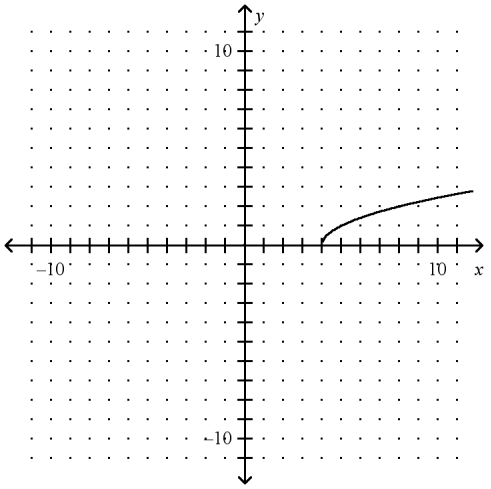
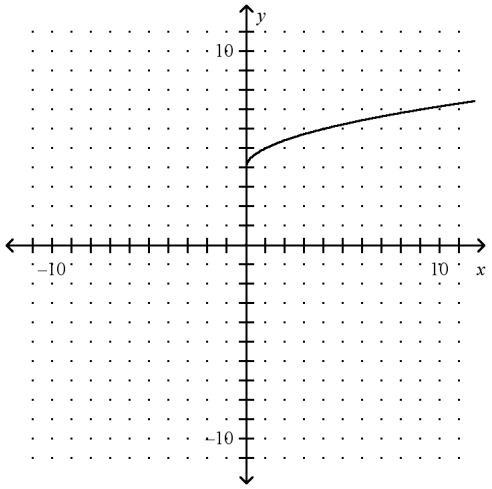
Name: _____ **Block:** _____ **Date:** _____ **ID: A**

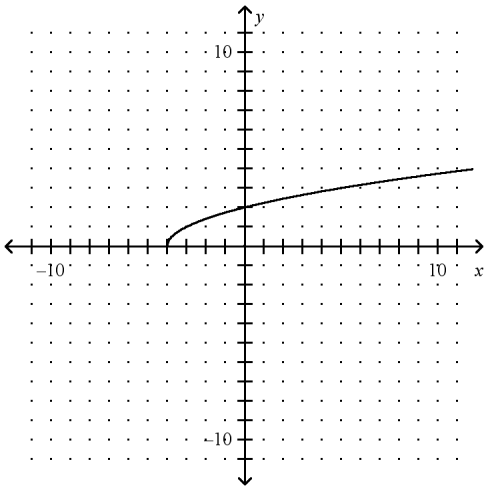
Algebra II Honors Review for final

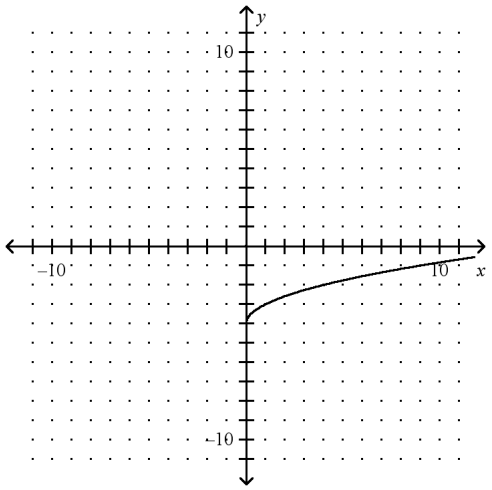
Multiple Choice
Identify the choice that best completes the statement or answers the question.

