

QUESTION 1



Select your answers from the drop-down menus below.

Find two functions f and g such that

$$h(x) = |2x - 6| + 14$$

can be written as

$$(f \circ g)(x)$$

.

$$f(x) =$$

$2x + 14$

✓
▼ and

$$g(x) =$$

$|x - 3|$

✓
▼

QUESTION 2



Select the correct answers that apply.

To find the exponential function of the form

$$f(x) = ab^x$$

, where

$$b$$

is positive, passing through the points

$$(1, -6)$$

and

$$\left(-1, -\frac{2}{3}\right)$$

, Rasha does the following calculation:

$$f(1) = ab^1 = -6$$

, and

$$f(-1) = ab^{-1} = -\frac{2}{3}$$

.

That is,

$$ab = -6$$

, and

$$ab^{-1} = -\frac{2}{3}$$

.

Now,

$$\frac{ab}{ab^{-1}} = \frac{-6}{-\frac{2}{3}}$$

$$b = 9$$

Thus,

$$a = \frac{-6}{b} = \frac{-6}{9} = -\frac{2}{3}$$

.

Rasha's work has an error. Select the option that shows the error, and then choose the correct function for $f(x)$

.

☐

The correct function is

$$f(x) = 2(3^x)$$

.

☐

She incorrectly substituted the coordinates of the two points in the function.

☐

The correct function is

$$f(x) = -3(2^x)$$

.

☒

She made a mistake while solving for b .


☐

Her answer is wrong since

a

cannot be negative.

☒

The correct function is

$$f(x) = -2(3^x)$$

.



QUESTION 3



Drag and drop the correct answer into the blanks.

Expand the given logarithmic expression, given all variables are positive, and

$$z \neq 0$$

. Drop the correct answer into the expansion steps and their corresponding reason.

Statement	Reason
$\ln\left(\frac{3x^8y^2}{2z^3}\right) =$ $\ln(3x^8y^2) - \ln(2z^3)$ ✓	Quotient rule ✓
$=$ $\ln 3 + \ln(x^8) + \ln(y^2) - [\ln 2 + \ln(z^3)]$ ✓	Product rule
$=$ $\ln 3 + 8\ln x + 2\ln y - \ln 2 - 3\ln z$ ✓	Power rule

$$\ln(3x^8y^2) + \ln(2z^3)$$

$$\ln 3 + \ln(x^8) + \ln(y^2) - \ln 2 + \ln(z^3)$$

$$\ln 3 + 8\ln x + 2\ln y - \ln 2 + 3\ln z$$

QUESTION 4



Drag and drop the correct answer in the spaces.

Drag and drop the steps to solve the given logarithmic equation for x . Round to the nearest hundredth.

$$\ln(2x - 3) = 1$$

$$e^{\ln(2x - 3)}$$



$$= e^1$$

(Use the base number e on both sides of the equation)

$$2x - 3$$



$$= e$$

$$2x =$$

$$3 + e$$



$$x =$$

$$\frac{3 + e}{2}$$

$$x \approx$$

$$2.86$$

.

$$\ln(2x - 3)$$

$$3 - e$$

$$2(3 + e)$$

$$2.76$$

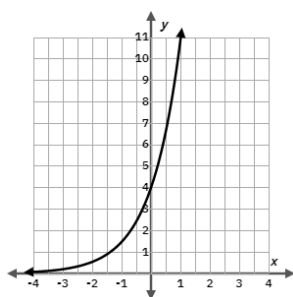
$$2.68$$

QUESTION 5

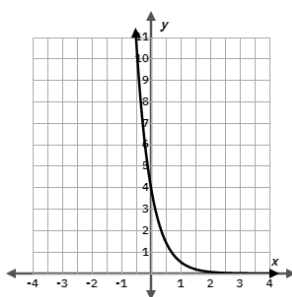


Drag and drop the correct answer into the spaces provided.

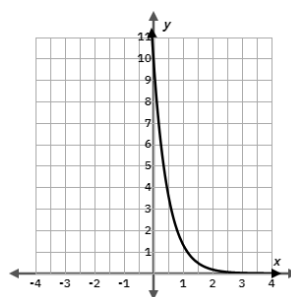
Use the given graphs to complete the sentence.



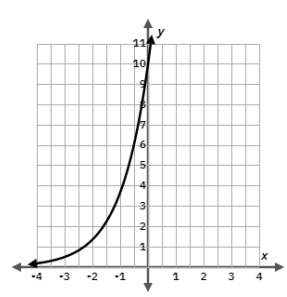
Graph A



Graph B



Graph C



Graph D

Graph A  is the graph of the function

$$f(x) = 4e^x$$

since it is the only graph that has both points: (0,4)  and (1, 10.9), and these coordinates

satisfy  the equation of

$$f(x) = 4e^x$$

D

B

(1, 3)

(0, 3)

C

do not satisfy

QUESTION 6



Drag and drop the correct answer into the spaces provided.

Write the given expression in exponential form.

$$\frac{16\sqrt{x^5}}{\sqrt[3]{8x^6}} =$$

$$\frac{16x^{\frac{5}{2}}}{\sqrt[3]{8}\sqrt[3]{x^6}}$$

$$= \frac{16x^{\frac{5}{2}}}{8^{\frac{1}{3}}x^{\frac{6}{3}}} \quad \checkmark$$

$$= \frac{16x^{\frac{5}{2}}}{(2^3)^{\frac{1}{3}}x^2}$$

$$= \frac{16x^{\frac{5}{2}}}{2x^2} \quad \checkmark$$

$$= 8x^{\frac{5}{2}-2} \quad \checkmark$$

=

$$8x^{\frac{1}{2}}$$

$$8x^{2-\frac{5}{2}}$$

$$\frac{16x^{\frac{2}{5}}}{8(x^{\frac{3}{6}})}$$

QUESTION 7



Select the correct answer from the drop-down menu.

If

$$n^{\frac{2}{3}} = x$$

and

$$n^{\frac{1}{4}} = a \cdot x$$

, find the value of

x

in terms of

a

, where

n

and

a

are positive numbers.

$x =$

$$\frac{1}{a^5 \sqrt[5]{a^3}}$$



QUESTION 8



Select your answer from the drop-down below.

If

$$f(x) = x^2 + 3x + 2$$

and

$$g(x) = x + 2$$

, find

$$(f \circ g)(x)$$

.

$$(f \circ g)(x) =$$

$$x^2 + 7x + 12$$



(Use lower case letters only)

QUESTION 9



Fill the correct answer in the provided blank.

If

$$f(x) = 3x^2 + 2x$$

and

$$g(x) = \sqrt{x^2 + 1}$$

, find

$$2f + g$$

.

$$(2f + g)(x) =$$

$$6x^2 +$$

$$4x + \sqrt{x^2 + 1}$$



(Use lower case letters only)

QUESTION 10



Fill the correct answer in the provided blank. (Use lower case letters only)

If

$$f(x) = x^2 + 9x$$

and

$$g(x) = 5x - 6$$

, find

$$(f - g)(x)$$

$$(f - g)(x)$$

=

$$x^2 + 9x - \boxed{5x} + 6$$

=

$$\boxed{x^2 + 4x + 6}$$

QUESTION 11



Fill the correct answer in the provided blank. (Use lower case letters only)

Let

$$f(x) = x + 3$$

and

$$g(x) = x^2 + 2x$$

. Find

$$(f + g)(x)$$

$$(f + g)(x)$$

=

$$(x + 3) + (x^2 + 2x)$$

=

$$x^2 + \boxed{2x} + x + 3$$

=

$$\boxed{x^2 + 3x + 3}$$

QUESTION 12



Select from the drop-down menus below.

