[A] Circle whether each statement is true or false.

T F   1. $3^{\log_3 5x} = 5x$

T F   2. $\log_2 16^{x+3} = 4x + 3$

T F   3. $\ln x^6 + \ln x^5 = \ln x^{30}$

T F   4. If $\ln x = 4$, then $e^4 = x$.

T F   5. $b(x) = x^5$ is an exponential function.

T F   6. The inverse of $g(x) = 9^x$ is $g^{-1}(x) = \log_9 x$.

T F   7. The graph of $g(x) = \log_w x$ passes through the point (0, 1).

T F   8. The domain of $f(x) = \log_p x$ is all real numbers, and the range is all positive real numbers.

T F   9. The equation $5^{2x} = 9^{x+1}$ can be solved by taking the log of each side and using the power property.

T F   10. If a bacteria colony starts at a population of 4000 and is increasing by 175% per day, the equation $9000 = 4000(1.75)^t$ could be used to solve for how long it will take to increase to 9000.

[B] For each expression, use a different property of logarithms to rewrite it, and state the property. Then evaluate each expression. Do not use a calculator.

1. $\log_{64} 32$

2. $\log_{128} 2$

3. $\log_2 \frac{1}{64}$

4. $\log 1000^{40}$

5. $\log_6 4 + \log_6 9$

6. $\log_4 192 - \log_4 3$

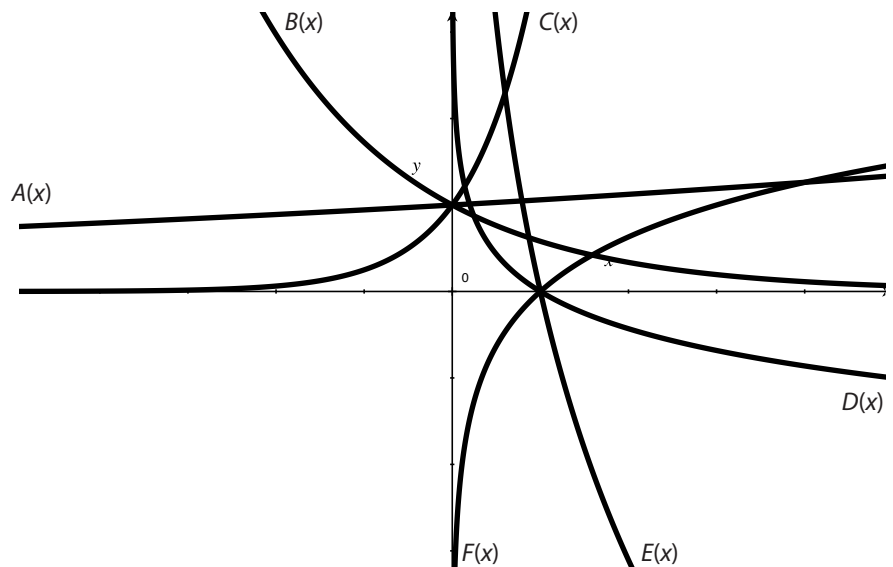**[C] Match each equation to its graph.**

1. _____$(x) = 4^x$

2. _____$(x) = 1.06^x$

3. _____$(x) = 0.58^x$

4. _____$(x) = \log_3 x$

5. _____$(x) = \log_{1/5} x$

6. _____$(x) = \log_{4/5} x$

[D] Solve, showing all work using only equations involving x. When finished, check each problem on a calculator if possible, and fix any that are incorrect or mark them wrong.

1. $\ln x = 4$

2. $6^{x+21} = 9^{4x-3}$

3. $\log_2 8^x = 4200$

4. $2\log 4x + \log 3x - \log 2x = 4$

[E] Write an equation and solve.

1. There are currently 64.9 million people living in France. Given an annual growth rate of 0.5%, in what year will France reach 70 million people?

2. The HALF-LIFE of a substance is the amount of time it takes to decay down to half of its original amount. What is the half-life of a substance that decays at a rate of 3.0% per minute?

[F] Do the following to organize your group's reviews.

1. Make sure your name and your partners' names are at the top of your review the first day.
2. Staple the reviews in order, all facing the same way. Put the staple in the very top left corner if everyone is finished or if the review is due; otherwise put the staple in the top right corner.