____ 1. Which represents the graph of $y = \sqrt{x+4}$?

Ⓐ 

Ⓒ 

Ⓑ 

Ⓓ 

____ 2. Which gives the solution(s) of the equation $\sqrt[3]{x-4} = 4$?

Ⓐ -60 Ⓑ $68, -60$ Ⓒ 68 Ⓓ 20

____ 3. Which gives the solution(s) of $\sqrt{x + 30} = x$? Check for extraneous solutions.

Ⓐ no solution Ⓑ 6 Ⓒ -5 Ⓓ $6, -5$

____ 4. Simplify the rational expression. State any restrictions on the variable. $\dfrac{a^2 + 6a + 5}{a^2 + 13a + 40}$

Ⓐ $\dfrac{-(a+1)}{a+8}$; $a \neq -5, a \neq -8$

Ⓑ $\dfrac{a+1}{a+8}$; $a \neq -5, a \neq -8$

Ⓒ $\dfrac{-(a+1)}{a+8}$; $a \neq -8$

Ⓓ $\dfrac{a+1}{a+8}$; $a \neq -5, a \neq 8$

____ 5. Solve the equation. $3x^{3/4} = 192$

Ⓐ 22.63 Ⓑ 369.22 Ⓒ 256 Ⓓ 1107.65

____ 6. Multiply or divide. State any restrictions on the variables. $\dfrac{2k^4}{7j^3} \cdot \dfrac{9j^6}{10k^2}$

Ⓐ $\dfrac{9k^6}{35j^9}$, $k \neq 0, j \neq 0$

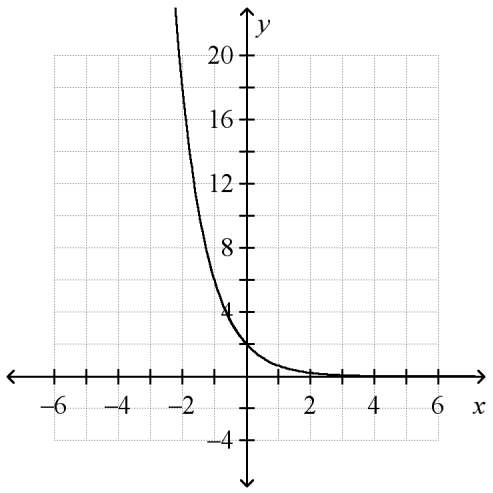
Ⓑ $\dfrac{9}{35}k^6j^9$, $k \neq 0, j \neq 0$

Ⓒ $\dfrac{9k^2j^3}{35}$, $k \neq 0, j \neq 0$

Ⓓ $\dfrac{35}{9k^2j^3}$, $k \neq 0, j \neq 0$

____ 7. Graph the exponential function. $y = 2(3)^x$

Ⓐ



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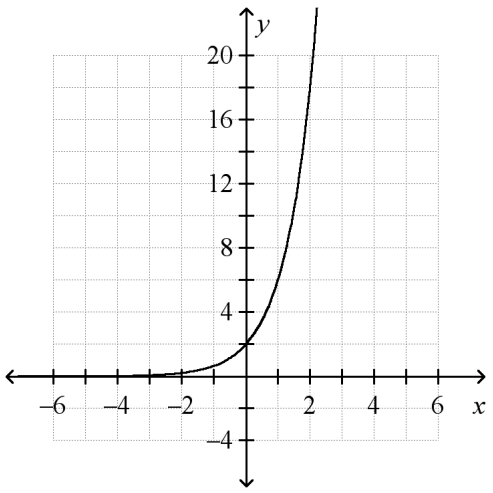

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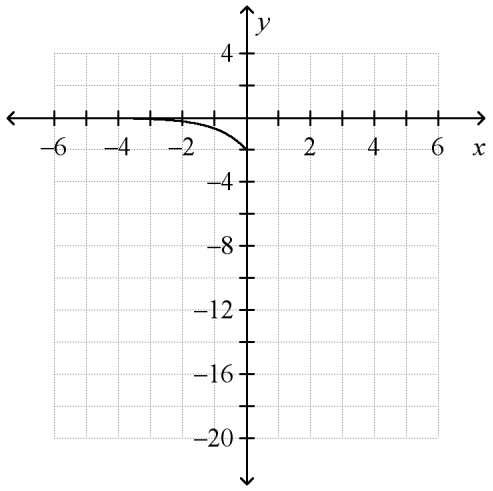

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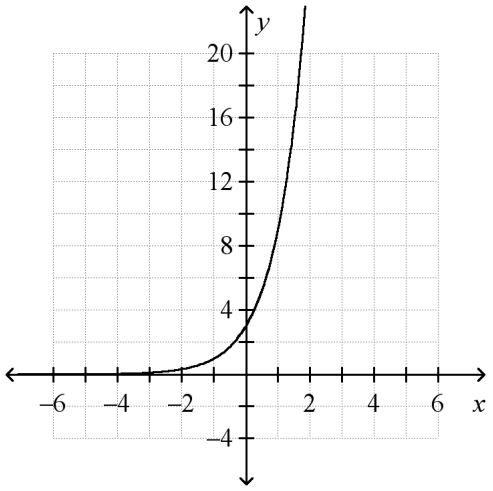
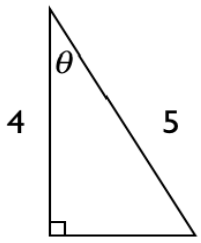


