MM3A2

MM3A2a

1. $\sqrt[6]{64}$

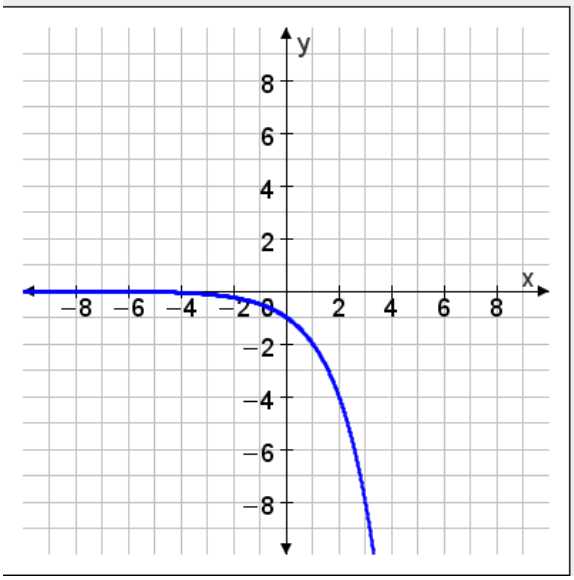
2. $\sqrt[5]{-32}$

3. $\sqrt[3]{-343}$

4. $\sqrt[6]{729}$

5. $\sqrt[4]{81}$

MM3A2e

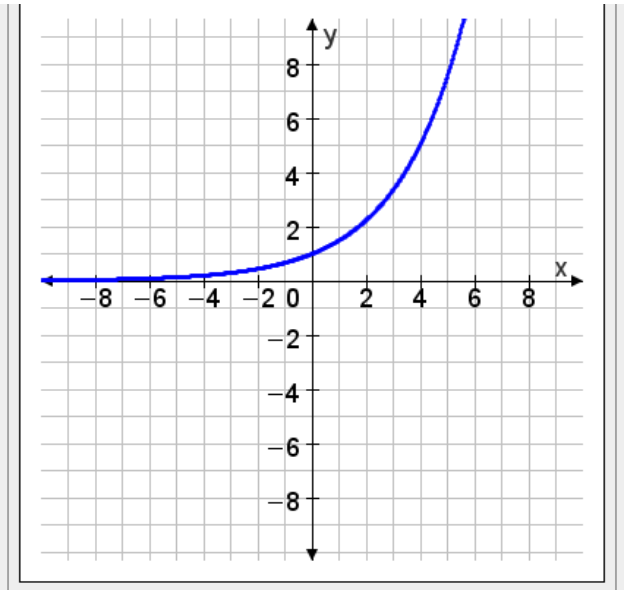


$f(x) = -(1/4) \cdot 8^x$

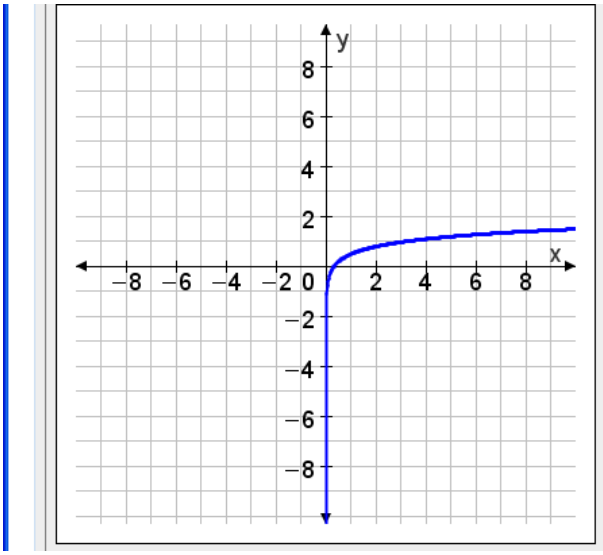
State the domain and range of the function.

What are the zeros of the function?

What are the intercepts of the function?



What are the intervals of increase and decrease?



