

Term 1 Final Project/Review

List all sets to which the number belongs.

1) $\frac{12}{3}$

C R Q Z W N

2) $\sqrt[3]{-8}$

C R Q Z

3) $5.111111\dots$

C R Q

4) $6 + i$

C

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

Irrational

6) Sum of two rational numbers

Rational

7) Product of two irrational numbers

Rational or Irrational

8) Product of two rational numbers

Rational

9) Sum of two irrational numbers

Rational or Irrational

10) Product of a rational and an irrational number

Irrational

Write each expression in exponential form.

11) $(\sqrt[3]{7a})^2$

$(7a)^{\frac{2}{3}}$

12) $(\sqrt[6]{10r})^5$

$(10r)^{\frac{5}{6}}$

Write each expression in radical form.

$$13) (4x)^{\frac{2}{3}}$$

$$\sqrt[3]{(4x)^2}$$

$$14) (6b)^{\frac{5}{2}}$$

$$\sqrt{(6b)^5}$$

Simplify. Your answer should contain only positive exponents.

$$15) a^{-3} \cdot (a^4 b^{-1})^{-4}$$

$$\frac{b^4}{a^{19}}$$

$$16) \frac{4m^4}{mn^{-1} \cdot m}$$

$$4m^2 n$$

$$17) \frac{2m^3 n^{-2}}{(m^{-1} n^3)^2}$$

$$\frac{2m^5}{n^8}$$

$$18) \left(x^{-\frac{1}{3}} y^{-2} \cdot x^{\frac{3}{2}} y^{\frac{5}{4}} \right)^{\frac{5}{3}}$$

$$\frac{y^{\frac{3}{4}} x^{\frac{35}{12}}}{y^2}$$

$$19) \frac{3x^{\frac{7}{4}} y^{-\frac{1}{2}}}{4x^{-\frac{3}{2}} y^2 \cdot 2x^{-1} y^{\frac{3}{2}}}$$

$$\frac{3y^{\frac{1}{2}} x^{\frac{17}{4}}}{8y^3}$$

$$20) \frac{m^{-1} n^{-\frac{1}{2}}}{\left(m^{\frac{1}{2}} n^{\frac{1}{2}} \right)^{-\frac{1}{4}}}$$

$$\frac{n^{\frac{5}{8}} m^{\frac{1}{8}}}{nm}$$

Simplify. Use absolute value signs when necessary.

21) $3\sqrt{128}$

$$24\sqrt{2}$$

22) $\sqrt{20x^4y^2}$

$$2x^2|y|\sqrt{5}$$

Simplify.

23) $-2\sqrt{3} + 3\sqrt{12} - 2\sqrt{6} + 3\sqrt{3}$

$$7\sqrt{3} - 2\sqrt{6}$$

24) $\sqrt{15n^2} \cdot \sqrt{6n^3}$

$$3n^2\sqrt{10n}$$

25) $\sqrt{10x^3} \cdot 2\sqrt{20x^2}$

$$20x^2\sqrt{2x}$$

26) $(\sqrt{2} + \sqrt{5})(2\sqrt{3} - \sqrt{5})$

$$2\sqrt{6} - \sqrt{10} + 2\sqrt{15} - 5$$

27) $\frac{2\sqrt{6}}{\sqrt{3}}$

$$2\sqrt{2}$$

28) $\frac{\sqrt{3}}{2\sqrt{2}}$

$$\frac{\sqrt{6}}{4}$$

29) $\frac{4}{4 - \sqrt{5}}$

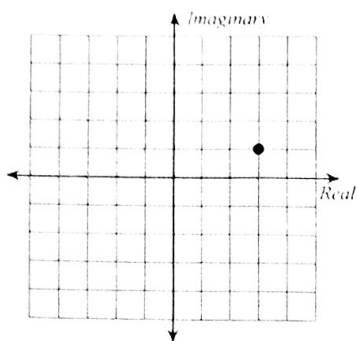
$$\frac{16 + 4\sqrt{5}}{11}$$

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

$$\frac{3\sqrt{5} - 4\sqrt{10} + 12\sqrt{2} - 32}{23}$$

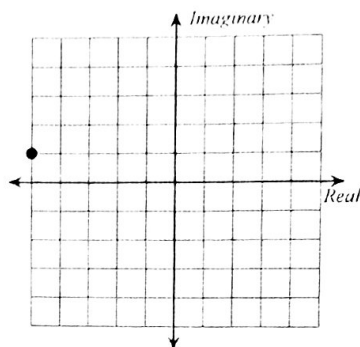
Identify each complex number graphed.