____ 8. Given the diagram, which equation is correct?



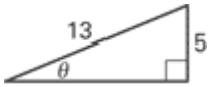
Ⓐ $\sin\theta = \frac{5}{4}$

Ⓒ $\cos\theta = \frac{4}{5}$

Ⓑ $\tan\theta = \frac{4}{5}$

Ⓓ $\sin\theta = \frac{4}{5}$

____ 9. What is the approximate value of θ in the triangle shown?



Ⓐ 67.3°
Ⓑ 22.6°
Ⓒ 21.0°
Ⓓ 30°

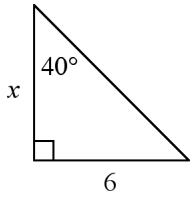
____ 10. Evaluate: $\log_2 16$

Ⓐ 4
Ⓑ $\frac{1}{4}$
Ⓒ 8
Ⓓ $\frac{1}{8}$

____ 11. What is the solution of the equation $9^{x+1} = 27^{x-1}$?

Ⓐ No solution
Ⓑ -2
Ⓒ 5
Ⓓ 2

____ 12. Find the value of x. Round your answer to the nearest tenth.



Not drawn to scale

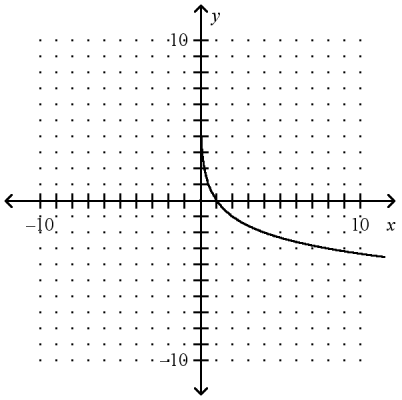
Ⓐ 3.9
Ⓑ 5
Ⓒ 4.6
Ⓓ 7.2

____ 13. Which is an equation for the inverse of the relation $y = 6x + 3$?

Ⓐ $y = 3x + 6$
Ⓑ $y = \frac{x-3}{6}$
Ⓒ $y = \frac{x+3}{6}$
Ⓓ $y = \frac{6x-3}{6}$

____ 14. Graph $y = \log_2 x$

Ⓐ



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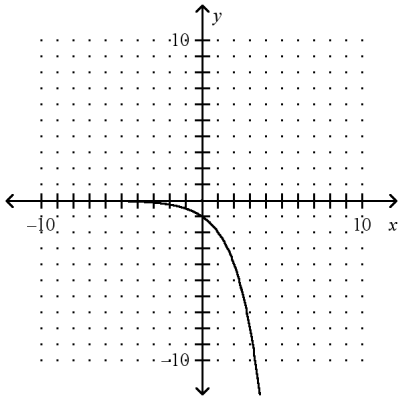

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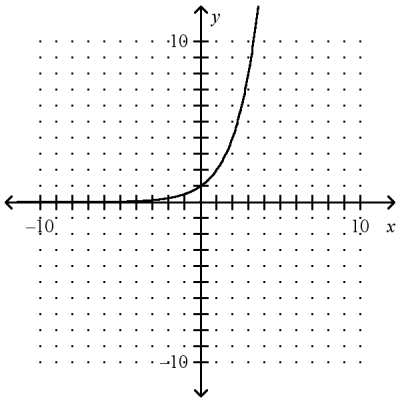

