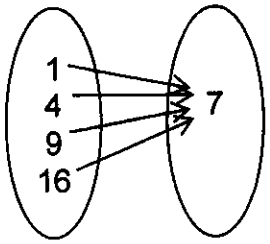
Sec I – Term 3 Name Key ID: 1

Notes: T3-Term Review Date _____ Period _____

Determine if the following relations are functions. If it is a function, state the domain and range.

1.



function: (yes) or no

D: {1, 4, 9, 16}

R: {7}

2.

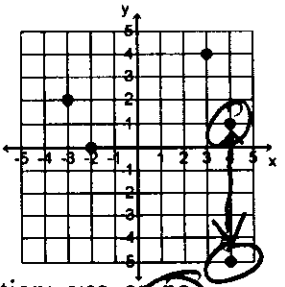
gallons of gas	cost
0	0
1	3.5
2	7
3	10.5

function: (yes) or no

D: {0, 1, 2, 3}

R: {0, 3.5, 7, 10.5}

3.

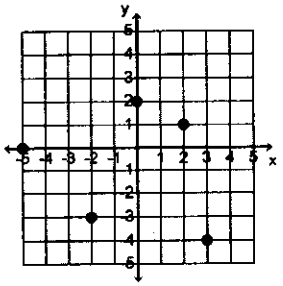


function: yes or (no)

D:

R:

4.

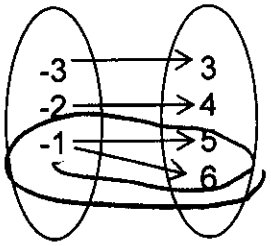


function: (yes) or no

D: {-5, -2, 0, 2, 3}

R: {-4, -3, 0, 1, 2}

5.



function: yes or (no)

D:

R:

6. {(-1, 1), (0, 0), (1, 1), (2, 4)}

function: (yes) or no

D: {-1, 0, 1, 2}

R: {0, 1, 4}

Identify the independent and dependent variable for each relation.

7. Increasing the temperature of a compound inside a sealed container increases the pressure inside a sealed container.

Independent: Temperature

Dependent: pressure

Discrete or (Continuous)

8. Mike's cell phone is part of a family plan. If he uses more minutes than his share, then there are fewer minutes available for the rest of his family.

Independent: Mikes minutes used

Dependent: Family minutes

Discrete or (Continuous)

9. Julian is buying concert tickets for himself and his friends. The more concert tickets he buys the greater the cost.

Independent: Tickets

Dependent: Cost

(Discrete) or Continuous

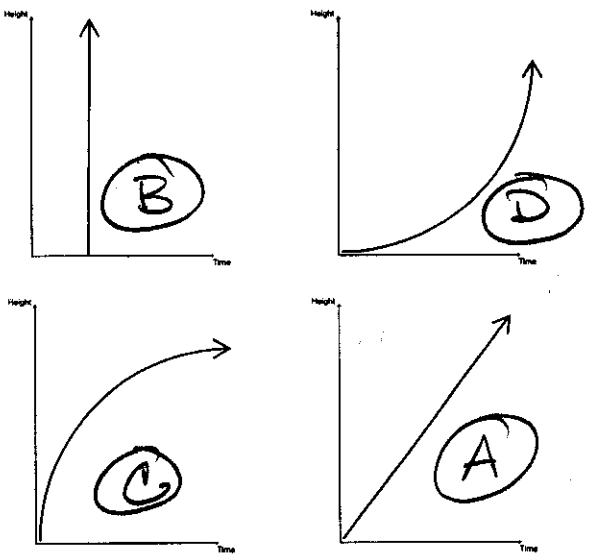
10. **Match the graph with the scenario about raising the school flag.**

a) Mr. Wallace uses a motor to raise the school flag at a constant rate.

b) The school flag is at the bottom and the top at the same time.

c) Mr. Murry uses a motor that raises the school flag fast in the beginning and slows near the top.

d) Mr. Sumner uses a motor that raises the school flag slow in the beginning and faster near the top.



