Name: _____

EOC FSA

Practice Test

DEPARTMENT OF MATHEMATICS, SCIENCE, & GIFTED

BROWARD COUNTY PUBLIC SCHOOLS

Algebra 2

No Calculator Portion

Compiled by the Broward County Public Schools
Office of Instruction and Intervention
Mathematics, Science, & Gifted Department

Algebra 2 EOC FSA Mathematics Reference Sheet

Formulas

$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$, where a, b, and c are coefficients in an equation of the form $ax^2 + bx + c = 0$

$\log_b a = \frac{\log a}{\log b}$

$\sin A° = \frac{\text{opposite}}{\text{hypotenuse}}$

$\cos A° = \frac{\text{adjacent}}{\text{hypotenuse}}$

$\tan A° = \frac{\text{opposite}}{\text{adjacent}}$

$P(B|A) = \frac{P(A \text{ and } B)}{P(A)}$

$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$

$z = \frac{(x - \mu)}{\sigma}$, where μ = mean and σ = standard deviation

Name: ____________________ Class: ________________ Date: ________ ID: A

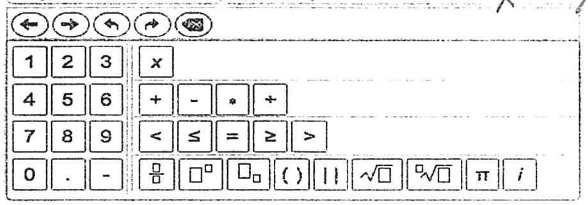
Algebra 2 EOC FSA Practice Test (No Calculator Portion)

1. A rational expression is shown.

$\frac{x^4-1}{x+1}$ = $(x^4-1)\div(x+1)$

What is the quotient?

[x^3-x^2+x-1]



4 3 2 1 0
-1 | 1 0 0 0 -1
-1 1 -1 1
1 -1 1 -1 | 0

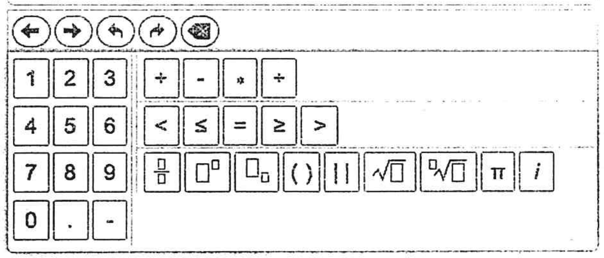
x^3-x^2+x-1

2. A number is shown.

$\sqrt{-25}$ = $5i$ = $0+5i$

Show the value of this number in $a + bi$ form.

[$0+5i$]



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3. In the cafeteria, sometimes salads are served and sometimes fruit is served. Linda notes that out of 15 days, 12 days salad is served and 3 days fruit is served. Predict how many days fruit is served in a 180-day school year. If necessary, round your answer to the nearest whole number.

Ⓐ 144 days
Ⓑ 36 days (circled)
Ⓒ 45 days
Ⓓ 33 days

salad fruit
$\frac{12}{15}$ $\frac{3 \cdot 12}{15 \cdot 12} = \frac{x}{180}$
$\frac{15x}{15} = \frac{3(180)}{15}$
$x = 36$

4. The table shows several complex numbers, where i is the imaginary unit.

Select all appropriate cells in the table where the product of the two numbers is a real number.

See below

	8 − 2i	3	i
8 + 2i	✓	☐	☐
5i	☐	☐	✓
−4	☐	✓	☐

5. If k is a constant, what is the value of k such that the polynomial $k^2x^3 - 6kx + 9$ is divisible by $x - 1$?

Enter your answer in the box.

$k =$ [3]

3 2 1 0
1 | k^2 0 $-6k$ 9
k^2 k^2 k^2-6k
k^2 k^2 k^2-6k | k^2-6k+9

divisible by means remainder is 0
$k^2-6k+9=0$
$(k-3)(k-3)=0$
$k-3=0$
$k=3$

#4.
$(8+2i)(8-2i)$
$64-16i+16i-4i^2$
$64-4(-1)$
$64+4$
68 ✓

$(8+2i)(3)$
$24+6i$ ✗

$(8+2i)i$
$8i+2i^2$
$8i-2$ ✗

$-4 \cdot i$
$-4i$ ✗

$-4 \cdot 3$
-12 ✓

$5i(8-2i)$
$40i-10i^2$
$40i+10$ ✗

$5i(3)$
$15i$ ✗

$5i \cdot i$
$5i^2$
-5 ✓

$-4(8-2i)$
$-32+8i$ ✗

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16

The sum of two quadratic expressions is 3 times the difference of the expressions.

The first expression is shown.

$4x^2 - 6x + 10$

Marci's steps for finding the second expression are shown.

Let A = $4x^2 - 6x + 10$

Let B = second expression

$(A + B) = 3(A - B)$

$A + B = 3A - 3B$

$4B = 2A$

$4B = 2(4x^2 - 6x + 10)$

$\frac{4B}{4} = \frac{8x^2}{4} - \frac{12x}{4} + \frac{20}{4}$

Create an equation that shows the next step used to find B.

$B = 2x^2 - 3x + 5$

17 Given that $x > 0$, which expression is equivalent to $5\sqrt{xy} + 25\sqrt{x}$?

Ⓐ $5(xy)^{-1} + 25x^{-1}$

Ⓑ $25x^{\frac{1}{2}}(\sqrt{y} + 5)$

Ⓒ $\sqrt{x}(25y^{\frac{1}{2}} + 5)$

Ⓓ $5x^{\frac{1}{2}}(y^{\frac{1}{2}} + 5)$

$5(xy)^{\frac{1}{2}} + 25(x)^{\frac{1}{2}}$

$= 5x^{\frac{1}{2}}y^{\frac{1}{2}} + 25x^{\frac{1}{2}}$

$= 5x^{\frac{1}{2}}(y^{\frac{1}{2}} + 5)$

Name: _____ ID: A

18

An expression is shown.

$\left(\frac{64y^9}{x^{-3}}\right)^{\frac{1}{3}}$

Create an equivalent expression.

Use only positive integer exponents in your answer.

$\sqrt[3]{4 \cdot 4 \cdot 4 x x x y y y y y y y y y}$

$= \sqrt[3]{64 x^3 y^9} = 4xy^3$

$4xy^3$

19

Create an expression that is equivalent to $(4x^2 + 7x - 9) - (-2x^2 - 4x + 6)$.

$4x^2 + 7x - 9 + 2x^2 + 4x - 6$ (distribute −1)

$= 6x^2 + 11x - 15$

$6x^2 + 11x - 15$

20 Jean polled a random sample from a population and calculated a sample statistic. Jean can use this statistic to draw an inference about what?

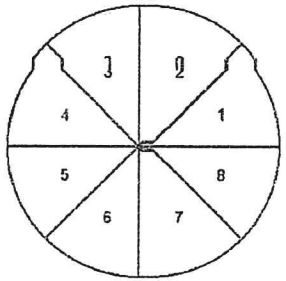
Ⓐ the corresponding sample parameter

Ⓑ the population size

Ⓒ the corresponding population statistic

Ⓓ the corresponding population parameter

1 You spin a spinner with 8 equally likely landing spaces numbered 1 to 8. Event A is landing on a prime number. Event B is landing on an odd number. What is the intersection of A and B?



A: {2, 3, 5, 7}

B: {1, 3, 5, 7}

A ∩ B: {3, 5, 7}

Both sets contain → intersection

All elements together → union

Elements in universe but not in set → complement

Ⓐ ∅

Ⓑ {3, 5, 7}

Ⓒ {1, 2, 3, 5, 7}

Ⓓ {1, 2, 3, 4, 5, 6, 7, 8}

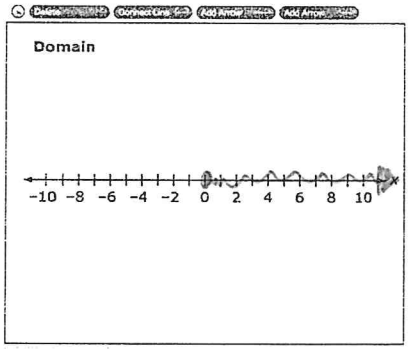
2

A function is shown.

$k(x) = x^{\frac{1}{2}}$

What is the domain of $k(x)$?

Use the Connect Line tool or either of the Add Arrow tools to show the domain of $k(x)$ on the number line.



$k(x) = x^{\frac{1}{2}} = \sqrt{x}$

$\sqrt{-}$ { not real

so $\sqrt{} \geq 0$

$\sqrt{x} \rightarrow D: x \geq 0$

or $[x, \infty)$

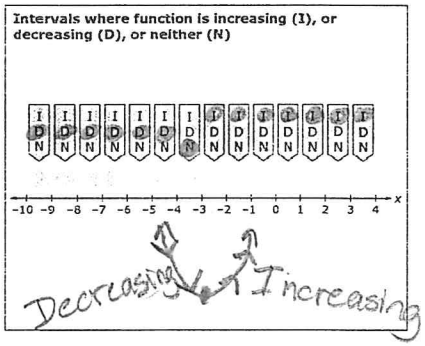
3

A function is shown.