Let

$$f(x) = 3x + 2$$

and

$$g(x) = x^2 + 4x$$

. Find

$$(f \cdot g)(x)$$

and state its domain.

• $(f \cdot g)(x) =$

$3x^3 + 14x^2 + 8x$ ✓ ▼ (Use lower case letters only)

• Domain: $(-\infty, \infty)$ ✓ ▼

QUESTION 13



Select your answers from the drop-downs below.

If

$$f(x) = 3x + 5$$

and

$$g(x) = \cos x$$

, find

$$(f \circ g)(x)$$

and state its domain. (Use lower case letters only)

$(f \circ g)(x) =$

$3 \cos(x) + 5$ ✓ ▼, and its domain = $(-\infty, \infty)$ ✓ ▼

QUESTION 14



Fill the correct answer in the blank provided.

Write

$$a^2 + 2ab + b^2$$

in terms of

$$a \cdot b$$

, given that

$$2\ln\left(\frac{a+b}{3}\right) = \ln ab$$

$$a^2 + 2ab + b^2$$

$$= 9ab \quad \checkmark \quad \text{(Use lower case letters only)}$$

QUESTION 15



Choose the correct answer.

Bashar and Ahmed are comparing the graphs of the two functions

$$y = f(x) = 3(2x - 2)^2 + 4$$

and

$$y = g(x) = 2(3x - 3)^2 + 4$$

in order to deduce their graphs from a parent graph.

Bashar's work	Ahmed's work
$y = f(x) = 3(2x - 2)^2 + 4 = 6(x - 1)^2 + 4$ $y = g(x) = 2(3x - 3)^2 + 4 = 6(x - 1)^2 + 4$ Hence, the two graphs are identical and they could be both determined from the graph of $y = 6x^2$, by a translation of 1 unit to the right and 4 units up.	$y = f(x) = 3(2x - 2)^2 + 4$ $y = f(x) = 12(x - 1)^2 + 4$ $y = g(x) = 2(3x - 3)^2 + 4$ $y = g(x) = 18(x - 1)^2 + 4$ Thus, the graph of f could be deduced from the graph of $y = 12x^2$, by a shift of 1 unit to the left and 4 units up. While the graph of g could be deduced from the graph of $y = 18x^2$ by a shift of 1 unit to the left and 4 units up.

☐ Bashar's work is correct but Ahmed's work contain an error as he simplified the functions in a wrong way.

☐ Bashar's work is correct and Ahmed's work is correct as both graphs could be determined from the graph of $y = x^2$.

☐ Bashar's work is wrong as he tranformed his function wrongly but Ahmed's work is correct.

☒ Bashar's and Ahmed's works both contain an error. Bashar simplified the functions wrongly but he tranformed the graphs correctly, while Ahmed simplified the functions correctly and he tranformed the graphs in a wrong way. ✓

QUESTION 16



Select from the drop-downs below.

If

$$f(x) = \sqrt{x + 1}$$

and

$$g(x) = x^2 - 1$$

, find

$$\left(\frac{f}{g}\right)(x)$$

and state its domain.

$$\left(\frac{f}{g}\right)(x) =$$

$$\frac{\sqrt{x + 1}}{x^2 - 1} \quad \checkmark \quad \vee$$

Domain: $(-1, 1) \cup (1, \infty)$ ✓ ∨

QUESTION 17



Choose the correct answer.

Consider the two functions

f

and

g

defined by

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

and

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

. Let

$$h(x) = \left(\frac{f+3}{f-g} \right)(x)$$

. Find the domain of

h

.

The domain of

h

is:



$$[0, 1) \cup (1, \infty)$$

.



$$(-\infty, -4) \cup (-4, -3] \cup [0, 1) \cup (1, \infty)$$

.



$$(-\infty, -4) \cup (1, \infty)$$

.



$$(-\infty, -3] \cup [0, \infty)$$

.

QUESTION 18



Select the correct answers that apply.

Farid records the percent area covered by a type of mold on a piece of bread. The given table shows his results, rounded to one decimal place.

Day	1	2	3	4	5

% covered by mold	8.2	13.6	22.4	36.9	60.
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Choose the correct choices that apply to this data set. Use a graphing tool to check the semi-log graph.

☐ $f(x) = 5e^{2x}$

☐ $f(x) = 50e^{3x}$

☐ The data is best represented by a polynomial since the semi-log graph is similar to a logarithmic curve.

☐ The data is best represented by a polynomial since the semi-log graph is similar to a straight line.

☒ The data is best represented exponentially since the semi-log graph is similar to a line.

☐ $f(x) = e^5 \cdot e^{\frac{x}{2}}$

☒ $f(x) = 5e^{\frac{1}{2}x}$

is the function that represents the given data.

☐ The data is best represented exponentially since the semi-log graph is similar to a curve.

QUESTION 19



Fill in the blank with the correct answer.

Ahmed wants to find a relation between

$$\cosh^2(x)$$

and

$$\sinh^2(x)$$

. After working on it for sometime, he got the relation

$$\cosh^2(x) = \sinh^2(x)$$

. His teacher, however, said it was **not the correct** relation.

Use the definitions of each of

$$\cosh(x)$$

and

$$\sinh(x)$$

, and follow the necessary steps to help Ahmed get the correct relation.

$$\cosh^2(x)$$

=

$$\sinh^2(x)$$

+

1



QUESTION 20



Choose the correct answer.

Which one of the following options represents the exponential form of

$$5^x$$

with base

$$e$$

?



$$e^{5x}$$



$$\ln(5^x)$$



$$e^{5^x}$$



$$e^{x \ln 5}$$



QUESTION 21



Select the correct answer from the drop-down menu.

Consider the equation

$$\ln\left(\frac{x-1}{x+2}\right) = -\ln(x+2)$$

, where

$$x > 1$$

- The equation holds when $x = 2$ ✓ ▼

QUESTION 22



Choose the correct answer.

Consider the following statements:

A

:

$$\log\left(\frac{x-1}{x+2}\right) = \log(x-1) - \log(x+2), \text{ for } x < -2 \text{ or } x > 1.$$

$$B: e^{2\ln x} = 2x, \text{ for } x > 0.$$

$$C: \log_2(x) \log_2(x+1) = \log_2 x(x+1), \text{ for } x > 0.$$

$$D: \log_4 x^3 = \frac{3}{2} \log_2(x), \text{ for } x > 0.$$

Which statements among *A*, *B*, *C*, and *D* is correct?

☐

Statement

B

is correct.

☐

Statement

A

is correct.

☐

Statement

C

is correct.

☒

Statement

D

is correct.



QUESTION 23



Rewrite the function

$$y = x^2 - 10x + 16$$

in order to compare it to the graph of

$$y = x^2$$

.

$y =$

$(x - 5)^2 - 9$ ✓ ▼

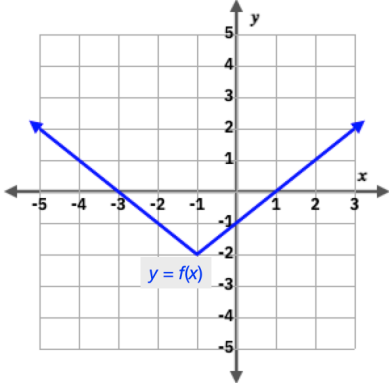
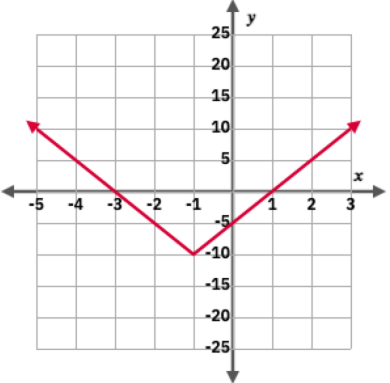
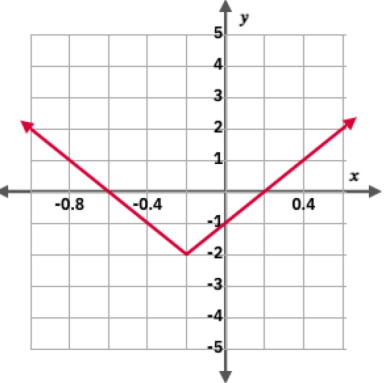
QUESTION 24



By using the graph of

$$y = f(x)$$

, drag and drop the correct function of each red graph.

