Sharyland ISD
Study Guide

Algebra II
Semester 2

Student Name: _____

Student ID: _____

Name: _____ **Class:** _____ **Date:** _____ **ID: A**

Sharyland ISD Algebra 2 B CBE Review

1. What is the relationship between the base of an exponential function and its rate of growth?

2. Graph the function $f(x) = 2^x + 4$.

3. Graph the function $y = \frac{1}{5} \cdot 10^x$

What are the zeros of the function? Graph the function.

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

Find any points of discontinuity for the rational function.

____ 5. What are the points of discontinuity? Are they all removable?

$$y = \frac{(x + 5)}{x^2 + 8x + 15}$$

a. $x = 1, x = -9, x = -5$; no
b. $x = 3, x = 5, x = 5$; yes
c. $x = -3, x = -5$; no
d. $x = 3, x = 5$; no

____ 6. Determine the x-intercept of the function $f(x) = 2^x - 4$.

a. There is no x-intercept.
b. $(2,0)$
c. $(4,0)$
d. $(0,-3)$

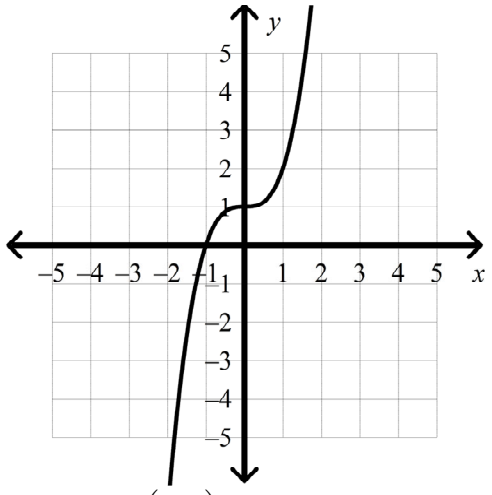
7. What values of a make the range of the function $f(x) = ae^x$ all negative numbers?

____ 8. Find the rational roots of $x^4 + 8x^3 + 7x^2 - 40x - 60 = 0$.
a. 2, 6 b. –6, –2 c. –2, 6 d. –6, 2

____ 9. Classify $-5x^4 + 2x^3 + 6x^2 + 7$ by degree.
a. quadratic
b. cubic
c. quartic
d. quintic

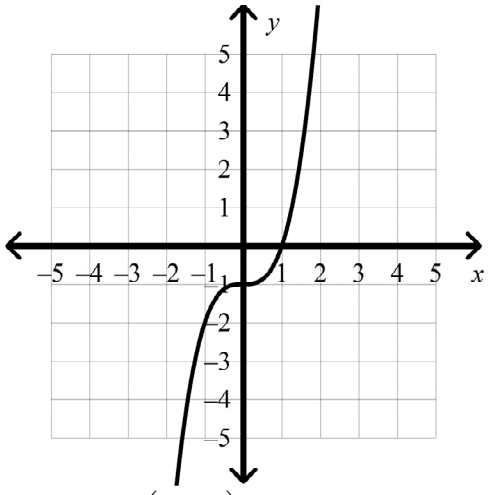
____ 10. Graph $y = (x-1)^3$. State the intercepts of the function.

a.



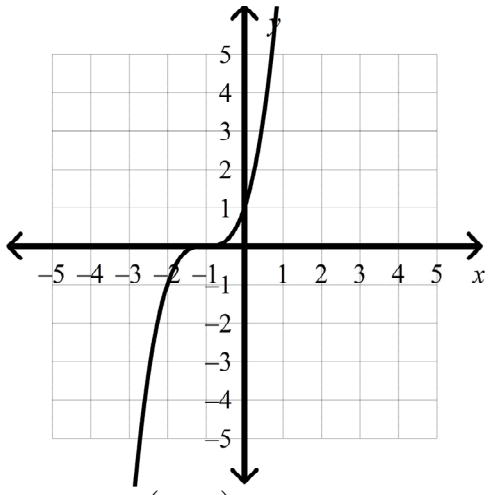
x-intercept: $(0, 1)$;
y-intercept: $(-1, 0)$

c.



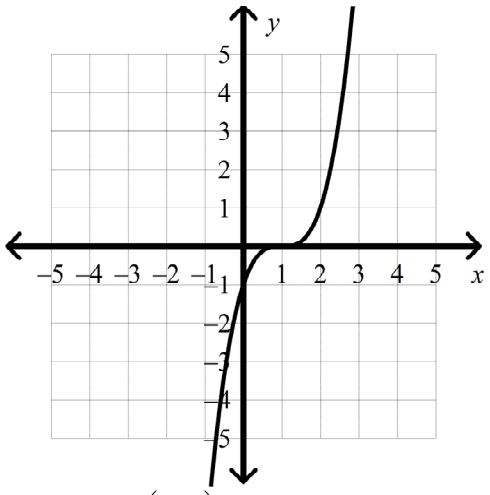
x-intercept: $(0, -1)$;
y-intercept: $(1, 0)$

b.



x-intercept: $(-1, 0)$;
y-intercept: $(0, 1)$

d.

