

Formula:  $A = A_0(1+r)^n$

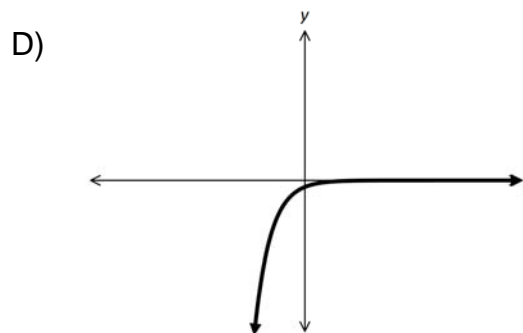
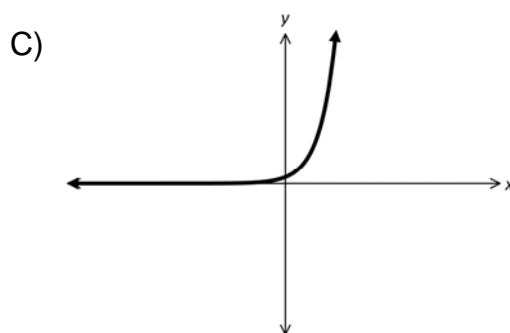
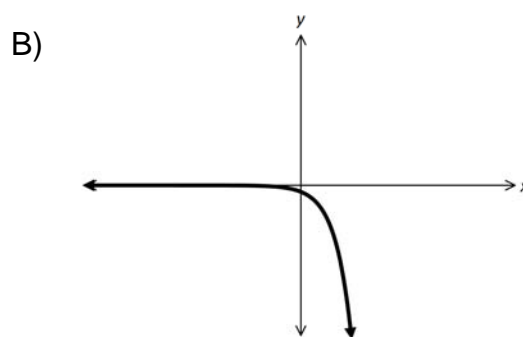
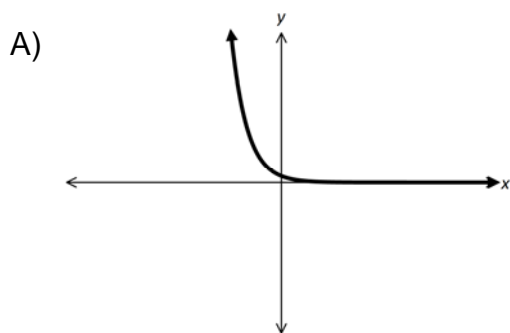
Part 1: Multiple Choice

Complete each multiple choice item and place your answer on the Answer Sheet provided. (15 marks)