		
$y = f(x)$	$y = 5f(x)$ ✓	$y = f(5x)$ ✓

$$y = f(x + 5)$$

$$y = \frac{1}{5} f(x)$$

$$y = f(x) + 5$$

QUESTION 25

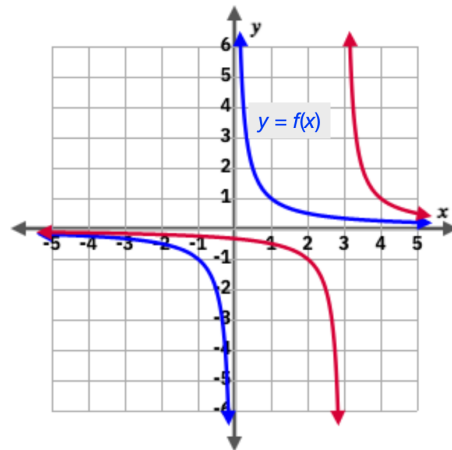


Choose the correct answer.

Use the graph of

$$y = f(x)$$

to choose the correct function for the red graph.



☐ $y = f(x + 3)$

☐ $y = f(x) + 3$

☒ $y = f(x - 3)$ ✓

☐ $y = f(x) - 3$

QUESTION 26



By completing the square, describe how to transform the graph of

$$y = x^2$$

, into the graph of

$$y = x^2 - 8x + 15$$

.

☐ $y = (x - 4)^2 + 1$

☒ $y = (x - 4)^2 - 1$ ✓



The graph will be moved four units to the right and one unit down.



$$y = (x - 1)^2 - 4$$



The graph will be moved four units to the right and one unit up.



The graph will be moved one unit to the right and four units down.

QUESTION 27



Drag and drop the correct answer into the space(s) provided.

Using the graph of

$$y = f(x)$$

, drag and drop the correct function of each red graph.

$y = f(x)$	$y = 6f(x)$ ✓	$y = 3f(x)$ ✓

$$y = f(3x)$$

$$y = 18f(x)$$

$$y = f(6x)$$

$$y = f(x) + 6$$

QUESTION 28

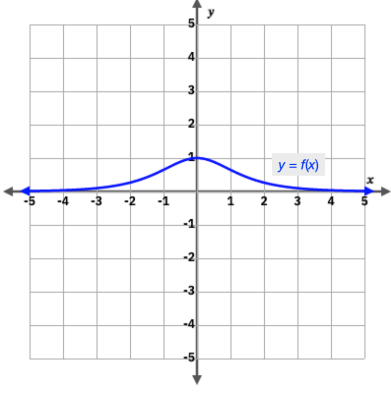
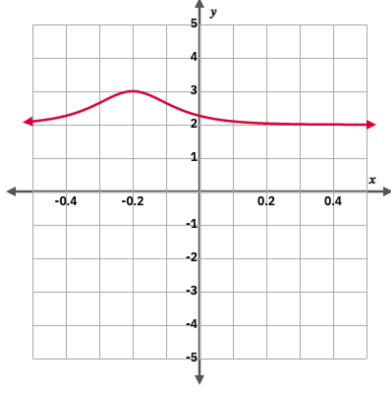
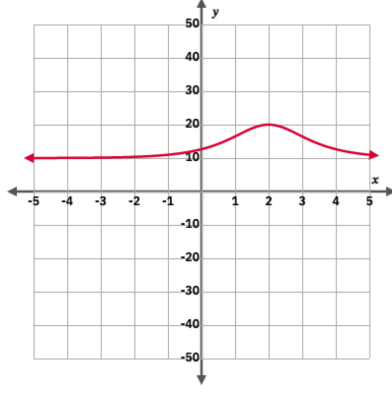


Drag and drop the correct answer into the space(s) provided.

Using the graph of

$$y = f(x)$$

, drag and drop the correct function for each red graph.

		
$y = f(x)$	$y = f(10x + 2) + 2$ ✓	$y = 10f(x - 2) + 10$ ✓

$$y = f(2x + 2) + 10$$

$$y = f(2x - 10) - 2$$

$$y = f(10x - 2) - 2$$

$$y = f(0.2x + 2) + 2$$

QUESTION 29

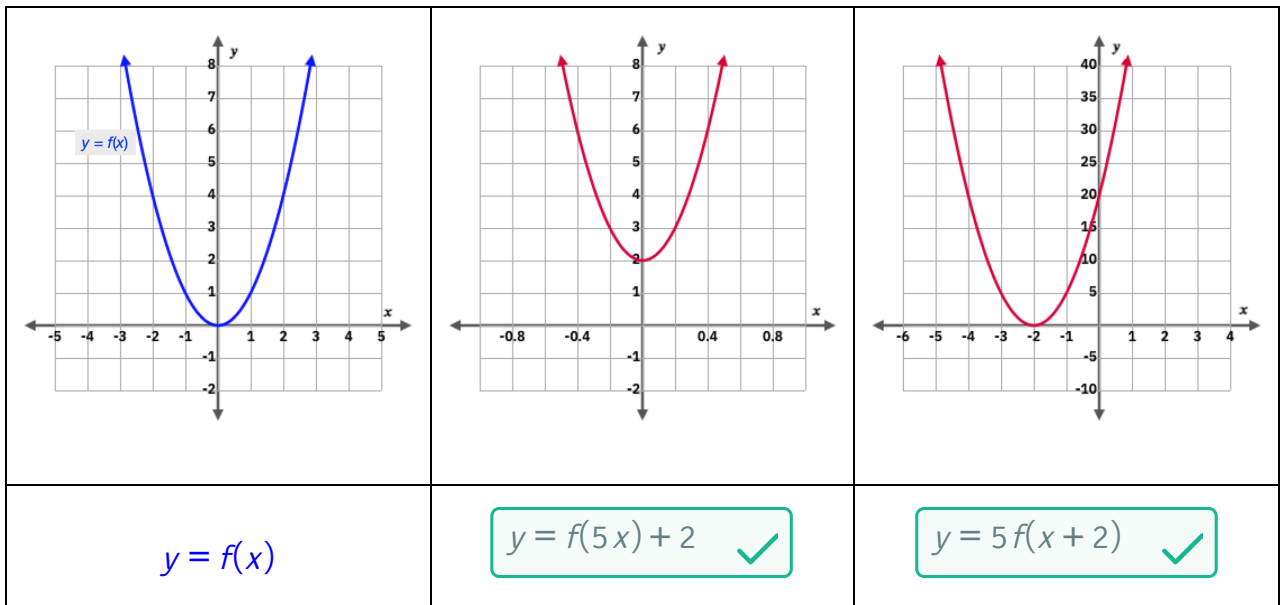


Drag and drop the correct answer into the space(s) provided.

