

Complex Numbers

- 1 Classify this number as natural, whole, integer, rational, irrational, imaginary, or complex. Pick the narrowest definition that fits.

$$\sqrt{23}$$

A	Whole Number
B	Rational Number
C	Irrational Number
D	Natural Number

- 2 Select the number that is a whole number

Whole Number

A	$-\frac{10}{12}$	B	$\frac{53i}{8}$
C	0		

- 3 Select the description that matches an irrational number

Irrational Number

- A Any number that can be expressed as a fraction of two integers (e.g., $1/2$, $-3/4$, 5).
- B Any number that can be found on the number line, including both rational and irrational numbers.
- C A real number that cannot be expressed as a simple fraction (e.g., $\sqrt{2}$, π).
- D A number that can be expressed as a real number multiplied by the imaginary unit i (e.g., $-2.5i$).

- 4 Select the narrowest description that matches this number type

$$\frac{3i}{3}$$

- A A number that can be expressed as a real number multiplied by the imaginary unit i (e.g., $-2.5i$).
- B Any number that can be expressed as a fraction of two integers (e.g., $1/2$, $-3/4$, 5).
- C A positive integer (1, 2, 3, ...).
- D A real number that cannot be expressed as a simple fraction (e.g., $\sqrt{2}$, π).

- 5 Select the number type that matches this description

Any number that can be found on the number line, including both rational and irrational numbers.

A	Whole Number
B	Real Number
C	Rational Number
D	Natural Number

- 6 Classify this number as natural, whole, integer, rational, irrational, imaginary, or complex. Pick the narrowest definition that fits.

$$\frac{0}{4}$$

A	Natural Number
B	Irrational Number
C	Whole Number

- 7 Select the number that is a pure imaginary number

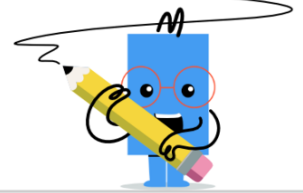
Pure Imaginary Number

A	$-\frac{35}{7}$	B	$\sqrt{\frac{80}{5}}$
C	$\frac{\sqrt{59}i}{6}$		

- 8 Select the description that matches a complex number

Complex Number

- A A real number that cannot be expressed as a simple fraction (e.g., $\sqrt{2}$, π).
- B Any number that can be found on the number line, including both rational and irrational numbers.
- C A non-negative integer (0, 1, 2, 3, ...).
- D A number that has a real and an imaginary part (e.g. $3 + 4i$).



Complex Numbers

9 Select the number that matches this description

A number that can be expressed as a real number multiplied by the imaginary unit i (e.g., $-2.5i$).

A $4 + \frac{61i}{7}$

B 3

C $11i$

10 Select the narrowest description that matches this number type

$$0.\overline{7}$$

A A real number that cannot be expressed as a simple fraction (e.g., $\sqrt{2}$, π).

B A non-negative integer (0, 1, 2, 3, ...).

C A positive integer (1, 2, 3, ...).

D Any number that can be expressed as a fraction of two integers (e.g., $1/2$, $-3/4$, 5).

11 Is this number a rational number (even if that's not it's narrowest type)?

Is 10 a rational number

A
Yes

B
No

12 Select the number type that matches this description

A positive integer (1, 2, 3, ...).

A
Irrational Number

B
Natural Number

13 Select the number that matches this description

Any number that can be expressed as a fraction of two integers (e.g., $1/2$, $-3/4$, 5).