1. Solve for x:  $8^{3x-2} + 7 = 39$

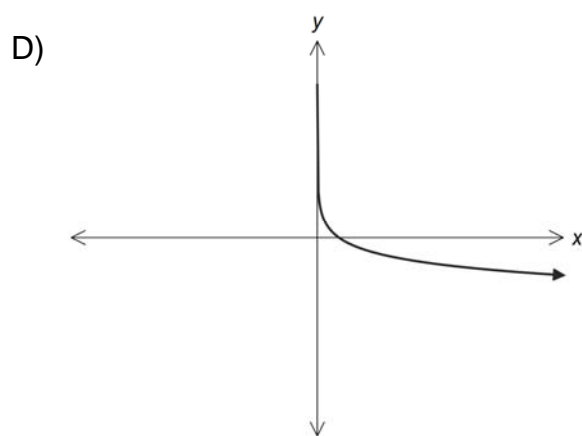
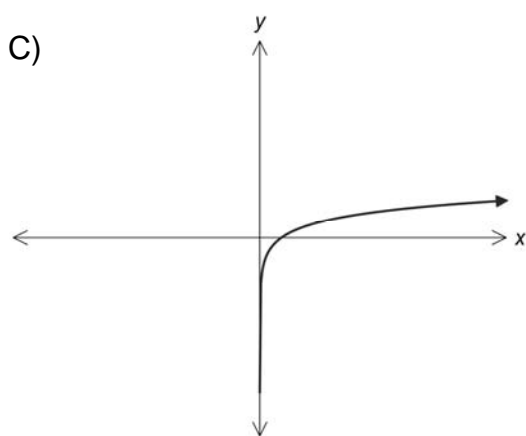
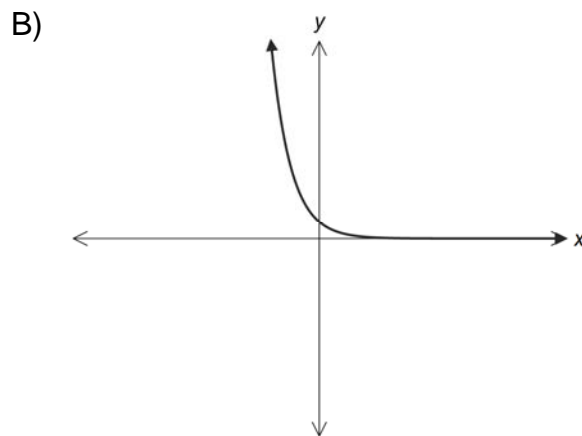
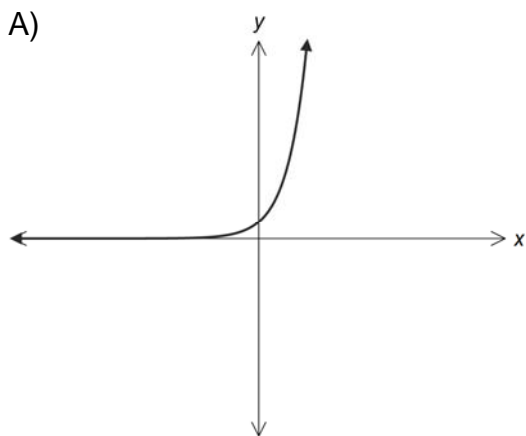
- A)  $-\frac{1}{9}$
- B)  $\frac{11}{6}$
- C)  $\frac{1}{9}$
- D)  $\frac{11}{9}$

2. Which graph represents the graph of  $y = ac^{bx}$  given that  $a > 0$ ,  $0 < c < 1$  and  $b < 0$ .



3. Which transformations occur when the graph of  $y = (3)^x$  is transformed to  $y = (3)^{-x+2}$  ?
- A) Horizontal reflection in y-axis and horizontal translation 2 units to the left
  - B) Horizontal reflection in y-axis and horizontal translation 2 units to the right
  - C) Vertical reflection in x-axis and horizontal translation 2 units to the left
  - D) Vertical reflection in x-axis and horizontal translation 2 units to the right
4. Which equation results when the mapping rule  $(x, y) \rightarrow \left(-3x-1, \frac{1}{4}y-2\right)$  is applied to  $y = 5^x$  ?
- A)  $y = \frac{1}{4}(5)^{-\frac{1}{3}(x+1)} - 2$
  - B)  $y = 4(5)^{-3(x+1)} + 2$
  - C)  $y = \frac{1}{4}(5)^{-\frac{1}{3}(x-1)} - 2$
  - D)  $y = 4(5)^{-3(x-1)} + 2$
5. What is the y-intercept of the function  $y = -2(3)^{2(x+1)} - 4$  ?
- A) -22
  - B) -6
  - C) 14
  - D) 32
6. A radioactive element decays exponentially with a half-life of 5 hours. How much time is required for a 64 mg sample to decay to 4 mg?
- A) -20
  - B) 0.8
  - C) 1.25
  - D) 20