[A] Circle whether each statement is true or false.

T F   1. $3^{\log_3 5x} = 5x$

T F   2. $\log_2 16^{x+3} = 4x + 3$

T F   3. $\ln x^6 + \ln x^5 = \ln x^{30}$

T F   4. If $\ln x = 4$, then $e^4 = x$.

T F   5. $b(x) = x^5$ is an exponential function.

T F   6. The inverse of $g(x) = 9^x$ is $g^{-1}(x) = \log_9 x$.

T F   7. The graph of $g(x) = \log_w x$ passes through the point (0, 1).

T F   8. The domain of $f(x) = \log_p x$ is all real numbers, and the range is all positive real numbers.

T F   9. The equation $5^{2x} = 9^{x+1}$ can be solved by taking the log of each side and using the power property.

T F   10. If a bacteria colony starts at a population of 4000 and is increasing by 175% per day, the equation $9000 = 4000(1.75)^t$ could be used to solve for how long it will take to increase to 9000.
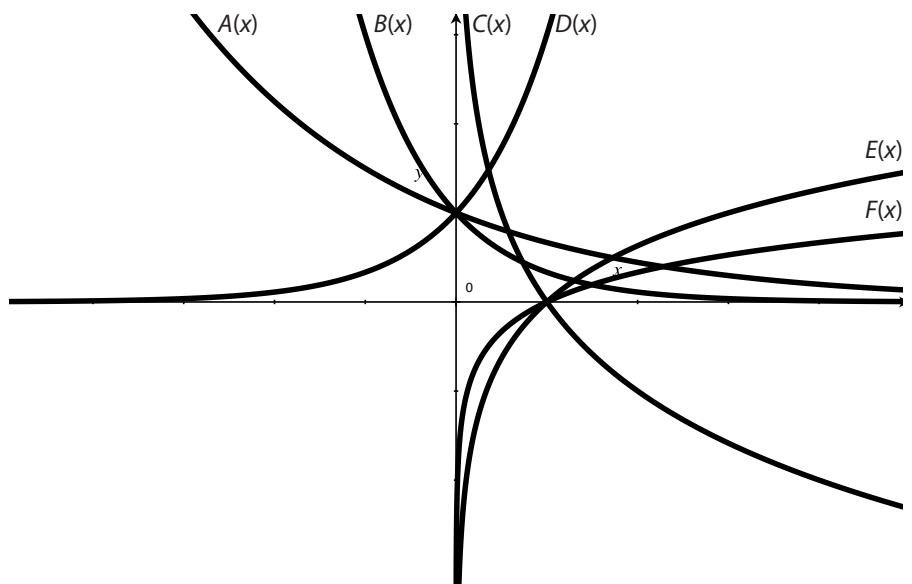
[B] For each expression, use a different property of logarithms to rewrite it, and state the property. Then evaluate each expression. Do not use a calculator.

1. $\log_{64} 32$ 2. $\log_{128} 2$ 3. $\log_2 \frac{1}{64}$

4. $\log 1000^{40}$ 5. $\log_6 4 + \log_6 9$ 6. $\log_4 192 - \log_4 3$

[C] Match each equation to its graph.

1. _____$(x) = 3^x$

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

3. _____$(x) = (\frac{2}{3})^x$

4. _____$(x) = \log_3 x$

5. _____$(x) = \log_8 x$

6. _____$(x) = \log_{1/2} x$

[D] Solve, showing all work using only equations involving *x*. When finished, check each problem on a calculator if possible, and fix any that are incorrect or mark them wrong.

1. $\ln x = \frac{1}{2}$

2. $2^{x + 21} = 9^{4x - 3}$

3. $\log_8 2^{30x} = 4200$

4. $2 \log_2 4x + \log_2 6x - \log_2 2x = 4$

[E] Write an equation and solve.

1. There are currently 64.9 million people living in France. Given an annual growth rate of 0.5%, how long will it take the population to triple?

2. The HALF-LIFE of a substance is the amount of time it takes to decay down to half of its original amount. What is the half-life of a substance that decays at a rate of 0.3% per minute?

[F] Bonus.

