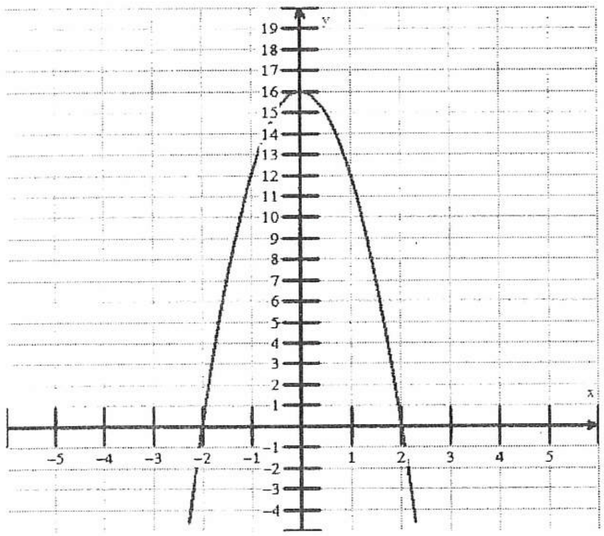
Name Key Review for Test 2-2 Quadratics

Period ______ Date________ Pre-AP Algebra 2

1)

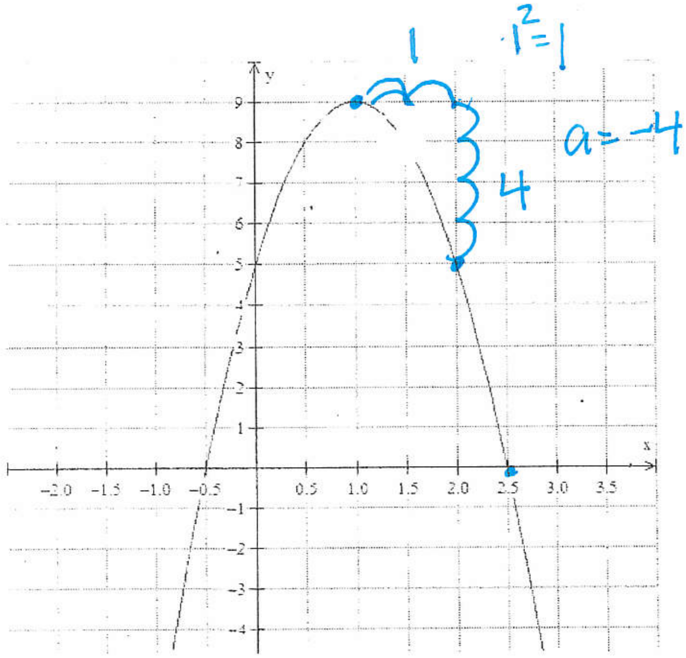


a) Vertex Form $y = -4(x)^2 + 16$

b) Standard Form $y = -4x^2 + 16$

c) Root Form $y = -4(x-2)(x+2)$

2)



a) Vertex Form $y = -4(x-1)^2 + 9$

Vertex (1, 9)

b) Standard Form $y = -4x^2 - 8x + 5$

Foil & distribute

c) Root Form $y = -(2x+1)(2x-5)$

$x = -\frac{1}{2}$

$2 \cdot x = -\frac{1}{2} \cdot 2$ $x = \frac{5}{2}$ $2.5 = \frac{5}{2}$

$2x = 5$ $-.5$

$(2x+1)$ $(2x-5)$

Foil $-(2x+1)(2x-5)$

$-(4x^2 - 8x^2 - 5)$

3) Also Study P. 120 #16 - 27 all and P. 135 # 1 - 18 all

Omit 3-8

16. a. $x = -\frac{3}{2}; x = 4$

b. $x = -\frac{1}{3}; x = -2$

c. $x = \frac{5}{2}$

d. $x = \frac{2}{3}; x = -\frac{2}{3}$

e. $x = \frac{4}{3}; x = -\frac{1}{2}$

17. More than one correct equation is possible; other correct equations would be real-number multiples of the equations given.

a. $x^2 + 3x - 40 = 0$

b. $3x^2 - 14x + 8 = 0$

c. $10x^2 + 9x - 7 = 0$

d. $x^2 - 12x + 36 = 0$

18. No. Sample explanation: The student is assuming that if a product is equal to 2, then one of the factors must be equal to 2. This assumption is incorrect. For example, the product $4\left(\frac{1}{2}\right)$ is equal to 2, but neither of the factors is equal to 2.

