

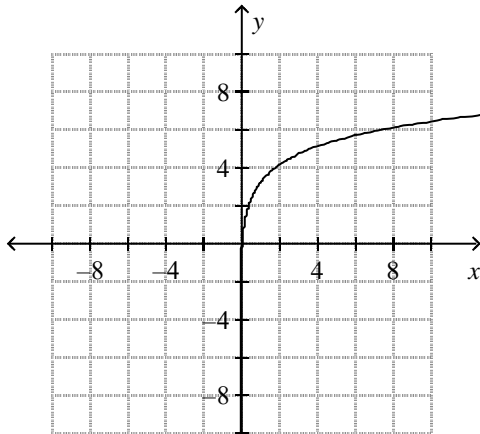
Midterm Review - Honors Math 3 – Spring 2019

1. Write a recursive formula for the sequence 15, 26, 48, 92, 180, Then find the next term.

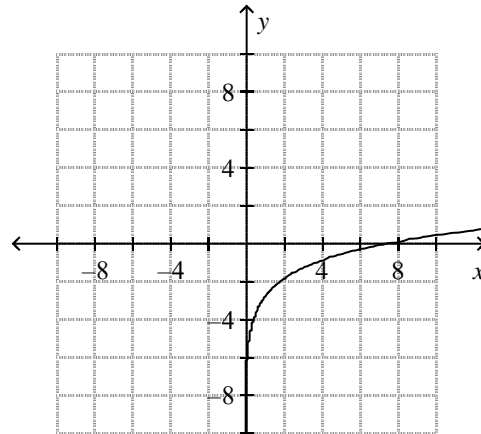
Graph the logarithmic equation.

2. $y = \log_2 x - 3$

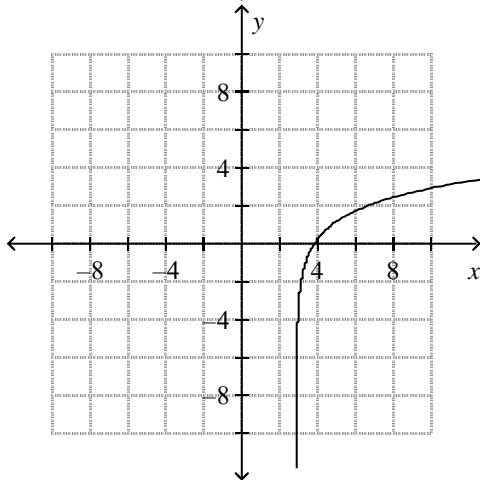
a.



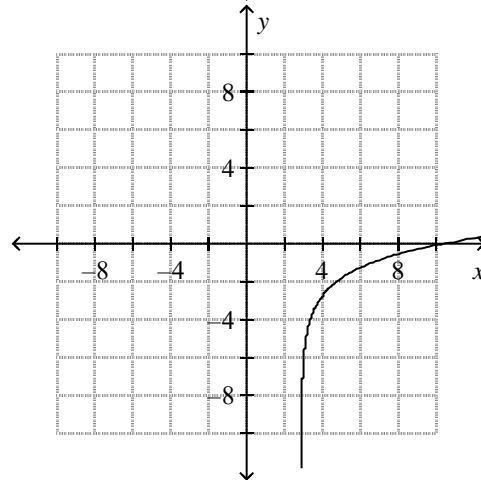
c.



b.



d.



Simplify. Write the answer in standard form.

3. $8(z^2 - 5z - 4) + (z^2 - 4)$
 4. $(2a^2 - 7a - 9) - (8a^2 + 8a - 3)$

Solve the equation. Check for extraneous solutions.

5. $4|4 - 3x| = 4x + 6$

Factor the expression.

6. $c^3 - 512$
 7. $x^4 - 18x^2 + 81$

8. $9x^2 - 64$
9. $4x^2 + 12x + 9$
10. $x^2 + x - 42$
11. $15x^2 - 16xy + 4y^2$

Use Pascal's Triangle to expand the binomial.

12. $(d + 5)^7$

Solve the system of inequalities by graphing.

