

COMPLEX NUMBERS-I

CANSU OLCE

A STAR MATHS (www.astarmaths.com.au)

1. $\sqrt{-1} \times \sqrt{-16} = ?$

2. $x^2 + 4 = 0$
 $x = ?$

3. If n is an integer, find $i^{8n} + i^{-4n}$.

4. If n is an integer, find i^{8n-1} .

5. $(i^{36} - i^{22})^5 = ?$

6. $i^{21} \times \sqrt{-1} = ?$

7. What is the imaginary part of $z = 3 - 2i$?

8. What is the real part of $z = 2i - 3$?

9. What is the imaginary part of $z = -2$?

10. What is the imaginary part of $z = \frac{1+3i}{2}$?
11. $z = \sqrt{3} - \sqrt{3}i$
Given the complex number z , what is $\text{Re}(z) + \text{Im}(z)$?
12. a and b are real numbers.
 $3 - 5i = a + bi$
Given the above, what is $a+b$?
13. m and n are real numbers.
 $\sqrt{-4} + \sqrt{16} = m + in$
Given the above, what is m/n ?
14. x and y are real numbers.
 $(2x - 1) + (y + 3)i = 2i - 5$
Given the above, what is $x-y$?
15. a and b are real numbers.
 $5bi + 4a - 8 + 10i = 0$
Given the above, what is b/a ?
16. $5a - 7bi + 1 = 6 + 14i$
Given the above, what is $a \times b$?

17. x and y are real numbers.
 $z_1 = 2x - y - 17 + (x + y + 3)i$
 $z_2 = 7i - 6$
 $z_1 = z_2$
Given the above, what is x/y ?

18. m and n are real numbers.
 $(m - 2) + (n + 1)i = 0$
Given the above, what is $m \times n$?

19. Find the conjugate of $3 + 2i$.

20. Find the conjugate of $-2i - 5$.

21. Find the conjugate of $z = -3$.

22. $z = \frac{1}{2} + \frac{\sqrt{2}}{2}i$
 $\text{Im}(z) + \text{Im}(\bar{z}) = ?$

23. If $\bar{z} = 1 - 3i$, find z .

24. a and b are real numbers.
 $z_1 = a + (b - 1)i$
 $z_2 = 5$
 $z_1 = \bar{z}_2$
 $a - b = ?$

25. Find the solution set of $x^2 - 4x + 5 = 0$.

26. Find the sum of the roots of $x^2 + 5x + 7 = 0$.

27. a and b are real numbers.
If $1-2i$ is a root of $x^2 + ax + b = 0$, what is $a+b$?

28. a is a real number. If $x_1 = i$ is a root of $x^3 + 2ax^2 + x - 6 = 0$, what is a ?

29. $z_1 = 5 - 3i$
 $z_2 = 2 + 5i$
Given the above, find $z_1 + z_2$

30. $z = 1 - 3i$
 $w = 2 - i$
Given the above, what is $\text{Im}(z - w)$?

31. $z_1 = -2 + 3i$
 $z_2 = 1 - 5i$
 $z_3 = 2i + 3$
Given the above, find $z_1 + z_2 + z_3$.

32. $z_1 = 3 + 2i$
 $z_2 = 5 + i$
 $z_1 - z_2 = ?$

33. z is a complex numbers.

$$z + \bar{z} = 8$$

What is $\text{Re}(z)$?

34. a and b are real numbers.

$$z_1 = 5 + 3i$$

$$z_2 = 2i - 3$$

$$-\bar{z}_1 + z_2 = a - bi$$

Given the above, what is $a \times b$?

35. $z_1 = 3 - 2i$

$$z_1 + z_2 = 5 + 3i$$

$$z_2 = ?$$

36. $z_1 + z_2 = 1 - 2i$

$$z_1 - z_2 = 3 + 4i$$

$$z_2 = ?$$

37. $A = i^{49} + i^{54} + i^{59} + i^{64}$

$$B = i^{-35} + i^{-40} + i^{-45} + i^{-50}$$

Given the above, what is $A+B$?

