#1. Solving By Factoring

Solve each quadratic equation by factoring:

15. $2x^2 + 7x + 3 = 0$

16. $3w^2 + 14w + 8 = 0$

17. $3n^2 - 7n + 2 = 0$

18. $5d^2 - 22d + 8 = 0$

19. $6h^2 + 8h + 2 = 0$

20. $8p^2 - 16p = 10$

21. $9y^2 + 18y - 12 = 6y$

22. $4a^2 - 16a = -15$

#2. Solving by Taking the Square Roots

Solve each quadratic by taking the Square Root of each side (use simplified square roots):

1. $c^2 - 12c + 36 = 4$

2. $w^2 - 10w + 25 = 16$

3. $b^2 + 16b + 64 = 9$

4. $y^2 + 2y + 1 = 3$

5. $r^2 + 4r + 4 = 7$

6. $a^2 - 8a + 16 = 12$

#3. Solve by Completing the Square

Find the value of c that makes each trinomial a perfect square.

7. $g^2 + 6g + c$

8. $y^2 + 4y + c$

9. $a^2 - 14a + c$

10. $n^2 - 2n + c$

11. $s^2 - 18s + c$

12. $p^2 + 20p + c$

Solve each equation by completing the square. Round to the nearest tenth if necessary.

13. $x^2 + 4x - 12 = 0$

14. $v^2 - 8v + 15 = 0$

15. $q^2 + 6q = 7$

16. $r^2 - 2r = 15$

17. $m^2 - 14m + 30 = 6$

18. $b^2 + 12b + 21 = 10$

19. $z^2 - 4z + 1 = 0$

20. $y^2 - 6y + 4 = 0$

#4: Solve using the Quadratic Formula

Solve using the Quadratic Fomrula. Round to the nearest tenth if necessary.

1. $u^2 - 49 = 0$

2. $n^2 - n - 20 = 0$

3. $s^2 - 5s - 36 = 0$

4. $b^2 + 11b + 30 = 0$

5. $c^2 - 7c = -3$

6. $p^2 + 4p = -1$

7. $a^2 - 9a + 22 = 0$

8. $x^2 + 6x + 3 = 0$

State the value of the discriminant. Then state whether there are 0, 1, or 2 real roots.

15. $q^2 + 4q + 3 = 0$

16. $m^2 + 2m + 1 = 0$

17. $a^2 - 4a + 10 = 0$

18. $w^2 - 6w + 7 = 0$

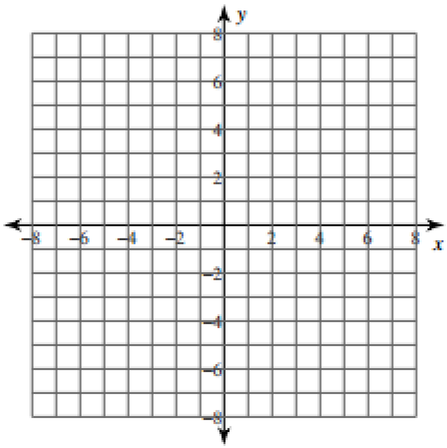
19. $z^2 - 2z - 7 = 0$

20. $y^2 - 10y + 25 = 0$

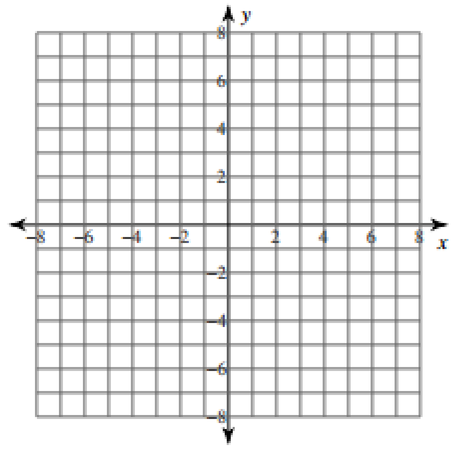
#5: Vertex Form

Identify the vertex and axis of symmetry of each. Then sketch the graph.

