Math II NCFE REVIEW Name: _____

1.

If y varies directly as the square of x and $y = 12$ when $x = 2$, find the value of x when $y = 108$.

A. 36
B. 6
C. 3
D. 4

2.

Solve algebraically for the positive value of x, $x \neq 0$, and check: $\frac{2x+5}{7} = \frac{1}{x}$

Answer: $x =$ ☐

3.

When factored completely, $x^3 - 9x$ is equivalent to

A. $x(x - 3)$
B. $x(x + 3)(x - 3)$
C. $(x + 3)(x - 3)$
D. $x(x + 3)$

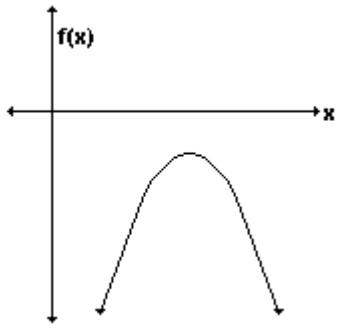
4.

If x varies inversely as y, and $x = 9$ when $y = 8$, find x when $y = 12$.

A. $^1/_2$
B. $^{32}/_3$
C. 6
D. 13

5.

The diagram shows a sketch of a quadratic function, $f(x)$.



What is the nature of the roots of the quadratic equation $f(x) = 0$?

A. imaginary
B. real, rational
C. real, rational
D. real, irrational

6.

Which logarithmic equation is equivalent to $L^m = E$?

A. $\log_L E = m$
B. $\log_E L = m$
C. $\log_m E = L$
D. $\log_E m = L$

7.

When air is pumped into an automobile tire, the pressure is inversely proportional to the volume. If the pressure is 35 pounds when the volume is 120 cubic inches, what is the pressure, in pounds, when the volume is 140 cubic inches?

Answer: _____ pounds

8.

The price of a stock, A(x), over a 12-month period decreased and then increased according to the equation $A(x) = 0.75x^2 - 6x + 20$, where x equals the number of months. The price of another stock, B(x), increased according to the equation $B(x) = 2.75x + 1.50$ over the same 12-month period. At what two prices, to the *nearest dollar*, are both stock values the same? State the *lower* price *first*.

Answer: $ _____ and $ _____

9.

Sean invests $10,000 at an annual rate of 5% compounded continuously, according to the formula $A = Pe^{rt}$, where A is the amount, P is the principal, $e = 2.718$, r is the rate of interest, and t is time, in years.

Determine, to the *nearest dollar*, the amount of money Sean will have after 2 years. Answer: $ _____

Determine how many years, to the *nearest year*, it will take for Sean's initial investment to double. Answer: _____ years

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10.

A pelican flying in the air over water drops a crab from a height of 30 feet. The distance the crab is from the water as it falls can be represented by the function $h(t) = -16t^2 + 30$, where t is time, in seconds. To catch the crab as it falls, a gull flies along a path represented by the function $g(t) = -8t + 15$. Can the gull catch the crab before the crab hits the water?

A. yes
B. no
C. cannot say

11.

Rewrite the expression $z^{-\frac{1}{5}}$ using radicals.

A. $\sqrt[5]{z}$
B. $\frac{1}{\sqrt[5]{z}}$
C. $-5\sqrt{z}$
D. $\frac{5}{\sqrt{z}}$

12.

The lateral surface area of a right circular cone, *s*, is represented by the equation $s = \pi r\sqrt{r^2 + h^2}$ where *r* is the radius of the circular base and *h* is the height of the cone. If the lateral surface area of a large funnel is 236.64 square centimeters and its radius is 4.75 centimeters, find its height, to the *nearest hundredth of a centimeter*.

Answer: _____ cm

13.

Depreciation (the decline in cash value) on a car can be determined by the formula $V = C(1 - r)^t$, where *V* is the value of the car after *t* years, *C* is the original cost, and *r* is the rate of depreciation. If a car's cost, when new, is \$15,000, the rate of depreciation is 30%, and the value of the car now is \$3,000, how old is the car to the *nearest tenth of a year*?

Answer: _____ years

14.