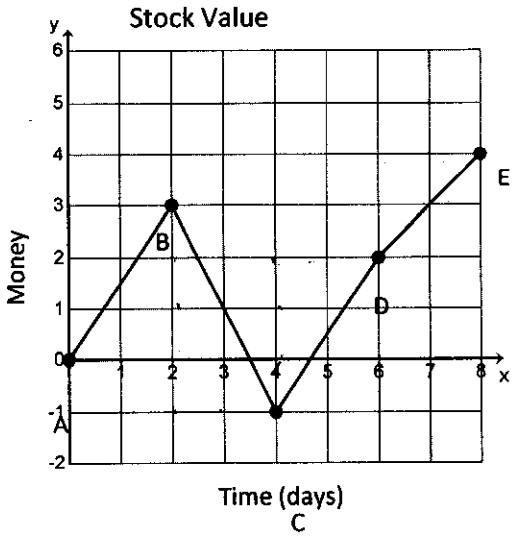
11. **For each portion of the graph:**
1) state the interval, x-values.
2) find the slope, and
3) explain what is going on?

A to B 1) [0, 2] 2) $\frac{3}{2} = \frac{\Delta y}{\Delta x}$
3)

B to C 1) [2, 4] 2) $\frac{-4}{2}$ or $\frac{-2}{1}$
3)

C to D 1) [4, 6] 2) $\frac{3}{2}$
3)

D to E 1) [6, 8] 2) $\frac{3}{2}$ or $\frac{1}{1}$
3)



Decide if the situation represents a linear increasing function, a linear decreasing function, an exponential growth function, or an exponential decay function. Then write the equation that represents the situation.

12. A geologist discovers a radioactive material that starts with 1,200 particles and has a half-life of one day.

Exp. Decay $f(x) = 1200\left(\frac{1}{2}\right)^x$

13. A marathon runner starts by running 3 miles and then adds an additional 4 miles per week to his workout schedule.

Linear Inc. $f(x) = 4x + 3$

14. The value of a car starts at \$15,000 and drops \$1000 per year it is owned.

Linear Dec. $f(x) = -1000x + 15{,}000$

15. Madden started a rumor and the number of students who heard the rumor doubled every hour.

Exp. Growth $f(x) = 1(2)^x$

Directions: **In each of the following problems, you are given one of the representations of a function. Complete the remaining 3 representations and answer the questions.**

16.

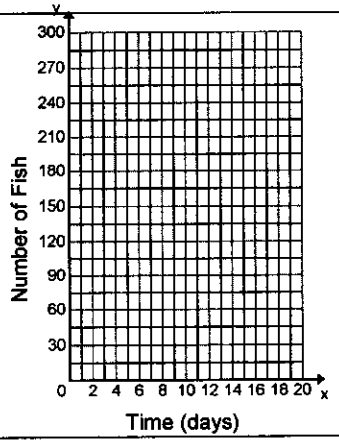
Context

There are 500 fish in a pond. A crocodile is loose in the pond and is eating the fish. Each day the crocodile eats 25 fish.

Table

0	500
1	475
2	450
3	425
4	400
5	375
6	350

Graph



Rate of Change:

-25

Start Point (*y*-intercept):

500

Equation:

$f(x) = mx + b$

$f(x) = -25x + 500$

Questions

1/2 a fish?

a) discrete or continuous

b) domain $[0, \infty)$

c) range $[0, 500]$

d) What is the value at $f(12)$?

$f(12) = -25(12) + 500$

$= 200$

e) What is the value at $f(20)$?

$= -25(20) + 500$

$= 0$

f) What x-value makes $f(x) = 225$ true?

$225 = -25x + 500$

$-500 \quad -500$

$-275 = -25x$

$\frac{-275}{-25} = \frac{-25x}{-25}$

$11 = x$

17.

Context

The water storage tank for irrigation holds 500 thousand gallons, each hour, the number of gallons of water in the tank decreases by 10% during the average day.