Using the graph of

$$y = f(x)$$

, drag and drop the correct function for each red graph.



$$y = 2f(x + 5)$$

$$y = f(0.4x) + 2$$

$$y = 5f(x - 2)$$

$$y = f(0.4x + 2)$$

$$y = f(5x) - 2$$

QUESTION 30

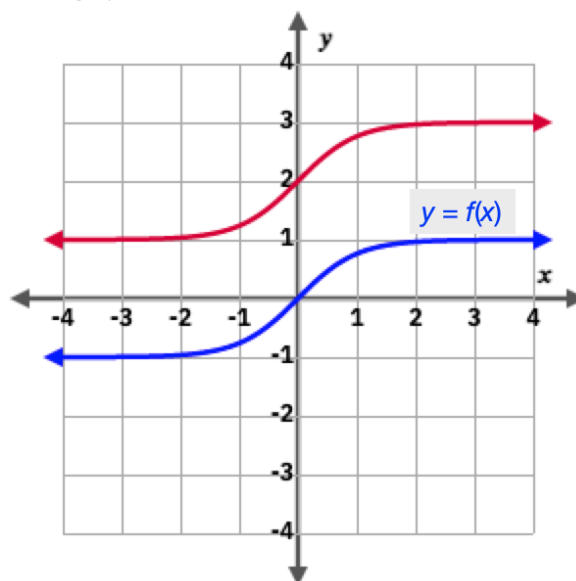


Choose the correct answer.

Use the graph of

$$y = f(x)$$

to choose the correct function for the red graph.



☐ $y = f(x + 2)$

☐ $y = f(x) - 2$

☐ $y = f(x - 2)$

☒ $y = f(x) + 2$



QUESTION 31



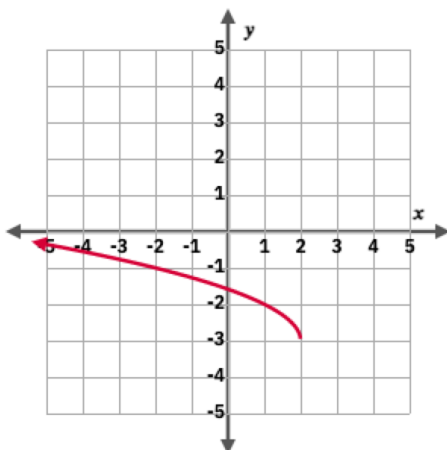
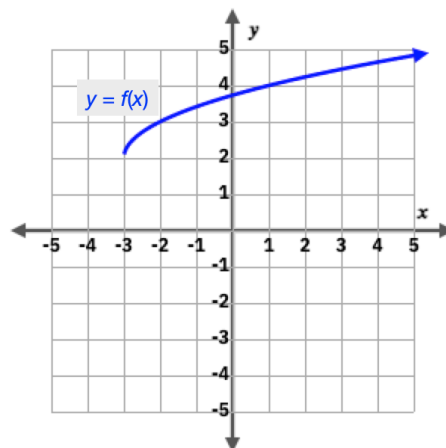
Choose the correct answer.

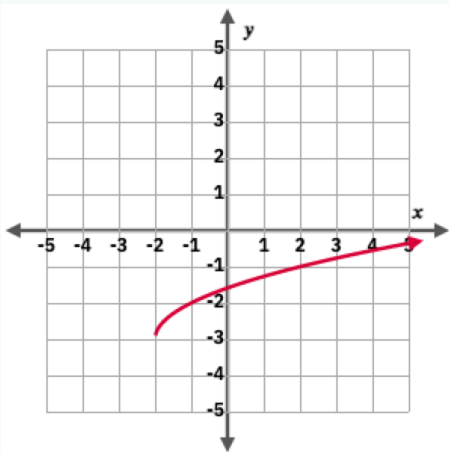
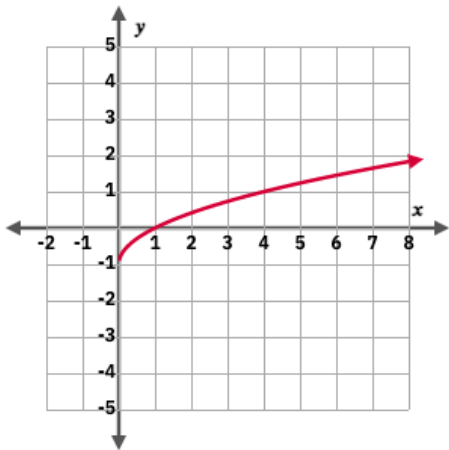
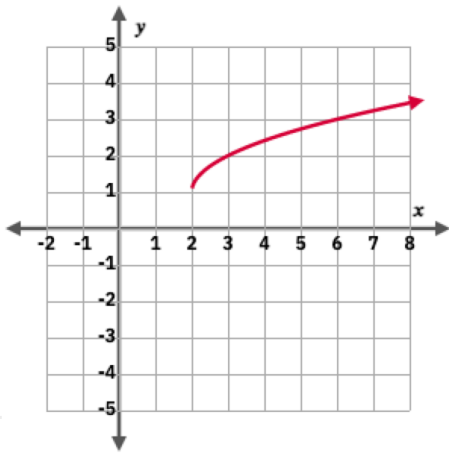
Use the graph of

$$y = f(x)$$

to choose the graph of

$$y = f(x - 1) - 5$$





QUESTION 32



Drag and drop the correct answer into the space(s) provided.

The figure shows two congruent graphs, one of them has the equation

$$y = f(x) = 3x^2$$

The second graph represents the function

$$y = g(x) =$$

$$3x^2 - 12x + 13 \checkmark.$$

The graph of

g

could be obtained from the graph of

f

by a shift of

1 unit up and 2 units to the right $\checkmark$.

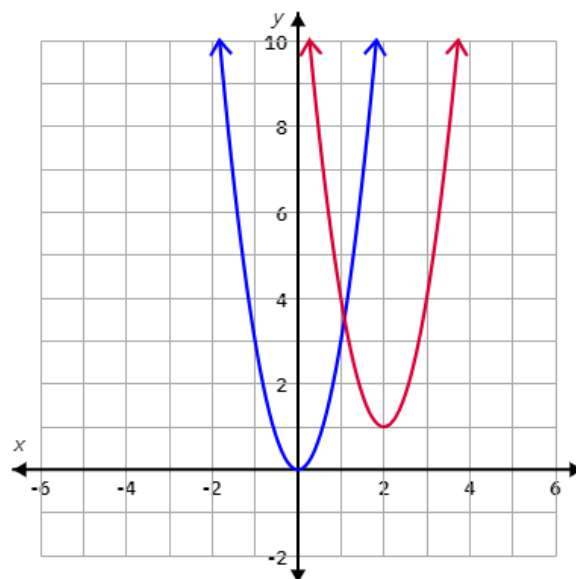
$$3(x - 2)^2 - 1$$

1 unit down and 2 units to the left

$$3(x + 2)^2 - 1$$

1 unit down and 2 units to the right

$$3x^2 + 12x + 13$$



QUESTION 33



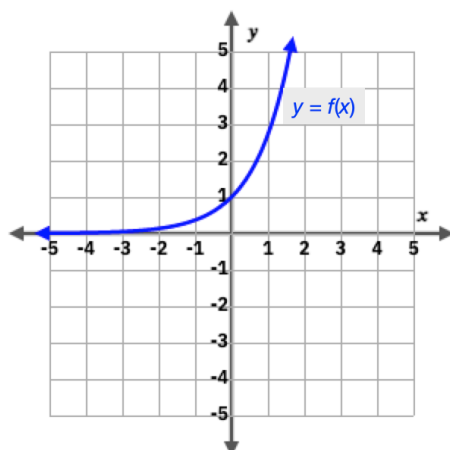
Choose the correct answer.