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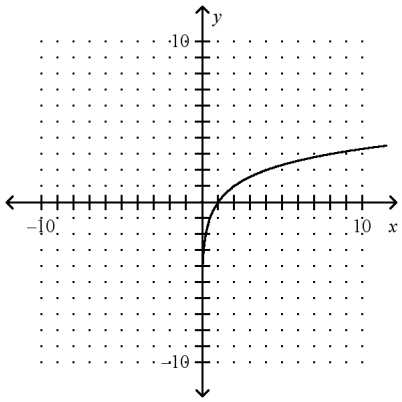
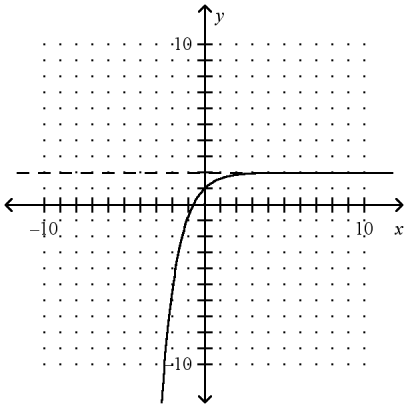


____ 15. Convert $\frac{17}{18}\pi$ to degrees.

Ⓐ 170° Ⓑ 191° Ⓒ 85° Ⓓ 340°

____ 16. Graph $f(x) = 2 + e^x$.

Ⓐ



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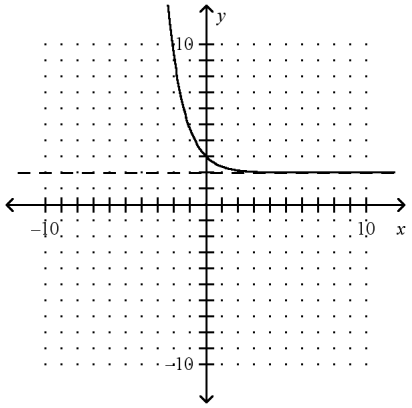

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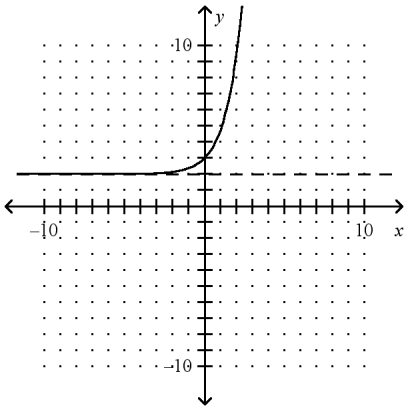

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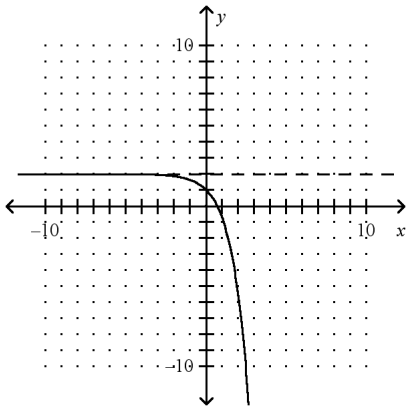


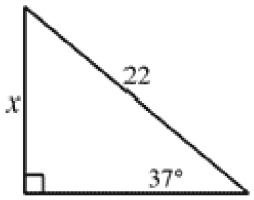
____ 17. The price per person of renting a bus varies inversely with the number of people renting the bus. It costs \$13 per person if 49 people rent the bus. About how much will it cost per person if 34 people rent the bus?

Ⓐ \$128.15 Ⓑ \$18.74 Ⓒ \$15.65 Ⓓ \$9.02

____ 18. Divide the expressions. Simplify the result. $\dfrac{x^2+9x+18}{x^2-9} \div \dfrac{x+6}{x-6}$

Ⓐ $\dfrac{x+3}{x-6}$ Ⓑ $\dfrac{x-9}{x-3}$ Ⓒ $\dfrac{x-6}{x-3}$ Ⓓ $\dfrac{9x+6}{3}$

____ 19. Find x. Round the result to the nearest hundredth.



Ⓐ $x = 16.58$
Ⓒ $x = 13.24$
Ⓑ $x = 17.57$
Ⓓ $x = 29.19$

____ 20. Convert $72°$ to radians.

Ⓐ $\frac{5}{2}\pi$
Ⓒ $\frac{2}{5}\pi$
Ⓑ $\frac{4}{5}\pi$
Ⓓ $\frac{5}{4}\pi$

____ 21. Given triangle ABC with $a = 7$, $C = 37°$, and $B = 18°$, find c. Round the answer to two decimal places.

Ⓐ 3.59 Ⓑ 5.14 Ⓒ 13.63 Ⓓ 18.56

____ 22. Given triangle ABC with $a = 12$, $b = 14$, and $A = 19°$, find c. Round your answer to two decimal places.

Ⓐ $c = 4.82$
Ⓒ $c = 24.34$ or 3.20
Ⓑ $c = 18.44$
Ⓓ $c = 24.34$ or 2.14

____ 23. Given triangle ABC with $b = 2$, $c = 4$, and $m\angle A = 118°$, find a. Round the answer to two decimal places.