$y = 8x^2 + 48x - 56$

Over which intervals is the graph increasing, decreasing, or neither?

Above each interval on the horizontal axis, click "I" to show increasing, "D" to show decreasing, or "N" to show neither.



$\frac{-b}{2a} = \frac{-48}{2 \cdot 8} = -3$

V: (-3, _)

$a = 8 > 0$ opens up

4

A small object with mass m is attached to a ceiling by a spring. The spring is pulled straight down and released so that the object begins to oscillate up and down. The period T of the object's oscillation is given by the formula $T = 2\pi\sqrt{\frac{m}{k}}$, where k is the spring constant, which describes the stiffness of the spring.

Which of the following gives k as a function of m and T?

Ⓐ $k = \frac{4\pi^2\sqrt{m}}{T}$

Ⓑ $k = \frac{2\pi\sqrt{m}}{T}$

Ⓒ $k = \frac{4\pi^2 m}{T^2}$ solve for k

Ⓓ $k = \frac{2\pi m}{T^2}$

$\frac{T}{2\pi} = \frac{2\pi\sqrt{\frac{m}{k}}}{2\pi}$

$\left(\frac{T}{2\pi}\right)^2 = \left(\sqrt{\frac{m}{k}}\right)^2 \rightarrow \frac{T^2}{4\pi^2} = \frac{m}{k}$ Cross multiply

$\frac{kT^2}{T^2} = \frac{4\pi^2 m}{T^2}$

$k = \frac{4\pi^2 m}{T^2}$

16

Meg deposited $1000 into a bank account that pays 3% monthly interest.

The formula for compound interest is shown.

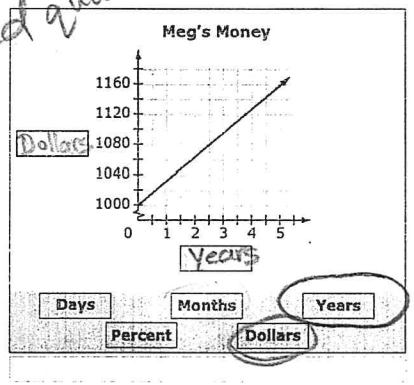
$A = P(1 + \frac{r}{n})^{nt}$

- P is the principal
- r is the rate
- n is the number of times compounded per year
- t is the time in years

Use the data in the graph to determine which units would be most appropriate to represent the information in the graph.

Drag a label to each box.

flawed question



17

Consider the equation $\frac{4^{x^2}}{2^x} = 2$.

Which equation is equivalent to the equation shown?

Ⓐ $2^{x^2} = 2$

Ⓑ $2^{x^2-x} = 2$

Ⓒ $2^{2x} = 2$

Ⓓ $2^{2x^2-x} = 2$

If base are equal, we can subtract exponents

$\frac{4^{x^2}}{2^x} = 2 \rightarrow \frac{(2^2)^{x^2}}{2^x} = 2$ Highinsky multiply

$\frac{2^{2x^2}}{2^x} = 2^1 \rightarrow 2^{2x^2-x} = 2^1$

How would we find x from here?

Bases same, so drop the base; If base same, exponents equal

$2x^2 - x = 1$

$2x^2 - x - 1 = 0$

$(2x+1)(x-1) = 0$

$2x+1=0 \quad x-1=0$

$-1 \quad -1 \quad +1 \quad +1$

$\frac{2x}{2} = \frac{-1}{2} \quad x = 1$

$x = -\frac{1}{2}$

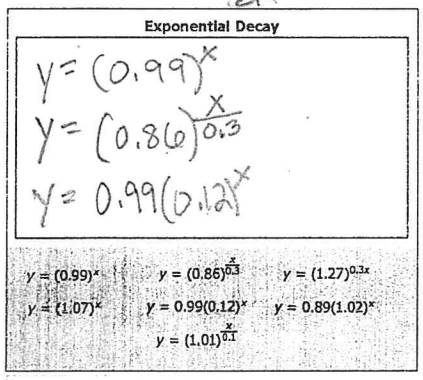
18

A set of exponential equations is shown.

Drag all of the functions that model exponential decay into the box.

base < 1

growth: base > 1



19

An equation is shown.

$x = \log(20) + 2$

Get log alone.

$x = \log(20) + 2$

$-2 \quad -2$

$x - 2 = \log(20)$ → exp. form $10^{(x-2)} = 20$

What is the exponential form of the equation?

$10^{(x-2)} = 20$

20

A radio station wants to get the opinions of listeners on the host of a new radio show. The station's staff emails a survey to all listeners who have subscribed to their online listening option. Is this sampling method biased, and why or why not?

Ⓐ The sample is not biased. It is a random sample.

Ⓑ The sample is not biased. The listeners have certainly heard the show.

Ⓒ The sample is biased. Some people who listen to the radio show might not subscribe to the online listening option.

Ⓓ The sample is biased. There is no way to know if the online subscribers listen to the station.

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21 What is the inverse function of $g(x) = 3x^2 - 2, x \geq 0$?

Create a function $f(x)$ that represents the inverse of $g(x)$.

$\frac{\sqrt{x+2}}{3}$

Switch x and y. Solve for y.

$x = 3y^2 - 2, y \geq 0$

$+2 \quad +2$

$\frac{x+2}{3} = \frac{3y^2}{3}$

$\frac{x+2}{3} = y^2$

$\pm\sqrt{\frac{x+2}{3}} = y$

$\pm\frac{\sqrt{x+2}}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \pm\frac{\sqrt{3(x+2)}}{3}$

$= \pm\frac{\sqrt{3x+6}}{3}$

22 An arc on the unit circle is $\frac{3\pi}{4}$ units long.

What is the radian measure of the arc's central angle?

Ⓐ $\frac{\pi}{4}$ radians

Ⓑ $\frac{3\pi}{4}$ radians

Ⓒ 3π radians

Ⓓ $\frac{3}{4}$ radians

23 In the formula $B = B_0 e^{rt}$, B is the balance, in dollars, of an account with initial balance rate r compounded continuously for t years. How can you rewrite this formula to use it to find the number of years needed to attain a certain balance?

Ⓐ $t = r\ln\frac{B}{B_0}$

Ⓑ $t = \ln\frac{B}{B_0} - r$

Ⓒ $t = \frac{\ln B}{r\ln B_0}$

Ⓓ $t = \frac{1}{r}\ln\frac{B}{B_0}$

$\frac{B}{B_0} = \frac{B_0 e^{rt}}{B_0}$

$\frac{B}{B_0} = e^{rt}$

$\frac{1}{r} \cdot \ln\frac{B}{B_0} = \frac{rt}{r}$

$\frac{1}{r}\ln\frac{B}{B_0} = t$

Name: _____ ID: A

24 A quadratic equation is shown.

$4(x+7)^2 = 11$

$\frac{4(x+7)^2}{4} = \frac{11}{4}$

$(x+7)^2 = \frac{11}{4}$

$\sqrt{(x+7)^2} = \pm\sqrt{\frac{11}{4}}$

$x+7 = \pm\frac{\sqrt{11}}{2}$

$-7 \quad -7$

Solve the equation and create one possible solution in radical form.

$\frac{\sqrt{11}}{2} - 7$

$x = \pm\frac{\sqrt{11}}{2} - 7$

25 An expression in exponential form is shown.

$x^{\frac{1}{3}}$

$x^{\frac{1}{3}} = \sqrt[3]{x}$

Create the equivalent radical form of the expression.

$\sqrt[3]{x}$

26 When using a c% confidence interval to estimate a population mean or proportion, how does the interval change as the value of c changes?

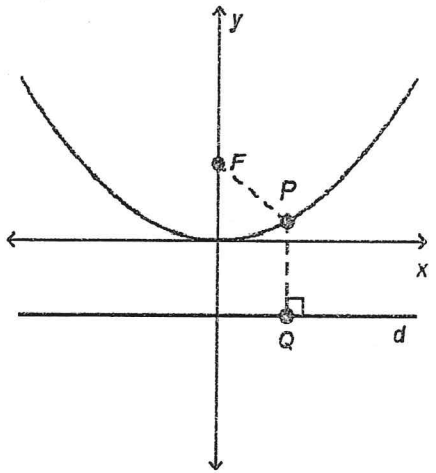
Ⓐ The interval gets wider as the value of c increases.

Ⓑ The interval gets narrower as the value of c increases.

Ⓒ The interval depends on the sample mean or proportion, not the value of c.

