EXPONENTIAL FUNCTIONS PRACTICE EXAM

Math 30-2

Name: _____ Date: _____

Multiple Choice & Numerical Response

Identify the choice that best completes the statement or answers the question. Each question is worth one mark.

1. Which of the following is an exponential function?
   A. $f(x) = \pi(1)^x$
   B. $g(x) = 3(-7)^x$
   C. $h(x) = 4(\pi)^x$
   D. $j(x) = x(2)^x$

2. How many y-intercepts does the exponential function $f(x) = 2(10)^x$ have?
   A. 0
   B. 1
   C. 2
   D. 3

3. How many turning points does the exponential function $f(x) = \frac{1}{2}(5)^x$ have?
   A. 0
   B. 1
   C. 2
   D. 3

Numerical Response 1

Consider the function $f(x) = 2(\pi)^x$.

- If the curve is decreasing, then record your answer as a "0".
- If the curve is increasing, then record your answer as a "1".

Use the following information to answer the next three question.

The graphs on the grid represent exponential functions in the form of

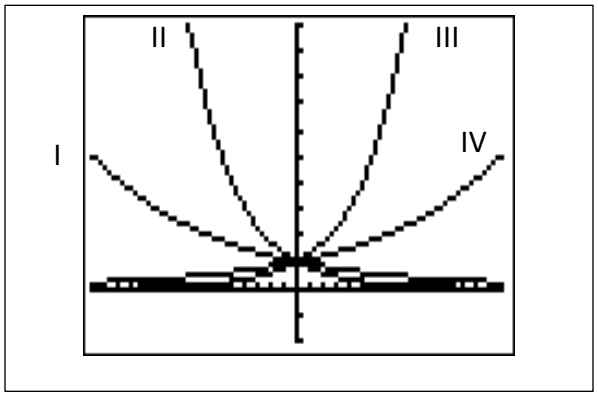
$y = p^x$

$y = q^x$

$y = \left(\frac{1}{p}\right)^x$

$y = \left(\frac{1}{q}\right)^x$

but not necessarily in that order

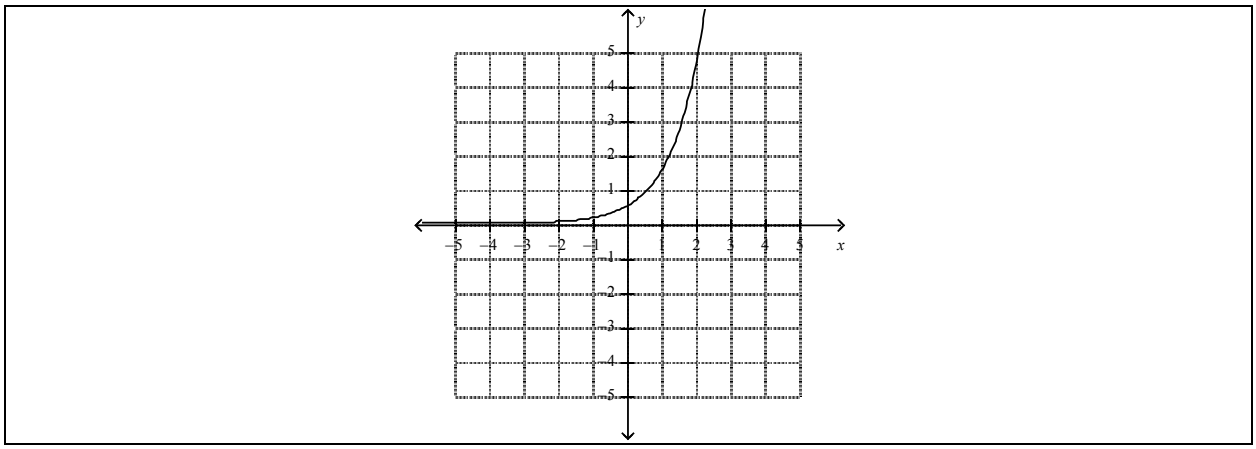


4. If p = 2 and q = 4, which graph represents $y = q^x$?
   A. I
   B. II
   C. III
   D. IV

5. Which of the graphs has the smallest *b* value?
   A. I
   B. II
   C. III
   D. IV

6. The y-intercept for the graph of the function $y = \left(\frac{1}{4}\right)^x$
   A. $\left(0, \frac{1}{4}\right)$
   B. $\left(\frac{1}{4}, 0\right)$
   C. $(0,1)$
   D. $(1,0)$

Use the following information to answer the next question



7. Match the following graph with its function.
   A. $y = 3(0.5)^x$
   B. $y = 2(1.25)^x$
   C. $y = 0.5(3)^x$
   D. $y = 2(0.75)^x$

8. Which statement is false?
   A. An exponential function is an increasing function if a > 0 and b > 1
   B. An exponential function is a decreasing function if a > 0 and 0 < b < 1
   C. The range of an exponential function is $y \in R$
   D. The domain of an exponential function is $x \in R$

9. Which option best describes the behavior of the exponential function $f(x) = 2(\pi)^x$?
   A. increasing because $a > 1$
   B. decreasing because $0 < a < 1$
   C. increasing because $b > 1$
   D. decreasing because $0 < b < 1$

10. Determine the y-intercept of the exponential function $g(x) = \frac{1}{2}(10)^x$.
    A. 0
    B. $\frac{1}{2}$
    C. 5
    D. 10

11. When the expression $9 \times 27^{x-1}$ is converted to base 3, the resulting expression is?

A. 3^{3x-5}
B. 3^{3x-1}
C. 3^{3x+1}
D. 3^{6x-6}

12. Solve the following exponential equation by writing both sides with the same base

$$2(3)^x = 162$$

A. $x = 2$
B. $x = 3$
C. $x = 4$
D. $x = 5$

Use the following information to answer the next question

x	1	2	3	4	5	6	7
y	6144	1536	384	96		6	1.5

13. The data set involves exponential growth. Determine the missing value from the table.
A. 36
B. 18
C. 48
D. 24

Use the following information to answer the next two questions.