31)



$$3+i$$

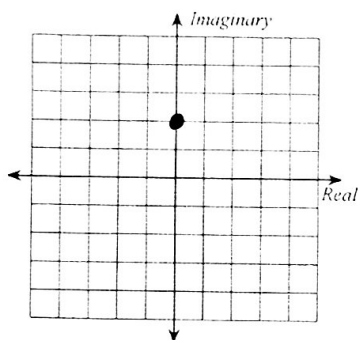
32)



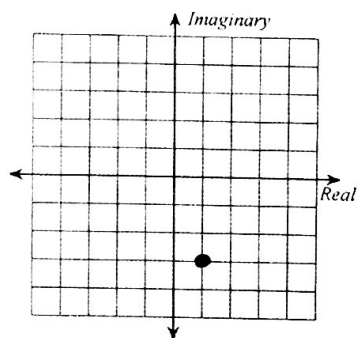
$$-5+i$$

Graph each number in the complex plane.

33) $2i$



34) $1 - 3i$



Find the modulus of each complex number.

35) $|-4 - i|$

$$\sqrt{17}$$

36) $|5 + 3i|$

$$\sqrt{34}$$

Simplify.

37) $(8 + 3i) - (-2 - 6i)$

$$10 + 9i$$

38) $(-6 - 8i)(-4 - 6i)$

$$-24 + 68i$$

39) $(6 - 3i)^2$

$$27 - 36i$$

40) $\frac{-1 + i}{3i}$

$$\frac{1 + i}{3}$$

41) $\frac{3i}{-6 + 2i}$

$$\frac{3 - 9i}{20}$$

42) $\frac{5 + 3i}{-5 - 10i}$

$$\frac{-11 + 7i}{25}$$

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

A conjugate is when you switch the middle sign of a binomial. It comes from the \pm option of a square root. Anything that comes from a root has a conjugate (irrational & imaginary).

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

A complex number has a real part and an imaginary part. Each number is complex since the real or imaginary part may have a coefficient of 0.

45) What does a fraction exponent mean?

It means you are taking a root.

Explain each property/theorem. Give an example to aid your explanation.

46) Zero Product Property

If two things multiply to be 0, then one of the multiples must be 0.

47) Fundamental Theorem of Algebra

The degree tells you how many solutions you'll have.

Describe when to use each strategy to solve a quadratic.

48) Factoring

When glasses works
(There are two numbers that multiply to acx^2 and add to bx)

49) Taking a square root

When there is only x^2

50) Complete the square

When $a=1$ and b is even

51) Quadratic formula

Anytime or when nothing else works

Find each product.

52) $(2x - 3)(5x + 8)$

$$10x^2 + x - 24$$

53) $(6x + 3)^2$

$$36x^2 + 36x + 9$$

Factor each completely.

54) $k^3 + 16k^2 + 63k$

$$k(k+7)(k+9)$$

55) $3n^4 - 42n^3 + 144n^2$

$$3n^2(n-8)(n-6)$$

56) $9x^4 - 39x^3 - 90x^2$

$$3x^2(3x+5)(x-6)$$

57) $2k^2 - 18$

$$2(k+3)(k-3)$$

Solve each equation by factoring.

58) $7x^2 - 21x - 196 = 0$

$$x = -4, 7$$

59) $6n^2 + 78n + 240 = 0$

$$n = -8, -5$$

60) $8p^2 = -4p + 40$

$$p = -\frac{5}{2}, 2$$

61) $15b^2 + 9b = 0$

$$b = 0, -\frac{3}{5}$$

Solve each equation by taking square roots.

