

Complex Numbers

Problems about complex numbers.

Problem 1 Which of the following are rational numbers? Select all that apply.

Select All Correct Answers:

- (a) 7 ✓
 - (b) e
 - (c) $\frac{\pi^2}{6}$
 - (d) $\frac{18}{11}$ ✓
 - (e) $8 - 3i$
 - (f) $\sqrt{-17}$
 - (g) $\sqrt[3]{-2}$
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Problem 2 Which of the following are real numbers? Select all that apply.

Select All Correct Answers:

- (a) 7 ✓
- (b) e ✓
- (c) $\frac{\pi^2}{6}$ ✓
- (d) $\frac{18}{11}$ ✓
- (e) $8 - 3i$
- (f) $\sqrt{-17}$

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(g) $\sqrt[3]{-2}$ ✓

Problem 3 Which of the following are complex numbers? Select all that apply.

Select All Correct Answers:

(a) 7 ✓

(b) $e \checkmark$

(c) $\frac{\pi^2}{6}$ ✓

(d) $\frac{18}{11}$ ✓

(e) $8 - 3i$ ✓

(f) $\sqrt{-17}$ ✓

(g) $\sqrt[3]{-2}$ ✓

Problem 4 Assuming none of the numbers involved are zero, select all operations below which must produce an irrational number.

Select All Correct Answers:

(a) *rational + rational*

(b) *rational + irrational* ✓

(c) *irrational + irrational*

(d) *rational* \times *rational*

(e) *irrational* \times *rational* \checkmark

(f) *irrational* \times *irrational*

Problem 5 Find $(2 + i) + 4$. $\boxed{6} + \boxed{1}i$
given given

Problem 6 Find $(-3 + 4i) - (-8 - i)$. $\boxed{5}_{\text{given}} + \boxed{5}_{\text{given}} i$

Problem 7 Find $(2 - 6i) - (3 + 8i)$. $\boxed{-1}_{\text{given}} + \boxed{-2}_{\text{given}} i$

Problem 8 Find $(2 + i) \times 4$. $\boxed{8}_{\text{given}} + \boxed{4}_{\text{given}} i$

Problem 9 Find $(-3 + 4i) \times (-8 - i)$. $\boxed{28}_{\text{given}} + \boxed{35}_{\text{given}} i$

Problem 10 Find $(2 - 6i) \times (3 + 8i)$. $\boxed{54}_{\text{given}} + \boxed{-2}_{\text{given}} i$

Problem 11 Write $\frac{1}{2+i}$ in the form $a + bi$. $\boxed{\frac{2}{3}}_{\text{given}} + \boxed{-\frac{1}{3}}_{\text{given}} i$

Hint: Try multiplying the numerator and denominator by something that will make the denominator into a whole number (in other words, the complex conjugate of $2+i$).

Problem 12 Find $(1 - 3i) \div (-3 + 5i)$. $\boxed{-\frac{18}{34}}_{\text{given}} + \boxed{\frac{4}{34}}_{\text{given}} i$

Hint: First find $\frac{1}{-3+5i}$, and then multiply.