Ⓓ The interval depends on the sample standard deviation, not the value of c.

27 In the diagram below, F is the focus of the parabola, line d is the directrix, and $\overline{QP} \perp d$. What is the relationship between FP and QP?



FP = QP

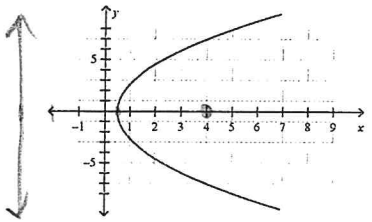
Ⓐ FP < QP
Ⓑ FP = QP
Ⓒ FP > QP
Ⓓ A relationship cannot be determined.

28 Marsha wants to know what local people think about the new city tax. She sits in a hotel lobby and asks the first 50 people that walk in how they feel about the tax. What type of sample is this?

Ⓐ stratified
Ⓑ convenience
Ⓒ self-selected
Ⓓ cluster

29 Find the equation of a parabola with focus $F(4,0)$ and directrix $x = -3$.

opening right



$V: (\frac{1}{2}, 0)$ → $x = y^2$

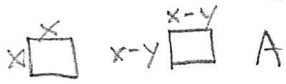
$(x - \frac{1}{2}) = y^2$

Ⓐ $y^2 = 14(x - \frac{1}{2})$
Ⓑ $x^2 = 14(y - \frac{1}{2})$
Ⓒ $(y - \frac{1}{2})^2 = 14x$
Ⓓ $(x - \frac{1}{2})^2 = 14y$

30 Determine which sampling method is most likely to be representative of the opinions of voters in an election race for governor of a state.

Ⓐ Over the course of a week, poll every customer who comes into a car dealership and is willing to answer questions.
Ⓑ Send questionnaires to 500 randomly selected registered members of each of the recognized political parties in the state.
Ⓒ Call 1000 randomly selected registered voters and ask their opinions.
Ⓓ Ask viewers of the 11:00 P.M. news on a local television station to register their opinions on the station's web site.

31



$A = (x-y)(x-y)$

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

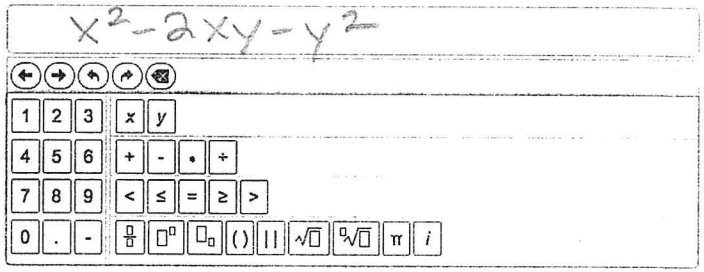
$= x^2 - 2xy - y$

A square has side length x.

A new square is created by subtracting y from each side of the original square.

Create an expression for the area of the new square in expanded form.

$x^2 - 2xy - y^2$



34

Two functions are shown.

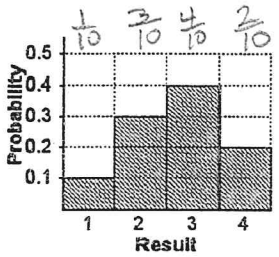
$f(x) = 3x + 1$

$g(x) = -\frac{3}{2}x - 7$

What is the value of x when $f(x) = g(x)$?

$-\frac{16}{9}$

35 A probability model for a spinner with 4 unequal sections labeled 1, 2, 3, and 4 is shown. Which result is most unlikely for this model?



Ⓐ The spinner lands on 1 twice in 20 spins.

Ⓑ The spinner lands on 2 twice in 5 spins.

Ⓒ The spinner lands on 3 twice in 25 spins.

Ⓓ The spinner lands on 4 twice in 10 spins.

34

Create an expression that represents the complete factorization of $2x^2 + 16x + 32$.

$2(x+4)^2$

35 200 people took part in a study involving a new headache medicine. After one week, the subjects were asked if they had a headache in the past week. According to the data in the two-way table, what fraction of the people who were given the placebo did not have a headache?

	Given medicine	Given placebo	Total
Headache	30	20	50
No headache	120	30	150
Total	150	50	200

Ⓐ $\frac{2}{5}$

Ⓑ $\frac{3}{4}$

Ⓒ $\frac{3}{5}$

Ⓓ $\frac{4}{5}$

36 Researchers measured the levels of fluoride in young children and gave tests to measure their intellectual development over several years. The results show that young children with higher exposure to fluoride tend to have lower IQ scores later in life. What can the researchers claim based on these results?

Ⓐ There is a relationship between fluoride levels in children and IQ scores.

Ⓑ Exposure to higher levels of fluoride reduces IQ.

Ⓒ There is no relationship between fluoride levels in children and IQ scores.

Ⓓ Reducing exposure to fluoride can increase IQ.

37 Which of these pairs of events are dependent?

Ⓐ You flip a coin and get tails. You flip it a second time and get heads.

Ⓑ You pull your friend's name out of a hat that holds 20 different names, replace the name, then draw out your friend's name again.

Ⓒ You spin a spinner divided into five equal parts and is numbered 1-5. You get a 3 on the first spin, and then spin again and get a 2 on the second spin.

Ⓓ You remove a black sock from a drawer without looking, then remove another black sock.

38

Two equations are shown. $a_1 - a_2 + \frac{3}{7}$

$a_1 = \frac{3}{4} + \frac{1}{2}i$

$a_2 = \frac{1}{4} + \frac{1}{6}i$

$\frac{3}{4} + \frac{1}{2}i - \left(\frac{1}{4} + \frac{1}{6}i\right) + \frac{3}{7}$

What is the value of $a_1 - a_2 + \frac{3}{7}$ in $a + bi$ form? $\frac{3}{4} + \frac{1}{2}i - \frac{1}{4} - \frac{1}{6}i + \frac{3}{7}$

$\frac{13}{14} + \frac{1}{3}i$

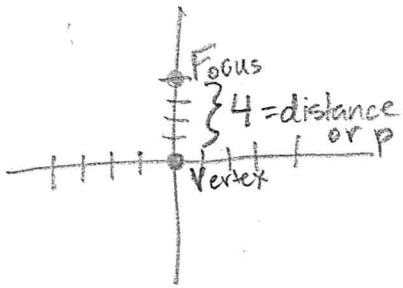
$\frac{7}{7}\cdot\frac{3}{4} - \frac{1}{4}\cdot\frac{7}{7} + \frac{3}{7}\cdot\frac{4}{4} \quad \frac{1}{2}i - \frac{1}{6}i$

$\frac{21}{28} - \frac{7}{28} + \frac{12}{28} \quad \frac{3}{6}i - \frac{1}{6}i$

$\frac{26}{28} + \frac{2}{6}i$

$\frac{13}{14} + \frac{1}{3}i$

39 The cross section of a television antenna dish is a parabola. For the dish at the right, the receiver is located at the focus, 4 feet above the vertex. Find an equation for cross section of the dish. (Assume the vertex is at the origin.) If the dish is 8 feet wide, how deep is it?



$y = ax^2$, and

$a = \frac{1}{4p}$ where

p is the distance

from the vertex

to the focus.

$a = \frac{1}{4 \cdot 4} = \frac{1}{16}$

$y = \frac{1}{16}x^2$

$x = 4$

$y = \frac{1}{16} \cdot 4^2 = \frac{1}{16} \cdot 16 = 1$ ft

40

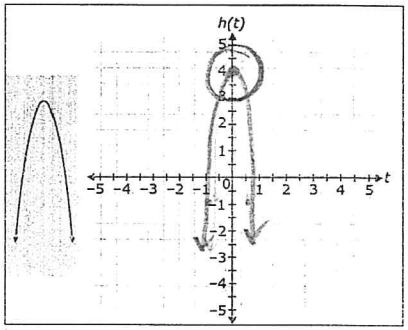
The path of a ball follows a function, as shown.

$h(t) = -4.9t^2 + 4$

Move the parabola shown to graph the function $h(t)$.

$-4.9(t+0)^2 + 4$

v: (0, 4)



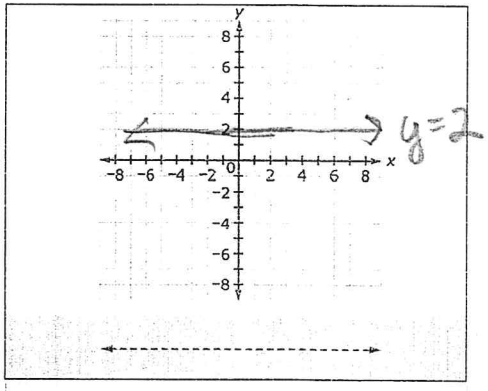
41

An equation is shown.

$y = \frac{8x^2}{4x^2 - 7x + 5}$

What is the horizontal asymptote for this equation?