The exponential function $f(x) = 15{,}000(1.02)^x$ models the amount of money in a savings account over a period of time. What does the value 15,000 represent?

A. amount remaining in the account
B. original amount in the account
C. rate of growth
D. time

15.

Which is equivalent to the expression $\dfrac{\left(4x^{-6}y^{12}\right)^{-1/2}}{2x^4y^{-4}}$ after it has been simplified?

A. $\dfrac{4}{xy^2}$
B. $\dfrac{1}{16x^2y^2}$
C. $\dfrac{1}{4xy^2}$
D. $4xy^2$

16.

Which function represents exponential growth?

A. $y = \left(\dfrac{3}{2}\right)^{-x} + 1$
B. $y = -5\left(\dfrac{1}{3}\right)^{-x}$
C. $y = 2\left(\dfrac{7}{8}\right)^{x} - 3$
D. $y = -3\left(\dfrac{1}{2}\right)^{x} - 1$

17.

If $x + ay = b$, then *y* equals

A. $\dfrac{b - x}{a}$
B. $\dfrac{b}{x + a}$
C. $b - x - a$
D. $\dfrac{b - a}{x}$

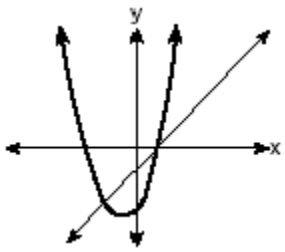
18.

The graphs of the equations $x^2 + y^2 = 9$ and $x = 1$ are drawn on the same set of axes. What is the total number of points common to both graphs?

A. 1
B. 2
C. 3
D. 4
E. 0

19.

The accompanying diagram shows the graphs of a linear equation and a quadratic equation.



How many solutions are there to this system of equations?

A. 1
B. 2
C. 3
D. 0

20.

Is the equation $A = 21000(1 - 0.12)^t$ a model of exponential growth or exponential decay, and what is the rate (percent) of change per time period?

A. exponential growth and 12%
B. exponential growth and 88%
C. exponential decay and 12%
D. exponential decay and 88%

21.

If $bx - 2 = K$, then x equals

A. $\frac{K}{b} + 2$
B. $\frac{K-2}{b}$
C. $\frac{2-K}{b}$
D. $\frac{K+2}{b}$

22.

Kathy plans to purchase a car that depreciates (loses value) at a rate of 14% per year. The initial cost of the car is $21,000. Which equation represents the value, v, of the car after 3 years?

A. $v = 21{,}000(0.14)^3$
B. $v = 21{,}000(0.86)^3$
C. $v = 21{,}000(1.14)^3$
D. $v = 21{,}000(0.86)(3)$

23.

During which of the following intervals is the equation, $y = -x^3 - 6x^2 + x + 5$, increasing?

A. $(-\infty, -4.08)$
B. $(0.08, \infty)$
C. $(-4.08, 0.08)$
D. $(-31.04, 5.04)$

24.

Describe the horizontal and/or the vertical shifts used to transform the equation $y = x^2$ into the equation $y = (x - 1)^2$.

A. left 1 unit and down 1 unit
B. left 1 unit, only
C. right 1 unit, only
D. right 1 unit and up 1 unit

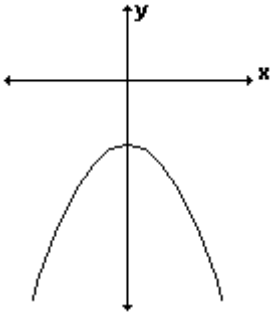
25.

What is the *negative* value of x that satisfies the equation $2x^2 + 5x - 3 = 0$?

A. -1
B. $-\frac{1}{2}$
C. -3
D. $-\frac{2}{3}$
E.

26.

Which equation can represent the parabola in the diagram?



A. $y = -x^2$
B. $y = x^2$
C. $y = x^2 - 3$
D. $y = -x^2 - 3$

27.

Solve for the *positive* value of x, to the *nearest tenth*:

$$\frac{1}{x} + \frac{1}{x+3} = 2$$

Answer: $x =$ ☐

28.