10%

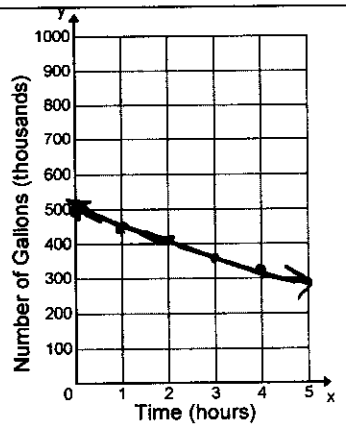
0.1

$1 - 0.1 = 0.9$

Table

Time (hours)	Water (thousand gallons)
0	500
1	450
2	405
3	365
4	328
5	295

Graph



Rate of Change:

0.9

Start Point (*y*-intercept):

500

Equation:

$f(x) = a \cdot b^x$

$= 500(0.9)^x$

Questions

a) discrete or continuous

b) domain $[0, \infty)$

c) range $[0, 500]$

d) What is the value at $f(2.5)$?

$f(2.5) = 500(0.9)^{2.5}$

$= 384$

e) What is the value at $f(4)$?

$= 500(0.9)^4$

$= 328$

f) What x-value makes f(x) =328 thousand true?

4 hours.

For each of the following, determine if it is linear increasing or decreasing or if it is exponential growth or decay. Then determine the equation of the function.

18.

You have a 40 dollars iTunes gift card. You decide to buy some songs for 2 dollar per song.

Linear Dec.

$f(x) = -2x + 40$

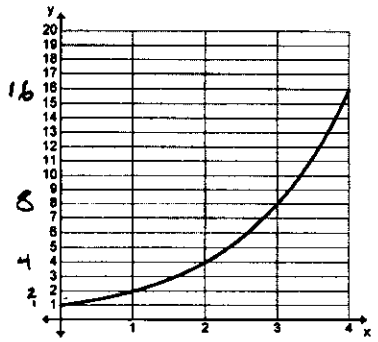
19.

x	y
0	1
1	3
2	9
3	27
4	81

Exp. Growth

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

20.



Exp. Growth

$f(x) = 1(2)^x$

21.

x	y
0	8
1	13 (+5)
2	18 (+5)
3	23 (+5)
4	28 (+5)

Lin. Inc.

$f(x) = 5x + 8$

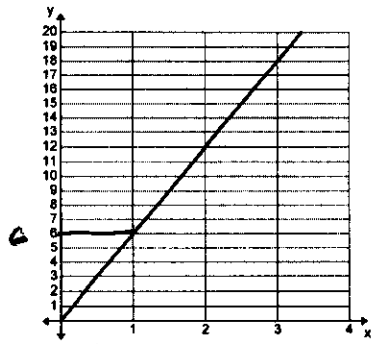
22.

You wake up with 2 chicken pox and each day the number of chicken pox you have triples.

Exp. Growth

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

23.



Lin. Inc.

$f(x) = 4x + 0$

24. **Evaluate using** $f(x) = -3x + 5$ **and** $g(x) = 8\left(\frac{1}{2}\right)^x$

a) $f(-1) = -3(-1) + 5$ $= 8$

b) $g(-1) = 8\left(\frac{1}{2}\right)^{-1}$ $= 16$

c) $\frac{f(-1)}{g(-1)} = \frac{8}{16} = \frac{1}{2}$

d) $f(2) = -3(2) + 5$ $= -6 + 5$ $= -1$

e) $g(2) = 8\left(\frac{1}{2}\right)^2$ $= 2$

f) $f(2) + g(2)$ $-1 + 2$ $= 1$

Determine the multiplier for each growth or decay rate.

25. 20% growth $1 + .2 = 1.2$

26. 12% decay $1 - 0.12 = 0.88$

27. 0.1% growth $1 + .001 = 1.001$

28. 98% decay $= 1 - 098 = 0.02$

29. 0.85% growth $1 + .0085 = 1.0085$

30. 2.5% decay $= 1 - .025 = 0.975$

For problems 17-20, Write the equation to model each situation. Then use the equation to answer the questions.

31. E. coli bacteria double in population every thirty minutes. If the initial population is 85, what's the population of bacteria after 3 hours? After one day?

3 hours = 6 30min
24 hours = 48 - 30min

$f(x) = 85(2)^x$

$f(6) = 85(2)^6$

$= 31520$

$f(48) = 85(2)^{48}$

$= 23,923,400,000,000,000$

32. Trevin purchases a car for $19,000. The car depreciates at a rate of 18% annually. After 6 years, Keaton offers to buy the car for $4,500. Should Trevin sell the car to Keaton? Explain.

