Date Completed: _____
Mentor Initials: _____

Exponential Equations (Advanced)

1. Janice opened a bank account that earns 3 percent interest compounded annually. Her initial deposit was \$200, and she used the expression $\$200(x)^t$ to find the value of the account after t years. What is the value of x in the expression?

A. .03
B. .3
C. 1
D. 1.03
E. 1.3

2. Janice's friend Tyler found an account that earns 3.5 percent interest compounded annually. Tyler made an initial deposit of \$200 into this account at the same time Janice made a deposit of \$200 into her account. After 5 years, how much more money will Tyler's initial deposit have earned than Janice's initial deposit? (Round your answer to the nearest cent.)

A. 4.32
B. 5.68
C. 6.15
D. 6.45
E. 7.23

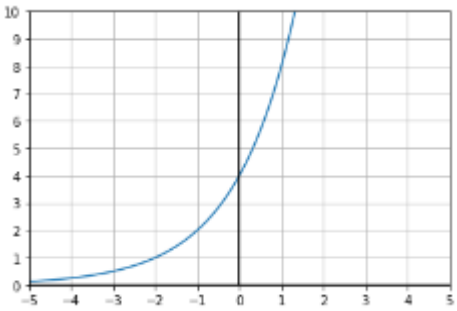
3. For the exponential function f, the table below shows some values of x and the corresponding values of $f(x)$. The function can be written in the form $f(x) = pr^x$, where p and r are constants. What is the value of r?

x	0	1	2
f(x)	8	14	24.5

A. 1.75
B. 2
C. 2.5
D. 8
E. 14

4. What is the graph of the equation $y = 4(2)^x$?
(No Calculator)

A.



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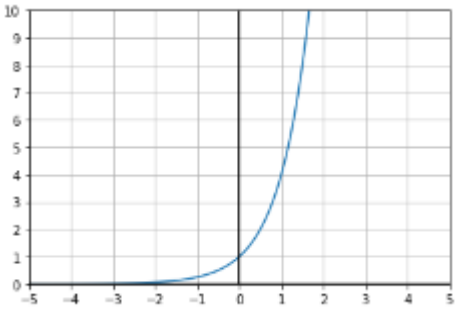

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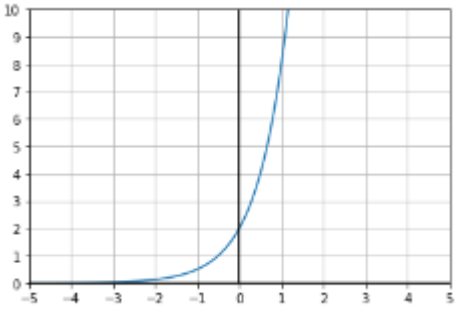

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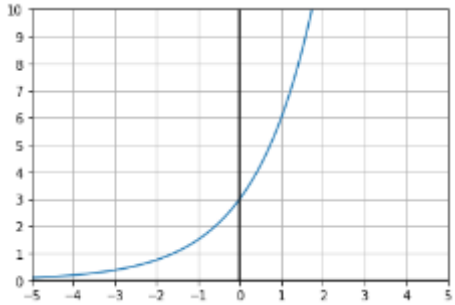


5. $A(t) = 40(2)^t$

The function $A(t)$ models the number of liters of a fluid in a tank after t hours. Which of the following models the number of liters of the fluid in the tank after m minutes?

A. $A(m) = 40(2)^{60m}$
B. $A(m) = 40(2)^{\frac{60}{m}}$
C. $A(m) = 40(2)^{m}$
D. $A(m) = 40(2)^{\frac{m}{60}}$
E. $A(m) = (60)(4)(2)^{m}$

6. For how many integers x is the equation $4^{-2x+2} = 16^{x^2-5}$ true?

A. 0
B. 1
C. 2
D. 3
E. An infinite number

7. $M = 1{,}200(1.03)^t$

The equation above models the number of members, M, of a gym t years after the gym opens. Of the following, which equation models the number of members of the gym h half years after the gym opens?

A. $M = 1{,}200(1.03)^{\frac{h}{2}}$
B. $M = 1{,}200(1.03)^{2h}$
C. $M = 1{,}200(1.015)^{2h}$
D. $M = 1{,}200(1.015)^{h}$
E. $M = 1{,}200(1.015)^{\frac{h}{2}}$

8. Kyle invested $\$2{,}500$ in a special savings account. The balance of this special savings account will double every 6 years. Assuming that Kyle makes no other deposits and no withdrawals, what will be the balance of Kyle's investment at the end of 36 years?

A. 90,000
B. 128,000
C. 160,000
D. 256,000
E. 512,000

9. The function W below gives the estimated weight $W(L)$, in pounds, of a rainbow trout based on its length L, in inches. Which of the following is the best interpretation of the number 1.34 in this context?

$$W(L) = 0.06(1.34)^L$$

A. For each increase of 1 pound in weight, the estimated length of the trout, in inches, increased by 34%.
B. For each increase of 1 inch in length, the estimated weight of the trout, in pounds, increases by 34%.
C. For each increase of 1 pound in weight, the estimated length of the trout increases by 1.34 inches.
D. For each increase of 1 inch in length, the estimated weight of the trout increases by 1.34 pounds.
E. For each increase of 1 pound in weight, the estimated weight of the trout, in pounds, increases by 1.34 pounds.