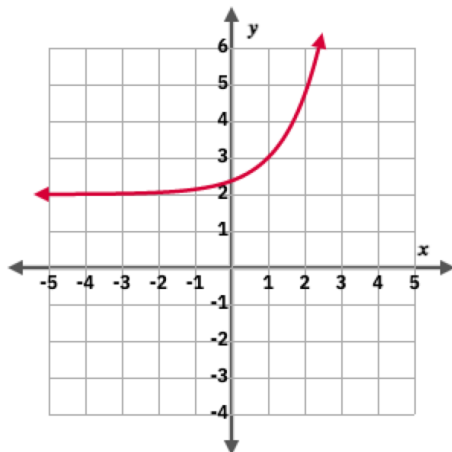
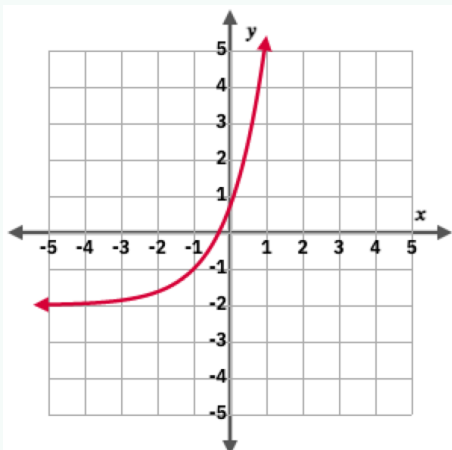
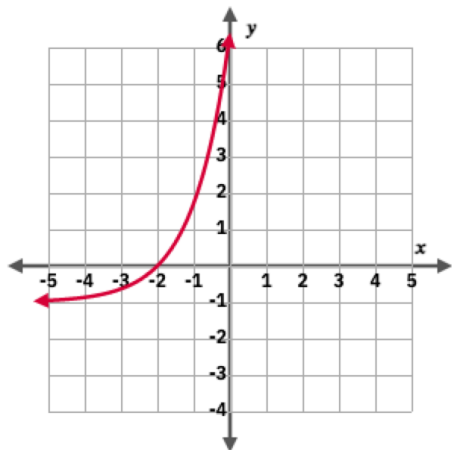
Use the graph of

$$y = f(x)$$

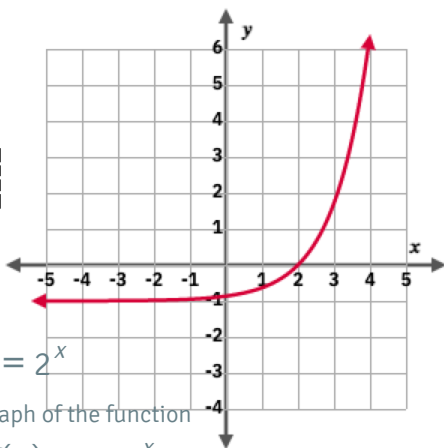
to choose the graph of

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





QUES



Given

$$g(x) = 2^x$$

, the graph of the function

$$y = f(x) = 2 \cdot 2^x + 2$$

, could be obtained in which of the following methods?

☐

Graph the function

$$y = 2^x$$

, shift the graph 2 units to the right and divide the scale on the y -axis by 2.

☐

Graph the function

$$y = 2^x$$

, shift the graph 2 units to the left and 1 unit up.

☒

Graph the function

$$y = 2^x$$

, shift the graph 1 unit to the left and 2 units up.


☐

Graph the function

$$y = 2^x$$

, shift the graph 2 units to the left and divide the scale on the y -axis by 2.

☒

Graph the function

$$y = 2^x$$

, shift the graph 1 unit up then multiply the scale on the y -axis by 2.



QUESTION 35



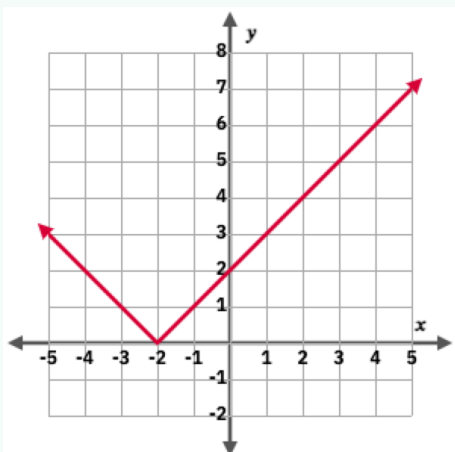
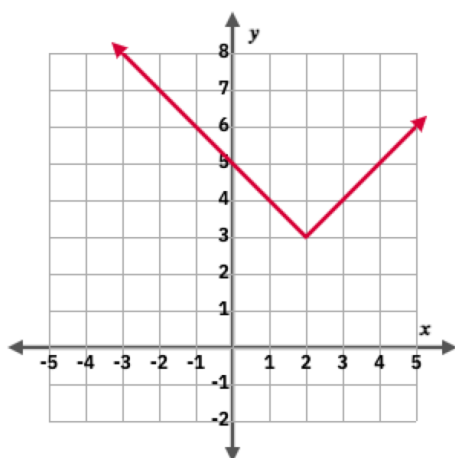
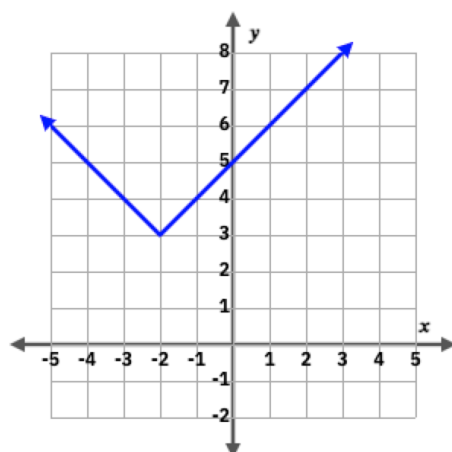
Choose the correct answer.

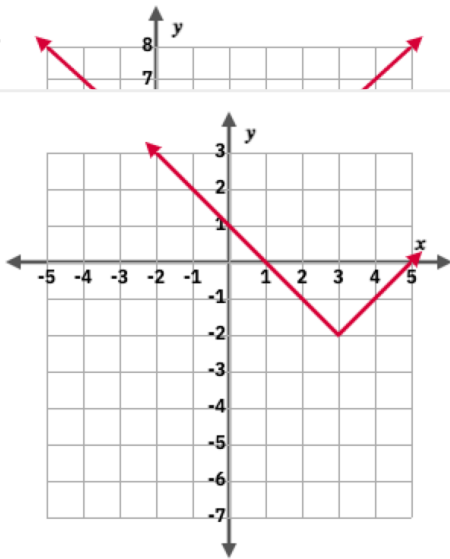
Use the graph of

$$y = f(x)$$

to choose the graph of

$$y = f(x) - 3$$





QUESTION 36



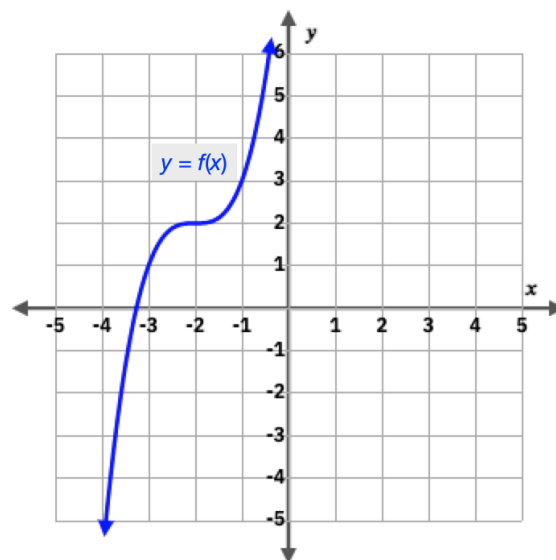
Choose the correct answer.