Find the domain and range of the radical function $f(x) = -\sqrt{x} + 1$.

A. $x \leq 0$ and $y > 1$
B. $x > 0$ and $y < 1$
C. $x \geq 0$ and $y \leq 1$
D. $x > 0$ and $y \geq 1$

29.

(a) An equation of the axis of symmetry of the graph of $y = -x^2 + 8x - 7$ is $x =$ ☐.

(b) Complete the table for $y = -x^2 + 8x - 7$, including all integral values of x such that $0 \leq x \leq 8$. This information can be used to sketch a graph of the equation.

x	$y = -x^2 + 8x - 7$
0	
1	
2	
3	
4	
5	
6	
7	
8	

(c) There are two roots of the equation

$$-x^2 + 8x - 7 = 0.$$

The smaller root is ☐, and the larger root is ☐.

30.

Scientists use the following formula to compare conventional mass, 'M_c,' which takes into account the buoyancy of an object, to its true mass, 'M'.

$$M_c = M\left[1+1.2\left(\frac{1}{8000}-\frac{1}{p}\right)\right]$$

Given that the conventional mass of an object is 1366.5 and its true mass is 1453.5, solve for 'p' to the *nearest thousandth*.

p = ☐

31.

The *minimum* value of the expression $\frac{1}{2}x^2 - 3x + 4$ is ☐, which occurs when x = ☐.

32.

What is the y-intercept of the parabola whose equation is $y = x^2 + 7x + 5$?

A. $-\frac{7}{2}$
B. 5
C. 3
D. $\frac{7}{2}$

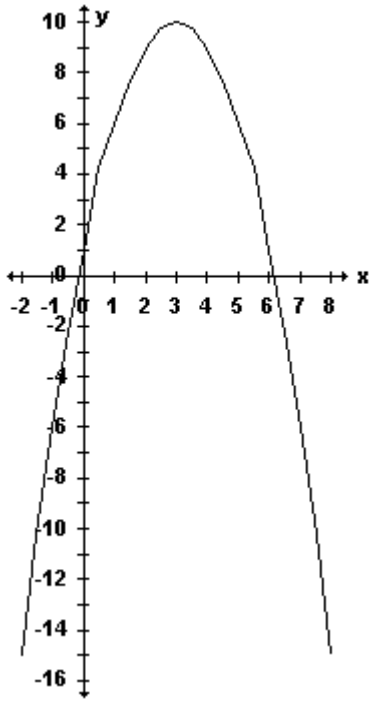
33.

What is the positive root of the equation $x^2 - 3x - 6 = 0$?

A. $\frac{3-\sqrt{33}}{2}$
B. $\frac{3+\sqrt{33}}{2}$
C. $\frac{-3-\sqrt{33}}{2}$
D. $\frac{-3+\sqrt{33}}{2}$

34.

Which equation defines the graph in the diagram?



A. $y = x^2 + 6x + 1$
B. $y = -x^2 + 6x + 1$
C. $y = x^2 + 3x$
D. $y = -x^2 + 3x - 1$

35.

A rock is thrown vertically from the ground with a velocity of 24 meters per second, and it reaches a height of $2 + 24t - 4.9t^2$ after t seconds. Round your answers to the *nearest hundredth*.

a How many seconds after the rock is thrown will it reach maximum height?Answer: ☐ seconds

b What is the maximum height the rock will reach, in meters?Answer: ☐ meters

c How many seconds after the rock is thrown will it hit the ground?Answer: ☐ seconds

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36.

What is the solution of the equation $\sqrt{5x - 9} - 3 = 1$?

A. $^1/_5$
B. $^{13}/_5$
C. $^5/_6$
D. 5

37.

The expression $8^{-\frac{2}{3}}$ is equivalent to

A. $\frac{1}{4}$
B. $-\frac{1}{4}$
C. -4
D. 4

38.

Factor completely: $3x^2 - 15x - 42$

A. $3(x + 2)(x + 7)$
B. $3(x - 2)(x + 7)$
C. $3(x + 2)(x - 7)$
D. $3(x - 2)(x - 7)$

39.