62) $10r^2 + 4 = 334$

$$r = \pm \sqrt{33}$$

63) $6(x+4)^2 + 8 = -10$

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

Solve each equation by completing the square.

64) $x^2 + 4x + 51 = 10$

$$x = -2 \pm i\sqrt{37}$$

65) $n^2 + 4n - 54 = -4$

$$n = -2 \pm 3\sqrt{6}$$

Solve each equation with the quadratic formula.

66) $-9x^2 = -9x + 11$

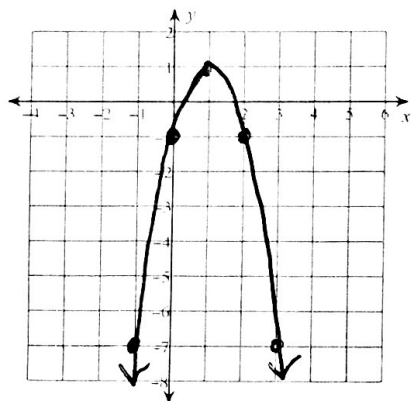
$$x = \frac{3 \pm i\sqrt{35}}{6}$$

67) $-p^2 + 11 = 3p$

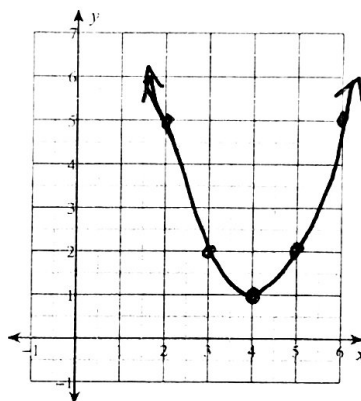
$$p = \frac{-3 \pm \sqrt{53}}{2}$$

Sketch the graph of each function.