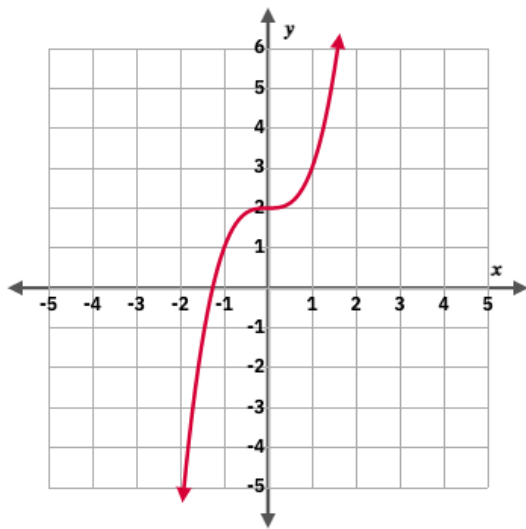
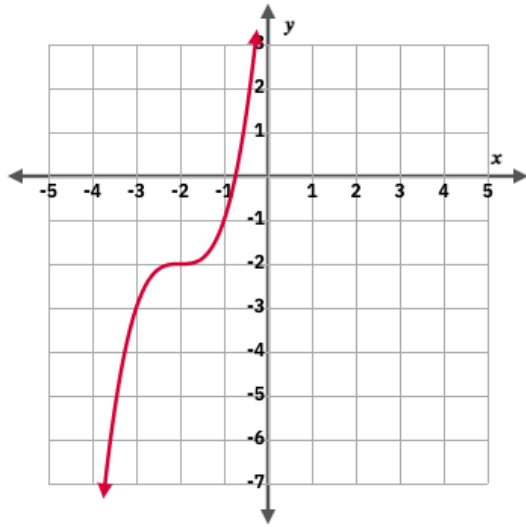
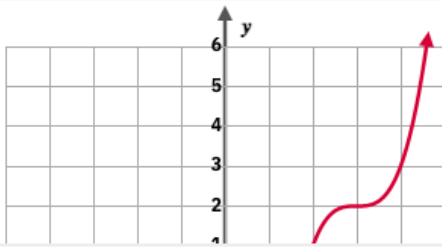
Use the graph of

$$y = f(x)$$

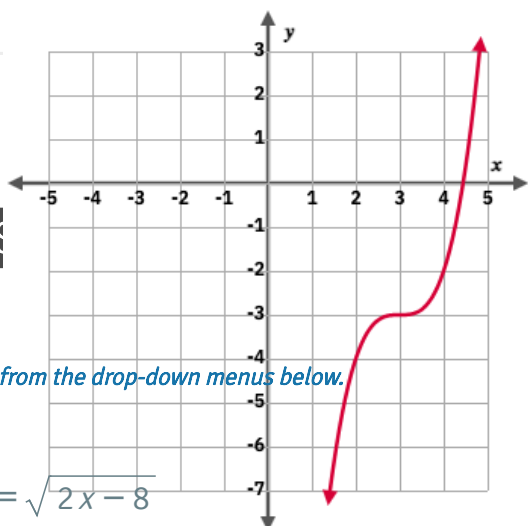
to choose the graph of

$$y = f(x - 5)$$





QUES



Select from the drop-down menus below.

If

$$f(x) = \sqrt{2x-8}$$

and

$$g(x) = 2x + 1$$

, find

$$(f - 2g)(x)$$

and state its domain.

$$(f - 2g)(x) =$$

$$\sqrt{2x-8} - 4x - 2 \quad \checkmark \quad \vee$$

The domain of

$$(f - 2g)$$

is

$$\{x | x \geq 4\}$$



QUESTION 38



Select your answer from the drop-down below.

If

$$f(x) = x^2$$

and

$$g(x) = \sqrt{x}, x \geq 0$$

, find

$$(f \circ g)(x)$$

$$(f \circ g)(x) =$$

X



QUESTION 39



Fill the correct answer in the blank provided. Give your answers from least to greatest.

Consider the two functions

f

and

g

defined by

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

and

$$g(x) = 2x - 1$$

.

Find the solutions to the equation

$$(f \circ g)(x) = (g \circ f)(x)$$

.

The solutions are:

$x =$

0



or

$x =$

2



QUESTION 40



Fill the correct answer in the blank provided.

Consider the three functions

h

,

f

, and

g

defined for any real number by

$$h(x) = x^2 - 6x + 8$$

,

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

, and

$$g(x) = x + a$$

where

a

is a real number.

Find the value of

a

so that

$$h(x) = (f \circ g)(x)$$

.

The value of

a

is:

$a =$

-2



QUESTION 41



Select your answer from the drop-down below.

A phone store has a 10% discount sale on all phones. Abdul has a coupon for AED 100 off the price of a phone.

Let x be the original price of the phone, $d(x)$ be the price after the discount and let $c(x)$ be the price after using the coupon. Find

$$(c \circ d)(x)$$

.

$$(c \circ d)(x) =$$

0.9x - 100



QUESTION 42



Choose the correct answer.

Consider the two functions

f

and

g

defined by

$$f(x) = \frac{x+3}{2x-4}$$

and

$$g(x) = |x - 1| + 2$$

.

Let

$$h(x) = (f \circ g)(x)$$

.

Find the domain of

h

.

The domain of

h

is:

☒ $(-\infty, 1) \cup (1, \infty).$



☐ $(-\infty, 1) \cup (1, 2) \cup (2, \infty).$

☐ $(-\infty, 1) \cup (2, \infty).$

☐ $(-\infty, 2) \cup (2, \infty).$

QUESTION 43



Choose the correct answer.

Given that

$$\cosh(2x) = 25$$

and

$$\sinh(2x) = 24$$

, what is the value of

x

?

☐ e^7

☐ 1

☒ $\ln(7)$





7

QUESTION 44



Fill in the blanks with the correct answer.

Semi-log graphs help determine whether a set of data is best represented exponentially  or polynomially.

If a set of data is best represented polynomially (with degree $\geq$

1), the semi-log graph will look more like a logarithmic  graph.

hyperbolic

parabolic

as a linear function

as a rational function

QUESTION 45



Drag and drop the correct answer into the blanks.

If a set of data is best represented exponentially, its semi-log graph will look like a straight line . Similarly, its

equation that represents the set of data will be in the form $f(x) = a e^{bx}$ , where

b = slope of the semi-log graph , and

$\ln a = y$ - intercept of the semi-log graph

b = slope of the graph

$f(x) = b e^{ax}$

logarithmic graph

$f(x) = -a e^{bx}$

$b = x$ - intercept

parabola

QUESTION 46



Fill in the blanks with the correct answer.

The domain of

$$f(x) =$$

$$\sinh(x)$$



is

$$(-\infty, \infty)$$



, and its range is

$$(-\infty, \infty)$$

$$[-1, \infty)$$

$$(1, \infty)$$

$$\cosh(x)$$

$$[1, \infty)$$

QUESTION 47



Fill in the blank with the correct answer.

Evaluate

$$f(1)$$

for

$$f(x) = \cosh(x)$$

. Round your answer to the nearest hundredth.

$$f(1) \approx$$

$$1.54$$



QUESTION 48



Fill in the blank with the correct answer.

Evaluate

$$g(x) = \sinh(x)$$

for

$$x = -1$$

. Round your answer to the nearest thousandth.

$$g(-1) \approx$$

- 1.175



QUESTION 49



Select the correct answer from the drop-down menu.

The hyperbolic sine function is defined as:

$\sinh(x) =$

$$\frac{e^x - e^{-x}}{2}$$
 ✓ ▼

QUESTION 50



Choose the correct answer.