A $\frac{\sqrt{5}i}{2}$

B $0.\overline{6}$

14 Is this number a rational number (even if that's not it's narrowest type)?

Is $\frac{\sqrt{5}i}{3}$ a rational number

A
No

B
Yes

15 Is a whole number also a complex number?

A
Always

B
Sometimes

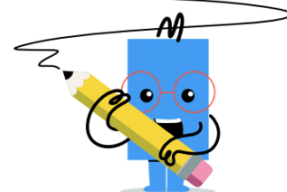
C
Never

16 Is a rational number also a pure imaginary number?

A
Always

B
Never

C
Sometimes



Complex Numbers

- 17** Rewrite the root as a complex number and simplify all radicals

$$\sqrt{-16}$$

A	$6i\sqrt{3}$	B	$7i\sqrt{4}$
C	$5i$	D	$4i$
E	$5i\sqrt{4}$	F	$3i$

- 18** Rewrite the root as a complex number and simplify all radicals

$$\sqrt{-44}$$

A	$3i\sqrt{10}$	B	$2i\sqrt{11}$
C	$4i\sqrt{10}$	D	$2i\sqrt{10}$
E	$3i\sqrt{7}$	F	$2i\sqrt{13}$

- 19** Add or subtract these complex numbers and simplify

$$(4 - 6i) + (2 - 6i)$$

A	$6 - 12i$	B	$6 + 12i$
C	$8 - 12i$	D	$5 - 12i$
E	$6 - 10i$	F	$6 - 13i$

- 20** Rewrite the root as a complex number and simplify all radicals

$$\sqrt{-32z}$$

A	$6i\sqrt{z}$	B	$4i\sqrt{z}$
C	$4i\sqrt{2z}$	D	$3i\sqrt{z}$
E	$3i\sqrt{4z^2}$	F	$2i\sqrt{4z}$

- 21** Multiply these complex numbers and simplify

$$(-5i) \cdot (3i)$$

A	17	B	$15 + 2i$
C	-15	D	$15 - 2i$
E	15	F	13

- 22** Multiply these complex numbers and simplify

$$(5 - 5i) \cdot (-3 - 4i)$$

A	$-35 - 4i$	B	$-35 + 5i$
C	$35 + 5i$	D	$-35 - 5i$
E	$-33 - 5i$	F	$-37 - 5i$

- 23** Rewrite the root as a complex number and simplify all radicals

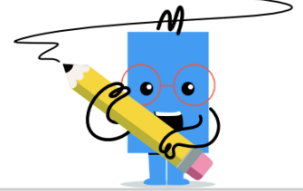
$$\sqrt{-50n^3p^4}$$

A	$5np^2i\sqrt{2n}$	B	$5np^3i\sqrt{n}$
C	$7npi\sqrt{2n}$	D	$2n^3p^4i\sqrt{4n^3}$
E	$7n^3pi\sqrt{2n}$	F	$4np^4i\sqrt{5n}$

- 24** Find the complex conjugate of this complex number

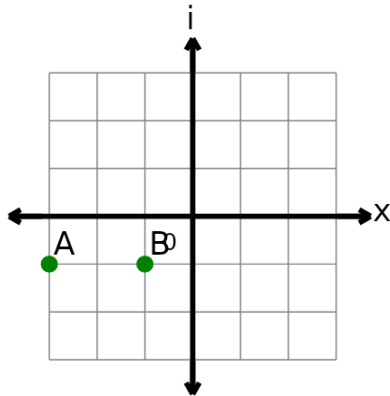
$$2 - 6i$$

A	$2 + 6i$	B	$3 + 6i$
C	$-2 - 6i$	D	$-2 + 6i$
E	$2 - 6i$	F	$6i$



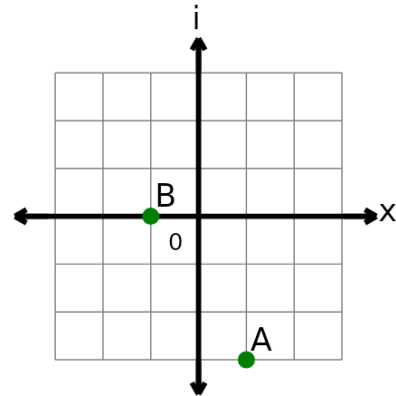
Complex Numbers

25 Add $A + B$ on the complex plane



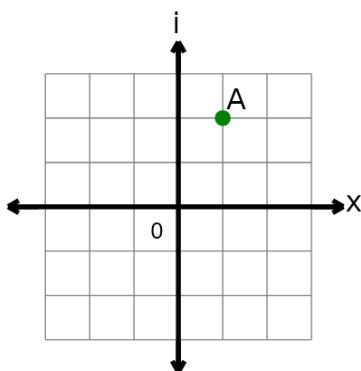
- | | | | |
|---|-----------|---|-----------|
| A | $-4 + 2i$ | B | $-4 - 1i$ |
| C | $-4 - 2i$ | D | $-4 - 4i$ |
| E | $-2 - 2i$ | F | $-5 - 2i$ |