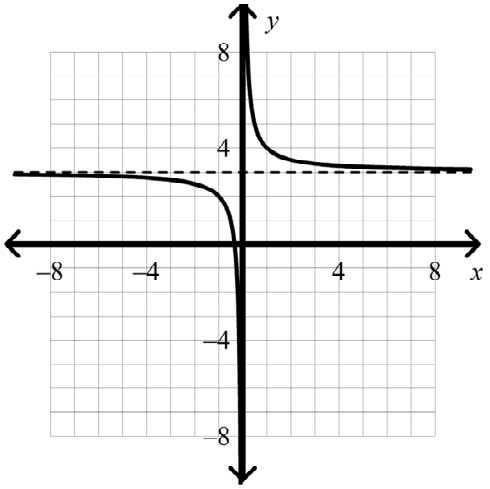


x-intercept: $(1, 0)$;
y-intercept: $(0, -1)$

11. Determine the equation of the line that represents the horizontal asymptote of the function $f(x) = 10^x + 2$.

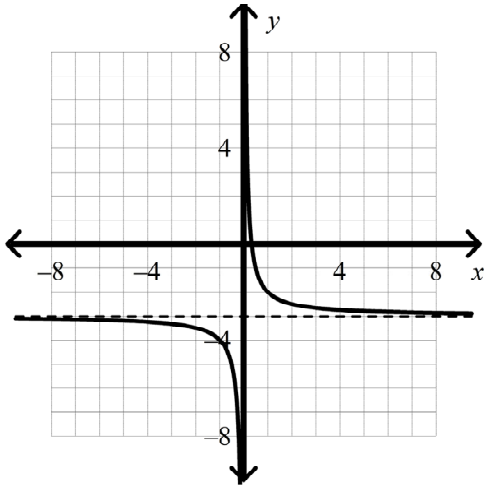
____ 12. Graph $y = \frac{1}{x} + 3$. Give the domain and range in inequalities.

a.



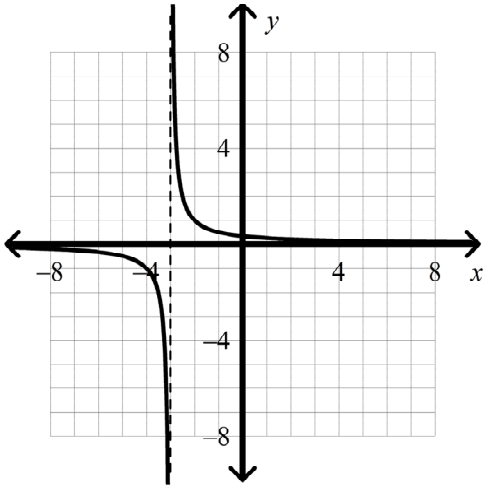
domain: $x > 0$ or $x < 0$;
range: $y > 3$ or $y < 3$

c.



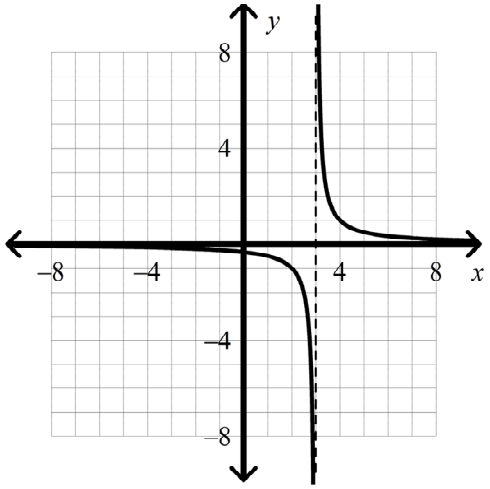
domain: $x > 0$ or $x < 0$;
range: $y > -3$ or $y < -3$

b.



domain: $x > 0$ or $x < 0$;
range: $y > -3$ or $y < -3$

d.



domain: $x > 0$ or $x < 0$;
range: $y > 3$ or $y < 3$

Simplify the expression.

13. $\left(2a^5 - 4a + a^4 + 2a^3 + 5\right) + \left(-5a^5 + 3a^3 - 9 + 11a\right)$

____ 14. Find all the real square roots of $-\frac{9}{16}$.

a. no real root

b. $-\frac{3}{4}$

c. $-\frac{3}{4}$ and $\frac{3}{4}$

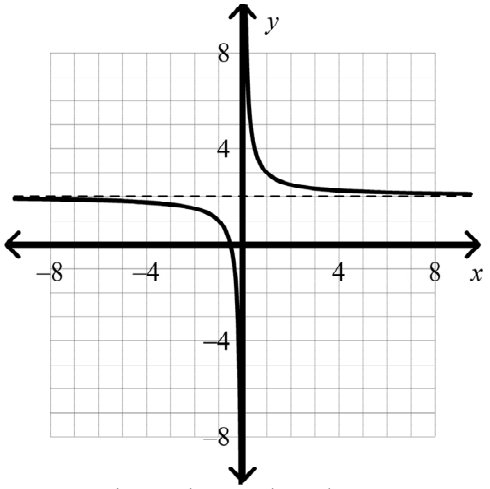
d. $\frac{81}{256}$

Graph the function.

15. $y = \dfrac{-1}{x}$

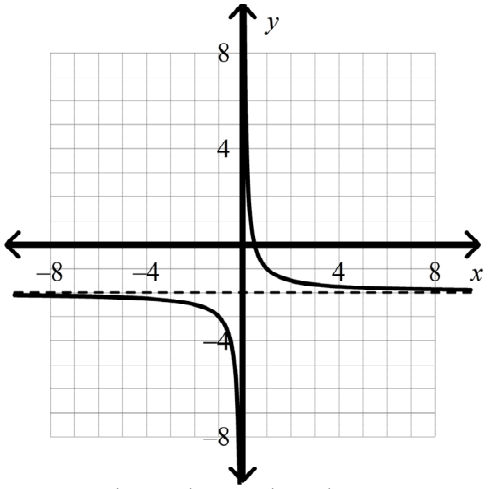
____ 16. Graph $y = \dfrac{1}{x-2}$. Give the domain and range in interval notation.

a.



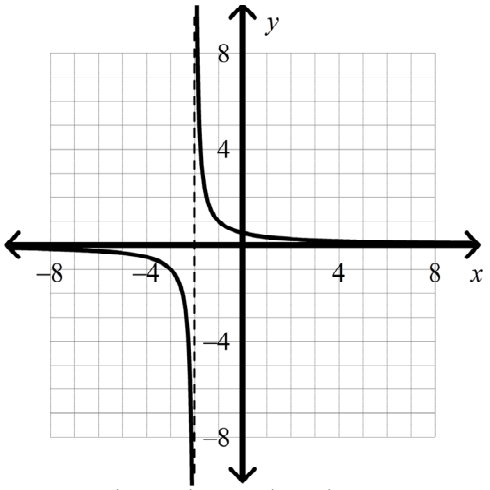
domain: $(-\infty, 0)$ and $(0, \infty)$;
range: $(-\infty, 2)$ and $(2, \infty)$

c.



