

Unit 1 Number Theory Review

List all sets to which the number belongs.

1) $\frac{15}{3}$

2) $\sqrt[3]{-64}$

3) 5.184759983665743625...

4) 0

Determine if the result of each situation will be rational or irrational. Give examples to support your answer.

5) Sum of a rational and an irrational number

6) Sum of two rational numbers

7) Product of two irrational numbers

8) Product of two rational numbers

9) Sum of two irrational numbers

10) Product of a rational and an irrational number

Write each expression in exponential form.

11) $\sqrt[3]{(7n)^5}$

12) $(\sqrt[4]{5m})^3$

Write each expression in radical form.

$$13) (5x)^{\frac{3}{4}}$$

$$14) 2v^{\frac{3}{4}}$$

Simplify. Your answer should contain only positive exponents.

$$15) 2xy^2 \cdot (y^0)^{-1}$$

$$16) x^{-1}y^4 \cdot (xy^2)^4$$

$$17) \frac{y^2}{2x^4y^3 \cdot x^2}$$

$$18) \frac{3x^2y^4}{x^{-3}y^2 \cdot x^{-3}y^3}$$

$$19) \frac{b^3}{(2a^4)^3}$$

$$20) \frac{2b^3}{(2a^4b^2)^{-2}}$$

Simplify. Your answer should contain only positive exponents with no fractional exponents in the denominator.

$$21) m^{\frac{1}{2}} n^{-\frac{3}{4}} \cdot \left(m^{-2} n^{\frac{5}{4}} \right)^3$$

$$22) x^{-\frac{1}{4}} \cdot \left(x^{-\frac{5}{3}} y^{-\frac{4}{3}} \right)^{-\frac{3}{2}}$$

$$23) \frac{2y^{-1}}{3xy^{-2} \cdot x^{\frac{1}{4}} y^{-\frac{4}{3}} \cdot 2y^2}$$

$$24) \frac{4u^{-1}v^{\frac{1}{3}}}{3u^{-\frac{4}{3}}v^{\frac{4}{3}} \cdot 4u^2v^{\frac{1}{2}}}$$

$$25) \frac{\left(x^{\frac{2}{3}} y^{\frac{1}{2}} \right)^{\frac{3}{2}}}{x^2 y^{\frac{2}{3}}}$$

$$26) \frac{\left(a^{\frac{2}{3}} b^0 \right)^2}{a^{\frac{3}{4}}}$$

Simplify. Use absolute value signs when necessary.

$$27) -\sqrt{80}$$

$$28) 7\sqrt{50}$$

29) $\sqrt{125x^2y^4}$

30) $\sqrt[4]{648x^5y^6}$

Simplify.

31) $-\sqrt{18} + 2\sqrt{3} + 3\sqrt{12}$

32) $2\sqrt{45} - 3\sqrt{2} - 2\sqrt{18}$

33) $2\sqrt{45} - \sqrt{3} - 2\sqrt{6} + 2\sqrt{20}$

34) $-2\sqrt{54} - 2\sqrt{3} + 2\sqrt{6} + 2\sqrt{54}$

35) $\sqrt{6a^2} \cdot 3\sqrt{2a^3}$

36) $\sqrt{10a^3} \cdot 5\sqrt{2a^3}$

37) $5\sqrt{2x} \cdot 5\sqrt{8x}$

38) $-5\sqrt{3m^2} \cdot \sqrt{12m^2}$

39) $(\sqrt{2} - 1)(-\sqrt{2} + 2)$

40) $(-1 + \sqrt{3})(-5 + \sqrt{3})$

$$41) \frac{5\sqrt{15}}{\sqrt{16}}$$

$$42) \frac{5\sqrt{4}}{\sqrt{9}}$$

$$43) \frac{3\sqrt{12}}{4\sqrt{15}}$$

$$44) \frac{4\sqrt{3}}{\sqrt{5}}$$

$$45) \frac{4 - 4\sqrt{5}}{2\sqrt{9}}$$

$$46) \frac{2 - 3\sqrt{5}}{\sqrt{4}}$$

$$47) \frac{3}{3 - \sqrt{5}}$$

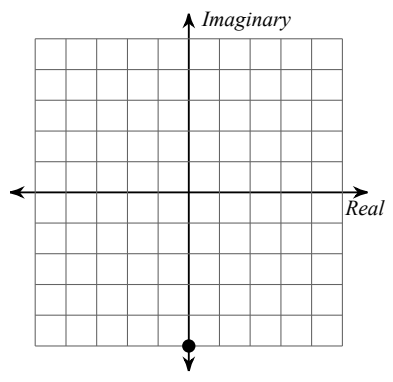
$$48) \frac{4}{4\sqrt{3} - 2\sqrt{2}}$$

$$49) \frac{3 - \sqrt{5}}{3 - \sqrt{2}}$$

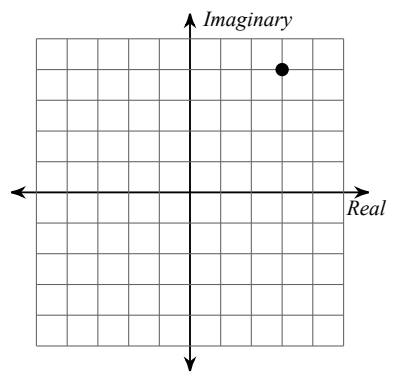
$$50) \frac{2\sqrt{2} + \sqrt{5}}{3 + 3\sqrt{5}}$$

Identify each complex number graphed.

51)

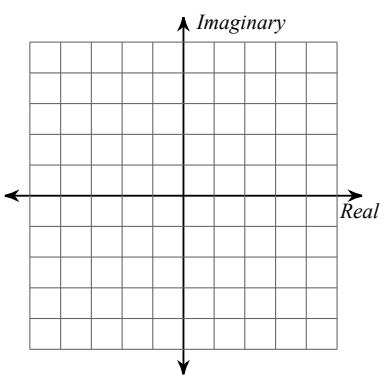


52)

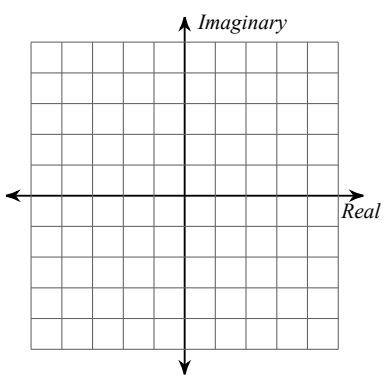


Graph each number in the complex plane.

53) $1 + i$



54) $3 + 3i$



Find the modulus of each complex number.

55) $|4 - 12i|$

56) $|8 + 2i|$

Simplify.

57) $(-3 + 3i) + (3 + 4i)$

58) $(4 - 6i) - (-7 + i)$

$$59) (-8 - 2i)(2 + 3i)$$

$$60) (-6 - 2i)(3 - 6i)$$

$$61) (7 - 4i)^2$$

$$62) \frac{5 + 4i}{-7i}$$

$$63) \frac{-4}{-8i}$$

$$64) \frac{-4}{-7i}$$

$$65) \frac{1}{9 - i}$$

$$66) \frac{5 - 3i}{9 - i}$$

$$67) \frac{-10 + 9i}{4 + 3i}$$

68) What is a conjugate? Where does it come from? What kinds of solutions have conjugates?

69) Define a complex number. Why is every number a complex number?

70) What does a fraction exponent mean?