38. $i + i^2 + i^3 + i^4 + \dots + i^{200} = ?$

39. $i + i^2 + i^3 + i^4 + i^5 + i^6 + i^7 = ?$

40. z is a complex number.
 $3z - 1 + 2i = 5 - i$
Given the above, find z .

41. $(2 - i)(2 + i) = ?$

42. $z = 3 - 2i$
Given the above, find $z\bar{z}$.

43. Find $(3 + 2i)^2$.

44. $(2 - \sqrt{3}i)^2 = ?$

45. $z = (1 + 2i)^2(1 - i)$
 $\text{Re}(z) + \text{Im}(z) = ?$

46. $(1 + i)^{10} = ?$

47. $(1 - i)^3 = ?$

48. $z = \frac{4 + i}{2 - 3i}$
 $\text{Re}(\bar{z}) + \text{Im}(\bar{z}) = ?$

49. $\frac{i^{201} + i^{202} + i^{203}}{i^{15} + i^{16}} = ?$

50. a and b are real numbers.
 $\frac{1 - 2i}{1 + i} = a - bi$
a+b=?

51. $\frac{1}{2+i} - \frac{1}{2-i} = ?$

52. $\frac{2-i}{2+i} - \frac{2+i}{2-i} = ?$

53. $z = 3 + i$
 $\frac{z + \bar{z}}{z - \bar{z}} = ?$

54. $z = 3i$
 $u = 4 + 3i$
 $\frac{\bar{z} \cdot \bar{u}}{3 + 4i} = ?$

55. $\frac{\sqrt{2} + i}{\sqrt{2} - i} - \frac{\sqrt{2} - i}{\sqrt{2} + i} = ?$

56. What is the real part of $\frac{2+i}{i} + \frac{i}{2-i}$?

57. $\frac{(1+i)^{20}}{(1-i)^{18}} = ?$

58. $\left(\frac{3+4i}{4-3i}\right)^{2011} = ?$

59. $z = \frac{1-3i}{1+i} + \frac{1+3i}{1-i}$
 $\bar{z} = ?$

60. For the complex number z
 $iz - 3 = 1 + i$
Find z .

61. $\frac{(3+2i)^6}{(1+5i)^6} = ?$

62. $(1-i)^2(1+3i)^2(1+i)^2(1-3i)^2 = ?$

63. $\frac{z^2+16}{z+4i} = 2i$
 $z = ?$

Answers

1. 4
2. $\{-2i, 2i\}$
3. 2
4. $-i$
5. 32
6. -1
7. -2
8. -3
9. 0
10. $\frac{3}{2}$
11. 0
12. -2
13. 2
14. -1
15. -1
16. -2
17. -5
18. -2
19. $3-2i$
20. $-5+2i$
21. -3
22. 0
23. $1+3i$
24. 4
25. $\{2+i, 2-i\}$
26. -5
27. 3
28. -3
29. $7+2i$
30. -2
31. 2
32. $-2+i$
33. 4
34. 40
35. $2+5i$
36. $-1-3i$
37. 0
38. 0
39. 1
40. $2-i$
41. 5
42. 13
43. $5+12i$
44. $1-4\sqrt{3}i$
45. 8
46. $32i$
47. $-2-2i$
48. $-\frac{9}{13}$
49. $-\frac{1}{2}-\frac{1}{2}i$
50. 1
51. $-\frac{2}{5}i$
52. $\frac{6}{5}$
53. $-3i$

- 54. -3
- 55. $\frac{2}{3}$
- 56. $\frac{4}{5}$
- 57. $-2i$
- 58. $-i$
- 59. -2
- 60. $1-4i$
- 61. $i/8$
- 62. 400
- 63. $6i$

www.astarmaths.com.au