26 Subtract $A - B$ on the complex plane



- | | | | |
|---|----------|---|----------|
| A | $2 + 3i$ | B | $2 - 5i$ |
| C | $2 - 2i$ | D | $2 - 3i$ |
| E | $-3i$ | F | $4 - 3i$ |

27 Find the complex conjugate of the point labelled 'A' on the complex plane



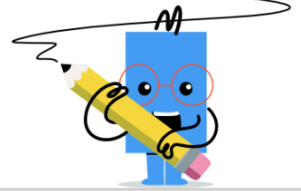
- | | | | |
|---|----------|---|-----------|
| A | $-2i$ | B | $-1 + 2i$ |
| C | $2 - 2i$ | D | $1 - 2i$ |
| E | $1 + 2i$ | F | $-1 - 2i$ |

28 What roots (solutions) would this quadratic equation have (use the quadratic formula)?

- | | | | |
|---|---------------------------------|---|---------------------------------|
| A | $x = \frac{4 \pm \sqrt{20}}{6}$ | B | $x = \frac{4 \pm \sqrt{20}}{2}$ |
| C | $x = \frac{4 \pm \sqrt{17}}{2}$ | | |

29 What roots (solutions) would this quadratic equation have (use the quadratic formula)?

- | | | | |
|---|----------------------------------|---|----------------------------------|
| A | $x = \frac{3 \pm \sqrt{13}}{-2}$ | B | $x = \frac{3 \pm \sqrt{10}}{-2}$ |
| C | $x = \frac{3 \pm \sqrt{15}}{-2}$ | D | $x = \frac{3 \pm \sqrt{13}}{1}$ |