Ⓐ 5.25 Ⓑ 4.87 Ⓒ 3.53 Ⓓ 3.26

____ 24. Solve ΔABC with $A = 69°$, $b = 34$, and $c = 46$.

Ⓐ $a = 46.38, B = 43.19°, C = 67.81°$
Ⓒ $a = 45.15, B = 43.19°, C = 67.81°$
Ⓑ $a = 46.38, B = 41.74°, C = 69.26°$
Ⓓ $a = 45.15, B = 41.74°, C = 69.26°$

____ 25. Solve. $\frac{1}{9} = 27^{7x-6}$

Ⓐ $\frac{4}{7}$
Ⓒ $\frac{16}{21}$
Ⓑ $-\frac{20}{21}$
Ⓓ $\frac{20}{21}$

____ 26. Solve the equation. Check for extraneous solutions. $\log_5(3x+9) = 2$

Ⓐ $\frac{23}{3}$ Ⓑ $\frac{16}{3}$ Ⓒ $\frac{1}{3}$ Ⓓ $\frac{34}{3}$

____ 27. The amount of money, A, accrued at the end of n years when a certain amount, P, is invested at a compound annual rate, r, is given by $A = P(1+r)^n$. If a person invests \$310 in an account that pays 8% interest compounded annually, find the balance after 5 years.

Ⓐ \$455 Ⓑ \$2790 Ⓒ \$13,950 Ⓓ \$443

Short Answer

28. Find the exact value of the following trigonometric function: $\csc 30°$

29. Find the exact value of the following trigonometric function: $\cot 45°$

30. Write the equation $\log_{64} 256 = \frac{4}{3}$ in exponential form.

31. Convert $220°$ to radian measure.

32. Write a rule for the nth term of the geometric sequence. $24, -18, \frac{27}{2}, -\frac{81}{8}, \ldots$

33. Write a rule for the nth term of the arithmetic sequence.
$3, -1, -5, \ldots$

34. Find the sum of the infinite geometric series if it has a sum. $\sum_{n=1}^{\infty} 12\left(\frac{1}{3}\right)^{n-1}$

35. Let $f(x) = 9 - x^2$ and $g(x) = 3 - x$. Find $\frac{f(x)}{g(x)}$.

36. Let $r(x) = x^2 + 2$ and $s(x) = x^3 - 4$. Find $r(s(-3))$.

37. Simplify the expression. $\sqrt[3]{64b^{15x}}$

38. Consider the following function $f(x) = \dfrac{3x+2}{x+2}$

a. State the domain and range of the function.

Domain: _____

Range: _____

b. Provide the equations of the vertical and horizontal asymptotes for the function.

Vertical Asymptote: _____

Horizontal Asymptote: _____

39. A ladder 16 feet long makes an angle of 53° with the ground as it leans against a store. How far up the side of the store does the ladder reach? Round your answer to the nearest tenth.

40. Solve the equation. Check for extraneous solutions. $\frac{2x}{x-2} = \frac{1}{x^2-4} + 1$

41. You deposit $2500 in an account. You can choose to deposit the money into Bank A or Bank B.

    a. Write an equation to model the amount of money you have in Bank A after *t* years if you get 4% average annual interest compounded quarterly.

    b. Write an equation to model the amount of money you have in Bank B after *t* years if you get 3.75% interest compounded continuously.

    c. After 10 years, at which bank will your account earn more money? How much more will you earn? Show all your work.