19. B

20. $b^2 + 30b - 5400 = 0$

21. $(b + 90)(b - 60) = 0$; $b = -90$ or $b = 60$; The solution $b = -90$ must be excluded, because b represents the base of a triangle, and it does not make sense for the base to be negative. The solution $b = 60$ shows that the base of the triangle measures 60 ft.

22. $x < -4$ or $x > 6$; Sample explanation: The factor $(x + 4)$ is negative for $x < -4$ and positive for $x > -4$. The factor $(x - 6)$ is negative for $x < 6$ and positive for $x > 6$. Both factors are negative, which means their product is positive when $x < -4$; and both factors are positive, which also means their product is positive when $x > 6$.

23. a. $-1 \le x \le 4$

b. $x < -\frac{2}{3}$ or $x > 3$

c. no real solutions

d. $x \le -3$ or $x \ge -1$

e. $-3 \le x \le 7$

f. $-\frac{2}{5} < x < 3$

24. $-16t^2 + 20t + 6 \ge 10$

25. $16t^2 - 20t + 4 \le 0$

26. $\frac{1}{4} \le t \le 1$; The ball is at least 10 ft above the ground between $\frac{1}{4}$ second and 1 second after it is thrown.

ADDITIONAL PRACTICE

If students need more practice on the concepts in this activity, see the Teacher Resources at SpringBoard Digital for additional practice problems.

Lesson 7-3

16. Solve each quadratic equation by factoring.

a. $2x^2 - 5x - 12 = 0$

b. $3x^2 + 7x = -2$

c. $4x^2 - 20x + 25 = 0$

d. $27x^2 - 12 = 0$

e. $6x^2 - 4 = 5x$

17. For each set of solutions, write a quadratic equation in standard form.

a. $x = 5, x = -8$ b. $x = \frac{2}{3}, x = 4$

c. $x = -\frac{7}{5}, x = \frac{1}{2}$ d. $x = 6$

18. A student claims that you can find the solutions of $(x - 2)(x - 3) = 2$ by solving the equations $x - 2 = 2$ and $x - 3 = 2$. Is the student's reasoning correct? Explain why or why not.

One face of a building is shaped like a right triangle with an area of 2700 ft^2. The height of the triangle is 30 ft greater than its base. Use this information for Items 19–21.

19. Which equation can be used to determine the base b of the triangle in feet?

A. $b(b + 30) = 2700$

B $\frac{1}{2}b(b + 30) = 2700$

C. $b(b - 30) = 2700$

D. $\frac{1}{2}b(b - 30) = 2700$

20. Write the quadratic equation in standard form so that the coefficient of b^2 is 1.

21. Solve the quadratic equation by factoring, and interpret the solutions. If any solutions need to be excluded, explain why.

Lesson 7-4

22. For what values of x is the product $(x + 4)(x - 6)$ positive? Explain.

23. Solve each quadratic inequality.

a. $x^2 - 3x - 4 \le 0$ b. $3x^2 - 7x - 6 > 0$

c. $x^2 - 16x + 64 < 0$ d. $2x^2 + 8x + 6 \ge 0$

e. $x^2 - 4x - 21 \le 0$ f. $5x^2 - 13x - 6 < 0$

The function $h(t) = -16t^2 + 20t + 6$ models the height in feet of a football t seconds after it is thrown. Use this information for Items 24–26.