Complex Numbers

30 Divide these complex numbers and simplify

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

A $\frac{-4 - 1i}{3}$

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

C $\frac{-4}{5}$

D $\frac{-6}{3}$

E $\frac{-4}{3}$

F $\frac{-4 + 2i}{3}$

31 Divide these complex numbers and simplify

$$\frac{3 + 4i}{-6 - 4i}$$

A $\frac{-17 - 6i}{26 + 2i}$

B $\frac{-17 - 5i}{26}$

C $\frac{-17 - 6i}{-26}$

D $\frac{-17 - 6i}{26}$

E $\frac{-17 - 6i}{25}$

F $\frac{-15 - 6i}{26}$

32 What is the discriminant of this quadratic equation (use the discriminant formula)?

A $\Delta = 0$

B $\Delta = 3$

C $\Delta = -3$

33 What is the discriminant of this quadratic equation (use the discriminant formula)?

A $\Delta = 12$

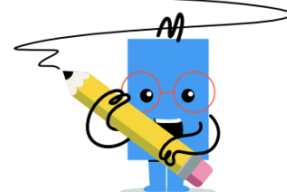
B $\Delta = -12$

C $\Delta = 0$

34 What roots (solutions) would this quadratic equation have (use the quadratic formula)?

A $x = \frac{1 \pm i\sqrt{39}}{-10}$

B $x = \frac{3.9 \pm i\sqrt{3.2}}{2.9}$



Complex Numbers

35 What roots (solutions) would this quadratic equation have (use the quadratic formula)?

A

$$x = \frac{-4 \pm i\sqrt{32}}{6}$$

B

$$x = \frac{7.3 \pm i\sqrt{1.9}}{9}$$

36 What roots (solutions) would this quadratic equation have?

$$y = -x^2 - 5x - 2$$

A

$$x = \frac{5 \pm \sqrt{17}}{-2}$$

B

$$x = \frac{5 \pm \sqrt{16}}{-2}$$

C

$$x = \frac{5 \pm \sqrt{13}}{-2}$$

D

$$x = \frac{5 \pm \sqrt{15}}{-2}$$

37 What roots (solutions) would this quadratic equation have?

$$y = -x + 2x^2 - 3$$

A

$$x = \frac{1 \pm \sqrt{28}}{4}$$

B

$$x = \frac{1 \pm \sqrt{27}}{4}$$

C

$$x = \frac{5 \pm \sqrt{25}}{4}$$

D

$$x = \frac{1 \pm \sqrt{25}}{4}$$

38 What is the discriminant of this quadratic equation?

$$y = -3x^2 + x - 4$$

A

$$\Delta = -47$$

B

$$\Delta = 47$$

C

$$\Delta = 0$$

39 What is the discriminant of this quadratic equation?

$$y = x^2 + 2x + 3$$

A

$$\Delta = 8$$

B

$$\Delta = -8$$

C

$$\Delta = 0$$

40 What roots (solutions) would this quadratic equation have?

$$y = -2x^2 + 3x - 2$$

A

$$x = \frac{4 \pm i\sqrt{7}}{6.6}$$

B

$$x = \frac{-3 \pm i\sqrt{7}}{-4}$$

41 Simplify the power of i

$$i^0$$

A

$$1$$

B

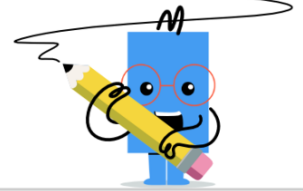
$$-i$$

C

$$i$$

D

$$-1$$



Complex Numbers

42 What roots (solutions) would this quadratic equation have?

$$y = 4x - 2x^2 - 4$$

A

$$x = \frac{-4 \pm i\sqrt{16}}{-4}$$

B

$$x = \frac{1.2 \pm i\sqrt{9.1}}{9.4}$$

43 Simplify the power of i
 i^5

A

$$-i$$

B

$$i$$

C

$$1$$

D

$$-1$$

44 Convert the given angle in degrees to radians

$$90^\circ$$

A

$$\frac{\pi}{4} \text{ rad}$$

B

$$\frac{5\pi}{2} \text{ rad}$$

C

$$\frac{4\pi}{2} \text{ rad}$$

D

$$\frac{2\pi}{2} \text{ rad}$$

E

$$\frac{\pi}{2} \text{ rad}$$

F

$$\frac{3\pi}{2} \text{ rad}$$