1. Find the inverse of $d(x) = \ln 6x$.

2. Radon has a half-life of 3.82 days. What is its rate of decay per day?

[A] Circle whether each statement is true or false.

T F   1. $3^{\log_3 5x} = 5x$

T F   2. $\log_2 16^{x+3} = 4x + 3$

T F   3. $\ln x^6 + \ln x^5 = \ln x^{30}$

T F   4. If $\ln x = 4$, then $e^4 = x$.

T F   5. $b(x) = x^5$ is an exponential function.

T F   6. The inverse of $g(x) = 9^x$ is $g^{-1}(x) = \log_9 x$.

T F   7. The graph of $g(x) = \log_w x$ passes through the point (0, 1).

T F   8. The domain of $f(x) = \log_p x$ is all real numbers, and the range is all positive real numbers.

T F   9. The equation $5^{2x} = 9^{x+1}$ can be solved by taking the log of each side and using the power property.

T F   10. If a bacteria colony starts at a population of 4000 and is increasing by 175% per day, the equation $9000 = 4000(1.75)^t$ could be used to solve for how long it will take to increase to 9000.

[B] For each expression, use a different property of logarithms to rewrite it, and state the property. Then evaluate each expression. Do not use a calculator.

1. $\log_{64} 32$

2. $\log_{128} 2$

3. $\log_2 {}^1/_{64}$

4. $\log 1000^{40}$

5. $\log_6 4 + \log_6 9$

6. $\log_4 192 - \log_4 3$

[C] Match each equation to its graph.

1. _____$(x) = \ln x$

2. _____$(x) = 2.4^x$

3. _____$(x) = ({}^{11}/_{14})^x$

4. _____$(x) = ({}^{20}/_{29})^x$

5. _____$(x) = \log_{0.4} x$

6. _____$(x) = \log_{1.4} x$
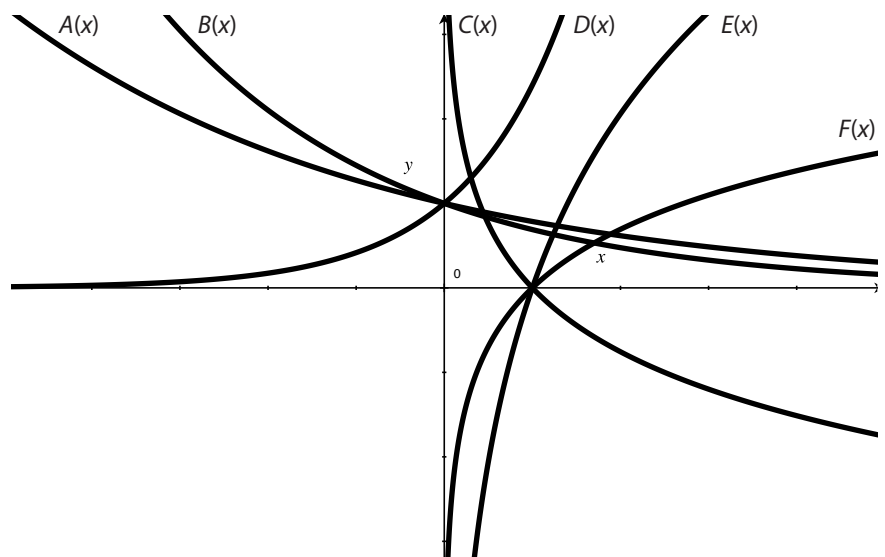
A(x)   B(x)   C(x)   D(x)   E(x)

F(x)

y

0

x

[D] Solve, showing all work using only equations involving *x*. When finished, check each problem on a calculator if possible, and fix any that are incorrect or mark them wrong.

1. $\ln 2x = \frac{1}{2}$

2. $(\frac{1}{4})^{x + 21} = 9^{4x - 3}$

3. $\log_{27} 9^{30x} = 4200$

4. $2 \ln 5x + \ln 6x - \ln 2x = 4$

[E] Write an equation and solve.

1. There are currently 64.9 million people living in France. Given an annual growth rate of 0.5%, how long will it take France's population to increase by 120%?

2. The HALF-LIFE of a substance is the amount of time it takes to decay down to half of its original amount. What is the half-life of a substance that decays at a rate of 0.03% per minute?

[F] Bonus.