In 1995 Bob invested $10 000.00 in mutual funds. The value of the funds can be calculated using the formula $A = 10000(0.87)^x$.

14. The mutual funds are

A. increasing by 87% each year.
B. increasing by 13% each year
C. decreasing by 87% each year
D. decreasing by 13% each year

Use the following information to answer the next question

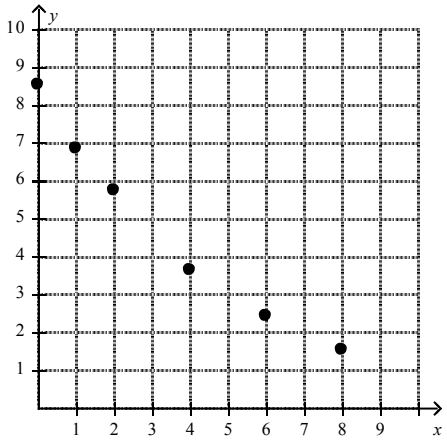
x	–6	–4	–3	–1	1	2
y	4.3	11.8	19.0	48.6	123.8	198.5

Numerical Response 2

Use exponential regression to interpolate the value of y when $x = –2$. Round your answer to the nearest tenth.

Use the following information to answer the next question

A scatter plot is drawn using a data set.



15. Interpolate the value of y when $x = 5$.
    A. 3.8
    B. 2.9
    C. 2.5
    D. 2.0

16. The equation of the exponential function that models a data set is $y = 6.8(1.03)^x$
    Extrapolate the value of y when $x = 22$.
    A. 8.72
    B. 29.46
    C. 7.46
    D. 13.03

17. An investment can be modeled by the following growth function, where x represents the time in years: $y = 4800(1.03)^x$. What was the annual interest rate for the investment?
    A. 48%
    B. 1.03%
    C. 3%
    D. 0.03%

18. Aaron invested $2400 at 4.8%/a compounded monthly. Define an exponential growth function for this investment, given x as the total number of compounds.
    A. $A(n) = 2400(1.048)^x$
    B. $A(n) = 200(1.048)^x$
    C. $A(n) = 2400(1.004)^x$
    D. $A(n) = 200(1.004)^x$

Use the following information to answer the next question

x	0	1	3	4	6	8
y	0.1	0.4	5.8	21.6	295	4052

Numerical Response 3

The equation of the exponential regression function is in the form of $y = a(b)^x$. The sum of a and b, rounded to the nearest hundredth, is _____.

Use the following information to answer the question.

A substance called sodium-24 has a half-life of approximately 15 hours. The equation of its decay is represented by the formula $A = 50\left(\frac{1}{2}\right)^{\frac{x}{15}}$

19. How much of the sodium-24 will be left after 35 hours?

A. 7.7 grams

B 8.4 grams

C. 9.9 grams

D. 10.4 gram

20. Which of the following graph **does not** pass through the point (1,10)

A. $y = 20(0.2)^x$
B. $y = 5(2)^x$
C. $y = 20(0.5)^x$
D. $y = 2(5)^x$

Numerical Response 4

Mrs. Johnson invested $1500 at 2%/a compounded semi-annually. An exponential growth function for this investment can be defined in the form of $y = a(b)^n$, where *n* represents the number of compounding periods. The value of *b*, to the nearest hundredth, is _____.

Numerical Response 5

An investment can be modeled by the following growth function, where *x* represents the time in years: $y = 2500(1.018)^x$. The value, to the nearest dollar, of the investment after 4 years is _____.

WRITTEN RESPONSE

1. The population of a town is **decreasing** at a rate of 7% per year. The current population of the town is 30 000 people. (3 marks)

a) Write an **exponential** equation in the form $y = ab^x$ that represents this situation

b) What would be the expected population of the town in 3 years?

c) How many years will it be before the population is reduce to **at least** 15 000?

Use the following information to answer the next question

At 1:00pm, a biologist starts an experiment with 300 yeast cells. Based on similar experiments, she estimates that the number of yeast cells in the culture will double every 30 minutes.

2.

a) Create a table of values that models the growth of the culture

Time	0 min	30 min	60 min	90 min	120 min	150 min
# of Yeast Cells	300					

b) Use exponential regression to determine a function that models this growth.

c) Estimate how many yeast cells there will be after

a. 4 hours

b. 12 hours

d) How long, to the nearest tenth of an hour, would you expect it to take the culture to grow to more than 100 000 yeast cells?

Answer Key

1. C
2. B
3. A
4. C
5. B
6. C
7. C
8. C
9. C
10. B
11. B
12. C
13. D
14. D
15. B
16. D
17. C
18. C
19. C
20. A

NR 1: 1

NR 2: 29.9

NR 3: 3.86

NR 4: 1.01

NR 5: 2685

WRITTEN

1a) $y=30000(0.93)^x$ b) 24131 people c) 10 yrs

2b) $y=300(1.023)^x$ c) 76800; 5.03×10^9 cells d) 4.2 hrs