An arch is built so that it is 6 feet wide at the base. Its shape can be represented by a parabola with the equation $y = -2x^2 + 12x$, where y is the height of the arch. The maximum height, y, of the arch is ☐ feet.

40.

The height of an object, h(t), is determined by the formula $h(t) = -16t^2 + 256t$, where t is time, in seconds. Which statement about the object is true?

A. The object will reach a maximum height.
B. The object will reach a minimum height.
C. The height of the object will not change.

41.

If x is a positive integer, $4x^{\frac{1}{2}}$ is equivalent to

A. $\frac{2}{x}$
B. $2x$
C. $4\sqrt{x}$
D. $4^{\frac{1}{x}}$

42.

Greg is in a car at the top of a roller-coaster ride. The distance, *d*, of the car from the ground as the car descends is determined by the equation $d = 144 - 16t^2$, where *t* is the number of seconds it takes the car to travel down to each point on the ride. How many seconds will it take Greg to reach the ground?

Answer: _____ seconds

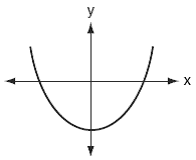
43.

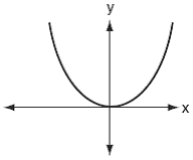
When simplified, the expression $\left(\sqrt[3]{m^4}\right)\left(m^{-\frac{1}{2}}\right)$ is equivalent to

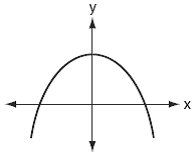
A. $\sqrt[3]{m^{-2}}$
B. $\sqrt[4]{m^3}$
C. $\sqrt[5]{m^{-4}}$
D. $\sqrt[6]{m^5}$

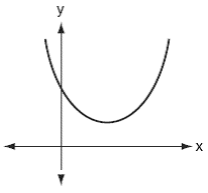
44.

Which graph represents a quadratic function with a negative discriminant?

A. 

B. 

C. 

D. 

45.

Rewrite the expression $\frac{1}{ab^{-\frac{2}{3}}}$ using radicals.

A. $\frac{\sqrt[3]{ab^2}}{\sqrt[3]{b^2}}$
B. $\frac{a}{\sqrt{b^3}}$
C. a
D. $a\sqrt[3]{b^2}$

46.

Which is equivalent to the expression $\frac{x^{\frac{1}{2}}y^{\frac{2}{3}}}{x^2y^{\frac{1}{2}}}$ after it has been simplified?

A. $\frac{x^{\frac{3}{2}}}{y^{\frac{1}{6}}}$
B. $x^{\frac{3}{2}}y^{\frac{1}{6}}$
C. $\frac{\sqrt{y^6}}{\sqrt[3]{x^2}}$
D. $\frac{\sqrt[6]{y}}{\sqrt{x^3}}$

47.

The formula: $m = 1.25d + \frac{\sqrt{s}}{d}$ can be used to find the mass, *m*, of an object based on its density, *d*, and surface area, *s*. If the mass of an object is measured at 15 tons and its density is 8 units per square foot, what is its surface area?

Surface area *s* = ☐

48.

What is the domain of the function: $f(x) = \sqrt{x-2} + 3$?

A. $(-\infty,\infty)$
B. $(2,\infty)$
C. $[2,\infty)$
D. $[3,\infty)$

49.

Solve for *x*: $\frac{4x}{x-3} = 2 + \frac{12}{x-3}$

A. 3
B. 0
C. -3
D. { }

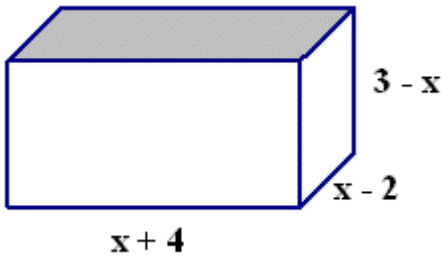
50.

Given the function $f(x) = \frac{a}{x-h} + k$, which direction does the graph shift when the value of *k* decreases?

A. left
B. right
C. down
D. up

51.

The dimensions of a rectangular prism are given below in the diagram.