1. Find the inverse of $d(x) = 10 + \log_2 6x$.

2. Uranium-237 has a half-life of 6¾ days. What is its rate of decay per hour?

**[A] Circle whether each statement is true or false.**

T F   1. $3^{\log_3 5x} = 5x$

T F   2. $\log_2 16^{x+3} = 4x + 3$

T F   3. $\ln x^6 + \ln x^5 = \ln x^{30}$

T F   4. If $\ln x = 4$, then $e^4 = x$.

T F   5. $b(x) = x^5$ is an exponential function.

T F   6. The inverse of $g(x) = 9^x$ is $g^{-1}(x) = \log_9 x$.

T F   7. The graph of $g(x) = \log_w x$ passes through the point (0, 1).

T F   8. The domain of $f(x) = \log_p x$ is all real numbers, and the range is all positive real numbers.

T F   9. The equation $5^{2x} = 9^{x+1}$ can be solved by taking the log of each side and using the power property.

T F   10. If a bacteria colony starts at a population of 4000 and is increasing by 175% per day, the equation
                $9000 = 4000(1.75)^t$ could be used to solve for how long it will take to increase to 9000.

[B] For each expression, use a different property of logarithms to rewrite it, and state the property. Then evaluate each expression. Do not use a calculator.

1. $\log_{64} 32$

2. $\log_{128} 2$

3. $\log_2 {}^1/_{64}$

4. $\log 1000^{40}$

5. $\log_6 4 + \log_6 9$

6. $\log_4 192 - \log_4 3$

[C] Given $H(x) = 4^x$, identify the following functions without using negatives.

1. $A(x) =$

2. $B(x) =$

3. $C(x) =$
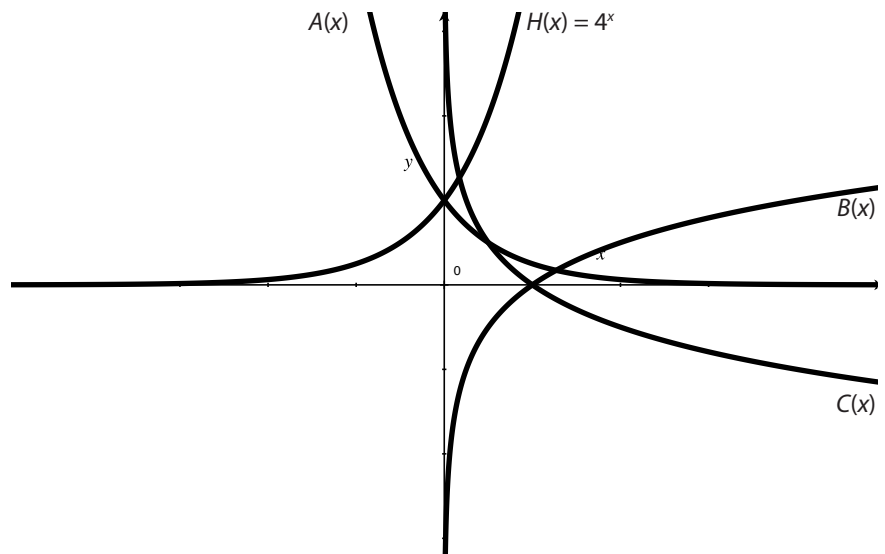
[D] Solve, showing all work using only equations involving x. When finished, check each problem on a calculator if possible, and fix any that are incorrect or mark them wrong.

1. $2 \ln 2x = 1.08\%$

2. $.0016^{x+21} = 9^{4x-3}$

3. $\log_{128} (\frac{1}{4})^{35x} = 4200$

4. $2 \log_2 4x + \log_4 9x^2 - \log_2 2x = 4$

[E] Write an equation and solve.

1. There are currently 64.9 million people living in France. Given an annual growth rate of 0.5%, in what year was the population 50 million?

2. The HALF-LIFE of a substance is the amount of time it takes to decay down to half of its original amount. How many minutes is the half-life of a substance that decays at a rate of .0325% per second?

[F] Bonus.

1. Find the inverse of $d(x) = 10 + \log (6x - 9)$.

2. Write a formula to find the decay rate r of a substance with a half-life of t years. (Solve the formula for r.)