45 Convert the given angle in radians to degrees

$$\pi \text{ rad}$$

A

$$180^\circ$$

B

$$30^\circ$$

C

$$0^\circ$$

D

$$45^\circ$$

47 Find the rectangular form of the complex number that has a modulus and argument (r, θ) of $(5, 127^\circ)$

A

$$-1 - 7i$$

B

$$-3 + 5i$$

C

$$-3 + 4i$$

D

$$-2 + 5i$$

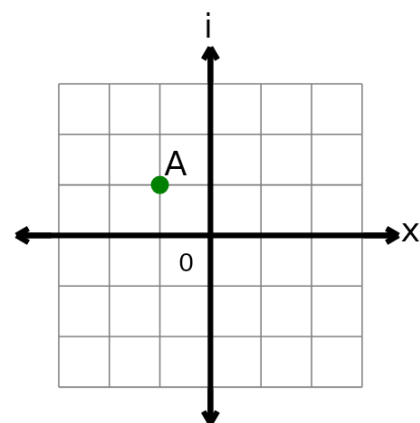
E

$$-2 + 6i$$

F

$$-8i$$

46 Find the absolute value of the point labelled 'A' on the complex plane



A

$$1.1$$

B

$$3.1$$

C

$$1$$

D

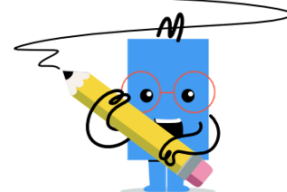
$$1.9$$

E

$$1.4$$

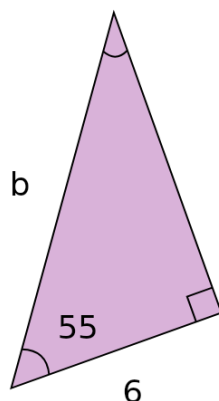
F

$$-1$$



Complex Numbers

48 Solve for the side length with trigonometry



A	$b = 12.6$	B	$b = 7.3$
C	$b = 10.5$	D	$b = 6.3$
E	$b = 9.4$	F	$b = 13.6$

49 Find the modulus and argument (r, θ) in degrees of this complex number

$$-4 - 4i$$

A	$(6.4, 141^\circ)$	B	$(5.1, 169^\circ)$
C	$(5.7, 225^\circ)$	D	$(7.1, 135^\circ)$
E	$(7.8, 130^\circ)$	F	$(4.5, 153^\circ)$

50 Find the rectangular form of the complex number that has a modulus and argument (r, θ) of

$$(7.2, 1.7\pi \text{ rad})$$

A	$-6 - 6i$	B	$4 - 6i$
C	$-7 - 3i$	D	$-9 - 4i$
E	$-5 - 2i$	F	$-7 - 4i$

51 Find the modulus and argument (r, θ) in radians of this complex number

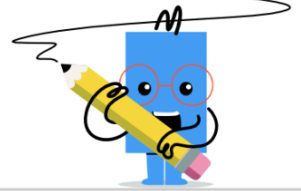
$$2 + 4i$$

A	$(3.2, 0.9\pi \text{ rad})$	B	$(1, 1\frac{1}{2}\pi \text{ rad})$
C	$(3.2, 0.1\pi \text{ rad})$	D	$(4.5, 0.4\pi \text{ rad})$
E	$(3.6, 0.8\pi \text{ rad})$	F	$(2.2, 1.6\pi \text{ rad})$

52 Find the polar form in degrees of this complex number

$$-5 + 2i$$

A	$5.4(\cos(158^\circ) + i \cdot \sin(158^\circ))$	B	$6.3(\cos(72^\circ) + i \cdot \sin(72^\circ))$
C	$5.8(\cos(59^\circ) + i \cdot \sin(59^\circ))$	D	$21.8(\cos(254^\circ) + i \cdot \sin(254^\circ))$
E	$16.3(\cos(282^\circ) + i \cdot \sin(282^\circ))$	F	$11.9(\cos(68^\circ) + i \cdot \sin(68^\circ))$



Complex Numbers

53 Find the rectangular form of this polar form complex number

$$7.2(\cos(146^\circ) + i \cdot \sin(146^\circ))$$

A	$-7 + 7i$	B	$-9 + 7i$
C	$-11 + 5i$	D	$-5 + 5i$
E	$-9 + 4i$	F	$-6 + 4i$

54 Find the rectangular form of this polar form complex number

$$6.4(\cos(0.8\pi \text{ rad}) + i \cdot \sin(0.8\pi \text{ rad}))$$

A	$-5 + 4i$	B	$3i$
C	$1 - 2i$	D	$-5 + 2i$
E	$-1 + 1i$	F	$3 - 2i$

55 Find the polar form in radians of this complex number

$$3 - 4i$$

A	$15.3(\cos(1.8\pi \text{ rad}) + i \cdot \sin(1.8\pi \text{ rad}))$	B	$13(\cos(1.8\pi \text{ rad}) + i \cdot \sin(1.8\pi \text{ rad}))$
C	$9.5(\cos(1.7\pi \text{ rad}) + i \cdot \sin(1.7\pi \text{ rad}))$	D	$7.7(\cos(1.6\pi \text{ rad}) + i \cdot \sin(1.6\pi \text{ rad}))$
E	$13(\cos(1\frac{13}{18}\pi \text{ rad}) + i \cdot \sin(1\frac{13}{18}\pi \text{ rad}))$	F	$5(\cos(1.7\pi \text{ rad}) + i \cdot \sin(1.7\pi \text{ rad}))$