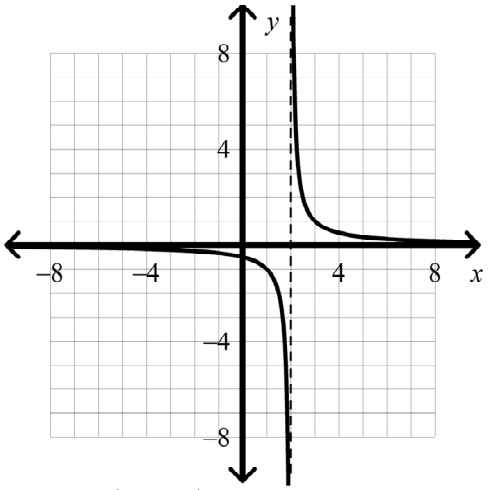
domain: $(-\infty, 0)$ and $(0, \infty)$;
range: $(-\infty, -2)$ and $(-2, \infty)$

b.



domain: $(-\infty, 0)$ and $(0, \infty)$;
range: $(-\infty, -2)$ and $(-2, \infty)$

d.



domain: $(-\infty, \infty)$;
range: $(-\infty, \infty)$

17. Suppose that x and y vary inversely, and $x = 5$ when $y = 6$. Write the function that models the inverse variation.

Evaluate the logarithm.

____ 18. log 0.01

a. –10 b. –2 c. 2 d. 10

____ 19. Complete the table of values for $f(x) = x^3$.

x	–5	–4	0	3	7
$f(x)$					

a.

x	–5	–4	0	3	7
$f(x)$	25	16	0	27	343

b.

x	–5	–4	0	3	7
$f(x)$	125	64	0	27	343

c.

x	–5	–4	0	3	7
$f(x)$	–125	–64	0	27	343

d.

x	–5	–4	0	3	7
$f(x)$	–25	–16	0	27	343

Find the real-number root.

____ 20. $\sqrt{-0.81}$

a. –0.9
b. –0.405
c. 0.9
d. no real number root

____ 21. $\sqrt{2.89}$

a. 1.45
b. 1.7
c. 8.35
d. no real number root

Simplify.

____ 22. $9^{\frac{1}{2}}$

a. 9^2
b. 3
c. 9
d. $\sqrt{9^2}$

____ 23. Determine the coordinates of the y-intercept for the function $f(x) = -8e^x$.

a. $(0, 8)$
b. $(0, -8)$
c. $\left(0, \frac{1}{8}\right)$
d. $\left(0, -\frac{1}{8}\right)$

____ 24. Write $5x^2(5x^2 - 4x^3)$ in standard form.

a. $10x^5 - 25x^4$
b. $-20x^5 + 25x^4$
c. $-20x^5 - 20x^4$
d. $10x + x^4$

What is the solution of the equation?

____ 25. $4(3 - x)^{\frac{4}{3}} - 5 = 59$

a. $-5, 11$
b. 5
c. 11
d. -11

Write the equation in logarithmic form.

____ 26. $2^6 = 64$

a. $\log_6 64 = 2$
b. $\log_2 64 = 6$
c. $\log 64 = 6 \cdot 2$
d. $\log 64 = 6$

Solve the exponential equation.

____ 27. $16^{7x} = 8$

a. -2
b. $\frac{3}{28}$
c. $\frac{11}{28}$
d. $\frac{28}{3}$

____ 28. Solve $\sqrt[3]{x} = -5$.

a. The solution is $x = -125$ or $x = 125$.
b. The solution is $x = 25$.
c. The solution is $x = -125$.
d. There is no solution.

What are the real or imaginary solutions of each polynomial equation?

____ 29. $x^4 - 29x^2 + 100 = 0$

a. $2, -2, 5, -5$
b. $2, -5$
c. $2, -2$
d. no solution

____ 30. Determine the intercepts and any asymptotes of the function $f(x) = e^x$.

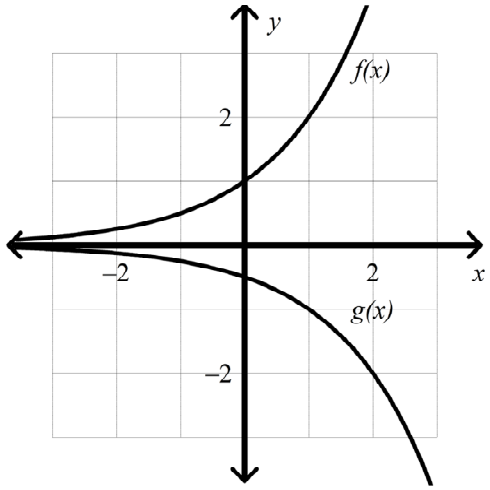
a. x-intercept: $(0, 1)$
no y-intercept
asymptotes: $y = 0$

b. no x-intercept
y-intercept: $(0, 1)$
asymptotes: $x = 0$

c. no x-intercept
y-intercept: $(0, 1)$
no asymptotes

d. no x-intercept
y-intercept: $(0, 1)$
asymptotes: $y = 0$

____ 31. The parent function $f(x) = 2^x$ and its transformation $g(x) = -\frac{1}{2} \cdot 2^x$ are shown on the graph below. Describe the effect the transformation has on the domain.



a. The transformation makes all the values in the domain negative instead of positive.

b. The transformation multiplies all the values in the domain by $-\frac{1}{2}$.

c. The transformation makes the domain and the range swap values.

d. The transformation has no effect on the domain.

