

Precalculus - Complex Numbers and Complex Zeros - Worksheet

Common Core N-CN.A.1, N-CN.A.2, N-CN.A.3, N-CN.C.7, N-CN.C.8, N-CN.C.9 · maths-pdf.fr/en/

Name: _____ Class: _____ Date: ____/____/____

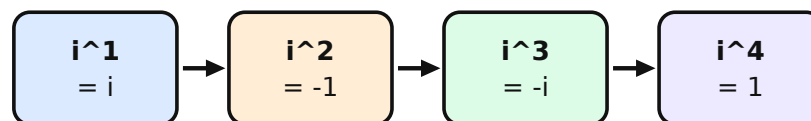
These 20 problems practice complex numbers and complex zeros (Common Core N-CN.A.1 to N-CN.A.3 and N-CN.C.7 to N-CN.C.9). You will compute with i , find moduli and conjugates, solve quadratics and find all zeros of polynomials.

Precalculus · Common Core State Standards: **N-CN.A.1, N-CN.A.2, N-CN.A.3, N-CN.C.7, N-CN.C.8, N-CN.C.9**

Exercise 1 - Square roots of negatives

Write $\sqrt{-36}$ and $\sqrt{-20}$ in terms of i .

Exercise 2 - Powers of i



Cycle of powers of i .

Simplify i^{27} and i^{50} .

Exercise 3 - Add complex numbers

Add: $(4+3i)+(2-5i)$.

Exercise 4 - Subtract complex numbers

Subtract: $(7-2i)-(3-6i)$.

Exercise 5 - Multiply

Multiply: $(2+3i)(4-i)$.

Exercise 6 - Square a complex number

Simplify $(3+4i)^2$.

Exercise 7 - Conjugate product

Find the conjugate of $5-12i$ and the product of $5-12i$ with its conjugate.

Exercise 8 - Divide

Write $\frac{3+2i}{1-i}$ in the form $a+bi$.

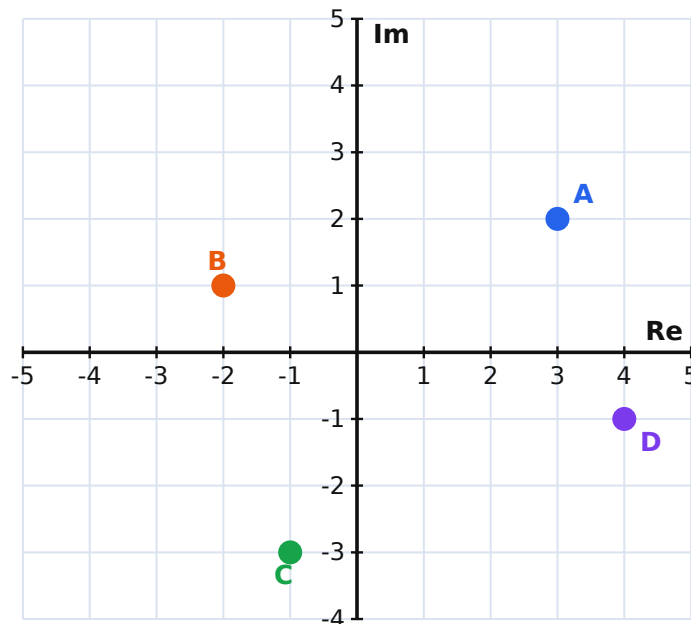
Exercise 9 - Divide a real number

Write $\frac{10}{3-i}$ in the form $a+bi$.

Exercise 10 - Modulus

Find $|5-12i|$ and $|-3+4i|$.

Exercise 11 - Read the complex plane



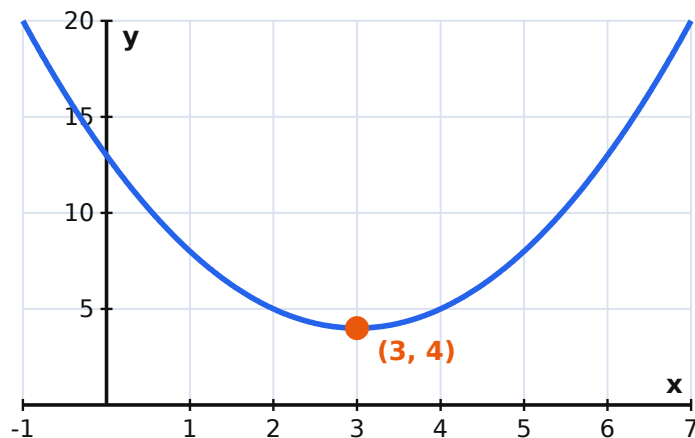
Four complex numbers.

Write the complex numbers A , B , C and D shown, and find the modulus of A .

Exercise 12 - A pure imaginary solution

Solve $x^2+4=0$.

Exercise 13 - Complex roots by the formula



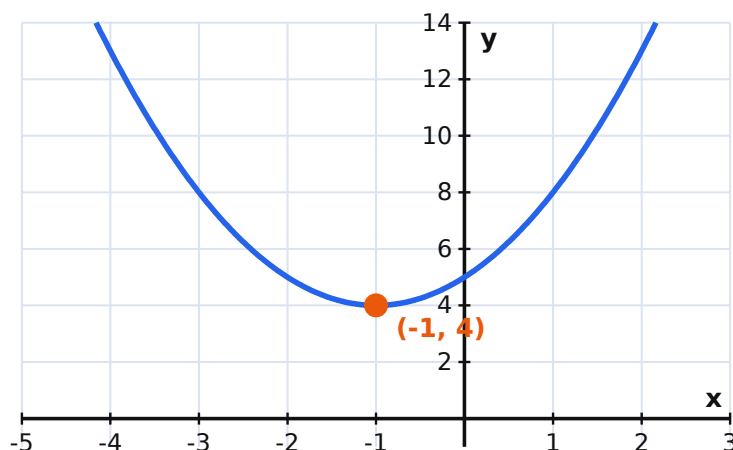
Graph of $y = x^2 - 6x + 13$.

Solve $x^2 - 6x + 13 = 0$ and explain why the graph has no x -intercepts.

Exercise 14 - Complex roots with a leading coefficient

Solve $2x^2 + 2x + 5 = 0$.

Exercise 15 - Discriminant



A parabola with no x -intercepts.

Use the discriminant to tell how many real and non-real roots each has: (a) $x^2 - 4x + 4$; (b) $x^2 + x + 3$; (c) $x^2 - 5x + 2$.

Exercise 16 - Conjugate pair

A polynomial with real coefficients has the zero $2 + 3i$. Name another zero and write the

quadratic factor with real coefficients.

Exercise 17 - All zeros of a cubic

Find all zeros of $f(x) = x^3 - 3x^2 + 7x - 5$, given that $x = 1$ is a zero.

Exercise 18 - Missing zeros

A polynomial of degree 5 with real coefficients has zeros 2 , $1+i$ and $-3i$. Find the other two zeros.

Exercise 19 - Impedance



Impedances in the complex plane.

In an electric circuit, two parts have impedances $Z_1 = 3 + 4i$ ohms and $Z_2 = 2 - i$ ohms in series. Find $Z_1 + Z_2$ and its magnitude to the nearest hundredth. If the current is $I = 2 + i$ amps through Z_1 , find the voltage $V = IZ_1$.

Exercise 20 - Verify a root

Show that $1 + 2i$ is a root of $x^2 - 2x + 5$.

Exercise 21 - Power of a complex number

Show that $(1+i)^2 = 2i$, then simplify $(1+i)^4$.