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Properties of complex numbers worksheet

Це Алгебра 2 - Складні номери Аркуш створить проблеми для властивостей складних чисел. Ви можете вибрати проблеми з графіком, які використовуються у другій половині аркуша. Click here for More Algebra 2 - Complex Numbers Worksheets Question 1. If $z_1 = 1 - 3i$, $z_2 = -4i$ and $z_3 = 5$ show that (i) $(z_1 + z_2) + z_3 = z_1 + (z_2 + z_3)$ Solution .L.H.S : $z_1 + z_2 = 1 - 3i - 4i = 1 - 7i$ $(z_1 + z_2) + z_3 = (1 - 7i) + 5 = 1 + 5 - 7i = 6 - 7i$ —(1)R.H.S : $z_2 + z_3 = -4i + 5z_1 + (z_2 + z_3) = (1 - 3i) + (4i + 5) = (1 + 5) + (-3 + 4)i = 6 - 7i$ —(2)(1) = (2)(i) $(z_1 z_2) z_3 = z_1 (z_2 z_3)$ Solution .L.H.S : $z_1 z_2 = (1 - 3i)(-4i) = -4i + 12i^2 = -4i + 12(-1) = -4i - 12 = -4i - 12$ $(z_1 z_2) z_3 = (-4i - 12)z_3 = (-4i - 12)(5) = -20i - 60$ —(1)R.H.S : $z_2 z_3 = -4i(5) = -20i$ $z_1 (z_2 z_3) = (1 - 3i)(-20i) = -20i + 60i^2 = -20i - 60$ —(2)(1) = (2)Hence proved. Question 2. If $z_1 = 3$, $z_2 = -7i$ and $z_3 = 5 + 4i$ (i) $z_1 (z_2 + z_3) = z_1 z_2 + z_1 z_3$ Solution .L.H.S : $z_2 + z_3 = -7i + (5 + 4i) = -7i + 5 + 4i = 5 - 7i + 4i = 5 - 3i$ $z_1 (z_2 + z_3) = 3(5 - 3i) = 15 - 9i$ —(1)R.H.S : $z_1 z_2 = 3(-7i) = -21i$ $z_1 z_3 = 3(5 + 4i) = 15 + 12i$ $z_1 z_2 + z_1 z_3 = -21i + 15 + 12i = 15 - 9i$ —(2)(1) = (2)(ii) $(z_1 + z_2)z_3 = z_1 z_3 + z_2 z_3$ Solution .L.H.S : $z_1 + z_2 = 3 - 7i$ $(z_1 + z_2)z_3 = (3 - 7i)(5 + 4i) = 15 + 12i - 35i - 28i^2 = 15 - 23i - 28(-1) = 15 - 23i + 28 = 43 - 23i$ —(1) $z_1 z_3 = 3(5 + 4i) = 15 + 12i$ $z_2 z_3 = (-7i)(5 + 4i) = -35i - 28i^2 = -35i - 28(-1) = -35i + 28 = 28 - 35i$ —(2) $(z_1 + z_2)z_3 = 43 - 23i$ —(1) $z_1 z_3 + z_2 z_3 = 15 + 12i - 35i + 28 = 43 - 23i$ —(2)(1) = (2)Hence proved. Питання 3. Якщо $z_1 = 2 + 5i$, $z_2 = -3 - 4i$ і $z_3 = 1 + i$, знайдіть доданку і множник обернений z_1 , z_2 і z_3 . Solution : $z_1 = 2 + 5i$ Additive inverse of $(z_1) : z_1 = 2 + 5i$ $1/z_1 = 1/(2 + 5i) = (1/(2 + 5i))((2 - 5i)/(2 - 5i)) = (2 - 5i)/(4 - 25(-1)) = (2 - 5i)/29$ Hence multiplicative inverse of $2 + 5i$ is $(2 - 5i)/29$ $z_2 = -3 - 4i$ Additive inverse of $(z_2) : z_2 = -3 - 4i$ Additive inverse = $3 + 4i$ Multiplicative inverse of $(z_2) : z_2 = -3 - 4i$ $1/z_2 = -3 - 4i$ $1/z_2 = -1/(3 + 4i) = (-1/(3 + 4i))((3 - 4i)/(3 - 4i)) = (-3 - 4i)/(9 - 16(-1)) = (-3 - 4i)/(9 + 16) = (-3 - 4i)/25$ Hence multiplicative inverse of $-3 - 4i$ is $(-3 - 4i)/25$ $z_3 = 1 + i$ Additive inverse of $(z_3) : z_3 = 1 + i$ Additive inverse = $-1 - i$ Multiplicative inverse of $(z_3) : z_3 = 1 + i$ $1/z_3 = 1/(1 + i) = (1/(1 + i))((1 - i)/(1 - i)) = (1 - i)/(1 - (-1)) = (1 - i)/2$ Hence multiplicative inverse of $1 + i$ is $(1 - i)/2$ Apart from the stuff given above , якщо вам потрібні будь-які інші речі в математиці, будь ласка, використовуйте наш google користувальницький пошук тут. Якщо у вас є які-небудь відгуки про наш математичний контент, будь ласка, надіть нам: v4formath@gmail.comМи завжди цінуємо ваші відгуки. Ви також можете відвідати наступні веб-сторінки на різних матеріалах в математиці. ПРОБЛЕМИ СЛОВАНCF і LCM проблеми словаПеренаси на простих рівнянь Проблеми з Word на лінійних рівнянь Проблеми з word на квадратних рівняньАлгебра проблеми словаПеренаси проблеми на and perimeter problems wordTimes On direct direct and inverse option Problems with Word on unit priceProblems With unitProblems With block Problems with Word regarding comparison of betsConverting custom blocks Problems with the word Problems with simple interestsProblems with problems of complex interestProblems with the types of angles Additional and additional angles Problems with the wordAddition the facts of the problem with the textGromishing Problems with the word General problems ryonsOne step of the equation of the problem of the wordLinear inequalities problems with the word Ratio and the proportion of problems with the wordTime and work problems with the wordProtests in sets and charts veinsEducation of problems with the centuriesPitagorous theorem of problems of the wordMeeting problems with number of wordsProtesting problems with constant speedPromove Word at the sum of the