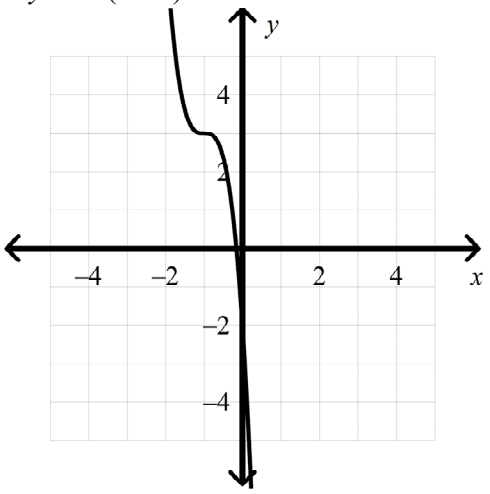
Write the expression as a single logarithm.

____ 32. $\log_2 56 - \log_2 7$

a. $\log 49$ b. $\log_2 49$ c. $\log_2 8$ d. $\log 8$

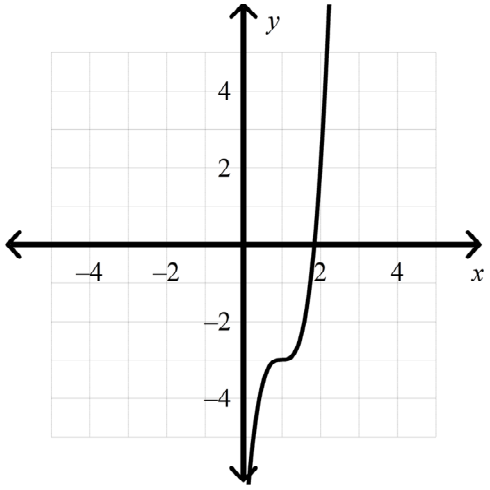
____ 33. Graph $y = -5(x - 1)^3 - 3$ and describe the end behavior.

a.



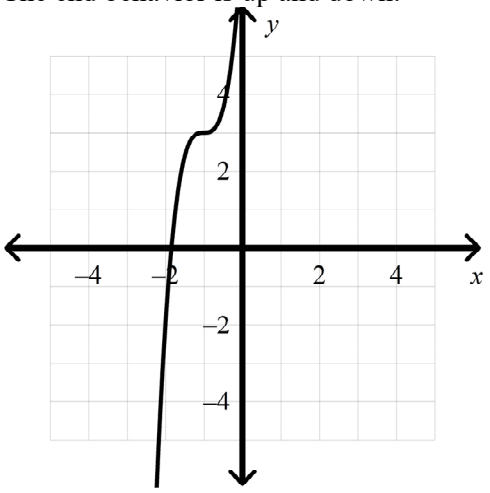
The end behavior is up and down.

c.



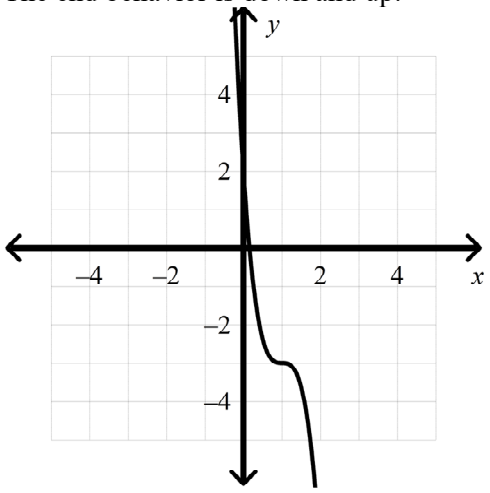
The end behavior is down and up.

b.



The end behavior is down and up.

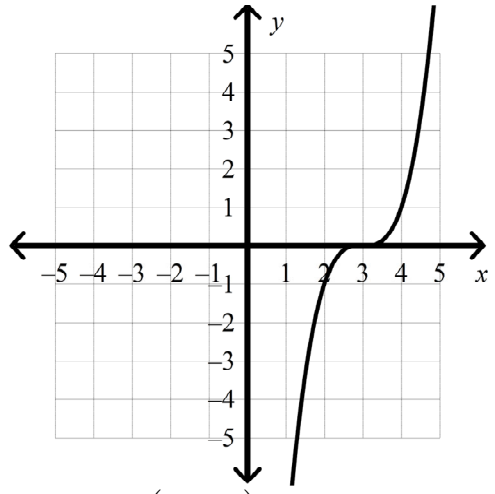
d.



The end behavior is up and down.

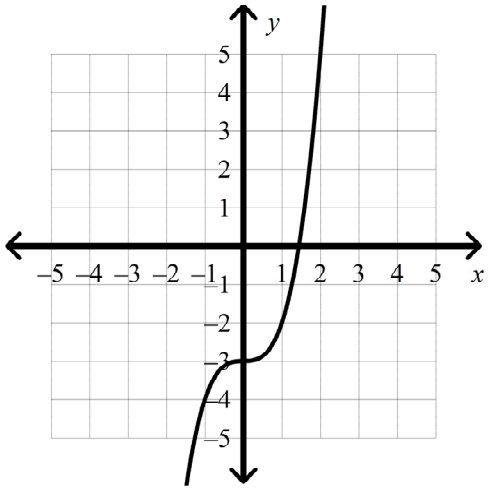
____ 34. Graph $y = x^3 + 3$. State the y-intercept of the function.

a.