13.
$$\begin{cases} x \geq 3 \\ y > 2 \end{cases}$$

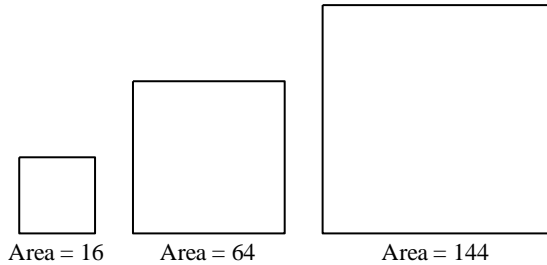
Find the roots of the polynomial equation.

14. $2x^3 + 2x^2 - 19x + 20 = 0$
15. Write an exponential function $y = ab^x$ for a graph that includes (0, 2.5) and (2, 40).
16. Write a polynomial function in standard form with zeros at -1, 4, and 3.
17. $6 - \sqrt{-160}$
18. Solve $|3x + 6| < 12$. Graph the solutions.
19. Determine which binomial is a factor of $4x^3 - 14x^2 + 4x + 6$.
 a. $x + 4$ b. $x + 3$ c. $x + 6$ d. $x - 3$
20. The formula $P = 14.7e^{-0.21x}$ gives the average atmospheric pressure P in pounds per square inch, at an altitude x in miles above sea level.
 a. Find the elevation at which the average atmospheric pressure is 8.4 lb/in.². Show the steps you used to solve this problem.
 b. What is the average atmospheric pressure at sea level? Explain.
21. A gardener builds a fence for a square garden that is 12 yd by 12 yd. A fence post is positioned at every corner and every 3 ft. How many fence posts will the gardener need?
22. Graph $f(x) = \begin{cases} -x - 2, & \text{if } x < 3 \\ 2x - 11, & \text{if } x \geq 3 \end{cases}$.
23. Solve $\frac{1}{16} = 64^{4x-3}$.
24. Write $-x^2(-4x^2 + 4x^3)$ in standard form. Then classify it by degree and number of terms.

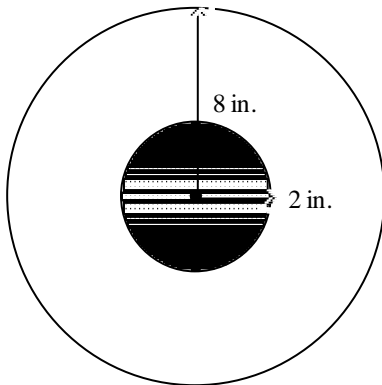
Solve the equation.

25. $-5|k - 2| = -35$

26. $4|x - 3| + 7 = 15$
27. Find the zeros of $f(x) = (x - 5)^2(x - 2)^3$ and state the multiplicity.
28. What is the perimeter of the fifth square in this pattern?



29. Solve by factoring.
 $4x^2 + 20x - 56 = 0$
30. The total number of horses and people at the riding academy for the Sunday session was 39. The total number of legs at the academy that day was 124. How many people were at the riding academy that Sunday?
31. If a dart hits the target at random, what is the probability that it will land in the shaded region?



Drawing not to scale

Solve the system by the method of substitution.

32.
$$\begin{cases} -2x - 2y + 3z = 1 \\ z = -3 \\ x + 2y - z = 1 \end{cases}$$

Write the expression as a single logarithm.

33. $5 \log_8 v + 6 \log_8 w$
34. Consider the sequence $-7, -5.6, -4.2, -2.8, -1.4, \dots$
- Write an explicit formula for the sequence. Explain your steps.
 - Write a recursive formula for the sequence. Explain your steps.

- c. Suppose you need to find the 50th term of the sequence. Explain which formula you would use.
 - d. Which term is the number 103.6? Explain your method for solving this problem.
35. A manufacturer determines that the number of drills it can sell is given by the formula $D = -3p^2 + 168p - 295$, where p is the price of the drills in dollars.
- a. At what price will the manufacturer sell the maximum number of drills?
 - b. What is the maximum number of drills that can be sold?
36. Write an explicit formula for the sequence 5, 6, 7, 8, 9, ... Then find $f(14)$.

Write the equation in logarithmic form.