corners of the triangle 180 degreesOintern themes Profit and loss shortcutsPercent shortcutsSpheres, keyboard shortcuts speed and distanceRatio and proportionsDemen and range of rational functionsDemen and range of rational functions with holesSamine rational functionsChange rational functions with holesVerting repetitive decimals in fractionsDecimal representation of rational numbersThe name of the square root using the long separation of methodL.C.M to solve problems of time and workTranspondering the problems of the word in algebraic expressionsRemainder when 2 power 256 is divided into 17Remainder, when 17 power 23 is divided into 16Sum of all three-digit numbers divided into 6Suma of all three-digit numbers divided into 7Sum from all three digits, divided into 8Sum from all three digits, formed using 1, 3, 4Suma of all three four-digit numbers formed with nonzero digitsSuma of all three four-digit numbers formed with the help of 0, 1, 2, 3Sum of all three four digits formed using 1, 2, 5, 6 author's onlinemath4all.com SBI! The properties of complex numbers are important in mathematics. List of properties in complex numbers 1. $\sqrt{-1} = i$, $-1 = i^2$, $-1 = i^2$, $z = a + ib$ is a complex number. The real part is $z = \text{Re}z$; imaginary part $z = \text{Im}z$. Negative $z = -z = -(a + ib) = -a - bi$. 5. Conyugat $z = \bar{z} = a - ib$. 6. $z \cdot \bar{z} = |z|^2 = a^2 + b^2$. 7. $|z| = |\bar{z}|$. 8. $\bar{\bar{z}} = z$. 9. $z = \bar{z}$ if and only if z is purely real. 10. $|z| = \sqrt{a^2 + b^2}$. 11. $\text{Re}z = (z + \bar{z})/2$, $\text{Im}z = (z - \bar{z})/2i$. Rees 13. $|z_1 z_2| = |z_1| |z_2|$. 14. $|(z_1/z_2)| = |z_1|/|z_2|$. 15. Triangle inequality: for any two complex numbers z_1, z_2 , $|z_1 + z_2| \leq |z_1| + |z_2|$. 16. $|z_1 - z_2| \geq ||z_1| - |z_2||$. 17. $z = x + iy$, then $|z| = \sqrt{x^2 + y^2}$, $\arg z = \tan^{-1}(y/x)$ polar shape: $z = r(\cos \theta + i \sin \theta)$. 18. $\arg(z_1 z_2) = \arg z_1 + \arg z_2$. 19. $\arg(z_1/z_2) = \arg z_1 - \arg z_2$. 20. Euler formula: $e^{i\theta} = \cos \theta + i \sin \theta$. 21. General rule for determining δ . 22. Cube root unity $1, (-1 + i\sqrt{3})/2, (-1 - i\sqrt{3})/2$. 23. The fourth roots of unity $1, i, -1, -i$. 24. Cube roots of unity form the tops of the equilateral triangle. 25. Fourth unity form the tops of the square, lying on the circle of the unit. 26. Des Moivre theorem: for any rational number n , $\cos n\theta + i \sin n\theta$ is a value or one of the values $(\cos \theta + i \sin \theta)^n$. 27. The sixth roots of unity form the tops of the six-legged all that lies on the circle of the block. 28. The n th roots of unity form the tops of the n -sided conventional polygon lying on the circle of the block. In order to continue to enjoy our site, we ask you to verify your identity as a person. Thank you very much for your cooperation. (1) Write the following in a rectangular form:(i) $[(5 + 9i) + (2 - 4i)]$ whole bars(ii) $(10 - 5i)/(6 + 2i)$ (iii) $3i \bar{z} + 1/(2 - i)$ Solution (2) If $z = x + iy$, find the following in a rectangular form. (i) $\text{Re}(1/z)$ (ii) $\text{Re}(i/z)$ (iii) $\text{Im}(3z + 4z\bar{z} - 4i)$ Solution(3) If $z_1 = 2 - i$ and $z_2 = -4 + 3i$, find the inverse $z_1 z_2$ and z_1/z_2 Solution(4) Complex numbers u, v , and w related $(1/u) = (1/v) + (1/w)$ if $v = 3 - 4i$ and $w = 4 + 3i$, find u in a rectangular shape. Solution(5) Prove the following properties: (i) z is real if and only if $z = \bar{z}$ (ii) $\text{Re}(z) = (z + \bar{z})/2$ Solution(6) Find the smallest value of a positive integer n , for which $(\sqrt{3} + i)^n$ (i) real (ii) is purely imaginary. Solution(7) (i) Show that (i) $(2 + i\sqrt{3})^{10} - (2 - i\sqrt{3})^{10}$ is purely imaginary(ii) $[(19 - 7i)/(9 + i)]^{12} + [(20 - 5i)/(7 - 6i)]^{12}$ is real above, if you need any other things in mathematics, please use our custom Google search here. If you have any feedback on our mathematical content, please provide us with: v4formath@gmail.com We always appreciate your feedback. You can also visit the following web pages on various math materials. 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