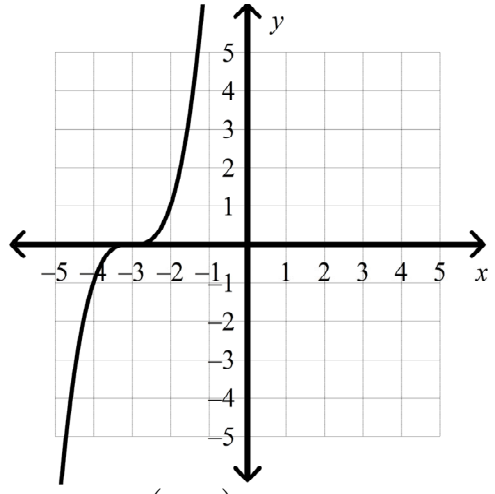
y-intercept: $(0, -27)$

c.



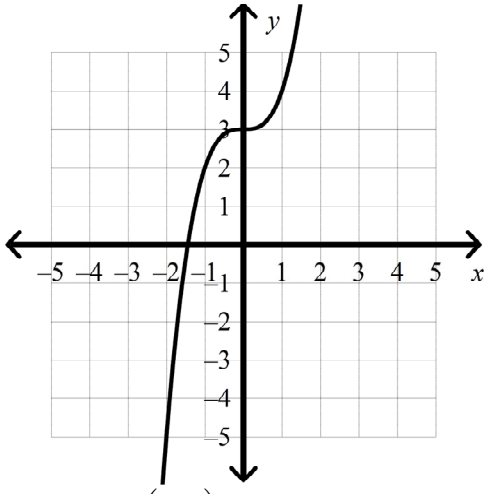
y-intercept: $(0, -3)$

b.



y-intercept: $(0, 27)$

d.



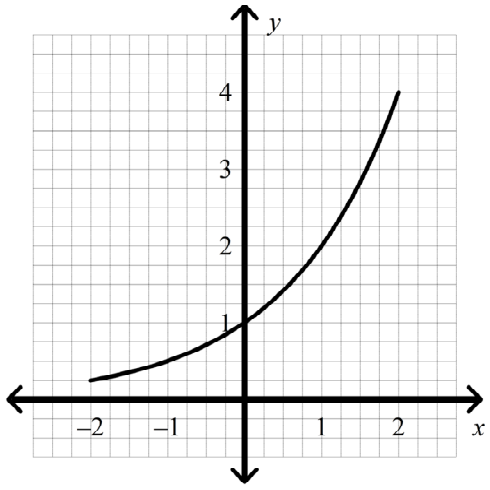
y-intercept: $(0, 3)$

What is the simplest form of the number?

____ 35. $27^{\frac{2}{3}}$

a. 18
b. 26
c. 9
d. 51

____ 36. The graph of $f(x) = 2^x$ is shown below on the interval $[-2,2]$. Use the graph to determine the coordinates of the maximum and minimum values of $f(x)$ on the given interval.



a. maximum: $\left(-2, \frac{1}{4}\right)$
minimum: $(2, 4)$

b. maximum: $(2, 4)$
minimum: $\left(-2, \frac{1}{4}\right)$

c. maximum: $\left(\frac{1}{4}, -2\right)$
minimum: $(4, 2)$

d. maximum: $(4, 2)$
minimum: $\left(\frac{1}{4}, -2\right)$

Multiply and simplify if possible.

____ 37. $\sqrt{12} \cdot \sqrt{2}$

a. $6\sqrt{2}$ b. $2\sqrt{6}$ c. $\sqrt{24}$ d. not possible

____ 38. What is the least common denominator (LCD) of the pair of rational expressions? Find the sum of the rational expressions in simplest form. State any restrictions on the variables.

$\frac{7x}{2y}, \frac{5}{x}$

a. The LCD is $2xy$. The sum is $\frac{7x^2 + 10y}{2xy}$ for $x \neq 0$ and $y \neq 0$.

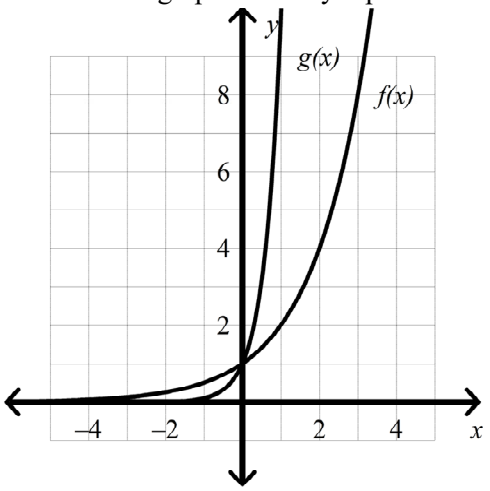
b. The LCD is $2y + x$. The sum is $\frac{7x + 5}{2y + x}$ for $x \neq -2y$.

c. The LCD is $2xy$. The sum is $\frac{14y + 5}{y}$ for $y \neq 0$.

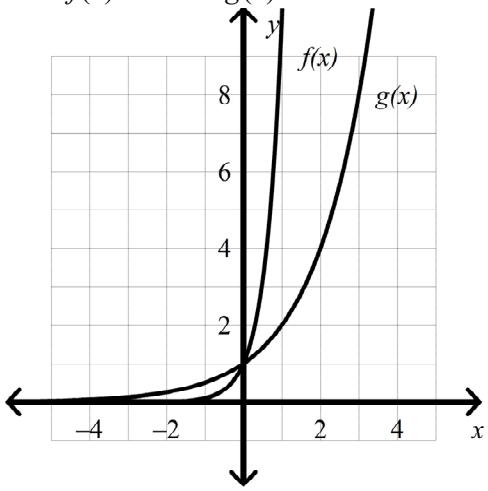
d. The LCD is $2y + x$. The sum is $\frac{7x^2 + 10y}{2y + x}$ for $x \neq -2y$.