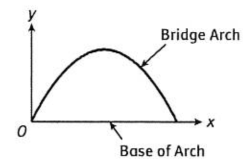
24. Write a quadratic inequality that can be used to determine when the football will be at least 10 ft above the ground.

25. Write the quadratic inequality in standard form.

26. Solve the quadratic inequality by factoring, and interpret the solution(s).

MATHEMATICAL PRACTICES
Make Sense of Problems and Persevere in Solving Them

27. The graph of the function $y = -\frac{1}{8}x^2 + 2x$ models the shape of an arch that forms part of a bridge, where x and y are the horizontal and vertical distances in feet from the left end of the arch.

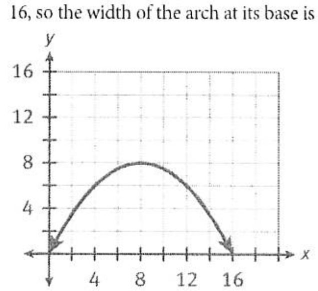


a. The greatest width of the arch occurs at its base. Use a graph to determine the greatest width of the arch. Explain how you used the graph to find the answer.

b. Now write a quadratic equation that can help you find the greatest width of the arch. Solve the equation by factoring, and explain how you used the solutions to find the greatest width.

c. Compare and contrast the methods of using a graph and factoring an equation to solve this problem.

27. a. 16 ft; Sample explanation: The graph shows that $y = 0$ when $x = 0$ and when $x = 16$. The distance between the points (0, 0) and (16, 0) is 16, so the width of the arch at its base is 16 ft.



b. $-\frac{1}{8}x^2 + 2x = 0$; $x = 0$ or $x = 16$; Sample explanation: The solutions show that $y = 0$ when $x = 0$ and when $x = 16$. The right end of the base of the arch is 16 ft from the left end of the base of the arch.

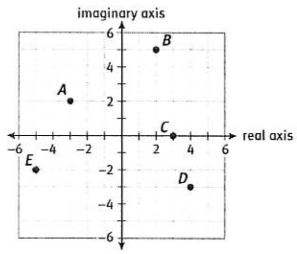
c. Sample answer: Both methods involve finding the values of x for which $y = 0$. When using a graph, the values of x are found by observing where the graph of the function intersects the x-axis. When using an equation, these values of x are found by substituting 0 for y in the equation of the function and then solving.

ACTIVITY 8 PRACTICE

Write your answers on notebook paper. Show your work.

Lesson 8-1

1. Write each expression in terms of i.
   a. $\sqrt{-64}$
   b. $\sqrt{-31}$
   c. $-7+\sqrt{-12}$
   d. $5-\sqrt{-50}$
2. Which expression is equivalent to $5i$?
   A. $\sqrt{-5}$ B. $-\sqrt{5}$
   C. $\sqrt{-25}$ D. $-\sqrt{25}$
3. Use the Quadratic Formula to solve each equation.
   a. $x^2+5x+9=0$
   b. $2x^2-4x+5=0$
4. The sum of two numbers is 12, and their product is 100.
   a. Let x represent one of the numbers. Write an expression for the other number in terms of x. Use the expressions to write an equation that models the situation given above.
   b. Use the Quadratic Formula to solve the equation. Write the solutions in terms of i.
5. Explain why each of the following is a complex number, and identify its real part and its imaginary part.
   a. $5+3i$ b. $\sqrt{2}-i$
   c. $-14i$ d. $\frac{3}{4}$
6. Draw the complex plane on grid paper. Then graph each complex number on the plane.
   a. $-4i$ b. $6+2i$
   c. $-3-4i$ d. $3-5i$
   e. $-2+5i$
7. What complex number does the ordered pair $(5, -3)$ represent on the complex plane? Explain.
8. Name the complex number represented by each labeled point on the complex plane below.