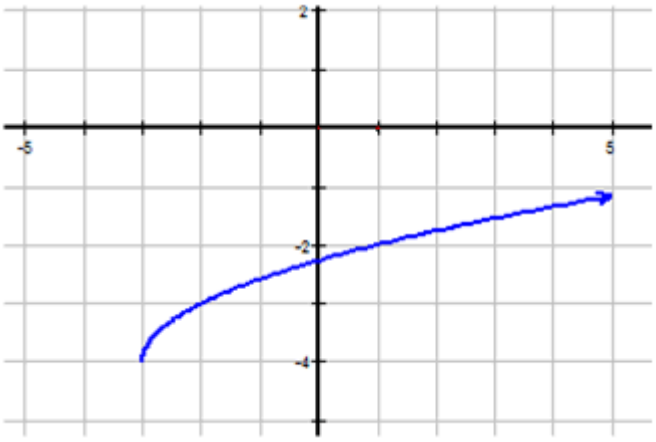


What is the approximate value of *x* that will produce the maximum volume?

A. 2 units
B. 2.25 units
C. 2.50 units
D. 2.75 units

52.

Which function produces the graph below?



A. $f(x) = \sqrt{x-3} - 4$
B. $f(x) = -\sqrt{x+3} - 4$
C. $f(x) = \sqrt{x+3} - 4$
D. $f(x) = \sqrt{x-3} + 4$

53.

A small rocket is launched from a height of 72 feet. The height of the rocket in feet, *h*, is represented by the equation $h(t) = -16t2 + 64t + 72$, where t = time, in seconds.

Graph this equation on your graphing calculator and use it to determine the number of seconds that the rocket will remain at or above 100 feet

Answer: ☐ seconds

54.

Find the vertex for the quadratic equation and tell if the vertex is a maximum or a minimum:
$y = -(x + 2)^2 - 4$.

A. (1, -4), maximum
B. (-2, -4), maximum
C. (2, -4), minimum
D. (-1, 2), minimum

55.

Graphically find the roots of the equation $y = -x^2 + 5$.

A. $x = 2.24$
B. $x = \sqrt{5}$
C. $x = \sqrt{-5}$
D. $x = \pm 2.24$

56.

Solve for 'x' to the nearest tenth.

$$2\sqrt{2x+1} = 3\sqrt{2x-3}$$

$x =$ ☐

57.

Solve the following system of equations algebraically and check:

- $y = 2x^2 + 2x + 3$
- $x = y - 3$

An *integer* solution to the system is $x =$ ☐, and $y =$ ☐.

A *noninteger* solution to the system is $x =$ ☐, and $y =$ ☐.

58.

A used car was purchased in July 2000 for $11,900. If the car depreciates 13% of its value each year, what is the value of the car, to the *nearest hundred dollar*s, in July 2003?

Answer: $ ☐

59.

What is the range of the polynomial $y = 3x^3 - 3x^2 - 3x + 8$ in interval notation?

A. (-2,2)
B. $(-\infty,\infty)$
C. $[\infty,-\infty)$
D. $\left[-\frac{1}{3},1\right]$

60.

The equation: $A = P(1 - r)^t$ can be used to model the decreasing population of bacteria, where *'t'* is the time in hours. The initial population was 100,000. After 5 hours, the population was 62,921. Find the rate of decrease as a percent. Round to the *nearest hundredth of a percent*.

Answer: $r =$ [ ] %

61.

If the graphs of $x^2 + y^2 = 4$ and $y = -4$ are drawn on the same axes, what is the total number of points common to both graphs?

A. 1
B. 2
C. 3
D. 4
E. 0

62.

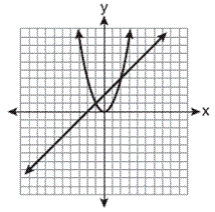
Since January 1980, the population of the city of Brownville has grown according to the mathematical model $y = 720{,}500(1.022)^x$, where x is the number of years since January 1980.
Which statement about this mathematical model is true?