37. $125^{\frac{4}{3}} = 625$
38. Orlando is making a design for a logo. He begins with a square measuring 24 inches on a side. The second square has a side length of 19.2 inches, and the third square has a side length of 15.36 inches. Which square will be the first square with a side length of less than 12 inches?
39. Find a third-degree polynomial equation with rational coefficients that has roots -4 and $6 + i$.
40. A balloon takes off from a location that is 182 ft above sea level. It rises 70 ft/min. Write an equation to model the balloon's elevation h as a function of time t .
41. Determine which binomial is *not* a factor of $4x^4 - 21x^3 - 46x^2 + 219x + 180$.
- a. $x + 4$
 - b. $x + 3$
 - c. $x - 5$
 - d. $4x + 3$
42. Solve $6^{2x} = 31$. Round to the nearest ten-thousandth.

Simplify the expression.

43. $(5u^6r^3t^2)^4$
44. $\frac{(xy^5)(x^5y)}{(x^6y)^4}$
45. $(-1 - 3i)(4 - 2i)$

Solve the quadratic equation by completing the square.

46. $-3x^2 - 5x = -7$
47. Write the equation that is the translation of $y = |x|$ right 2 units and down 10 units.

Solve the inequality. Graph the solution.

48. $|2x + 9| \geq 23$
49. A rental car agency charges a flat fee of \$33.00 plus \$3.00 per day to rent a certain car. Another agency charges a fee of \$31.00 plus \$3.25 per day to rent the same car.

- a. Write a system of equations to represent the cost c for renting a car at each agency for d days.
 - b. Using a graphing calculator, find the number of days for which the costs are the same. Round your answer to the nearest whole day.
50. David, Tom, Bill, and Norman live in Chicago, Vancouver, New Jersey, and Los Angeles. Tom is the brother of the man who lives in Vancouver. Norman is not Tom's brother and does not live in Los Angeles. Either David or Bill lives in Chicago. David is an only child. Which person lives in which city?
51. A furniture maker uses the specification $17.86 \leq w \leq 18.14$ for the width w in inches of a desk drawer. Write the specification as an inequality.
52. The range of a car is the distance R in miles that a car can travel on a full tank of gas. The range varies directly with the capacity of the gas tank C in gallons.
- a. Find the constant of variation for a car whose range is 374 mi with a gas tank that holds 22 gal.
 - b. Write an equation to model the relationship between the range and the capacity of the gas tank.
53. Write two linear equations you can use to graph $y = |3x - 8|$.

Divide using long division.

54. $(x^4 + 4x^3 - 50x^2 + 23x + 10) \div (x - 5)$

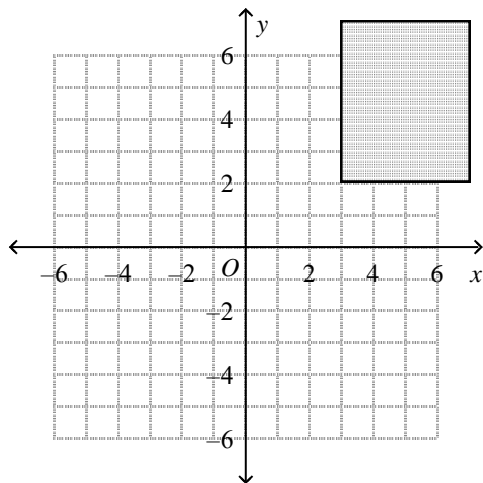
Simplify.

55. $8\sqrt{20}$

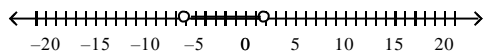
56. The dimensions in inches of a shipping box at We Ship 4 You can be expressed as width x , length $x + 5$, and height $3x - 1$. The volume is about 7.6 ft^3 . Find the dimensions of the box in inches. Round to the nearest inch.

Midterm Review - Honors Math 3 - Fall 2018 Answer Section

1. $f(n) = 2f(n-1) - 4; f(1) = 15; 356$
2. B
3. $9z^2 - 40z - 36$
4. $-6a^2 - 15a - 6$
5. $x = \frac{5}{8}$ or $x = \frac{11}{4}$
6. $(c-8)(c^2 + 8c + 64)$
7. $(x-3)(x+3)(x-3)(x+3)$
8. $(3x+8)(3x-8)$
9. $(2x+3)^2$
10. $(x+7)(x-6)$
11. $(3x-2y)(5x-2y)$
12. $d^7 + 35d^6 + 525d^5 + 4375d^4 + 21875d^3 + 65625d^2 + 109375d + 78125$
- 13.