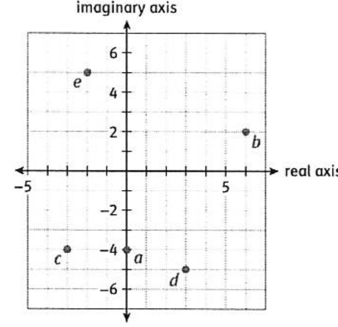
Lesson 8-2

9. Find each sum or difference.
   a. $(5-6i)+(-3+9i)$
   b. $(2+5i)+(-5+3i)$
   c. $(9-2i)-(1+6i)$
   d. $(-5+4i)-\left(\frac{7}{3}+\frac{1}{6}i\right)$
10. Find each product, and write it in the form $a+bi$.
   a. $(1+4i)(5-2i)$
   b. $(-2+3i)(3-2i)$
   c. $(7+24i)(7-24i)$
   d. $(8-3i)(4-2i)$
11. Find each quotient, and write it in the form $a+bi$.
   a. $\frac{3+2i}{5-2i}$ b. $\frac{-1+i}{5-2i}$
   c. $\frac{10-2i}{5i}$ d. $\frac{3+i}{3-i}$
12. Explain how to use the Commutative, Associative, and Distributive Properties to perform each operation.
   a. Subtract $(3+4i)$ from $(8+5i)$.
   b. Multiply $(-2+3i)$ and $(4-6i)$.

ACTIVITY 8 Continued

ACTIVITY PRACTICE

1. a. $8i$ b. $i\sqrt{31}$
   c. $-7+2i\sqrt{3}$ d. $5-5i\sqrt{2}$
2. C
3. a. $x=-\frac{5}{2}\pm\frac{\sqrt{11}}{2}i$
   b. $x=1\pm\frac{\sqrt{6}}{2}i$
4. a. $12-x$; $x(12-x)=100$
   b. $x=6-8i$, $x=6+8i$
5. a. $5+3i$ is a complex number because it has the form $a+bi$. The real part is 5, and the imaginary part is $3i$.
   b. $\sqrt{2}-i$ is a complex number because it can be written in the form $a+bi$: $\sqrt{2}+(-1)i$. The real part is $\sqrt{2}$, and the imaginary part is $-1i$.
   c. $-14i$ is a complex number because it can be written in the form $a+bi$: $0+(-14)i$. The real part is 0, and the imaginary part is $-14i$.
   d. $\frac{3}{4}$ is a complex number because it can be written in the form $a+bi$: $\frac{3}{4}+0i$. The real part is $\frac{3}{4}$, and the imaginary part is $0i$.
6. a–e.



7. $5-3i$; The first number in the ordered pair is the real part of the complex number, and the second number in the ordered pair is the imaginary part of the complex number.
8. A: $-3+2i$
   B: $2+5i$
   C: 3
   D: $4-3i$
   E: $-5-2i$
9. a. $2+3i$
   b. $-3+8i$
   c. $8-8i$
   d. $-\frac{22}{3}+\frac{23}{6}i$
10. a. $13+18i$
   b. $0+13i$
   c. $625+0i$
   d. $26-28i$
11. a. $\frac{11}{29}+\frac{16}{29}i$
   b. $-\frac{7}{29}+\frac{3}{29}i$
   c. $-\frac{2}{5}-2i$
   d. $\frac{4}{5}+\frac{3}{5}i$
12. a. Sample answer: Use the Distributive Property to rewrite subtraction as addition of the opposite: $(8+5i)-(3+4i)=(8+5i)+[-3+(-4)i]$. Then use the Commutative and Associative Properties to group the real addends and the imaginary addends: $[8+(-3)]+[5i+(-4)i]$. Add the real addends, and then use the Distributive Property to add the imaginary addends: $5+[5+(-4)]i=5+i$.
   b. Sample answer: First, apply the Distributive Property to multiply: $(-2+3i)(4-6i)=-8+12i+12i+18$. Then use the Commutative and Associative Properties to group the real addends and the imaginary addends: $(-8+18)+(12i+12i)$. Add the real addends, and then use the Distributive Property to add the imaginary addends: $10+(12+12)i=10+24i$.