

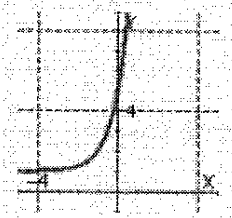
Multiple Choice

Identify the choice that best completes the statement or answers the question.

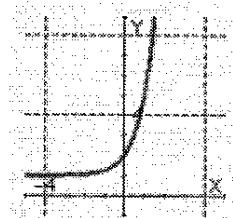
- ___ 1. Graph the function using translations.

$$f(x) = 4^{x+1} + 1$$

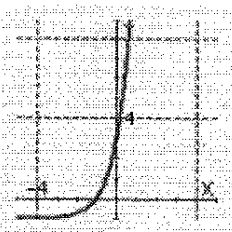
a.



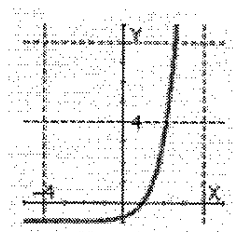
c.



b.



d.



- ___ 2. How much more interest could \$500 earn in 8 years, compounded semiannually (two times a year), if the annual interest rate were 7% instead of 4%?

Assume that there are no deposits or withdrawals.

- a. \$183.64
- b. \$539.59
- c. \$180.60
- d. \$282.05
- e. \$73.68

- ___ 3. Some financial institutions pay daily interest, compounded by the 360/365 method, using the formula

$$A = A_0 \left(1 + \frac{r}{360}\right)^{365t}$$

(t is in years). Using this method, what will an initial investment of \$1,100 be worth in 4 years, assuming a 4% annual interest rate?

- a. \$1,278.44
- b. \$1,100.00
- c. \$1,293.72
- d. \$4,582.10
- e. \$1,100.04

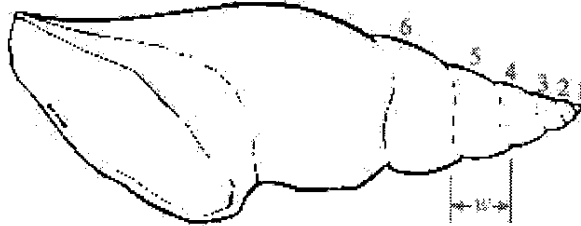
- ___ 4. Tritium, a radioactive isotope of hydrogen, has a half-life of 12.4 years. Of an initial sample of 30 grams, how much will remain after 10 years?
- 19.5833 grams
 - 7.5000 grams
 - 12.7012 grams
 - 17.1536 grams
 - 1.8694 grams
- ___ 5. In April of 1986, the world's worst nuclear power disaster occurred at Chernobyl in the former USSR. An explosion released about 942 kilograms of radioactive cesium-137 (^{137}Cs) into the atmosphere. If the half-life of ^{137}Cs is 30.17 years, how much will remain in the atmosphere in 148 years?
- 31.4295 kg
 - 144.7506 kg
 - 192.0280 kg
 - 817.8724 kg
 - 0.0000 kg
- ___ 6. A Wisconsin lake is stocked with 11,000 bluegill. The population is expected to grow exponentially according to the model $P = P_0 2^{t/2}$. How many bluegill will be in the lake in 6 years?
- 66,000 bluegill
 - 44,000 bluegill
 - 132,000 bluegill
 - 13,859 bluegill
 - 88,000 bluegill
- ___ 7. A colony of 3 million bacteria is growing in a culture medium. The population P after t hours is given by the formula $P = (3 \times 10^6)(2.3)^{t/2}$. Find the population after 8 hours.
- 358 million bacteria
 - 2349 million bacteria
 - 10 million bacteria
 - 55 million bacteria
 - 24 million bacteria
- ___ 8. In a city with a population of 1,200,000, there are currently 1000 cases of infection with the HIV virus. If the spread of the disease is projected by the formula

$$P = \frac{1,200,000}{1 + (1200 - 1)e^{-0.4t}}$$

how many people will be infected in 6 years?

- 5,300 people
- 60,800 people
- 10,900 people
- 11,000 people
- 302,100 people

9. The width w (in millimeters) of successive growth spirals of the sea shell *Catapulus voluto*, shown in the illustration, is given by the function $w = 1.54e^{0.503n}$, where n is the spiral number. To the nearest tenth of a millimeter, find the width of the second spiral.



- a. 3.1 mm
 b. 4.2 mm
 c. 11.4 mm
 d. 2.5 mm
 e. 8.4 mm
10. What does the expression $\log_4 4^x$ equal?