Drag the dashed line to the coordinate grid to graph the horizontal asymptote for this equation.



$y = \frac{8x^2}{4x^2}$ } same

asymptote

$y = 2$ or plug in 1000

$y = \frac{8(1000)^2}{4(1000)^2 - 7(1000) + 5}$

$= \frac{8{,}000{,}000}{4{,}000{,}000 - 7000 + 5} \approx 2$

$y = 2$

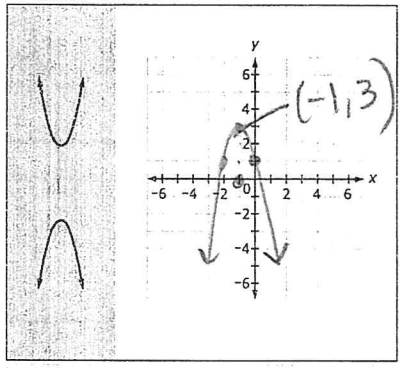
14 Consider the quadratic function shown.

$f(x) = -2(x+1)^2$

V: (-1, 0)

Move one parabola onto the coordinate grid to show the transformation $f(x) + 3$.

up 3



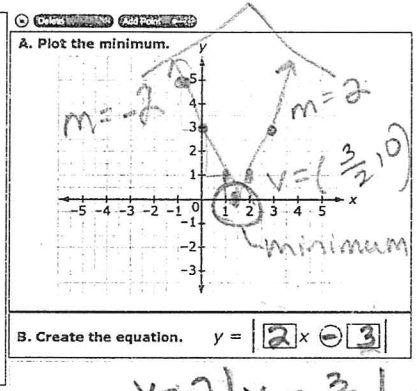
15 The table of values represents an absolute value function.

x	y
-1	5
0	3
1	1
2	1
3	3

A. Use the Add Point tool to plot the minimum of this function.

B. Drag numbers into the boxes and an operation symbol into the circle to create the equation of this function.

a = 2



+ − 0 1 2 3 4 5 6 7 8 9

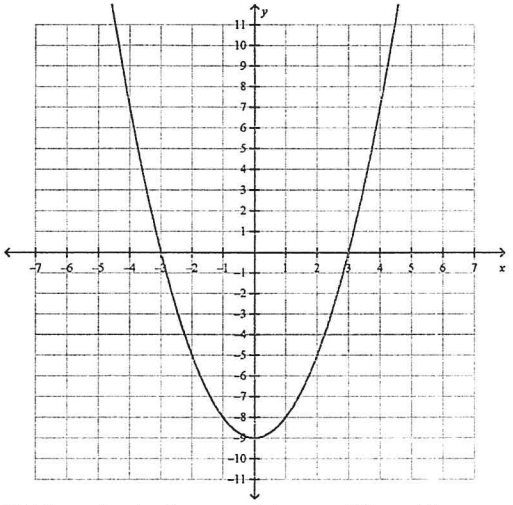
$y = 2\left|x - \frac{3}{2}\right|$ → correct but you can also write as $y = |2x - 3|$ Distributing +2 wouldn't change absolute value

16 In a bag of 20 candies, 12 are red and 15 have peanuts in them. If the events of picking a red candy and picking a candy with peanuts are independent, how many of the red candies have peanuts?

Ⓐ 3
Ⓑ 6
Ⓒ 9
Ⓓ 12

$\frac{12}{20} \cdot \frac{15}{20} = \frac{180}{400} \frac{\div 20}{\div 20} = \frac{9}{20}$

15 A graph is shown.



max

Which equation has the same minimum as this graph?

Ⓐ $y = -x^2 - 9$ min → none
Ⓑ $y = x^2 + 9$ min → 9
Ⓒ $y = -x^2 - 6x$ min → none → ∩
Ⓓ $y = x^2 - 6x$ min →

V: (0, 9)

$\frac{-b}{2a} = \frac{6}{2(1)} = 3$

$y = 3^2 - 6(3)$

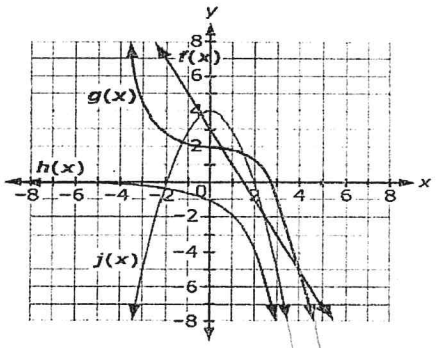
$9 - 18$

-9

V: (3, -9) ↓ min

46

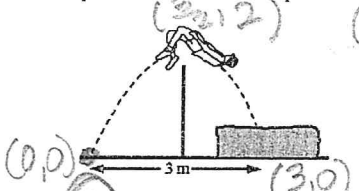
Four functions are shown on the graph.



When $x > 100$, which function has the **smallest** y-values?

Ⓐ f(x)
Ⓑ g(x)
Ⓒ h(x)
Ⓓ j(x)

47 Suppose the maximum height jumped by the high jumper is 2 meters. Assuming that the jumper left the ground at the origin and followed a parabolic path, which system could be used to write an equation of the parabola that models the path followed by the high jumper in the form $f(x) = ax^2 + bx + c$.



Ⓐ $0a + 0b + c = 0$
$9a + 3b + c = 0$
$\frac{9}{4}a + \frac{3}{2}b + c = 2$

Ⓑ $3a + 3b + c = 3$
$9a + 3b + c = 0$
$\frac{9}{4}a + \frac{3}{2}b + c = 2$

Ⓒ $0a + 0b + c = 0$
$3a + 3b + c = 0$
$\frac{3}{2}a + \frac{3}{2}b + c = 2$

Ⓓ $3a + 3b + c = 3$
$9a + 3b + c = 0$
$\frac{9}{4}a + \frac{3}{2}b + c = 0$

48 Kelly is completeing the square to solve the equation $2x^2 - 32x = 10$.

Which equation could be the result of completing the square?

Ⓐ $(x-8)^2 = 5$
Ⓑ $(x-8)^2 = 69$
Ⓒ $2(x-8)^2 = 10$
Ⓓ $2(x-8)^2 = 74$

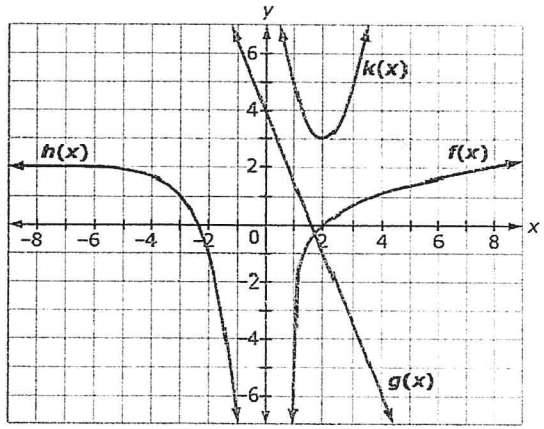
49 A group researching a certain vitamin instructs a group of 100 people to take their vitamin three times a day, once with each meal. Another 100 people were told to keep their usual eating habits. After three months, the people who were instructed to take the vitamins had healthier hair, skin, and nails than those who did not take the vitamins. Which response describes the treatment, treatment group, and control group?

Ⓐ Treatment: having healthier hair, skin, and nails
Treatment group: the 100 people told to keep their usual eating habits
Control group: the 100 people told to take the vitamin
Ⓑ Treatment: take a vitamin with each meal
Treatment group: the 100 people told to take the vitamin
Control group: the 100 people told to keep their usual eating habits
Ⓒ Treatment: having healthier hair, skin, and nails
Treatment group: the 100 people told to take the vitamin
Control group: the 100 people told to keep their usual eating habits
Ⓓ Treatment: take a vitamin with each meal
Treatment group: the 100 people told to keep their usual eating habits
Control group: the 100 people told to take the vitamin

Name: _____ ID: A

50

The graphs of $f(x)$, $g(x)$, $h(x)$, and $k(x)$ are shown.



Which function changes at a constant rate per unit relative to x?

Ⓐ f(x)
Ⓑ g(x)
Ⓒ h(x)
Ⓓ k(x)

Name: _____

EOC FSA

Practice Test

DEPARTMENT OF MATHEMATICS, SCIENCE, & GIFTED

BROWARD COUNTY PUBLIC SCHOOLS

Algebra 2

Calculator Portion

Compiled by the Broward County Public Schools
Office of Instruction and Intervention
Mathematics, Science, & Gifted Department

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

Algebra 2 EOC FSA Practice Test (Calculator Portion)

1

The height of a coconut falling from a tree can be represented by the function $h(t) = -16t^2 + 24$, where $h(t)$ is the height of the coconut, in feet, and t is time, in seconds.