What is the rate of change on the interval of $\{x \mid x>0\}$?

Rational Exponents

Express using rational exponents.

1. $\sqrt{7}$ 2. $\sqrt[4]{27}$ 3. $\sqrt[8]{x^4}$ 4. $\sqrt[3]{12y^5z^7}$

Evaluate:

5. $27^{\frac{2}{3}}$ 6. $125^{\frac{-1}{3}}$ 7. $16^{\frac{-3}{4}}$ 8. $\left(\frac{16}{81}\right)^{\frac{1}{4}}$

Simplify the following:

9. $27^{\frac{1}{6}}$ 10. $125^{\frac{1}{9}}$ 11. $\sqrt[4]{49}$ 12. $\sqrt[4]{196}$

13. $a^{\frac{2}{3}}y^{\frac{1}{4}}e^{\frac{1}{2}}$ 14. $x^{\frac{9}{21}}y^{\frac{5}{3}}$ 15. $27^{\frac{1}{2}}a^{\frac{2}{3}}c^{\frac{7}{6}}$

1. After 10 minutes, half the amount of a certain medicine leaves a person's bloodstream. If Sadie takes 100 mg of the medicine, how much of the medicine is left in her bloodstream after 30 minutes?

2. The half-life of a substance is 15 years. If there are 100 g of the substance present now, how many grams of the substance will be present in 10 years?

For questions 3 and 4, the half-life of carbon-14 is 5730 years.

3. Talia found a dinosaur bone at an archeological site. A carbon-14 test showed that the bone is 20,000 years old. What percent of the original carbon-14 remains in the bone?

4. What percent of carbon-14 remains in a fossil that is 1204 years old?

5. A bacteria population triples every minute. There are 100 bacteria now. In how many minutes will there be 2500 bacteria?

6. An investment earns 5% annual interest. If Dalia invests $3,500, in how many years will she have $10,000?

7. The population of a city grows at a rate of 3% per year. The population was 125,000 in 2009. In what year will the population reach 1,000,000?

8. A radioactive substance has a half-life of 200 years. After how many years will 75% of the substance remain in a sample?

1. Alessandra invested $2500 into a bank account that earns 3% compounded annually. Which expression represents the balance in Alessandra's account after y years?

a. $2500 \cdot 1.03^{y}$ c. $2500 \cdot 3^{y}$

b. $2500 \cdot 1.03y$ d. $2500 + 3^{y}$

2. A certain bacteria population doubles every two minutes. If there are 500 bacteria now, how many bacteria will there be in 9 minutes?

a. $500 \cdot$ c. $500 \cdot 9^{2}$

b. $500 \cdot 2^{9}$ d. $500 \cdot 9 \cdot 2$

3. Which of the following is equivalent to ?

a. c.

b. d.

4. For which value of x is = 16 ?

a. 2 c. 12

b. 8 d. 40

5. The half-life of a certain radioactive substance is 120 years. Approximately what percent of the substance remains in a 320-year-old sample?

a. 16% c. 50%

b. 32% d. 77%

6. Mandy invested $3000 into a bank account that earns 2% compounded annually. What will be the balance in Mandy's account after 14 years?

a. $3840 c. $3958

b. $3898 d. $4201

7. A certain bacteria population triples every 30 seconds. If there are 20 bacteria now, how many bacteria will there be in 2 minutes?

a. $20 \cdot 3^4$ c. $3 \cdot 20^4$

b. $20 \cdot 4^3$ d. $4 \cdot 20^3$

8. Which of the following is equivalent to ?

a. c.

b. d.

9. For which value of p is ?

a. 2 c. 24

b. 8 d. 512

10. The half-life of a certain medicine in the bloodstream is 5 hours. Approximately what percent of the medicine will remain in the bloodstream after 4 hours?

a. 21% c. 50%

b. 42% d. 57%

11. The growth of a bacteria population follows the function $(x) = 100 \cdot 1.24^x$. Explain how you can use a graph to determine when the bacteria population will reach 10,000.