42. Given triangle ABC with $a = 3$, $A = 40°$, and $B = 27°$, find b. Round your answer to two decimal places.

43. Find angle A in triangle ABC given that $a = 12$, $b = 19$, and $c = 21$. Round your answer to two decimal places.

44. Randy buys a car that costs $25,000 new, but depreciates 5% per year in each succeeding year.

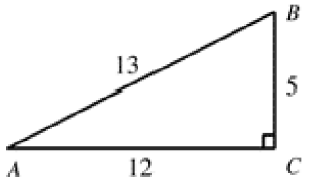
    Susan buys a car that costs $22,000 new, but depreciates 4% per year in each succeeding year.

    a. Write an equation to model the value of Randy's car after t years.

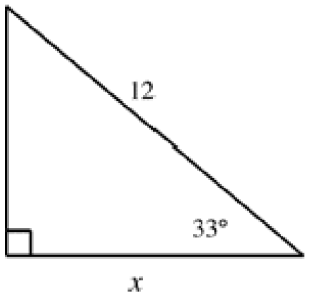
    b. Write an equation to model the value of Susan's car after t years.

    c. After 10 years, whose car has more value?

45. Write sin A as a fraction in lowest terms.

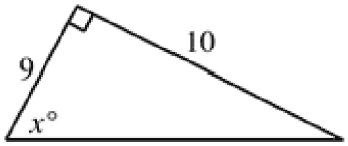


46. Find x to the nearest hundredth.

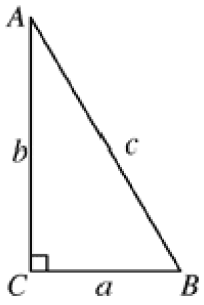


47. Evaluate without using a calculator. $\cot 60°$

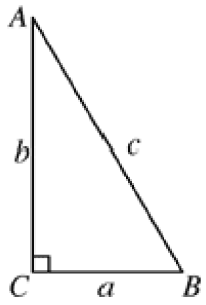
48. Solve for x to the nearest degree.



49. Solve ΔABC using the diagram and the given measurements. (The triangle is not drawn to scale.)
$B = 42°$, $a = 17$



50. Solve ΔABC using the diagram and the given measurements. (The triangle is not drawn to scale.)
$A = 45°$, $a = 3$



51. A slide 2.8 m long makes an angle of 29° with the ground. How high is the top of the slide above the ground?

52. Convert $\frac{5\pi}{12}$ radians to degree measure.

53. Solve triangle ABC given that $A = 47°$, $B = 52°$, and $b = 78$.

54. Given triangle ABC with $b = 8$, $c = 5$, and $A = 58°$, find a. Round the answer to two decimal places.

55. Solve for x. $4^{-2} \cdot 4^{x+1} \cdot 4^{3} = 4^{5}$

56. The amount of money, A, accrued at the end of n years when a certain amount, P, is invested at a compound annual rate, r, is given by $A = P(1+r)^{n}$. If a person invests \$250 in an account that pays 10% interest compounded annually, find the balance after 15 years.

57. The projected worth (in millions of dollars) of a large company is modeled by the equation $y = 256(1.04)^{x}$. The variable x represents the number of years since 1997. What is the projected annual percent of growth, and what should the company be worth be in 2007?

58. How much money must be deposited now in an account paying 7% annual interest, compounded yearly, to have a balance of \$1000 after 6 years?

59. A piece of equipment costs \$85,000 new but depreciates 15% per year in each succeeding year. Find its value after 10 years.

60. A piece of equipment costs \$75,000 new but depreciates 12% per year in each succeeding year. Find its value after 8 years.

61. Simplify the expression. $e^{x} \cdot 6e^{3x-1}$

62. Use the formula $A = Pe^{rt}$. If \$5500 is deposited in an account at the bank and earns 9% annual interest, compounded continuously, what is the amount in the account, rounded to the nearest dollar, after 6 years?

63. The formula $A = 2000e^{rt}$ can be used to find the dollar value of an investment of \$2000 after t years when the interest is compounded continuously at a rate of r percent.
a. Find the value of the investment after 12 years if the interest rate is 8%.

b. Find the value of the investment after 5 years if the interest rate is 4%.