____ 39. Determine which graph correctly represents the functions $f(x) = 2^x$ and $g(x) = 10^x$.

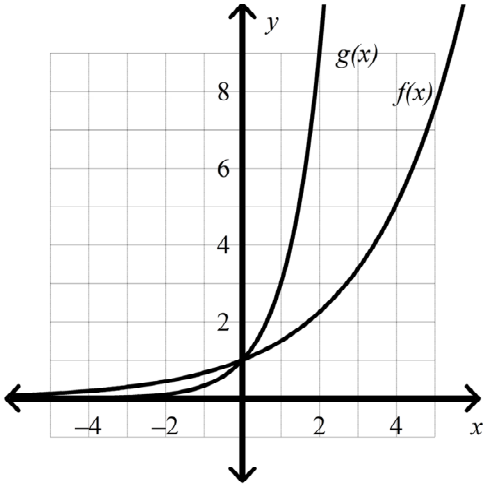
a.



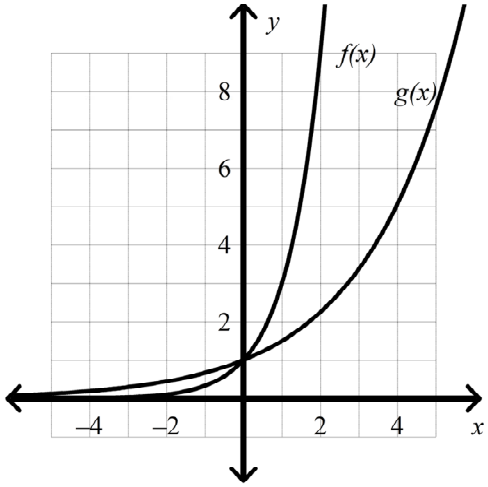
c.



b.



d.



____ 40. Find the annual percent increase or decrease that $y = 0.35(2.3)^x$ models.

a. 230% increase
b. 135% increase
c. 35% decrease
d. 65% decrease

Use natural logarithms to solve the equation. Round to the nearest thousandth.

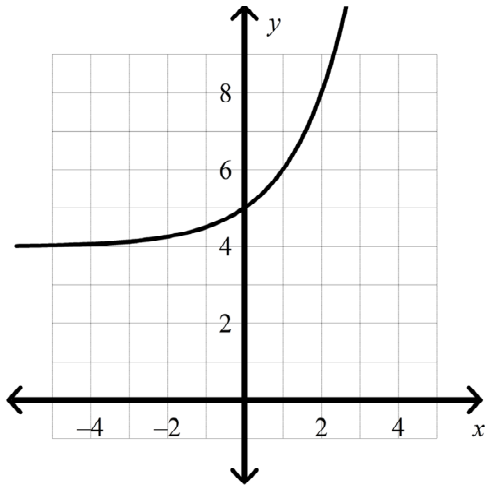
____ 41. $e^x = \frac{3}{4}$

a. –0.288 b. –0.275 c. 0.275 d. 0.288

Sharyland ISD Algebra 2 B CBE
Answer Section

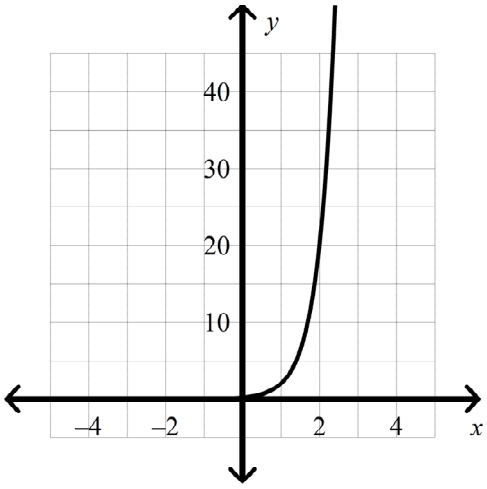
1. ANS:
   The greater the value of the base, the greater the function's rate of growth.

   PTS: 1 DIF: L2 REF: 7-1 Attributes of Exponential Functions
   OBJ: 7-1.1 To graph and analyze the key attributes of exponential functions
   TOP: 7-1 Problem 1 Comparing the Graphs of y = 2^x and y = 10^x
   KEY: exponential function
2. ANS:



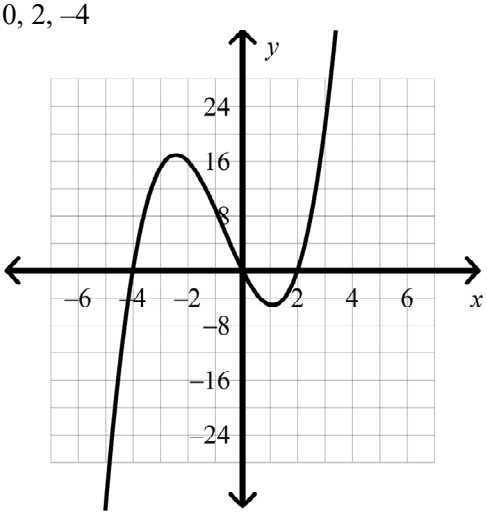
   PTS: 1 DIF: L2 REF: 7-2 Transformations of Exponential Functions
   OBJ: 7-2.1 To determine the effects of transformations on the exponential parent functions, f(x) = 2^x and f(x) = 10^x TOP: 7-2 Problem 3 Analyzing y = f(x) + d for f(x) = 2^x
   KEY: exponential parent function

3. ANS:



PTS: 1 DIF: L2 REF: 7-2 Transformations of Exponential Functions
OBJ: 7-2.1 To determine the effects of transformations on the exponential parent functions, f(x) = 2^x and f(x) = 10^x TOP: 7-2 Problem 2 Analyzing y = af(x) for f(x) = 10^x
KEY: exponential parent function

4. ANS:
0, 2, –4



PTS: 1 DIF: L3 REF: 8-3 Polynomials, Linear Factors, and Zeros
OBJ: 8-3.1 To analyze the factored form of a polynomial
TOP: 8-3 Problem 2 Finding Zeros of a Polynomial Function KEY: root