Which one of the following options represents a hyperbolic cosine function?

☒ $\cosh(x) = \frac{e^x + e^{-x}}{2}$ ✓

☐ $\cosh(x) = \frac{-e^x + e^{-x}}{2}$

☐ $\cosh(x) = -\frac{e^x + e^{-x}}{2}$

☐ $\cosh(x) = \frac{e^x - e^{-x}}{2}$

QUESTION 51



Fill in the blanks with the correct answer.

The table below shows the population of a type of bear recorded over the years.

t (no. of years after 2000 A.D.)	5	10	15
$P(t)$	28	786	22,026

Complete the table below, which you can use to sketch the semi-log graph of the given data. Round your answer to the nearest integer.

t (no. of years after 2000 A.D.)	5	
$\ln P(t)$	3	7

Using the given data and a graphing utility, the data can be represented exponentially ✓.

So,

$P(t)$

has the form

ae^{bt}

, where b is the slope ✓ of the semi-log graph.

x-intercept

y
-intercept

8

5

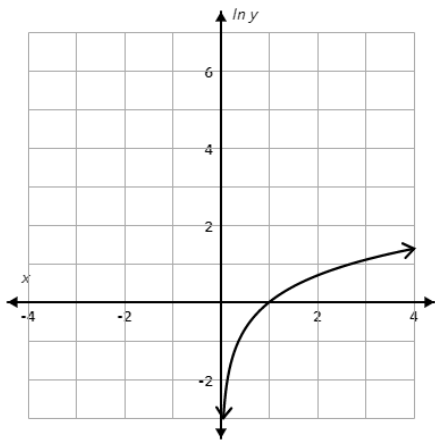
polynomially

QUESTION 52

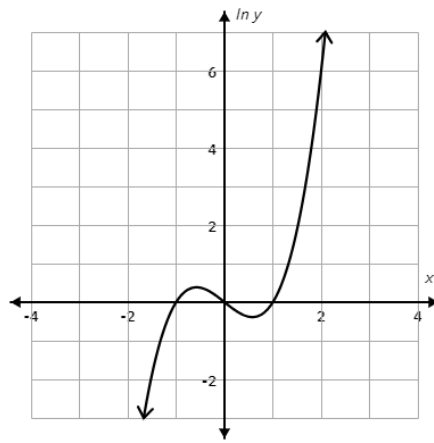


Drag and drop the correct answer into the blank.

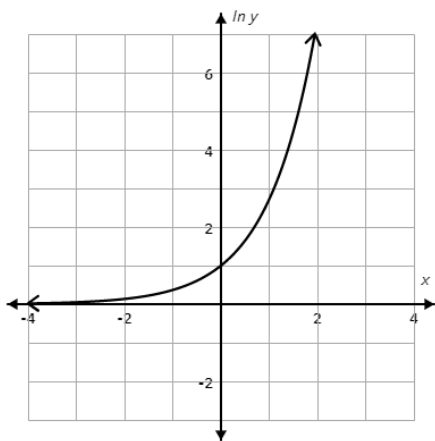
Which of the following is the semi-log graph of an exponential function?



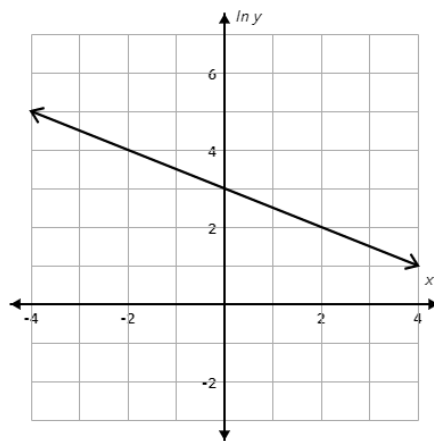
Graph A



Graph B



Graph C



Graph D

Among these, graph **D** is the semi-log graph of an exponential function.

B

A

C

QUESTION 53



Choose the correct answer.

A semi-log graph for data that shows the bacterial growth in fungi is represented by the equation $\ln y = -3x + 7$

Select the function that represents the bacterial growth in fungi.



It is a polynomial function given by

$$f(x) = 3x^7$$

It is a polynomial function given by

☐ $f(x) = 7x^3$

It is an exponential function given by

☐ $f(x) = -3e^{7x}$

It is an exponential function given by

☒ $f(x) = e^7 e^{-3x}$



QUESTION 54



Select the correct answer from the drop-down menus.

A microbiologist was comparing the growth rate of two types of bacteria, A and B , over a 24-hour period. She found that bacterium A had a growth function modeled by

$$f(t) = e^{15} e^{2.1t}$$

, where

t

is in hours, while the bacterium B data made a semi-log graph of equation

$$\ln y = 3.3t + 15.$$

She compared the initial count of both bacteria A and B at time

$$t = 0$$

and concluded that the initial count of A was identical to B ✓ ▼.

At the end of the 24-hour period, bacteria B ✓ ▼ had the largest growth.

QUESTION 55



Fill the correct answer in the blank provided.

Consider the equation

$$3 \log_8(x) + \log_4(x^2) = \log_2(x + 2)$$

, where

$$x > 0.$$

This equation holds true when

$x =$

2



QUESTION 56



Choose the correct answer.

Consider the equation

$$2\ln(x+1) + 2\ln(x) = \ln x(x+1)$$

, where

$$x > 0.$$

For what value of

x

does this equation hold?



$$x = -0.56, \text{ or } x = 3.56$$



$$x = 0.62$$



$$x = 3.56$$



$$x = 0.62, \text{ or } x = -1.62.$$

QUESTION 57



Drag and drop the correct answer into the blank.

Express the given logarithmic expression in its simplified form.

$$\log_3 25^x + \log_3 5^{3x} =$$

$5x \log_3 5$



$x \log_3 5$

$2x \log_3 5$

$5x \log_5 3$

$\log_3 5$

QUESTION 58



Fill the correct answer in the blank.

What is the value of the given logarithm?

$$\log\left(\frac{1}{100,000}\right) =$$

-5



QUESTION 59



Select the correct answer from the drop-down menu.

Simplify the given logarithmic expression. Express the solution as a single logarithm.

$$3 \ln 5 - \ln 3 =$$

$$\ln \frac{125}{3}$$



QUESTION 60



Select the correct answer from the drop-down menus.

The domain of a logarithmic function is

$(0, \infty)$



And its range is

$(-\infty, \infty)$



QUESTION 61



Select the correct answer from the drop-down menus.

Evaluate the given expression using the natural logarithm, and round to the nearest thousandth.

$$\log_3 91 =$$

$$\frac{\ln 91}{\ln 3}$$

$\approx$

$$4.106$$

QUESTION 62



Select the correct answer from the drop-down menu.

When

$$x > 0 \text{ and } y > 0$$

, the expanded form of the logarithmic expression

$$\ln(5xy^3)$$

is

$$\ln 5 + \ln x + 3 \ln y$$

QUESTION 63



Drag and drop the correct answer to complete the statement.

$$y = \log_b x \text{ if and only if}$$

$$x = b^y$$



, when

$$b > 0 \text{ and } b \neq 1$$

$$x = y^b$$

$$b = y^x$$

$$b = x^y$$

QUESTION 64



Select the correct answer from the drop-down menus.

An exponential function is a function in the form $f(x) = a b^x$ ✓ ▼, where $a \neq 0$ and $b > 0$ ✓ ▼.

QUESTION 65



Choose the correct answer.

Use the rules of exponents to write the expression

$$\frac{5x^2\sqrt{x}}{4x^3}$$

in exponential form.