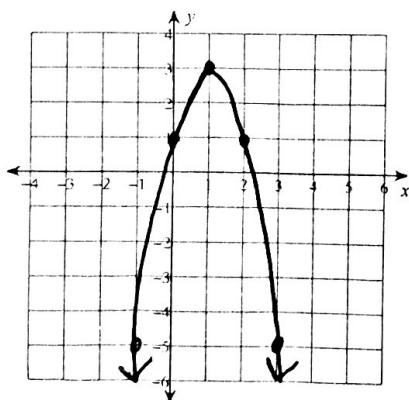
68) $y = -2x^2 + 4x - 1$



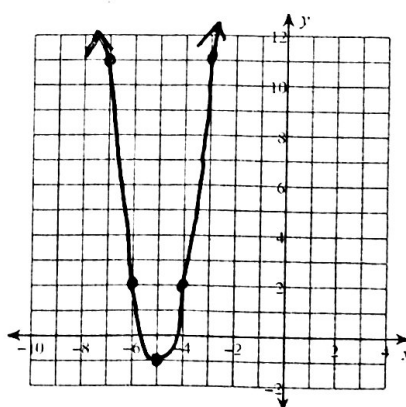
69) $y = x^2 - 8x + 17$



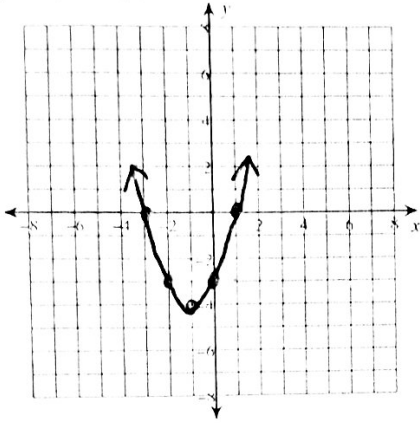
70) $y = -2(x - 1)^2 + 3$



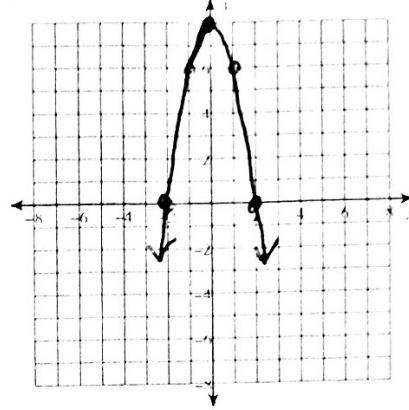
71) $y = 3(x + 3)^2 - 1$



72) $y = (x - 1)(x + 3)$

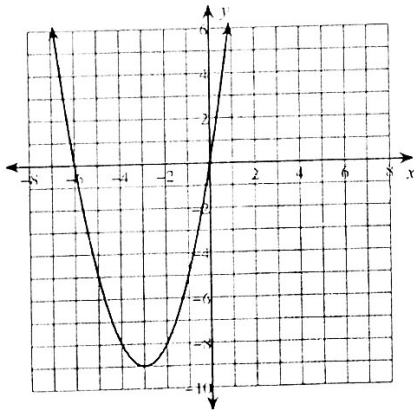


73) $y = -2(x - 2)(x + 2)$



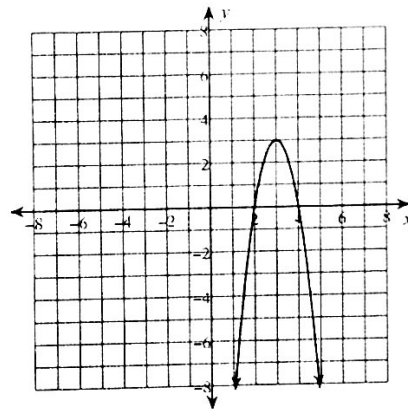
Identify the equation from the graph.

74)



$y = x(x+6)$ or $y = (x+3)^2 - 9$

75)



$y = -3(x-2)(x-4)$ or $y = -3(x-3)^2 + 3$

76) A rocket is launched from atop a 192 foot cliff with an initial velocity of 64 ft/s represented by the equation $h = -16t^2 + 64t + 192$.

a. What is the maximum height of the rocket?

256 ft

b. How long will it take the rocket to reach its maximum height?

2 seconds

c. How high is the rocket after 2.5 seconds?

252 ft

d. How long will it take the rocket to hit the ground after it is launched?

6 seconds

77) You are trying to dunk a basketball. You need to jump 2.5 feet in the air to dunk the ball. The height that your feet are above the ground is given by the function $h = -16t^2 + 12t$.

a. What is the maximum height your feet will be above the ground?

2.25 ft

b. Will you be able to dunk the basketball?

No

78) A diver is standing on a platform 24 feet above the pool. He jumps from the platform with an initial upward velocity of 8 ft/s. Use the formula $h = -16t^2 + 8t + 24$, where h is his height above the water, and t is the time.

a. What is the maximum height of the diver?

25 ft

b. How long did it take the diver to reach the maximum height?

.25 seconds

c. How long will it take for him to hit the water?

1.5 seconds

Write each equation in standard form.

79) $y = 4(x - 6)(x - 8)$

$$y = 4x^2 - 56x + 192$$

80) $y = -3(x + 3)^2 + 2$

$$y = -3x^2 - 18x - 29$$

Write each equation in intercept form.

81) $y = 2b^2 + 18b + 40$

$$y = 2(b+4)(b+5)$$

82) $y = 4x^2 + 8x$

$$y = 4x(x+2)$$

83) $y = (x+3)^2 + 1$

Can't factor

My bad 😊

84) $y = -(x+3)^2 + 4$

$$y = -(x+6)(x-1)$$

Write each equation in vertex form.

85) $y = x^2 - 16x - 27$

$$y = (x-8)^2 - 91$$

86) $y = m^2 - 4m - 21$

$$y = (m-2)^2 - 25$$

87) $y = (k+4)(k+2)$

$$y = (k+3)^2 - 1$$

88) $y = n(n-8)$

$$y = (n-4)^2 - 16$$