7. Which graph represents  $y = \log_c x$ , where  $0 < c < 1$ ?



8. What is the logarithmic form of  $(\sqrt[a]{b})^c = d$  ?

A)  $\log_b\left(\frac{c}{a}\right) = d$

B)  $\log_b(d) = \frac{c}{a}$

C)  $\log_d\left(\frac{c}{a}\right) = b$

D)  $\log_d(b) = \frac{c}{a}$

9. What is the inverse of  $y = 6^x$ ?
- A)  $x = \log_y 6$
  - B)  $x = \log_6 y$
  - C)  $y = \log_x 6$
  - D)  $y = \log_6 x$
10. What is the equation of the asymptote on the graph of the function  $y = 4\log_2(2x+8) - 3$ ?
- A)  $x = -8$
  - B)  $x = -4$
  - C)  $y = -3$
  - D)  $y = 4$
11. Solve for  $x$ :  $\log_5(2x) + \log_5(x-4) = \log_5 24$ .
- A)  $\{-6, 2\}$
  - B)  $\{2\}$
  - C)  $\{6\}$
  - D)  $\{-2, 6\}$
12. Which is  $2\log_3 A + \frac{1}{2}\log_3 B - \frac{1}{3}\log_3 C$  expressed as a single logarithm?
- A)  $\log_3\left(\frac{A^2 + \sqrt{B}}{\sqrt[3]{C}}\right)$
  - B)  $\log_3(A^2 + \sqrt{B} - \sqrt[3]{C})$
  - C)  $\log_3(A^2\sqrt{B} - \sqrt[3]{C})$
  - D)  $\log_3\left(\frac{A^2\sqrt{B}}{\sqrt[3]{C}}\right)$

13. If  $M = \log_2(5)$  and  $N = \log_2(3)$ , what is  $\log_2\left(\frac{25}{27}\right)$  in terms of  $M$  and  $N$ ?

- A)  $2M + 3N$
- B)  $2M - 3N$
- C)  $M^2 + N^3$
- D)  $M^2 - N^3$

14. In which step does the first error occur when solving for  $x$  in the equation  $10^x + 5 = 60$ ?

STEP 1:  $\log(10^x + 5) = \log(60)$

STEP 2:  $\log(10^x) + \log(5) = \log(60)$

STEP 3:  $x\log(10) = \log(60) - \log(5)$

STEP 4:  $x = \frac{\log(60) - \log(5)}{\log(10)}$

- A) Step 1
- B) Step 2
- C) Step 3
- D) Step 4

15. The magnitude of an earthquake,  $M$ , as measured on the Richter scale is given by  $M = \log I$ , where  $I$  is the intensity of the earthquake. The magnitude of the earthquake in Haiti measured 7 on the Richter scale and the magnitude of the earthquake in Chernobyl measured 4 on the Richter scale. How many times as intense was the earthquake in Haiti as compared to the one in Chernobyl?

- A) 1.75
- B) 3
- C) 300
- D) 1000

Name: \_\_\_\_\_

Mark: \_\_\_\_\_

Part I: ANSWER SHEET

1. \_\_\_\_\_ 2. \_\_\_\_\_ 3. \_\_\_\_\_ 4. \_\_\_\_\_ 5. \_\_\_\_\_

6. \_\_\_\_\_ 7. \_\_\_\_\_ 8. \_\_\_\_\_ 9. \_\_\_\_\_ 10. \_\_\_\_\_

11. \_\_\_\_\_ 12. \_\_\_\_\_ 13. \_\_\_\_\_ 14. \_\_\_\_\_ 15. \_\_\_\_\_

Part II: CONSTRUCTED RESPONSE

Complete each item in the space provided. Read each question carefully and provide all necessary details as part of your solution. (15 marks)

1. Algebraically solve each equation for x:

A)  $\sqrt[5]{8^{x-1}} = \sqrt[3]{16^x}$  (3 marks)

1. B)  $2^{x+4} \cdot \left(\frac{1}{4}\right)^{x-1} = 3$  (3 marks)

C)  $\log_8(x^2 + 4x - 8) - \log_8(x - 1) = 1$  (3 marks)

- Matthew invests \$800 into an educational fund that accumulates 8% interest per year, compounded annually. Tegan invests \$1000 into an educational fund that earns 6% per year, compounded annually. Set up two equations and algebraically determine when both investments will be equal. (6 marks)