64. Evaluate without using a calculator. $\log_2 16$

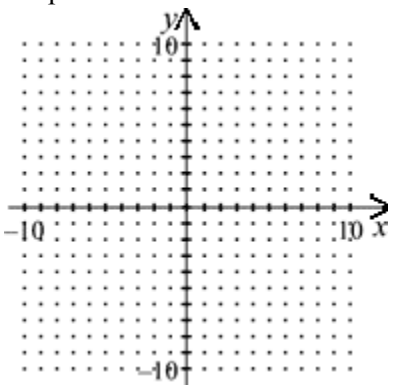
65. Evaluate without using a calculator. $\log_7 \frac{1}{49}$

66. Evaluate $\ln e^{-4}$.

67. Evaluate $\ln e^{3}$.

68. Find the inverse of the function. $y = \log_8 x$

69. Graph the function. State the domain and range. $y = \ln(x+2)$



70. Solve for x. $3^2 \cdot 3^4 \cdot 3^5 = 3^x$

71. Evaluate without using a calculator. $\csc 45°$

72. A rural school district believes that the number of school children in the district during the next 20 years can be modeled by the function $S(t) = 5700e^{-0.023t}$.
a. Does the school district believe the number of school children in the district will increase or decrease during the next 20 years? How fast does the school district believe the number of school children in the district is increasing or decreasing? Explain.

b. How many school children are in this district now? According to the model, how many children will be in the district in 10 years? How much smaller will the number of school children in the district be in 10 years?

c. Use the model to predict how much smaller the population of school children in the district will be in 20 years? Compare the predicted decrease during the first 10 years to the predicted decrease during the second 10 years.

d. According to the model, does the school district lose the same number of students each year? Explain.

Algebra II Honors Review for final
Answer Section

MULTIPLE CHOICE

1. ANS: B OBJ: Lesson 6.5 Graph Square Root and Cube Root Functions
2. ANS: C OBJ: Lesson 6.6 Solve Radical Equations
3. ANS: B OBJ: Lesson 6.6 Solve Radical Equations
4. ANS: B OBJ: 8-4.1 Simplifying Rational Expressions
5. ANS: C OBJ: 6-1 Use Rational Expressions
6. ANS: C OBJ: 8-4.2 Multiplying and Dividing Rational Expressions
7. ANS: C OBJ: 7-1.1 Exponential Growth
8. ANS: C OBJ: 13.1 Evaluating Trig Ratios
9. ANS: B OBJ: 13.2 Solving for angles using trig
10. ANS: A OBJ: Lesson 7.4 Evaluate Logs
11. ANS: C OBJ: 7.6 Solve exponential equations not needing logs.
12. ANS: D OBJ: 8-3.1 Using Tangents in Triangles
13. ANS: B OBJ: Lesson 6.4 Use Inverse Functions
14. ANS: D OBJ: Lesson 7.4 Evaluate Logarithms and Graph Logarithmic Functions
15. ANS: A OBJ: Lesson 13.2 Define General Angles and Use Radian Measure
16. ANS: B OBJ: Lesson 7.3 Use Functions Involving e
17. ANS: B OBJ: Lesson 8.1 Model Inverse and Joint Variation
18. ANS: C OBJ: Lesson 8.4 Multiply and Divide Rational Expressions
19. ANS: C
20. ANS: C
21. ANS: B
22. ANS: D
23. ANS: A
24. ANS: A
25. ANS: C
26. ANS: B
27. ANS: A

SHORT ANSWER

28. ANS:
    2

    OBJ: Lesson 13.1 Use Trigonometry with Right Triangles
29. ANS:
    1

    OBJ: Lesson 13.1 Use Trigonometry with Right Triangles

30. ANS:
$64^{4/3} = 256$

OBJ: Lesson 7.4 Log Definitions

31. ANS:
$\frac{11\pi}{9}$ radians

OBJ: Lesson 13.2 Define General Angles and Use Radian Measure

32. ANS:
$a_n = 24\left(-\frac{3}{4}\right)^{n-1}$

OBJ: Lesson 12.3 Analyze Geometric Sequences and Series

33. ANS:
$3 + (n-1)(-4) = -4n + 7$

OBJ: Lesson 12.2 Analyze Arithmetic Sequences and Series

34. ANS:
18

OBJ: Lesson 12.4 Find Sums of Infinite Geometric Series

35. ANS:
$3 + x$

OBJ: Lesson 6.3 Perform Function Operations and Composition

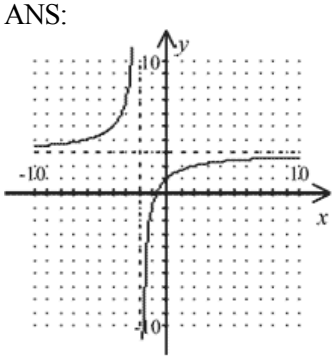
36. ANS:
963

OBJ: Lesson 6.3 Perform Function Operations and Composition

37. ANS:
$4b^{5x}$

OBJ: Lesson 7.3 Use Functions Involving e

38. ANS:



a) Domain: all real numbers except -2. Range: All real numbers except 3.