14. $\frac{3+i}{2}, \frac{3-i}{2}, -4$
15. $y = 2.5(4)^x$
16. $f(x) = x^3 - 6x^2 + 5x + 12$
17. $6 - 4i\sqrt{10}$
18. $-6 < x < 2$



19. D
20. [4] a.

$$P = 14.7e^{-0.21x}$$

$$8.4 = 14.7e^{-0.21x}$$

$$\frac{8.4}{14.7} = e^{-0.21x}$$

Substitute 8.4 for P .
Divide each side by 14.7.

$$\ln\left(\frac{8.4}{14.7}\right) = \ln e^{-0.21x}$$

$$\ln\left(\frac{8.4}{14.7}\right) = -0.21x$$

$$\left(\ln\left(\frac{8.4}{14.7}\right)\right) \div (-0.21) = x$$

$$2.7 \approx x$$

The elevation is about 2.7 miles above sea level.

Take the natural logarithm of each side.

Simplify.

Divide each side by -0.21 .

Use a calculator.

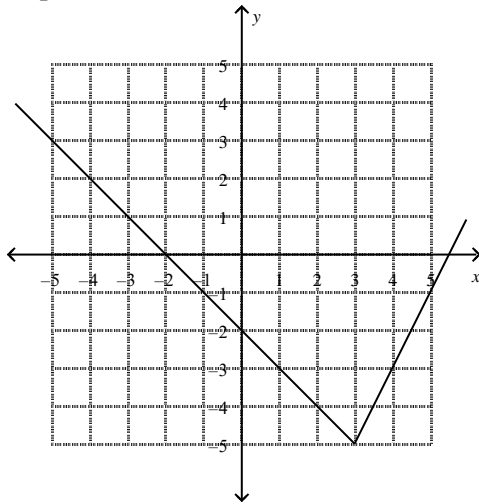
b. The average atmospheric pressure at sea level is 14.7 lb/in.^2 because x is 0 and $e^0 = 1$.

[3] one mathematical error or one incorrect answer

[2] two mathematical errors or one error and an incomplete explanation

[1] one correct answer with no explanation

21. 48 posts



22.

23. $\frac{7}{12}$

24. $-4x^5 + 4x^4$; quintic binomial

25. $-5, 9$

26. $x = 5$ or $x = 1$

27. 5, multiplicity 2; 2, multiplicity 3

28. 80 units

29. $-7, 2$

30. 16 people

31. 1

31. 16

32. $(-8, 3, -3)$

33. $\log_8(v^5 w^6)$

34.

a. $y = 1.4(x - 1) - 7 = 1.4x - 8.4$

b. $f(n) = f(n - 1) + 1.4$; $f(1) = -7$.

c. Substitute the values into the explicit formula or make a chart for the recursive to find the 50th term.

d. Substitute 103.6 for y in the explicit formula and solve for x . The term 103.6 is the 80th term of the sequence.

35. \$28; 2,057 drills

36. $y = x + 4$; 18

37. $\log_{125} 625 = \frac{4}{3}$

38. fifth square

39. $x^3 - 8x^2 - 11x + 148 = 0$

40. $h = 70t + 182$

41. A

42. 0.9583

43. $625u^{24}r^{12}t^8$

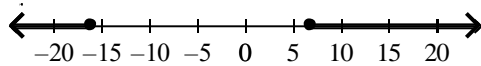
44. $\frac{y^2}{x^{18}}$

45. $-10 - 10i$

46. $-\frac{5}{6} \pm \frac{\sqrt{109}}{6}$

47. $y = |x - 2| - 10$

48. $x \leq -16$ or $x \geq 7$



49. a. $\begin{cases} c = 3.00d + 33.00 \\ c = 3.25d + 31.00 \end{cases}$

b. 8

50. David, Chicago; Tom, Los Angeles; Bill, Vancouver; Norman, New Jersey

51. $|w - 18| \leq 0.14$

52. 17 mi/gal; $R = 17C$

53. $\begin{cases} y = 3x - 8 \\ y = -3x + 8 \end{cases}$

54. $x^3 + 9x^2 - 5x - 2$

55. $16\sqrt{5}$

56. 15 in. by 20 in. by 44 in.