Complex numbers, vectors and matrices Worksheet

Precalculus

Name _____ Date _____

Warm-up

1. Find $\sqrt{-100} = ki$. Find k.

2. Find the magnitude of $\langle 6, 8 \rangle$.

3. Top-left entry of $\begin{pmatrix} 8 & 0 \\ 0 & 1 \end{pmatrix} + \begin{pmatrix} 5 & 0 \\ 0 & 1 \end{pmatrix}$?

4. Identify $y = 8x^2 + 1$.
   (A) Hyperbola (B) Ellipse (C) Circle (D) Parabola

5. Choosing a committee of 3 from 10 is a:
   (A) Probability (B) Neither (C) Combination (D) Permutation

Practice

6. $(1 + i)(6 + i) = p + qi$.
   p _____ q _____

7. A vector has magnitude 15 at 90°. What's its vertical component?

8. $\begin{pmatrix} 8 & 7 \end{pmatrix} \begin{pmatrix} 5 \\ 3 \end{pmatrix}$ gives one number. What is it?

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9. How far does $\dfrac{x^2}{81} + \dfrac{y^2}{36} = 1$ reach along the x-axis?

10. How many ways can you choose 2 from 15?

11. Find $(7 + 5i)(7 - 5i)$.

12. Find the vector from $(-4, 4)$ to $(-6, -3)$: $\langle p, q \rangle$.
    p _____ q _____

13. What's the size of the product of a 2×3 and a 3×4 matrix? Enter the number of columns.

Challenge

14. Find the magnitude of $12 + 16i$.

15. For what k are $\langle 6, 3 \rangle$ and $\langle 3, k \rangle$ perpendicular?

16. For what k is $\begin{pmatrix} 6 & 5 \\ k & 20 \end{pmatrix}$ not invertible?

17. Divide to find the ellipse form of $9x^2 + 9y^2 = 81$. What's the denominator under x^2?

18. How many 3-letter codes use 7 letters, with no repeats?

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Complex numbers, vectors and matrices Worksheet: Answer Key

Precalculus

1. 10

   $\sqrt{100} \cdot i$.

2. 10

   $\sqrt{6^2 + 8^2}$.

3. 13

   Add matching entries.

4. (D) Parabola

   Only one variable is squared.

5. (C) Combination

   Order doesn't matter.

6. p 5, q 7

   Distribute: $6 + 7i + i^2$.

7. 15

   It points straight up.

8. 61

   Row times column.

9. 9

   $\sqrt{81}$.

10. 105

    $\frac{15 \cdot 14}{2}$.

11. 74

    $7^2 + 5^2$.

12. p -2, q -7

    End minus start.

13. 4

    The outside numbers give the size: 2×4.

14. 20

    $\sqrt{12^2 + 16^2}$.

15. -6

    Dot product 0: $63 + 3k = 0$.

16. 24

    $6 \cdot 20 - 5k = 0$.

17. 9

    Divide every term by 81.

18. 210

    $7 \times 6 \times 5$.

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