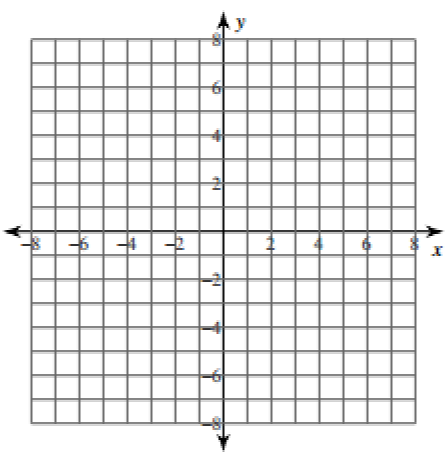
15) $f(x) = -3(x-2)^2 - 4$



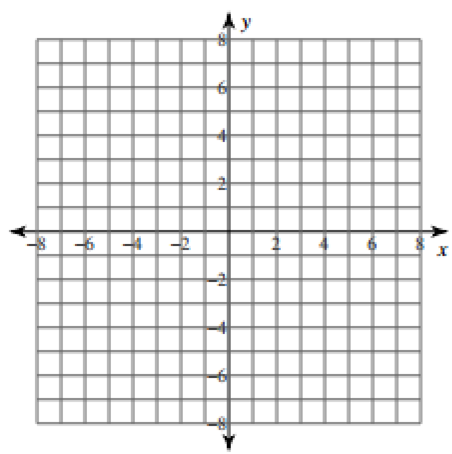
16) $f(x) = -\frac{1}{4}(x-1)^2 + 4$



17) $f(x) = \frac{1}{4}(x+4)^2 + 3$



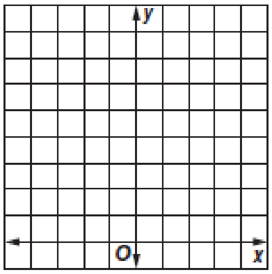
18) $f(x) = \frac{1}{4}(x+5)^2 + 2$



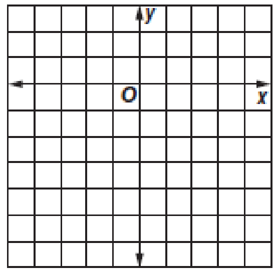
#6: Standard Form

Write the equation of the axis of symmetry, and find the coordinates of the vertex of the graph of each function. Identify the vertex as a maximum or minimum. Then graph the function.

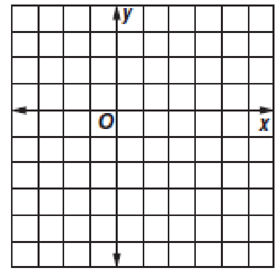
5. $y = 2x^2$



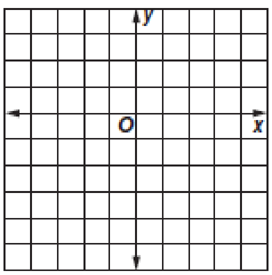
6. $y = x^2 - 2x - 5$



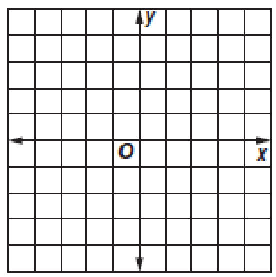
7. $y = -x^2 + 4x - 1$



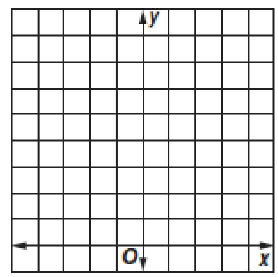
8. $y = -x^2 - 2x + 2$



9. $y = 2x^2 + 4x - 2$



10. $y = -2x^2 - 4x + 6$



#7: Quadratic Applications

1. Jason jumped off of a cliff into the ocean in Acapulco while vacationing with some friends. His height as a function of time could be modeled by the function $h(t) = -16t^2 + 16t + 480$, where t is the time in seconds and h is the height in feet.

   a. How long did it take for Jason to reach his maximum height?

   b. What was the highest point that Jason reached?

   c. Jason hit the water after how many seconds?

2. If a toy rocket is launched vertically upward from ground level with an initial velocity of 128 feet per second, then its height *h* after *t* seconds is given by the equation $h(t) = -16t^2 + 128t$ (if air resistance is neglected).

   a. How long will it take for the rocket to return to the ground?

3. A rocket is launched from atop a 101 – foot cliff with an initial velocity of 116 ft/s.
   a. Substitute the values into the vertical motion formula $h(t) = -16t^2 + vt + h_0$. Let h(t) = 0
   b. Use the quadratic formula to find out how long the rocket will take to hit the ground after it is launched. Round to the nearest tenth of a second.

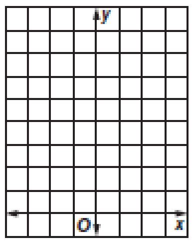
4. You and a friend are hiking in the mountains. You want to climb to a ledge that is 20 ft. above you. The height of the grappling hook you throw is given by the function $h(t) = -16t^2 - 32t + 5$. What is the maximum height of the grappling hook? Can you throw it high enough to reach the ledge?