1. What is the domain of the function ?

a. all real numbers
b. all real numbers for $x > 0$
c. all real numbers for $x < 7$
d. all real numbers for $x > 7$

2. What is the range of the function ?

a. all real numbers
b. all real numbers for $x > 0$
c. all real numbers for $x < 3$
d. all real numbers for $x > 3$

3. Which of the following is equivalent to ?

a.
b.
c.
d.

4. For what value of x is ?

a. 9
b. 11
c. 26
d. 28

5. For what value of x is ?

a. 2.54
b. 12
c. 55
d. 300

6. What is the equation of the vertical asymptote of ?

a. –
b. –
c. –
d. –

7. What is the range of the function ?

a. all real numbers
b. all real numbers for $y > 0$
c. all real numbers for $y < 9$
d. all real numbers for $y > 9$

8. What is the approximate value of log 250?

a. 2.40
b. 2.45
c. 2.50
d. 2.55

9. For what value of x is ?

a. 11
b. 31
c. 32
d. 33

10. For what value of x is undefined?

a. 2 c. 4

b. 3 d. 5

11. For a logarithmic function, describe how to find the equation of the vertical asymptote.

Simplify .

a. -4
b.
c.
d.

Simplify

a.
b.
c.
d.

Simplify

a.
b.
c.
d.

If , then

a.
b.
c.
d.

The volume of a sphere can be given by the formula . You have to design a spherical container that will hold a volume of 55 cubic inches. What should the radius of your container be?

a. 13.13 in.
b. 2.36 in.
c. 3.62 in
d. 2.49 in.

Simplify —

a. –
b. 1
c. 5
d. –

Simplify – –

a. –
b. —
c. —
d. —

What is the value of –?

a. –
b. 5
c. –
d. –

Simplify + . Assume all variables are positive.

a. +
b.
c.
d.

Simplify – – . Write your answer using only positive exponents.

a.
b. —
c. —
d. ——

Find the inverse of .

a.

b.

c.

d.

Find the inverse of – .

a.

b.

c. –

d. –

Simplify .

a. *N*

b. *b*

c.

d.

Write the equation – in exponential form.

a. – = 729

b. –

c. –

d. –

Find the *y*-intercept of the equation.

a. 4

b. -21

c. -3

d. 7

State the domain and the range for – .

a. Domain:

   Range:

b. Domain:

   Range: all real numbers

c. Domain: all real numbers

   Range:

d. Domain:

   Range:

The graph of has an asymptote at

a.

b.

c.

d.

Jerry graphs . He needs a greater rate of change. Which function might help him?

a.

b.

c.

d. –

How is the graph of transformed to become .

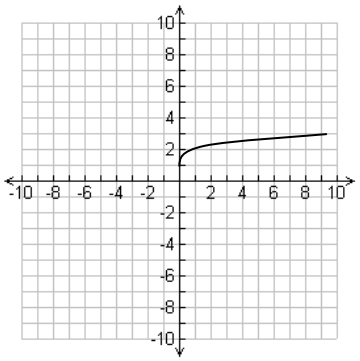
a. It moves left 4.

b. It moves up 4.

c. It moves right 4.

d. It moves down 4.

Which function is represented by the following graph?



a.

b.

c.

d.

At Area Six High School with population 1,024, 18 students have colds on September 1, and the number of students with colds doubles every 11 days.
Variables: p_0=_____ r= _____ n=_____

a. Write the equation that describes this growth pattern. _____
b. Draw a graph that shows the number of students *not having had a cold over two months.*
c. How many students did not have a cold after 30 days. _____
d. When was half the student body affected? _____

The population of Russia in 2006 was 142 million and because of declining births and life expectancy the growth rate is decreasing at 0.6% per year.
Variables: p_0=_____ r= _____ n=_____

a. Write the equation that describes this decay pattern. _____
b. Draw a graph that shows the population from 2006 to 2050.
c. How many people will live in Russia in 2075? _____
d. In what year will the population be down to 100 million? Do mathematically. Verify graphically _____