5. ANS: C PTS: 1 DIF: L2
REF: 11-3 Asymptotes of Rational Functions
OBJ: 11-3.2 To analyze the attributes of rational functions
TOP: 11-3 Problem 1 Finding Points of Discontinuity
KEY: point of discontinuity | removable discontinuity | non-removable discontinuity

6. ANS: B PTS: 1 DIF: L3
REF: 7-2 Transformations of Exponential Functions
OBJ: 7-2.1 To determine the effects of transformations on the exponential parent functions, f(x) = 2^x and f(x) = 10^x TOP: 7-2 Problem 3 Analyzing y = f(x) + d for f(x) = 2^x
KEY: exponential parent function

7. ANS:
$a < 0$

PTS: 1 DIF: L2 REF: 7-3 Attributes and Transformations of f(x) = e^x
OBJ: 7-3.1 To graph and analyze key attributes and transformations of functions of the form f(x) = e^x
TOP: 7-3 Problem 3 Analyzing y = af(x) for f(x) = e^x KEY: natural base exponential function

8. ANS: B PTS: 1 DIF: L3
REF: 8-6 Theorems About Roots of Polynomial Equations
OBJ: 8-6.1 To solve equations using the Rational Root Theorem
TOP: 8-6 Problem 1 Finding a Rational Root KEY: Rational Root Theorem

9. ANS: C PTS: 1 DIF: L2
REF: 8-1 Attributes of Polynomial Functions OBJ: 8-1.1 To classify polynomials
TOP: 8-1 Problem 1 Classifying Polynomials
KEY: degree of a polynomial | polynomial function | standard form of a polynomial function

10. ANS: D PTS: 1 DIF: L3
REF: 10-1 Attributes and Transformations of Cubic Functions
OBJ: 10-1.2 To analyze the effect of transformations on the graph of the cubic parent function
TOP: 10-1 Problem 3 Analyzing y = f(x - c) for f(x) = x^3 KEY: cubic parent function

11. ANS:
$y = 2$

PTS: 1 DIF: L3 REF: 7-2 Transformations of Exponential Functions
OBJ: 7-2.1 To determine the effects of transformations on the exponential parent functions, f(x) = 2^x and f(x) = 10^x TOP: 7-2 Problem 4 Analyzing y = f(x) + d for f(x) = 10^x
KEY: exponential parent function

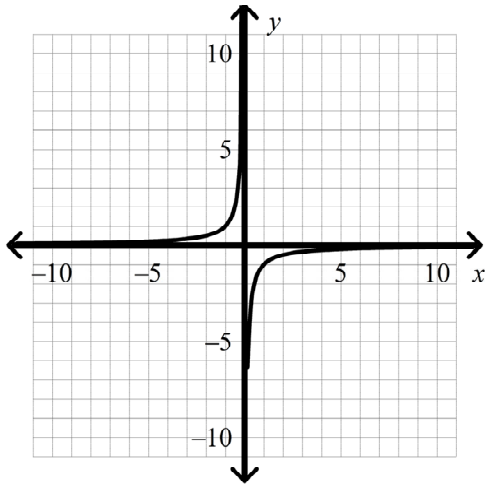
12. ANS: A PTS: 1 DIF: L3
REF: 11-2 Attributes and Transformations of Reciprocal Functions
OBJ: 11-2.2 To graph transformations of reciprocal functions
TOP: 11-2 Problem 3 Analyzing the Graph of f(x) + d When f(x) = 1/x
KEY: reciprocal function

13. ANS:
$-3a^5 + a^4 + 5a^3 + 7a - 4$

PTS: 1 DIF: L3 REF: 8-2 Adding, Subtracting, and Multiplying Polynomials
OBJ: 8-2.1 To add, subtract, and multiply polynomials TOP: 8-2 Problem 1 Adding Polynomials
KEY: polynomials

14. ANS: A PTS: 1 DIF: L2 REF: 9-1 Roots and Radical Expressions
OBJ: 9-1.1 To find nth roots TOP: 9-1 Problem 1 Finding All Real Roots
KEY: nth root

15. ANS:



PTS: 1 DIF: L2
REF: 11-2 Attributes and Transformations of Reciprocal Functions
OBJ: 11-2.1 To graph reciprocal functions
TOP: 11-2 Problem 1 Graphing an Inverse Variation Function KEY: reciprocal function

16. ANS: D PTS: 1 DIF: L3
REF: 11-2 Attributes and Transformations of Reciprocal Functions
OBJ: 11-2.2 To graph transformations of reciprocal functions
TOP: 11-2 Problem 4 Analyzing the Graph of f(x - c) When f(x) = 1/x
KEY: reciprocal function

17. ANS:

$y = \frac{30}{x}$

PTS: 1 DIF: L2 REF: 11-1 Inverse Variation
OBJ: 11-1.1 To recognize and use inverse variation
TOP: 11-1 Problem 2 Determining an Inverse Variation KEY: inverse variation

18. ANS: B PTS: 1 DIF: L4
REF: 7-5 Attributes of Logarithmic Functions
OBJ: 7-5.1 To write and evaluate logarithmic expressions, while relating them to exponential expressions
TOP: 7-5 Problem 2 Evaluating a Logarithm KEY: logarithm

19. ANS: C PTS: 1 DIF: L2
REF: 10-1 Attributes and Transformations of Cubic Functions
OBJ: 10-1.1 To graph and identify key attributes of cubic functions
TOP: 10-1 Problem 1 Analyzing the Key Attributes of the Cubic Parent Function
KEY: cubic parent function

20. ANS: D PTS: 1 DIF: L3 REF: 9-1 Roots and Radical Expressions
OBJ: 9-1.1 To find nth roots TOP: 9-1 Problem 2 Finding Roots
KEY: radicand | index | nth root

21. ANS: B PTS: 1 DIF: L3 REF: 9-1 Roots and Radical Expressions
OBJ: 9-1.1 To find nth roots TOP: 9-1 Problem 2 Finding Roots
KEY: radicand | index | nth root