What is the initial height, in feet, of the coconut?

initial height means $t = 0$

$h(0) = -16(0)^2 + 24 = 24$

24

2

A scientist studies several colonies of bacteria. She records the number of cells in the colony every hour. Several tables containing the data are shown.

Click on the table or tables that represent exponential growth.

Colony 1

Hours	Cells
0	10
1	25
2	40
3	55

+15, +15, +15 — linear

Colony 2

Hours	Cells
0	3
1	12
2	48
3	192

×4, ×4, ×4 — exp.

Colony 3

Hours	Cells
0	4.0
1	4.5
2	5.0
3	5.5

+0.5, +0.5, +0.5 — linear

Colony 4

Hours	Cells
0	8
1	12
2	18
3	27

+4, +6, +9 — not linear,

but $\frac{12}{8} = \frac{18}{12} = \frac{27}{18} = \frac{3}{2}$, so exp.

Colony 5

Hours	Cells
0	200
1	100
2	50
3	25

÷2, ÷2, ÷2

3

A farmer has 160 meters of fencing to make two enclosures, one for his goats and one for his pigs. The farmer plans to make a circular enclosure for his goats and a rectangular enclosure for his pigs. He plans to use between 20 meters and 30 meters of fencing to make the pig enclosure. Based on the constraints, which describes the possibilities for the area A of the goat enclosure? Round to the nearest whole number as needed.

Ⓐ $21m^2 \le A \le 22m^2$

Ⓑ $1345m^2 \le A \le 1560m^2$

Ⓒ $130m^2 \le A \le 140m^2$

Ⓓ $5380m^2 \le A \le 6240m^2$

$130 \le C \le 140$ 20–30 m

P

9

$C = 2\pi r$

$\frac{130}{2} \le \frac{2\pi r}{2} \le \frac{140}{2}$

$\frac{65}{\pi} \le r \le \frac{70}{\pi}$

$A = \pi r^2$

$\left(\frac{65}{\pi}\right)^2 \le r^2 \le \left(\frac{70}{\pi}\right)^2$

$\pi\left(\frac{65}{\pi}\right)^2 \le \pi r^2 \le \pi\left(\frac{70}{\pi}\right)^2$

$1345\,m^2 \le A \le 1560\,m^2$

Name: _____ ID: A

4

Consider the equation $\frac{4^{x^2}}{2^x} = 2$.

$\frac{2^{2x^2}}{2^x} = 2$

$2^{2x^2 - x} = 2^1$

$2x^2 - x = 1$

$2x^2 - x - 1 = 0$

$(2x + 1)(x - 1) = 0$

$2x + 1 = 0$ $\quad x - 1 = 0$

$2x = -1$ $\quad x = 1$

$x = -\frac{1}{2}$ $\quad x = 1$

Which values are solutions to the equation?

Select **all** that apply.

Ⓐ -2

Ⓑ -1

Ⓒ $-\frac{1}{2}$

Ⓓ $\frac{1}{2}$

Ⓔ 1

Ⓕ 2

5

What extraneous solution arises when the equation $\sqrt{x+3} = 2x$ is solved for x by first squaring both sides of the equation?

Enter your answer in the box.

$-\frac{3}{4}$

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

$(\sqrt{x+3})^2 = (2x)^2$

$\sqrt{-\frac{3}{4}+3} \ne 2\left(-\frac{3}{4}\right)$

$x + 3 = 4x^2$

$-x - 3 \quad -x - 3$

$0 = 4x^2 - x - 3$

$0 = (4x + 3)(x - 1)$

$x = -\frac{3}{4}, 1$

extraneous

6

The heights of adult males in the United States are approximately normally distributed. The mean height is 70 inches (5 feet 10 inches) and the standard deviation is 3 inches.

Use the table to estimate the probability that a randomly-selected male is more than 74.5 inches tall. Express your answer as a decimal.

$\frac{74.5 - 70}{3}$

$\frac{4.5}{3} = 1.5$

z	−2.5	−2	−1.5	−1	−0.5	0	0.5	1	1.5	2	2.5
Area	0.01	0.02	0.07	0.16	0.31	0.5	0.69	0.84	0.93	0.98	0.99

to the left

Ⓐ 0.07

Ⓑ 0.83

Ⓒ 0.93

Ⓓ 0.5

7

Given the following system of equations, what number should you multiply the first equation by so that the x-term will be eliminated when the first equation is added to the second equation?

$2x - y + 7z = 65$

$-3x + 4y - 2z = -5$

$x + 9y - 5z = -24$

$\frac{2a}{2} = +\frac{3}{2}$

$a = \frac{3}{2}$

Ⓐ $-\frac{3}{2}$

Ⓑ $-\frac{2}{3}$

Ⓒ $\frac{2}{3}$

Ⓓ $\frac{3}{2}$

Name: _____ ID: A

$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$

$0.47 = 0.42 + 0.14 - P(A \text{ and } B)$

8 What is $P(A \text{ and } B)$ given that $P(A) = 0.42$, $P(B) = 0.14$, and $P(A \text{ or } B) = 0.47$?

Ⓐ 0.06 Ⓒ 0.56

Ⓑ 0.09 Ⓓ 0.63

$0.47 = 0.56 - P(A \text{ and } B)$

$-0.56 \quad -0.56$

$\frac{-0.09}{-1} = \frac{-P(A \text{ and } B)}{-1}$

$0.09 = P(A \text{ and } B)$

9 Currency conversions for British pounds and U.S. dollars are shown.

- 1 British pound = 1.59 U.S. dollars
- 1 U.S. dollar = 0.99 Canadian dollar

The functions $B(x) = 1.59x$ and $C(y) = .99y$ represent these conversions, where x represents British pounds and y represents U.S. dollars.

Create a composite function that represents a conversion from x British pounds to y Canadian dollars.

$f(g(x)) = 1.574x$ $\quad .99(1.59x)$

$\begin{array}{r} 159 \\ \times\ 99 \\ \hline 1431 \\ 1431 \\ \hline 157.41 \end{array}$

10 On the unit circle, a central angle θ in standard position intercepts an arc that is 2 units long. If you reflect angle θ across the y-axis to create a new angle α in standard position, what is the measure of α?

Ⓐ $2 - 2\pi$ radians Ⓒ $\pi - 2$ radians

Ⓑ $2 - \pi$ radians Ⓓ $2\pi - 2$ radians

11 If events A and B are independent, $P(A) = 0.62$, and $P(B \mid A) = 0.93$, what is $P(B)$?

Ⓐ 0.93 Ⓒ 0.67

Ⓑ 0.58 Ⓓ 0.41

$P(B|A) = \frac{P(A \text{ and } B)}{P(A)} = \frac{P(A)P(B)}{P(A)}$

$P(B|A) = P(B)$

$0.93 = P(B)$

12 Four cattle ranches plan to increase the size of their herds. the expressions show the predicted herd size for each ranch after n years.

Ranch Data

Ranch Name	Herd Size
Bar 2	100n + 2000
Flying T	90n + 1000
Lazy J	100n + 3000
TC	120n + 1000

100
90
100
120

Which ranch has the herd with the fastest growth rate? slope

Ⓐ Bar 2 Ⓒ Lazy J

Ⓑ Flying T Ⓓ TC

Name: _____ ID: A

15 What is the solution of the equation $\frac{2m^2 + 3m - 5}{m^2 + 4m - 5} = 4$?

$(m+5)(m-1) \rightarrow m \neq -5, 1$

Enter your answer in the space provided. Enter only your answer. You may not need to use all of the answer boxes.

$m = \square$ $-\frac{15}{2}$ or -7.5

$(m^2+4m-5)\frac{2m^2+3m-5}{m^2+4m-5} = 4(m^2+4m-5)$

$2m^2 + 3m - 5 = 4m^2 + 16m - 20$

$-2m^2 - 3m + 5 \quad -2m^2 - 3m + 5$

$0 = 2m^2 + 13m - 15$ $\quad -30$, $-2 \cdot 15$

$0 = (2m^2 - 2m + 15m - 15)$

$0 = 2m(m-1) + 15(m-1)$

$0 = (m-1)(2m+15)$

$m = 1$ $\quad m = -\frac{15}{2}$

13 If $P(A) = 0.43$ and $P(B \mid A) = 0.89$, find $P(A \text{ and } B)$.

Ⓐ 0.51 Ⓒ 0.11

Ⓑ 0.48 Ⓓ 0.38

See below

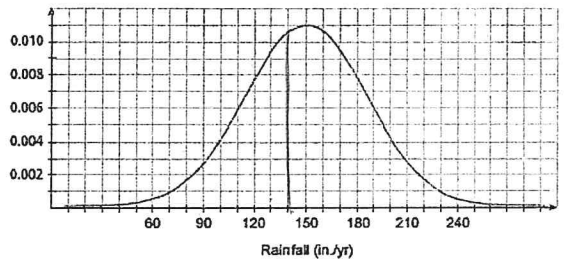
14 What is the axis of symmetry of the graph of $f(x) = 3x^2 - 6x + 6$?