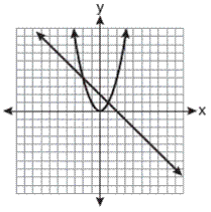
A. 720,500 represents the population in 1980, while the 1.022 represents a growth rate of 22% added to the current population.
B. 720,500 represents the population in 1980, while 1.022 represents a growth rate of .22% added to the current population.
C. 720,500 represents the population in 1980, while 1.022 represents a growth rate of 2.2% added to the current population.
D. 720,500 represents the population in 1980, while 1.022 represents a growth rate of .022% added to the current population.

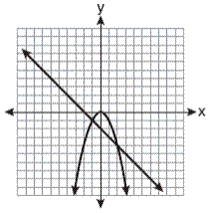
63.

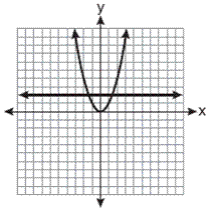
Which graph could be used to find the solution to the following system of equations?

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

A. 

C. 

B. 

D. 

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64. What is the degree of $(x^5 + 4x^3 + 6x) - (x^5 + 2x^4 - 1)$?

65. What is the product of $(x - 4)(2x^2 - 3x + 1)$? Show your work.

66. When factored completely, $x^3 - 9x$ is equivalent to…..

67. Find the roots using quadratic formula? $x^2 - 5x - 3 = 0$? Show your work.

68. Find the x - intercepts of the quadratic $4x^2 - 96 = 0$

69. Find the zero(s) of the quadratic equation $2x^2 - x = 4$

70. Find the area of the rectangle with side lengths (x-5) and (x+3).

71. Suppose you have 56 feet of fencing to enclose a rectangular dog pen. The function $A = 28x - x^2$, where x = width, gives you the area of the dog pen in square feet. What width gives you the maximum area? What is the maximum area? Round to the nearest tenth as necessary.

A. width = 14 ft; area = 196 ft^2 **B.** width = 14 ft; area = 588 ft^2

C. width = 28 ft; area = 420 ft^2 **D.** width = 28 ft; area = 196 ft^2

72. A rocket is shot into the air with an initial velocity of 800 m/sec. The equation $\boldsymbol{h = -16t^2 + 1440t}$ models the height of the ball. How long does it take for the rocket to hit the ground?

73. Using the equation $y = (x-1)^2 + 4$, determine the vertex and axis of symmetry.

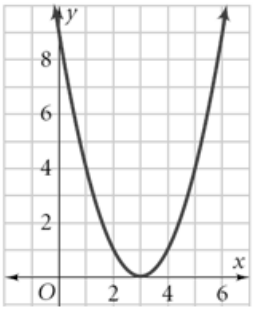
74. For which discriminant is the graph possible?

A. $b^2-4ac = -9$

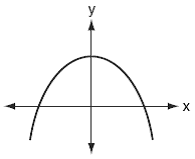
B. $b^2-4ac = 0$

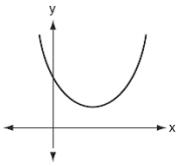
C. $b^2-4ac = 3$

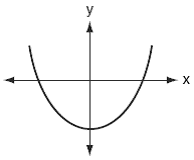
D. $b^2-4ac = ½$

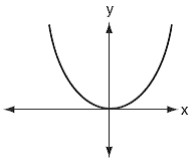


75. Which graph represents a quadratic function with a negative discriminant?

A. 

C. 



B. D. 

76. Identify the axis of symmetry, the vertex, and range of the function $y = 2x^2 + 4x - 2$

77. Graphically find the roots of the equation $y = -x^2 + 5$.

78. An arch is built so that it is 6 feet wide at the base. Its shape can be represented by a parabola with the equation $y = -2x^2 + 12x$, where y is the height of the arch. The maximum height, y, of the arch is _____feet.

79. The height of an object, h(t), is determined by the formula $h(t) = -16t^2 + 256t$, where $t$is time, in seconds. Which statement about the object is true?

80. Greg is in a car at the top of a roller-coaster ride. The distance, d, of the car from the ground as the car descends is determined by the equation $d = 144 - 16t^2$, where $t$is the number of seconds it takes the car to travel down to each point on the ride. How many seconds will it take Greg to reach the ground?