56 Find the exponential form in radians of this complex number

$$-6 - 4i$$

A	$17.2e^{1.2\pi i}$	B	$10.8e^{1.2\pi i}$
C	$15.6e^{\frac{7}{9}\pi i}$	D	$15.8e^{1.3\pi i}$
E	$7.2e^{1.2\pi i}$	F	$20e^{1.2\pi i}$

57 Find the exponential form in radians of this complex number

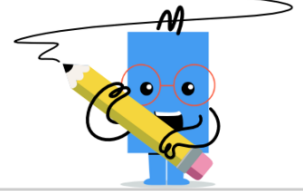
$$7.1(\cos(0.8\pi \text{ rad}) + i \cdot \sin(0.8\pi \text{ rad}))$$

A	$10.4e^{1.9\pi i}$	B	$7.1e^{0.8\pi i}$
C	$3.6e^{0.3\pi i}$	D	$6.3e^{0.1\pi i}$
E	$5.1e^{0.1\pi i}$	F	$13.9e^{1.9\pi i}$

58 Find the rectangular form of this complex number that is in exponential form

$$6.4e^{0.2\pi i}$$

A	$-1 - 9i$	B	2
C	$-1 - 5i$	D	$4 + 4i$
E	$1 + 4i$	F	$5 + 4i$

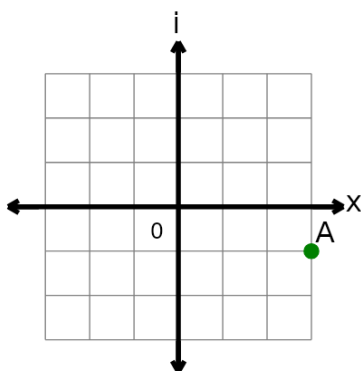


Complex Numbers

59 Find the polar form in radians of this complex number that is in exponential form
 $2.8e^{0.3\pi i}$

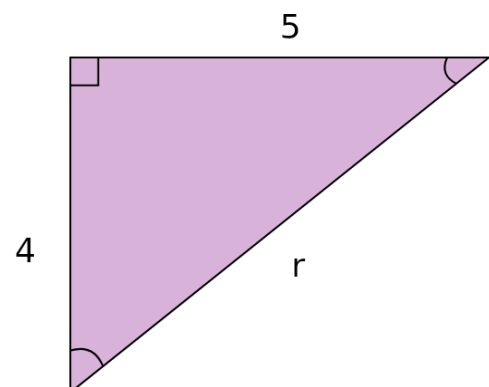
- | | |
|---|---|
| A
$3(\cos(1\frac{1}{2}\pi \text{ rad}) + i \cdot \sin(1\frac{1}{2}\pi \text{ rad}))$ | B
$5.4(\cos(0.3\pi \text{ rad}) + i \cdot \sin(0.3\pi \text{ rad}))$ |
| C
$6.8(\cos(0.1\pi \text{ rad}) + i \cdot \sin(0.1\pi \text{ rad}))$ | D
$3.2(\cos(0.1\pi \text{ rad}) + i \cdot \sin(0.1\pi \text{ rad}))$ |
| E
$8.5(\cos(0.3\pi \text{ rad}) + i \cdot \sin(0.3\pi \text{ rad}))$ | F
$2.8(\cos(0.3\pi \text{ rad}) + i \cdot \sin(0.3\pi \text{ rad}))$ |

60 Identify the point labelled 'A' on the complex plane



- | | |
|----------------|---------------|
| A
$3 - 3i$ | B
$1 - 1i$ |
| C
$-3 - 1i$ | D
$1 + 3i$ |
| E
$3 + 1i$ | F
$3 - 1i$ |

61 Find the length of the missing side as a decimal value based on the Pythagorean theorem



- | | | |
|--------------|---------------|---------------|
| A
$r=20$ | B
$r=4.72$ | C
$r=3.88$ |
| D
$r=6.4$ | E
$r=3$ | F
$r=2.2$ |