- a. 0
 b. 4
 c. 1
 d. x
 e. 10

11. Find the value of x .

$$\log_5 390,625 = x$$

- a. $x = 195,313$
 b. $x = 8$
 c. $x = 5$
 d. $x = 390,625$

12. Find the value of x .

$$4^{\log_4 6} = x$$

- a. $x = 4$
 b. $x = -6$
 c. $x = 6$
 d. $x = 0$
 e. $x = -4$

- ___ 13. Find the value of x .

$$x^{\log_2 3} = 3$$

- a. $x = -2$
- b. $x = 2$
- c. $x = -3$
- d. $x = 0$
- e. $x = 3$

- ___ 14. Use a calculator to find y to four decimal places.

$$\ln y = \log 7$$

- a. $y = 1.7552$
- b. $y = 6.1083$
- c. $y = 0.6329$
- d. $y = 7$
- e. $y = 2.3282$

- ___ 15. An earthquake has an amplitude of 6,500 micrometers and a period of 0.025 second. Find its measure on the Richter scale.

- a. 3.8
- b. 5.4
- c. 8.8
- d. 12.5
- e. 6.5

- ___ 16. If $k = 0.2$, how long will it take a battery to reach a 30% charge? Assume that the battery was fully discharged when it began charging.

- a. 2.6 minutes
- b. 0.2 minutes
- c. 0.8 minutes
- d. 6.0 minutes
- e. 1.8 minutes

- ___ 17. A population growing at an annual rate r will triple in a time t given by the formula $t = \frac{\ln 3}{r}$. If the growth rate remains constant and equals 13% per year, how long will it take the population of the town to triple?

- a. 8.5 years
- b. 2.6 years
- c. 1.1 years
- d. 3.7 years
- e. 7.7 years

- ___ 18. One mole of gas expands isothermally to double its volume. If the gas temperature is 390K, what energy is absorbed?
- 3,605 joules
 - 149 joules
 - 428 joules
 - 3,562 joules
 - 2,478 joules

- ___ 19. In business, equipment is often depreciated using the double declining-balance method. In this method, a piece of equipment with a life expectancy of N years, costing $\$C$, will depreciate to a value of $\$V$ in n years, where n is given by the formula

$$n = \frac{\log V - \log C}{\log\left(1 - \frac{2}{N}\right)}$$

If a computer that cost \$36,000 has a life expectancy of 5 years and has depreciated to a value of \$14,000, how old is it?

- 1.0 years old
 - 0.4 years old
 - 1.8 years old
 - 1.9 years old
 - 3.1 years old
- ___ 20. Tell whether the statement $\log_5 5^6 = 6(5^{\log 5^6})$ is true or false.
- true
 - false
- ___ 21. Use a calculator and the change-of-base formula to find the logarithm $\log_4 6$.
- 0.77
 - 0.87
 - 0.76
 - 1.29
 - 0.27
- ___ 22. Solve the equation.
- $$\log(9x - 2) = \log(8x + 7)$$
- $x = 9$
 - none of these
 - $x = 8$
 - $x = 12$
 - $x = 7$

College Algebra, 11e, Chapter 4, Test E

- _____ 23. A cloth fragment is found in an ancient tomb. It contains 54% of the carbon-14 (half-life is 5700 years) that it is assumed to have had initially. How old is the cloth?
- a. none of these
 - b. 6,400 years
 - c. 6,100 years
 - d. 4,400 years
 - e. 6,000 years
- _____ 24. A bacterial culture grows according to the formula $P = P_0 a^t$. If it takes 7 days for the culture to triple in size, how long will it take to double in size?
- a. 4.8 days
 - b. 1.9 days
 - c. 0.2 days
 - d. -1.1 days
 - e. none of these
- _____ 25. Water whose temperature is at 100°C is left to cool in a room where the temperature is 50°C . After 4 minutes, the water temperature is 88° . If the water temperature T is a function of time t given by $T = 50 + 50e^{kt}$, find k .
- a. $k = -0.07$
 - b. $k = -0.30$
 - c. $k = -0.13$
 - d. none of these
 - e. $k = 0.05$

Answer Section

MULTIPLE CHOICE

- | | |
|------------|--------|
| 1. ANS: A | PTS: 1 |
| 2. ANS: C | PTS: 1 |
| 3. ANS: C | PTS: 1 |
| 4. ANS: D | PTS: 1 |
| 5. ANS: A | PTS: 1 |
| 6. ANS: E | PTS: 1 |
| 7. ANS: B | PTS: 1 |
| 8. ANS: C | PTS: 1 |
| 9. ANS: B | PTS: 1 |
| 10. ANS: D | PTS: 1 |
| 11. ANS: B | PTS: 1 |
| 12. ANS: C | PTS: 1 |
| 13. ANS: B | PTS: 1 |
| 14. ANS: E | PTS: 1 |
| 15. ANS: B | PTS: 1 |
| 16. ANS: E | PTS: 1 |
| 17. ANS: A | PTS: 1 |
| 18. ANS: D | PTS: 1 |
| 19. ANS: C | PTS: 1 |
| 20. ANS: B | PTS: 1 |
| 21. ANS: A | PTS: 1 |
| 22. ANS: A | PTS: 1 |
| 23. ANS: B | PTS: 1 |
| 24. ANS: C | PTS: 1 |
| 25. ANS: A | PTS: 1 |