Ⓐ $x = -1$ Ⓒ $y = 1$

Ⓑ $x = 1$ Ⓓ $y = 3$

$-\frac{b}{2a} = \frac{6}{2 \cdot 3} = 1 = X$

16 The area under the normal curve below is equal to 1 unit. Each grid square has an area of 0.01 unit.



Suppose the annual rainfall in an Alaskan town is normally distributed with a mean of 150 inches per year and a standard deviation of 36 inches per year. Use the graph to approximate the probability that the rainfall in a given year is less than 140 inches. Express your answer as a percent.

Ⓐ 51% Ⓒ 50%

Ⓑ 61% Ⓓ 39%

14. $P(B|A) = \frac{P(A \text{ and } B)}{P(A)}$

$0.43 \cdot 0.89 = \frac{P(A \text{ and } B)}{0.43} \cdot 0.43$

$P(A \text{ and } B)$

$\begin{array}{r} .89 \\ \times\ .43 \\ \hline 267 \\ 356 \\ \hline 0.3827 \end{array}$

17 What is the distance between the points of intersection of the graphs of $y = x^2$ and $y = 6 - x$?

Ⓐ $\sqrt{26}$
Ⓑ $5\sqrt{2}$
Ⓒ $2\sqrt{37}$
Ⓓ $\sqrt{170}$

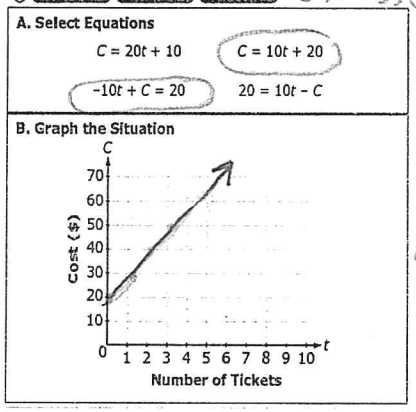
$x^2 = 6 - x$
$x^2 + x - 6 = 0$
$(x+3)(x-2) = 0$
$x = -3, 2$
$y = (-3)^2 = 9$
$y = 2^2 = 4$
$(-3, 9)(2, 4)$
$d = \sqrt{5^2 + (-5)^2}$
$d = \sqrt{50}$
$25 \cdot 2$
$5\sqrt{2}$

18

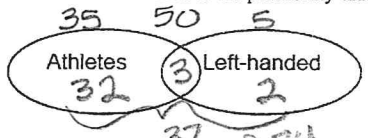
Mike's class is going on a field trip to the museum. The total cost of the trip includes the cost of the tickets to the museum and a parking fee. Each ticket costs \$10, and the parking fee is \$20.

A. Select all the equations that represent this situation, where C is the total cost and t is the number of tickets sold.

B. Use the Add Arrow tool to graph this situation.



19 Of 50 students going on a class trip, 35 are student athletes and 5 are left-handed. Of the student athletes, 3 are left-handed. Which is the probability that one of the students on the trip is an athlete or is left-handed?



$P(A \text{ or } L) = P(A) + P(L) - P(A \text{ and } L)$
$= \frac{35}{50} + \frac{5}{50} - \frac{3}{50}$
$= \frac{37}{50} = \frac{74}{100} = 0.74$
$\frac{37}{50} = 0.74$

Ⓐ 0.2
Ⓑ 0.5
Ⓒ 0.74
Ⓓ 0.8

20 The table below shows the balance b, in dollars, of Daryl's savings account t years after he made an initial deposit. What is an explicit formula for the geometric sequence that represents this situation?

Time, t (years)	Balance, b (dollars)
1	\$1218
2	\$1236.27
3	\$1254.81
4	\$1273.64

\$18.00
\$18.27

$\frac{1236.27}{1218} = \frac{1254.81}{1236.27} = \frac{1273.64}{1254.81}$
$1.015 = 1.015 = 1.015$

Ⓐ $b(t) = 1.015(1218)^{t-1}$
Ⓑ $b(t) = 1218(1.015)^t$
Ⓒ $b(t) = 1218 + 1.015(t-1)$
Ⓓ $b(t) = 1218(1.015)^{t-1}$

or plug in t and see which formula gives b

21 Which of the following always has the same value as $\sin\theta$?

Ⓐ $\sin(\theta + \frac{\pi}{2})$
Ⓑ $\sin(\theta + \pi)$
Ⓒ $\sin(\theta + \frac{3\pi}{2})$
Ⓓ $\sin(\theta + 2\pi)$

2π is a period, all the way around the circle

22 A car decelerates such that each second it travels 5% less than the distance it traveled in the previous second. About how far does the car travel in 5 seconds if it is traveling at 30 meters per second during the first second of deceleration?

Ⓐ 100.0 m
Ⓑ 135.7 m
Ⓒ 142.5 m
Ⓓ 165.8 m

$30 + 30(.95) + 30(.95)^2 + 30(.95)^3 + 30(.95)^4 = 135.7$
or $\sum_{n=1}^{5} 30(.95)^{n-1} = a_1$ graph and repeat

See below

23 Sara examines two events, M and C. $P(M)$ is $\frac{2}{7}$ and $P(M \text{ and } C)$ is $\frac{1}{14}$. If M and C are independent events, what is $P(C)$?

Ⓐ $\frac{1}{49}$
Ⓑ $\frac{3}{14}$
Ⓒ $\frac{1}{4}$
Ⓓ $\frac{5}{14}$

$P(M \text{ and } C) = P(M) \cdot P(C)$
$\frac{1}{14} = \frac{2}{7} \cdot P(C) \cdot \frac{7}{2}$
$\frac{1}{4} = P(C)$

24 110 students are surveyed about their pets. The results are shown in the table. Which statement is true?

	Boys B	Girls G	Total
At least one pet P	18	39	57
no pets N	27	26	53
Total	45	65	110

$\frac{27}{45} = P(N|B) = .6$
$\frac{18}{45} = P(P|B) = .4$
$\frac{39}{65} = P(N|G) = .$
$P(P) = \frac{57}{110} = .5$

Ⓐ 27% of the boys have no pets.
Ⓑ 40% of the boys have at least one pets.
Ⓒ 49% of the girls have no pets.
Ⓓ 57% of the students have at least one pets.

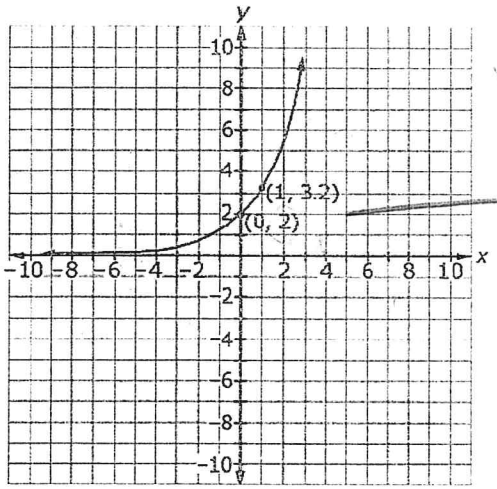
22
1st second: 30m
2nd second: $30(.95)$
3rd second: $30(.95)^2$
4th second: $30(.95)^3$
5th second: $30(.95)^4$
135.7

or $\sum_{k=1}^{5} 30(.95)^{k-1} = \frac{30(1-0.95^5)}{(1-0.95)}$
$= \frac{30(1-.95^5)}{0.05} = 135.7$

$S_n = \sum_{k=1}^{n} a_1(r)^{k-1} = \frac{a_1(1-r^n)}{(1-r)}$

Name: _____ ID: A

24 A graph of an exponential function is shown.



Plug in both points

Which equation represents the function shown in this graph?

Ⓐ $y = 2(3.2)^x$ $2(3.2)^0 = 2$

Ⓑ $y = 2(1.6)^x$ $2(1.6)^0 = 2$

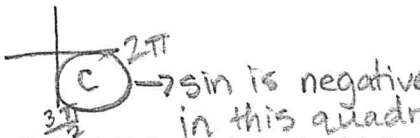
$2(3.2)^1 \neq 3.2$

Ⓒ $y = 3.2(2)^x$ $3.2(2)^0 \neq 2$

Ⓓ $y = 1.6(2)^x$ $1.6(2)^0 \neq 2$

$2(1.6)^1 = 3.2$

Name: _____ ID: A



C → sin is negative in this quadrant

25 Given that $\cos\theta = 0.7087$ and $\frac{3\pi}{2} < \theta < 2\pi$, what is the approximate value of $\sin\theta$?

Ⓐ -0.7055
Ⓑ -0.4977
Ⓒ 0.4977
Ⓓ 0.7055

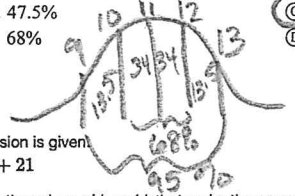
find $\cos^{-1} 0.7087$

calc: 0.7087 then $\cos^{-1}$

Then push sin.