☐ $\frac{5}{4}x^{-\frac{3}{2}}$

☒ $\frac{5}{4}x^{-\frac{1}{2}}$ ✓

☐ $\frac{5}{4}x^{\frac{1}{2}}$

☐ $\frac{4}{5}x^{-2}$

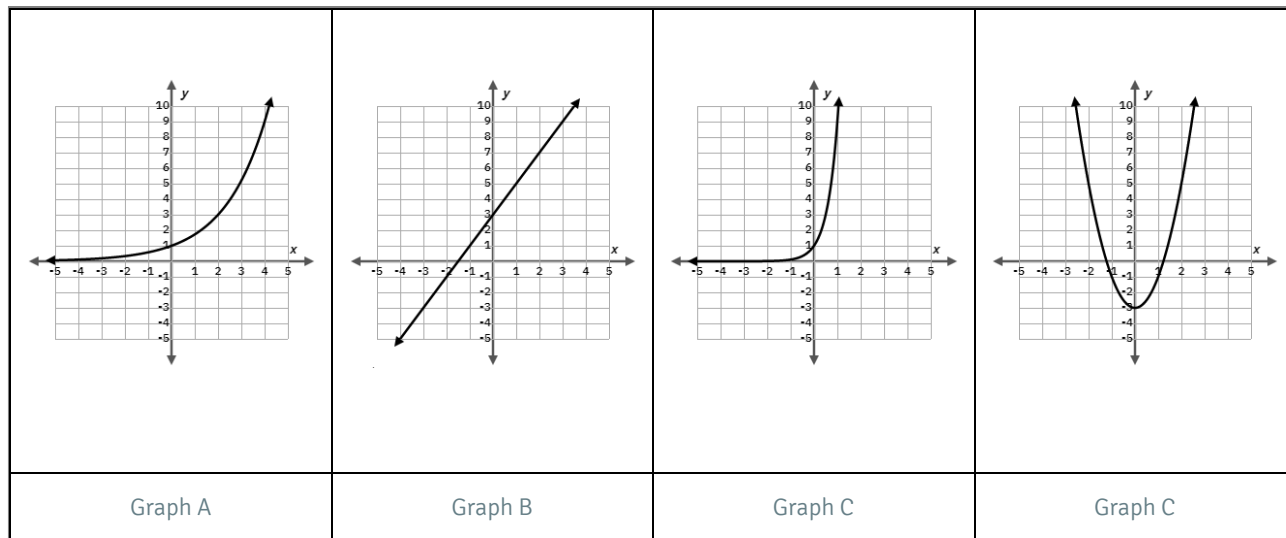
QUESTION 66



Select the correct answer from the drop-down menus.

The ordered pair $(4, 9)$ is on graph **A**, which is the graph of the **exponential** function

$$f(x) = 3^{\frac{1}{2}x}$$

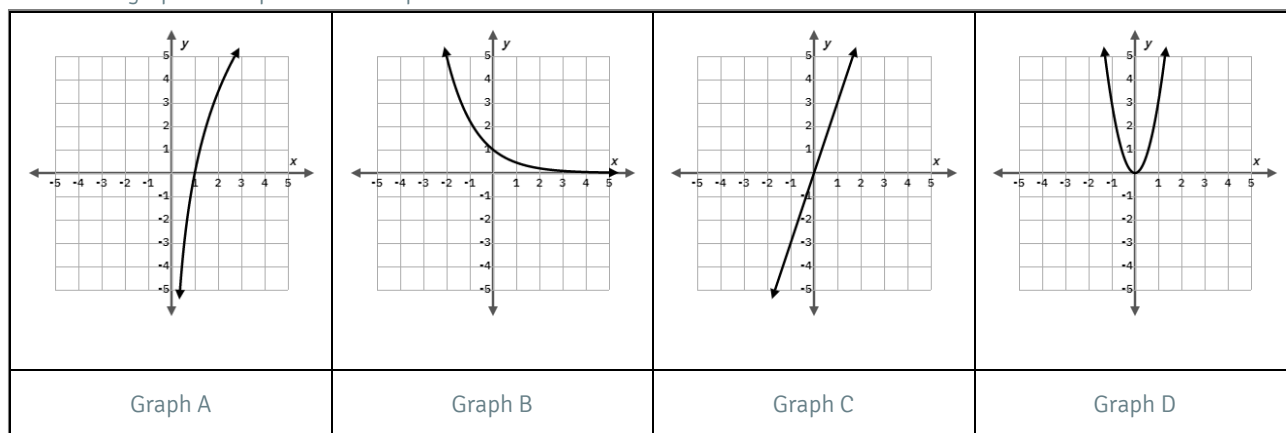


QUESTION 67



Drag and drop the correct answer into the space provided.

Choose the graph that represents an exponential function.



Graph **B** represents an exponential function.

D

A

C

QUESTION 68



Fill in the blank with the correct answer.

Round to the nearest hundredth.

$$e^{\frac{1}{2}} \approx$$

1.65



QUESTION 69



Drag and drop the correct answer into the space provided.

For

$$f(x) = \left(\frac{1}{2}\right)^x$$

;

$$f(3) =$$

0.125



0.251

1.73

0.5

QUESTION 70



Drag and drop the correct answer into the spaces provided.

Write the given expression in exponential form.

$$\frac{\sqrt{8} \cdot \sqrt[3]{x^9}}{2^{\frac{1}{2}}} =$$

$$\frac{\sqrt{2^3} \cdot x^{\frac{9}{3}}}{2^{\frac{1}{2}}}$$



=

$$\frac{2^{\frac{3}{2}} \cdot x^3}{2^{\frac{1}{2}}}$$

$$= 2^{\frac{3}{2} - \frac{1}{2}} \cdot x^3 \quad \checkmark$$

$$= 2x^3 \quad \checkmark$$

$$\frac{\sqrt{2^2} \cdot x^{\frac{3}{9}}}{2^{\frac{1}{2}}}$$

$$2^{\frac{3}{2} + \frac{1}{2}} \cdot x^3$$

$$2^2 x^3$$

QUESTION 71



Drag and drop the correct answer into the spaces provided.

Consider the two functions

$$f(x) = a(3^x)$$

and

$$g(x) = a\left(\frac{1}{3}\right)^x$$

, where

a

is positive. The graphs of

f

and

g

intersect the horizontal line

$$y = 2a$$

at the points

A

and

B

, respectively.

The coordinates of the midpoint

M

of the line joining the points

A

and

B

are:

$(0, 2a)$



$(a(3^{2a}), 2a)$

$(2^a, 0)$

$(3^{2a}, 0)$

$(0, \frac{a(3)^{2a}}{2})$

QUESTION 72



Drag and drop the correct answer into the space provided.

The half-life of a radioactive material is the time taken for half of its original material to decay. Titanium-44 is a radioactive material with a half-life of 60 years.

If 20 grams of a Titanium-44 sample was placed in a laboratory, which of the following functions

f

represents the mass, in grams, of the remaining radioactive material after

t

months?

The remaining radioactive material after

t

months is represented by

$$f(t) = 20\left(\frac{1}{2}\right)^{\frac{t}{720}}$$



$$f(t) = 20\left(\frac{1}{2}\right)^{\frac{12t}{60}}$$

$$f(t) = 20\left(\frac{1}{2}\right)^{\frac{t}{60}}$$

$$f(t) = \frac{20}{720t}$$

$$f(t) = 720\left(\frac{1}{2}\right)^{\frac{t}{60}}$$

QUESTION 73



Fill in the blank with the correct answer.

If

$$\sqrt{x\sqrt{x\sqrt{x}}} = x^{\sqrt{A}}$$

, what is the **exact** value of

A

?

A

= $\frac{49}{64}$ ✓