22. ANS: B PTS: 1 DIF: L2 REF: 9-4 Rational Exponents
OBJ: 9-4.1 To simplify expressions with rational exponents
TOP: 9-4 Problem 1 Simplifying Expressions with Rational Exponents
KEY: rational exponents
23. ANS: B PTS: 1 DIF: L3
REF: 7-3 Attributes and Transformations of f(x) = e^x
OBJ: 7-3.1 To graph and analyze key attributes and transformations of functions of the form f(x) = e^x
TOP: 7-3 Problem 3 Analyzing y = af(x) for f(x) = e^x KEY: natural base exponential function
24. ANS: B PTS: 1 DIF: L3
REF: 8-1 Attributes of Polynomial Functions OBJ: 8-1.1 To classify polynomials
TOP: 8-1 Problem 1 Classifying Polynomials
KEY: degree of a polynomial | polynomial function | standard form of a polynomial
25. ANS: A PTS: 1 DIF: L4 REF: 10-4 Cube Root Equations
OBJ: 10-4.1 To solve cube root equations
TOP: 10-4 Problem 2 Solving Equations With Rational Exponents
KEY: cube root equation
26. ANS: B PTS: 1 DIF: L2
REF: 7-5 Attributes of Logarithmic Functions
OBJ: 7-5.1 To write and evaluate logarithmic expressions, while relating them to exponential expressions
TOP: 7-5 Problem 1 Writing Exponential Equations in Logarithmic Form
KEY: logarithm
27. ANS: B PTS: 1 DIF: L2
REF: 7-9 Exponential and Logarithmic Equations
OBJ: 7-9.1 To solve exponential and logarithmic equations
TOP: 7-9 Problem 1 Solving an Exponential Equation - Common Base
KEY: exponential equation
28. ANS: C PTS: 1 DIF: L3 REF: 10-4 Cube Root Equations
OBJ: 10-4.1 To solve cube root equations
TOP: 10-4 Problem 1 Solving a Cube Root Equation With Real Roots
KEY: cube root equation
29. ANS: A PTS: 1 DIF: L2 REF: 8-4 Solving Polynomial Equations
OBJ: 8-4.1 To solve polynomial equations by factoring
TOP: 8-4 Problem 1 Solving Polynomial Equations Using Factors
KEY: polynomial
30. ANS: D PTS: 1 DIF: L3
REF: 7-3 Attributes and Transformations of f(x) = e^x
OBJ: 7-3.1 To graph and analyze key attributes and transformations of functions of the form f(x) = e^x
TOP: 7-3 Problem 2 Analyzing the Attributes of y = e^x KEY: natural base exponential function
31. ANS: D PTS: 1 DIF: L2
REF: 7-2 Transformations of Exponential Functions
OBJ: 7-2.1 To determine the effects of transformations on the exponential parent functions, f(x) = 2^x and f(x) = 10^x TOP: 7-2 Problem 1 Analyzing y = af(x) for f(x) = 2^x
KEY: exponential parent function
32. ANS: C PTS: 1 DIF: L2 REF: 7-6 Properties of Logarithms
OBJ: 7-6.1 To use the properties of logarithms
TOP: 7-6 Problem 1 Simplifying Logarithms

33. ANS: D PTS: 1 DIF: L4
REF: 8-1 Attributes of Polynomial Functions
OBJ: 8-1.2 To graph polynomial functions and describe end behavior
TOP: 8-1 Problem 3 Graphing Cubic Functions
KEY: polynomial function | end behavior | turning point
34. ANS: D PTS: 1 DIF: L3
REF: 10-1 Attributes and Transformations of Cubic Functions
OBJ: 10-1.2 To analyze the effect of transformations on the graph of the cubic parent function
TOP: 10-1 Problem 2 Analyzing y = f(x) + d for f(x) = x^3 KEY: cubic parent function
35. ANS: C PTS: 1 DIF: L3 REF: 9-4 Rational Exponents
OBJ: 9-4.1 To simplify expressions with rational exponents
TOP: 9-4 Problem 5 Simplifying Numbers With Rational Exponents
KEY: rational exponent
36. ANS: B PTS: 1 DIF: L2
REF: 7-1 Attributes of Exponential Functions
OBJ: 7-1.1 To graph and analyze the key attributes of exponential functions
TOP: 7-1 Problem 2 Analyzing Attributes of the Graphs of y = 2^x and y = 10^x
KEY: exponential function
37. ANS: B PTS: 1 DIF: L2
REF: 9-2 Multiplying and Dividing Radical Expressions
OBJ: 9-2.1 To multiply and divide radical expressions
TOP: 9-2 Problem 1 Multiplying Radical Expressions
KEY: simplest form of a radical expression
38. ANS: A PTS: 1 DIF: L3
REF: 11-5 Adding and Subtracting Rational Expressions
OBJ: 11-5.1 To add and subtract rational expressions
TOP: 11-5 Problem 2 Finding the Least Common Denominator KEY: least common denominator
39. ANS: A PTS: 1 DIF: L2
REF: 7-1 Attributes of Exponential Functions
OBJ: 7-1.1 To graph and analyze the key attributes of exponential functions
TOP: 7-1 Problem 1 Comparing the Graphs of y = 2^x and y = 10^x
KEY: exponential function
40. ANS: A PTS: 1 DIF: L3
REF: 7-1 Attributes of Exponential Functions
OBJ: 7-1.2 To model exponential growth and decay
TOP: 7-1 Problem 3 Identifying Exponential Growth and Decay
KEY: exponential decay | exponential function | exponential growth
41. ANS: A PTS: 1 DIF: L2 REF: 7-10 Natural Logarithms
OBJ: 7-10.2 To solve equations using natural logarithms
TOP: 7-10 Problem 3 Solving an Exponential Equation KEY: natural logarithmic function