5. You are trying to dunk a basketball. You need to jump 2.5 ft. in the air to dunk the ball. The height that your feet are above the ground is given by the function $h(t) = -16t^2 + 12t$. What is the maximum height your feet will be above the ground? Will you be able to dunk the basketball?

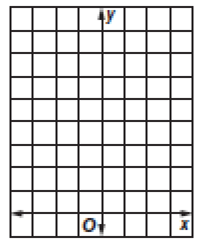
#8: Graphing Exponential Functions

Graph each function. State the y-intercept. Then use the graph to determine the approximate value of the given expression. Use a calculator to confirm the value.

1. $y = 2^x$; $2^{2.3}$

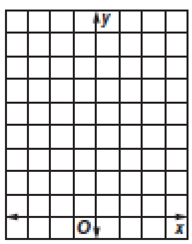


2. $y = \left(\frac{1}{3}\right)^x$; $\left(\frac{1}{3}\right)^{-1.6}$

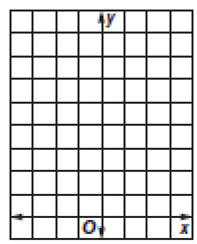


Graph each function. State the y-intercept.

3. $y = 3(2^x)$



4. $y = 3^x + 2$



Determine whether the data in each table display exponential behavior. Explain why or why not.

5.

x	−3	−2	−1	0
y	9	12	15	18

6.

x	0	5	10	15
y	20	10	5	2.5

#9: Growth & Decay

POPULATION For Exercises 1 and 2, use the following information.

The population of New York City increased from 8,008,278 in 2000 to 8,168,388 in 2005. The annual rate of population increase for the period was about 0.4%. **Source:** www.nyc.gov

1. Write an equation for the population t years after 2000.

2. Use the equation to predict the population of New York City in 2015.

5. **HOUSING** Mr. and Mrs. Boyce bought a house for $96,000 in 1995. The real estate broker indicated that houses in their area were appreciating at an average annual rate of 4%. If the appreciation remained steady at this rate, what was the value of the Boyce's home in 2005?

8. **FINANCES** Kyle saved $500 from a summer job. He plans to spend 10% of his savings each week on various forms of entertainment. At this rate, how much will Kyle have left after 15 weeks?

9. **TRANSPORTATION** Tiffany's mother bought a car for $9000 five years ago. She wants to sell it to Tiffany based on a 15% annual rate of depreciation. At this rate, how much will Tiffany pay for the car?

#10: Compound Interest

1.) Your 3 year investment of $20,000 received 5.2% interested compounded semi annually. What is your total return?

Answer:

2.) You borrowed $59,000 for 2 years at 11% which was compounded annually. What total will you pay back?

Answer:

3.) Your allowance of $190 got 11% compounded monthly for 1 2/3 years. What's it worth after the 1 2/3 years?

Answer:

4.) Your 6 1/4 year investment of $40,000 at 14% compounded quarterly is worth how much now?

Answer:

5.) You borrowed $1,690 for 5 1/2 years a at 5.7% compounded semi annually. What total will you pay back?

Answer:

6.) Your $440 gets 5.8% compounded annually for 8 years. What will your $440. be worth in 8 years?

#11: Half-Life

1. The half life of Cs-137 is 30.2 years. If the initial mass of the sample is 1.00kg, how much will remain after 151 years?

2. Carbon-14 has a half life of 5730 years. Consider a sample of fossilized wood that when alive would have contained 24g of C-14. It now contains 1.5g. How old is the sample?

1. An isotope of cesium (cesium-137) has a half-life of 30 years. If 1.0 g of cesium-137 disintegrates over a period of 90 years, how many g of cesium-137 would remain?

2. Actinium-226 has a half-life of 29 hours. If 100 mg of actinium-226 disintegrates over a period of 58 hours, how many mg of actinium-226 will remain?

3. Sodium-25 was to be used in an experiment, but it took 3.0 minutes to get the sodium from the reactor to the laboratory. If 5.0 mg of sodium-25 was removed from the reactor, how many mg of sodium-25 were placed in the reaction vessel 3.0 minutes later if the half-life of sodium-25 is 60 seconds?

#12: Geometric Sequences

9) State the common ratio for each geometric sequence and write the next three terms.

a) 1, 2, 4, 8, ... **b)** -3, 9, -27, 81, ... **c)** $\frac{2}{3}, -\frac{2}{3}, \frac{2}{3}, -\frac{2}{3}, \ldots$ **d)** 600, -300, 150, -75, ...

10) For the geometric sequence 54, 18, 6, ... determine the formula for the general term and then find t_9.

11) Write the first four terms of each geometric sequence.

a) $t_n = 5(2)^{n-1}$ **b)** $a = -1, r = \frac{1}{5}$