 \\ -3 & 5 & -1 \end{bmatrix}$$

Inverses of Matrices

Use a graphing calculator to find the inverse of a matrix.

Example: Using a calculator, what is the inverse of: $\begin{bmatrix} -5 & 5 & -2 \\ 5 & -2 & 4 \\ -3 & 5 & -1 \end{bmatrix}$

Using Inverses to Solve Problems

Three friends went shopping at their favorite store. All the pants, shirts and sweaters were on sale, and articles of each type cost the same. The table shows the friends' purchases. Using the information in the tables, determine the cost of each sweater.

	# of Pants	**# of Shirts**	**# of Sweaters**	**Total**
Alicia	5	5	2	$377
Bette	5	6	0	$322
Cara	3	7	3	$408

Practice Problems:

Simplify:

1. $-\frac{7}{4i}$

2. $\frac{-4-i}{3i}$

3. $5\mathrm{i} + 4 - (2 - 3\mathrm{i})$

4. $(-2 + 5\mathrm{i})^2$

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

6. $(2 + 6\mathrm{i}) - (6 + 2\mathrm{i})$

7. If one root of a quadratic is 4 + 6i, state the other root.

8. Sketch a graph of a quadratic with complex roots.

Simplify the following matrix expressions:

9. $[0 \quad -3 \quad 0] + [-3 \quad -1 \quad 2]$

10. $\begin{bmatrix} 0 & 3 & 2 \\ 0 & -2 & -5 \end{bmatrix} - \begin{bmatrix} -1 & -6 & -4 \\ 4 & 1 & -4 \end{bmatrix}$

11. $[-4 \quad 5 \quad -2] - \begin{bmatrix} -1 & -3 \\ -3 & 5 \\ -4 & -6 \end{bmatrix}$

12. $3\begin{bmatrix} -3 & 3 \\ -5 & 3 \\ -3 & 0 \end{bmatrix}$

13. $-5\left(\begin{bmatrix} 3 \\ 6 \\ 0 \end{bmatrix} - \begin{bmatrix} 0 \\ -5 \\ 0 \end{bmatrix}\right)$

14. $\begin{bmatrix} -3 & 0 \\ -1 & 2 \\ -2 & 4 \end{bmatrix} * \begin{bmatrix} 4 & 6 \\ -2 & 4 \end{bmatrix}$

15. $\begin{bmatrix} -3 & -4 \\ 6 & -1 \end{bmatrix} * \begin{bmatrix} -5 & 1 \\ 3 & -5 \\ 6 & 4 \end{bmatrix}$

Find the inverse if it exists:

16. $\begin{bmatrix} -2 & 6 \\ -3 & 2 \end{bmatrix}$

17. $\begin{bmatrix} -2 & 2 & 3 \\ -3 & -3 & -6 \\ -2 & 3 & -1 \end{bmatrix}$

18. $\begin{bmatrix} 4 & -5 & -2 \\ 1 & 3 & 0 \\ -1 & -3 & 0 \end{bmatrix}$

19. Chelsea, Sam and Mike are selling sugar, chocolate chip and peanut butter cookie dough for a school fundraiser. The table below represents how many packages of each type they sold and the amount of money they made. Using the information in the tables, determine the cost of each type of cookie dough.

	Sugar	Chocolate Chip	Peanut Butter	Total
Chelsea	8	12	11	$450
Sam	7	5	13	$353
Mike	14	6	9	$404

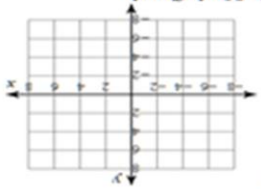
Answers:

1) $\frac{7i}{4}$ 2) $-\frac{1}{3} + \frac{4i}{3}$ 3) $2 + 8i$ 4) $-21 - 20i$

5) $-6 - 30i$ 6) $-4 + 4i$ 7) $4 - 6i$ 8)

9) $[-3 \quad -4 \quad 2]$ 10) $\begin{bmatrix} 1 & 9 & 6 \\ -4 & -3 & -1 \end{bmatrix}$

11) Undefined



12) $\begin{bmatrix} -9 & 9 \\ -15 & 9 \\ -9 & 0 \end{bmatrix}$ 13) $\begin{bmatrix} -15 \\ -55 \\ 0 \end{bmatrix}$ 14) $\begin{bmatrix} -18 & -12 \\ 2 & -8 \\ 4 & -16 \end{bmatrix}$

15) Undefined

16) $\frac{1}{14} \cdot \begin{bmatrix} 2 & -6 \\ 3 & -2 \end{bmatrix}$ 17) $-\frac{1}{69} \cdot \begin{bmatrix} -15 & 2 & 12 \\ 9 & 8 & -21 \\ 21 & 11 & -3 \end{bmatrix}$

18) No inverse exists

19. Sugar $13; Choc. Chip $16; PB $14