10. Radioactive substances decay over time. The mass M, in grams, of a particular radioactive substance, d days after the beginning of an experiment, is shown in the table below.

Number of days, d	Mass, M (grams)
0	140
40	121.93
80	106.2
120	92.5

If this relationship is modeled by the function $M(d) = a \cdot 10^{bd}$, which of the following could be the values of a and b ?

A. $a = 14$ and $b = 0.0132$
B. $a = 14$ and $b = -0.0132$
C. $a = 140$ and $b = 0.0015$
D. $a = 140$ and $b = -0.0015$
E. $a = 140$ and $b = 0.0132$

11. The total amount of a certain substance present in a laboratory experiment is given by the formula $A = A_0\left(2^{\frac{h}{4}}\right)$, where A is the total amount of the substance h hours after an initial amount (A_0) of the substance began accumulating. Which of the following expressions gives the number of hours it will take an initial amount of 8 grams of this substance to accumulate to 64 grams?

A. 8
B. 16
C. $\log_2(32)$
D. $4\log_2(8)$
E. $4\log_2(64)$

12. Given that 8 to the power of $\left(\frac{3x+1}{x}\right)$ equals 1, x = ?

A. $-\frac{1}{3}$
B. $-\frac{1}{9}$
C. $\frac{1}{3}$
D. $\frac{8}{17}$
E. 1

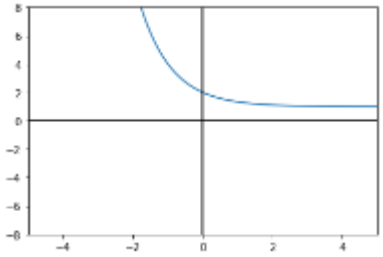
13. A biologist grows a culture of bacteria as part of an experiment. At the start of the experiment, there are 60 bacteria in the culture. The biologist observes that the population of bacteria doubles every 20 minutes. Which of the following equations best models the number, n, of bacteria t hours after the start of the experiment?

A. $n = 60(2)^{\frac{t}{20}}$
B. $n = 60(2)^{\frac{t}{3}}$
C. $n = 60(1 + 3t)$
D. $n = 60(2)^{3t}$
E. $n = 60(2)^{20t}$

14. The function f is defined by the equation below. Which of the following is the graph of $y = -f(x)$ in the xy-plane? (SAT: No-Calculator)

$$f(x) = 3^x + 1$$

A.



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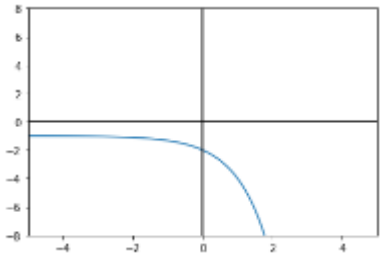

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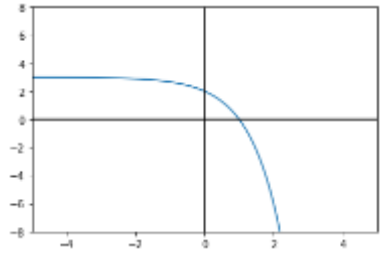

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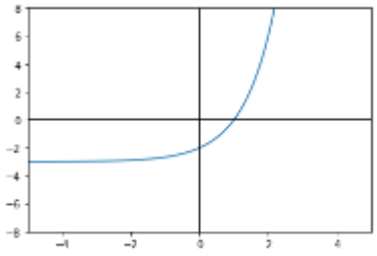
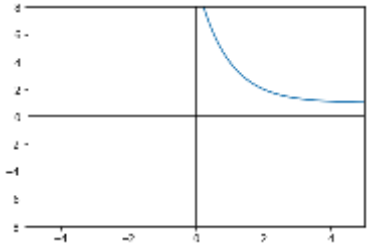


E.



15. The expression below gives the amount of money, in dollars, generated in a year by a $1,500 deposit in a bank account that pays an annual interest rate of r%, compounded monthly. Which of the following expressions show how much additional money is generated at an interest rate of 6% than at an interest rate of 4%?

$$1{,}500\left(1+\frac{r}{1{,}200}\right)^{12}$$

A. $1{,}500\left(1+\frac{6-4}{1{,}200}\right)^{12}$

B. $1{,}500\left(1+\frac{\frac{6}{4}}{1{,}200}\right)^{12}$

C. $\frac{1{,}500\left(1+\frac{6}{1{,}200}\right)^{12}}{1{,}500\left(1+\frac{4}{1{,}200}\right)^{12}}$

D. $1{,}500\left(1+\frac{6}{1{,}200}\right)^{12}-1{,}500\left(1+\frac{4}{1{,}200}\right)^{12}$

E. $1{,}500\left(1+\frac{.06-.04}{1{,}200}\right)^{12}$