18% = 0.18

1 - 0.18 = 0.82

$f(x) = 19000(0.82)^x$

$f(6) = 19000(0.82)^6$

$= \$5776.13$ no, its worth more than $4500

33. The number of people who own computers has increased 23.2% annually since 1990. If 500,000 people owned a computer in 1990, predict how many people will own a computer in 2015.

25 years

23.2% = 0.232

1 + 0.232

= 1.232

$f(x) = 500,000(1.232)^x$

$f(25) = 500,000(1.232)^{25}$

$= 93,095,300$ computers.

34. You apply for and receive a credit card. You spend $2,000 at an interest rate of 22% per month. How much debt will you have in one month? After 2 years? = 24 months

22% = 0.22

1 + 0.22

1.22

$f(x) = 2000(1.22)^x$

$f(1) = 2000(1.22)^1$

$= 2440$

$f(24) = 2000(1.22)^{24}$

$= 236410$

35. A species of extremely rare, deep water fish has an extremely rarely have children. If there are a 821 of this type of fish and their growth rate is 2% each month, how many will there be in half of a year, in 10 years and 100 years?

a) Half a year (6 months)

$f(x) = 821(1.02)^x$

$f(6) = 821(1.02)^6$

$= 924$

b) 10 years (120 months)

$f(120) = 821(1.02)^{120}$

$= 8838$

c) 100 years (1200 months)

$f(1200) = 821(1.02)^{1200}$

$= 17,161,300,000,000$

36. The population of Henderson City was 3,381,000 in 2010, and is growing at an annual rate of 1.8%. If this growth continues, what will the approximate population of Henderson City be in the years 2020, 2030, and 2050?

a) 2020: 10 years

$f(x) = 3381000(1.018)^x$

$f(x) = 3381000(1.018)^{10}$

$= 4,013,200$

b) 2030: 20 years

$f(20) = 3381000(1.018)^{20}$

$= 4830600$

c) 2050: 40 years

$f(40) = 3381000(1.018)^{40}$

$= 6,901,700$

Determine if the following tables represent a linear function $(f(x) = mx + b)$, an exponential function $(f(x) = a \cdot b^x)$, or neither. If the function is linear or exponential, write the equation.

37. f(x) = $2(4)^x$

x	f(x)
0	2
1	8
2	32
3	128
4	512

$\frac{8}{2}=4$ $\frac{32}{8}=4$ $\frac{128}{32}=4$

38. f(x) = $-5x+15$

x	f(x)
0	15
1	10
2	5
3	0
4	-5

-5 -5 -5 -5

39. f(x) = None

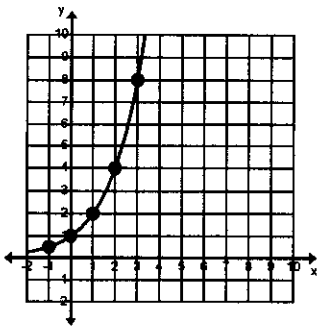
x	f(x)
0	0
1	5
2	20
3	45
4	80

+5 +15 NO

EX $\frac{5}{0}=$ und. $\frac{20}{5}=4$ NO

Determine the Exponential Equation, $f(x) = a \cdot b^x$, for each of the following graphs.

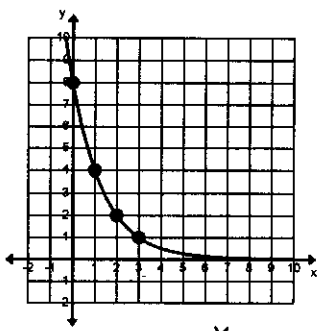
40)



$f(x) = 1(2)^x$

0	1
1	2
2	4
3	8

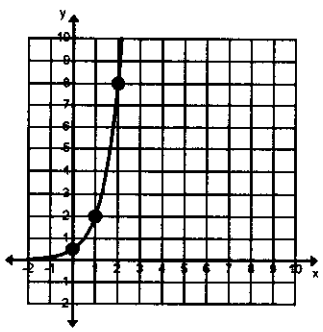
41)



$f(x) = 8(\frac{1}{2})^x$

0	8
1	4
2	2
3	1

42)



$f(x) = \frac{1}{2}(4)^x$

0	½
1	2
2	8
3	