b) x=-2, y=3

OBJ: Lesson 8.2 Graph Simple Rational Functions

39. ANS:
12.78 ft

OBJ: Lesson 13.1 Use Trigonometry with Right Triangles

40. ANS:
–1, –3

OBJ: Lesson 8.6 Solve Rational Equations

41. ANS:

a. $A = 2500(1 + \frac{.04}{4})^{4t}$

b. $A = 2500e^{0.0375t}$

c. Bank B; Your account earns $3637.48 at Bank B and your account earns $3722.16 at Bank A, so your account at Bank A earns $84.68 more than the account at Bank B.

OBJ: 7-3 Exponential models.

42. ANS:
a=2.12

OBJ: Lesson 13.5 Apply the Law of Sines

43. ANS:
$A = 34.5°$

OBJ: Lesson 13.6 Apply the Law of Cosines

44. ANS:

a) $25000(1-.05)^t$ b) $22000(1-.04)^t$

c) After 10 years Randy's car is worth $14,968.42 while Susan's car is worth $14626.32. So Randy's car is worth more after 10 years.

OBJ: 7-2 Ecponential Models

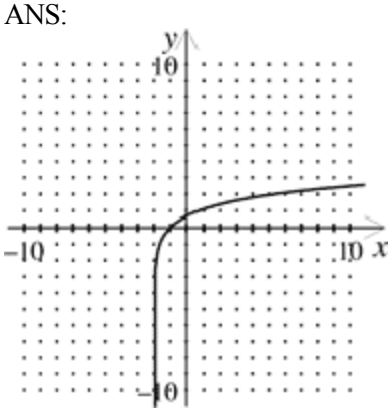
45. ANS:
$\frac{5}{13}$
46. ANS:
10.06
47. ANS:
$\frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$
48. ANS:
48
49. ANS:
$A = 48°, b = 15.31, c = 22.88$
50. ANS:
$B = 45°, b = 3.00, c = 4.24$
51. ANS:
1.36 m
52. ANS:
75°
53. ANS:
$C = 81°, a = 72.39, c = 97.76$
54. ANS:
6.83
55. ANS:
3
56. ANS:
\$1044
57. ANS:
4%; \$378.94 million
58. ANS:
\$666.34
59. ANS:
\$16,734.32
60. ANS:
\$26,972.59
61. ANS:
$6e^{4x-1}$
62. ANS:
\$9438
63. ANS:
a. \$5223.39
b. \$2442.81
64. ANS:
4
65. ANS:
–2

66. ANS:
-4

67. ANS:
3

68. ANS:
$y = 8^x$

69. ANS:



Domain: $x > -2$; Range: all real numbers

70. ANS:
11

71. ANS:
$\sqrt{2}$

OTHER

72. ANS:
a. The school district believes that the number of school children in the district will decrease by 2.3% a year. $S(t) = 5700e^{-0.023t}$ is a natural base function in the form $y = ae^{rx}$. Since $5700 > 0$ and $-0.023 < 0$, the function is an exponential decay function. The rate of decrease is $r = -0.023$ or -2.3%, so the number of school children in the district is believed to be decreasing by 2.3% a year.
b. 5700; about 4529; about 1171 students smaller.
c. About 2102 students smaller; The model predicts a decrease of about 1171 during the first 10 years and a decrease of about 931 during the next 10 years.
d. The model predicts that the number of students in the district will decrease by 2.3% a year. This will result in larger decreases in the number of students early in the time period because the decrease will be 2.3% of larger numbers. As the population of school children declines, the decrease will become smaller since it will be 2.3% of increasingly smaller numbers.