26 A manufacturer finds that the life expectancy of its best-selling model of dishwashers is 11 years and the standard deviation is 1 year. The lifespans are approximately normally-distributed. What percent of dishwasher models will last from 9 to 13 years?

Ⓐ About 47.5%
Ⓑ About 68%
Ⓒ About 95%
Ⓓ About 34%



27

Part A

An expression is given.
$x^2 - 8x + 21$

Determine the values of h and k that make the expression $(x - h)^2 + k$ equivalent to the given expression.

Enter your answers in the space provided. Enter **only** your answer.

$h = \square$ 4
$k = \square$ 5

$x^2 - 8x + 21$

$(x^2 - 8x + 16) + 21 = 16$

$(x-4)^2 + 5$

Part B

An equation is given.
$x^2 - 8x + 21 = (x - 4)^2 + 3x - 16$ $= (x-4)^2 + 5$ (Previous problem)

Find one value of x that is a solution to the given equation.

Use the Equation Editor. Enter ONLY your solution.

$x = \square$ 7

so $3x - 16 = 5$
$+16 \quad +16$
$\frac{3x}{3} = \frac{21}{3}$
$x = 7$

OR

$x^2 - 8x + 21 = (x-4)^2 + 3x - 16$
$x^2 - 8x + 21 = (x-4)(x-4) + 3x - 16$
$x^2 - 8x + 21 = x^2 - 4x - 4x + 16 + 3x - 16$
$x^2 - 8x + 21 = x^2 - 5x$
$-x^2 + 5x \quad -x^2 + 5x$
$-3x + 21 = 0$
$-21 \quad -21$
$\frac{-3x}{-3} = \frac{-21}{-3}$
$x = 7$

Name: _____ ID: A

28 Events A and B are independent. Find the missing probability.

$P(A) = \_?\_$

$P(B) = 0.3$

$P(A \text{ and } B) = 0.06$

$0.06 = P(A) \cdot P(B)$

$\frac{0.06}{0.3} = \frac{P(A)(0.3)}{0.3}$

$P(A) = 0.2$

Ⓐ 0.7

Ⓑ 0.24

Ⓒ 0.2

Ⓓ 0.3

29 *The following carryout combinations are available at Mike's Carryout.*

Combo Meal	Price
One pizza (10 inches), one coke (300 milliliters), one bag of chips (200 grams)	$9.00
One pizza (10 inches), two cokes (300 milliliters)	$10.00
Two pizzas (10 inches), two bags of chips (200 grams)	$12.00

$1x + 1y + 1z = 9$ ①

$1x + 2y = 10$ ②

$2x + 2z = 12$ ③

Assume that the price of a combo meal is the same price as purchasing each item separately. Find the price of a pizza, a coke, and a bag of chips.

Ⓐ pizza: \$2, coke: \$4, bag of chips: \$3

Ⓑ pizza: \$2, coke: \$3, bag of chips: \$4

Ⓒ pizza: \$3, coke: \$2, bag of chips: \$4

Ⓓ pizza: \$4, coke: \$3, bag of chips: \$2

30 The table below shows the number of days that a meteorologist predicted it would be sunny, and the number of days it was sunny. Based on the data in the table, what is the conditional probability that it will be sunny on a day when the meteorologist predicts it will be sunny?

	Sunny	Not Sunny	Total
Predicts sunny	570	20	590
Does not predict sun	63	347	410
Total	633	367	1000

$P(\text{Sunny} \mid \text{Predicts Sun}) = \frac{P(\text{S and PS})}{P(\text{PS})} = \frac{570}{590} = .966$

Ⓐ 57%

Ⓑ 59%

Ⓒ 90%

Ⓓ 97%

31 Select all the solutions for the following system:

$x^2 = 2y + 10$

$3x - y = 9$

$3x - y = 9$

$-3x \quad -3x$

$-y = -3x + 9$

$y = 3x - 9$

$x^2 = 2(3x - 9) + 10$

$x^2 = 6x - 18 + 10$

$x^2 = 6x - 8$

$-6x + 8 \quad -6x + 8$

$x^2 - 6x + 8 = 0$

$(x - 2)(x - 4) = 0$

$x = 2, 4$

Ⓐ (-3, 2)

Ⓑ (2, -3)

Ⓒ (4, 2)

Ⓓ (-4, 3)

Ⓔ (4, 3)

Ⓕ (0, 0)

Ⓖ (3, 4)

Ⓗ (3, 3)

(2, -3)

2: $y = 3(2) - 9 = -3$

(4, 3)

$y = 3(4) - 9 = 3$

① $(-2) = -2x - 2y - 2z = -18$

③ $2x + 2z = 12$

$-2y = -6$

$y = 3$ cokes

② $1x + 2(3) = 10$

$x + 6 = 10$

$-6 \quad -6$

$x = 4$ pizza

① $4 + 3 + z = 9$

$7 + z = 9$

$-7 \quad -7$

$z = 2$ chips

Name: _____ ID: A

32 Researchers randomly select 10 students who are given breakfast and 10 students who are not. Each group takes an 80 question math test 1 hour after the students in the treatment group eat breakfast, and the researchers record the number of questions each student answers correctly. The data are shown in the table. Resampling the data finds that 95% of the differences of the means for the reconfigured treatment and control groups are less than 5.2. (Note that resampling involves randomly scrambling the data from the treatment and control groups and calculating a difference of means for the reconfigured groups: treatment group mean minus control group mean. Each new difference obtained from a resampling becomes part of a resampling distribution.) Is there evidence that eating breakfast increases performance on the math test?

Number of correct questions

Breakfast	No breakfast
56	58
62	54
68	62
73	48
56	68
57	65
49	60
72	72
62	52
57	45

Avg (mean):

Breakfast: $\frac{621}{10} = 62.1$

No Breakfast: $\frac{584}{10} = 58.4$

$62.1 - 58.4 = 3.7$

Ⓐ Yes; the difference of the means from the experiment is greater than 5.2.

Ⓑ Yes; the difference of the means from the experiment is less than 5.2.

Ⓒ No; the difference of the means from the experiment is greater than 5.2.

Ⓓ No; the difference of the means from the experiment is less than 5.2.

33 Annie volunteers in the tutoring center at her school. The table shows how much time she spends in the tutoring center each week for six weeks.

Volunteer Hours

Week	Time (minutes)
1	190
2	140
3	105
4	95
5	85
6	85

not linear

Which function **best** fits the data?

Ⓐ $y = -40x + 220$ linear

Ⓑ $y = -20x + 186\frac{2}{3}$ linear

Ⓒ $y = 195.5(0.852)^x \rightarrow y = 195.5(0.852)^1 = 166.14$ ✗

Ⓓ $y = 257.9(0.737)^x$

$y = 257(.737)^1 = 190.07$ ✓

(Key says C, but that is incorrect.)

Name: _____ ID: A

34 52% of the visitors to a museum purchase tickets to the planetarium. 24% of the visitors to a museum buy tickets for both the planetarium and the 3D theater. About what percent of visitors who buy tickets for the planetarium also buy tickets for the 3D theater?

Ⓐ 28% Ⓒ 54%
Ⓑ 46% Ⓓ 52%

Planetarium 52% } 24% both
3D theater

35 An expression is shown.

$5x^2 + 2x + 1 = 0$

What is one possible solution to this quadratic equation?

$-\frac{1}{5} + \frac{2}{5}i$ OR $-\frac{1}{5} + \frac{2}{5}i$

$P(P \text{ and } 3) = P(P) \cdot P(3)$

$\frac{.24}{.52} = \frac{.52 \cdot P(3)}{.52} \rightarrow 0.46 = P(3)$

$P(3|P) = \frac{P(3 \text{ and } P)}{P(P)}$

OR $= \frac{.24}{.52} = 0.46$

$5x^2+2x+1=0$

$x = \frac{-2 \pm \sqrt{4-4 \cdot 5 \cdot 1}}{2 \cdot 5}$ 4-20

$x = \frac{-2 \pm \sqrt{-16}}{10} = \frac{-2 \pm 4i}{10} = -\frac{1}{5} \pm \frac{2}{5}i$

36 An arc on the unit circle is $\frac{4\pi}{3}$ units long.

What is the degree measure of the arc's central angle?

Ⓐ 60° Ⓒ 240°
Ⓑ 120° Ⓓ 300°

$\frac{4\pi}{3} \cdot \frac{180^\circ}{\pi} = 240^\circ$ (60)

37 A geneticist is studying a population of fruit flies. Of the 1278 flies, 467 are wingless and 446 have red eyes. There are 210 flies that are wingless whose eyes are not red. What is the approximate probability that a fly is wingless or has red eyes?

Ⓐ 0.49 Ⓒ 0.71
Ⓑ 0.51 Ⓓ 0.88

1278
wingless 467 red eyes 446
wingless not red, so wingless red = 467 − 210 = 257
210

$P(W \text{ or } R) = P(W) + P(R) - P(W \text{ and } R)$

$= \frac{467}{1278} + \frac{446}{1278} - \frac{257}{1278} = \frac{656}{1278} \approx 0.51$

Name: _____ ID: A

38 An equation is shown.

$(x+13)^{\frac{1}{2}} = 10$

What is the solution to the equation?

$(\sqrt{x+13})^2 = 10^2$

$x+13 = 100$

$x = 87$

87

39 Given the following probabilities:

P(A) = 0.5
P(B) = 0.3
P(C) = 0.4
P(D) = 0.7
P(A and B) = 0.8
P(B and C) = 0.75
P(C and D) = 0.28
P(A and D) = 0.2

$P(A \text{ and } B) = P(A) \cdot P(B)$ if A and B are independent.

$P(A) \cdot P(B) = 0.5(0.3) = 0.15$ ×
$P(B) \cdot P(C) = 0.3(0.4) = 0.12$ ×
$P(C) \cdot P(D) = 0.4(0.7) = 0.28$ ✓
$P(A) \cdot P(D) = 0.5(0.7) = 0.35$ ×

Which 2 events are independent?

Ⓐ A and B Ⓒ B and C
Ⓑ A and D Ⓓ C and D

40 *Chocos is a dish made from wheat, sugar, and cocoa. Bertha is making a large pot of chocos for a party. Wheat (w) costs $5 per pound, sugar (s) costs $3 per pound, and cocoa (c) costs $4 per pound. She spends $48 on 12 pounds of food. She buys twice as much cocoa as sugar.*

How much wheat, sugar, and cocoa will she use (in pounds) in her dish?

Ⓐ wheat: 6 lb, sugar: 3 lb, cocoa: 3 lb Ⓒ wheat: 3 lb, sugar: 6 lb, cocoa: 3 lb
Ⓑ wheat: 3 lb, sugar: 3 lb, cocoa: 6 lb Ⓓ wheat: 6 lb, sugar: 2 lb, cocoa: 4 lb

$5w + 3s + 4c = 48$
$w + s + c = 12$
$c = 2s$
$c = 2 \cdot 3$
$c = 6$

$w + s + c = 12$
$w + 3 + 6 = 12$
$w = 3$

$5w + 3s + 4(2s) = 48$
$w + s + 2s = 12$
$5w + 11s = 48$
$-5(w + 3s = 12)$
$-5w - 15s = -60$
$5w + 11s = 48$
$-4s = -12$
$\frac{-4s}{-4} = \frac{-12}{-4}$
$s = 3$

Name: _____ ID: A

41 Zachary is studying the behavior of a group of cells in a lab. He starts with 500 cells and observes that the cell population triples every hour. The function shown models the number of cells after t hours.

$f(t) = 500(3)^t$

$\frac{50,000}{500} = \frac{500(3)^t}{500}$

$100 = 3^t \rightarrow \log_3 100 = t$

Which equation can be used to determine how many hours it will take for the cell population o reach 50,000?

Ⓐ $\log_{100} 3 = t$

Ⓑ $\log_3 500 = t$

Ⓒ $\log_3 100 = t$

Ⓓ $\log_{1,500} 50,000 = t$

42

Becky throws a ball into the air. The height of the ball in feet, $f(t)$, after t seconds can be modeled by the function shown.

$f(t) = -16t^2 + 40t + 6$

What is the height of the ball, in feet, 2 seconds after Becky throws it?

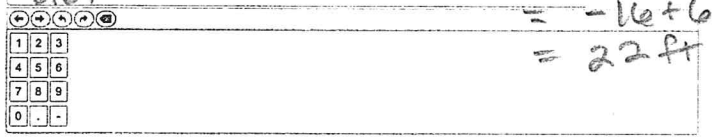
$f(2) = -16(2)^2 + 40(2) + 6$

$= -64 + 80 + 6$

$= -16 + 6$

$= 22$ ft

22



Name: _____ ID: A

43

Rebecca records the amount of money, $f(x)$, in her bank account each month, x, as shown in the table.

Bank Account

Month (x)	Amount of Money $f(x)$
0	$ 6
1	$12
2	$24
3	$48
4	$96

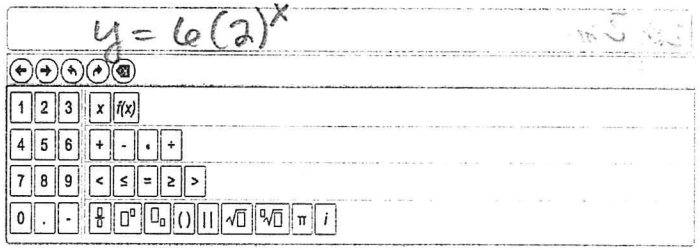
6, 12, 24 Doubles exponential

start value

$y = 6(2)^x$

Create a function that models this relationship.

$y = 6(2)^x$



44

An equation is shown.

$3x^2 + 14x = 5$

$-5 \quad -5$

$3x^2 + 14x - 5 = 0$

$15 = 1 \cdot 15$

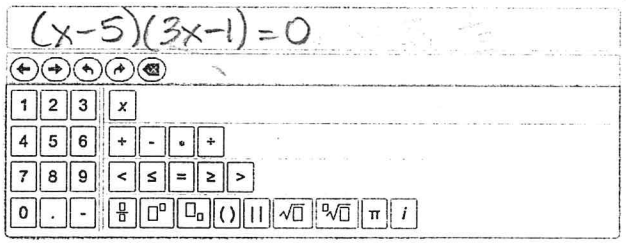
$3x^2 + 15x - x - 5 = 0$

$3x(x+5) - 1(x+5) = 0$

$(x-5)(3x-1) = 0$

Re-create the equation in an equivalent factored form to reveal the zeros.

$(x-5)(3x-1) = 0$



Name: _____ ID: A

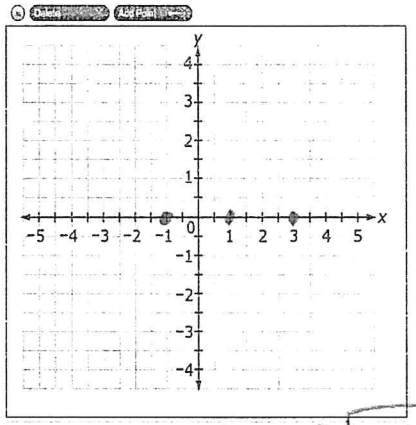
$\frac{p}{q} = \pm1, \pm2, \pm3, \pm4, \pm6, \pm12, \pm\frac{1}{2}, \pm\frac{3}{2}, \pm\frac{1}{4}, \pm\frac{3}{4}$

45

A polynomial is shown.

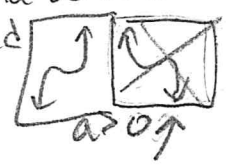
$y = 4x^3 - 12x^2 - 4x + 12$

Use the Add Point tool to show the locations of all zeros of this polynomial.



end behavior

odd



OR

1 | 4 -12 -4 12

4 -8 -12

4 -8 -12 | 0

$\frac{4x^2}{4} - \frac{8x}{4} - \frac{12}{4} = \frac{0}{4}$

$x^2 - 2x - 3 = 0$

$(x-3)(x+1) = 0$

$x = 3, -1, 1$

factor: $4x^2(x-3) - 4(x-3)$

$(4x^2-4)(x-3)$

$4(x^2-1)(x-3)$ → $4(x+1)(x-1)(x-3)$

zeros: $-1, 1, 3$

46

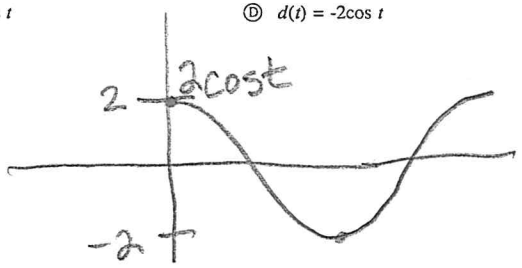
A mass is suspended from a spring. When the mass is displaced vertically from its resting position and released, the displacement of the mass relative to its resting position is periodic. If the mass is raised 2 inches from its resting position and released, which function could model the displacement d, in inches, of the mass t seconds after being released? (Assume that the displacement above the resting position is positive and the displacement below the resting position is negative.)

Ⓐ $d(t) = 2 \sin t$

Ⓑ $d(t) = 2 \cos t$

Ⓒ $d(t) = -2 \sin t$

Ⓓ $d(t) = -2\cos t$



(sint starts at 0)
(cost starts at 1)
2cost starts at 2