Pick up The
Warm up

it has to with geometric
sequences from yesterday

HW
help

**1.** Find the missing terms of the sequence and write a sequence formula in both *zero term* and *first term* format.

a) ____, ____, 125, ______,.... (hint: the multiplier is 1.25)

first term format: $t_n =$ ______________ zero term format: $t_n =$ ______________

b) 4000, 1000, 250, ____, ____, ....

first term format: $t_n =$ ______________ zero term format: $t_n =$ ______________

**1.** Find the missing terms of the sequence and write a sequence formula in both *zero term* and *first term* format.

a) 80, 100, 125, 156.25,.... (hint: the multiplier is 1.25)

first term format: $t_n = 80(1.25)^{n-1}$ zero term format: $t_n = 64(1.25)^n$

zero term

$\frac{250}{1000} = .25$

16000 b) 4000, 1000, 250, 62.5, 15.625, ....

$t_1$ $t_3$

$\frac{1000}{4000} = \frac{1}{4} = .25$

first term format: $t_n = 4000(.25)^{n-1}$ zero term format: $t_n = 16000(0.25)^n$

$t_0$ or $= 4000(\frac{1}{4})^{n-1}$ or $= 16000(\frac{1}{4})^n$

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eral customers at a fancy restaurant were reporting food poisoning. A biologist named Tina v
ding bacteria growth on the cooking surfaces. She is trying to predict the amount of bacteria a
. Unfortunately she lost the count after the first hour and forgot to record count at six hours.

a) Determine the missing counts.

| hours | # bacteria |
|---|---|
| 1 | 4 |
| 2 | 10 |
| 3 | 25 |
| 4 | 62.5 |
| 5 | 156.25 |
| 6 | |

$\frac{25}{10} = 2.5$

b) Write a sequence formula, using the notation, "$t_n =$" that models the growth after $n$ hours.

$t_n = 4(2.5)^{n-1}$

c) Use your formula to calculate the predicted bacteria counts after 20 hours.

$t_{20} = 4(2.5)^{20-1} = 145,519,152.3$ bacteria

**2.** Several customers at a fancy restaurant were reporting food poisoning. A biologist named Tina w recording bacteria growth on the cooking surfaces. She is trying to predict the amount of bacteria aft hours. Unfortunately she lost the count after the first hour and forgot to record count at six hours.

a) Determine the missing counts.

multiplier is 2.5 $\frac{25}{10} = 2.5$ $\frac{625}{25} = 2.5$

b) Write a sequence formula, using the notation, "$t_n =$" that models the growth after $n$ hours.

$$t_n = 4(2.5)^{n-1} \quad \text{or} \quad t_n = 1.6(2.5)^n$$

c) Use your formula to calculate the predicted bacteria counts after 20 hours.

$$t_{20} = 4(2.5)^{20-1} = 145{,}519{,}152 \text{ bacteria}$$

| hours | # bacteria |
|---|---|
| 1 | 4 |
| 2 | 10 |
| 3 | 25 |
| 4 | 62.5 |
| 5 | 156.25 |
| 6 | 390.625 |

rmula for the geometric sequence:

| $n$ | $t_n$ |
|---|---|
| 1 | 20 |
| 2 | 68 |
| 3 | 231.2 |
| 4 | 786.08 |
| 5 | |

$$t_n = 20(3.4)^{n-1}$$

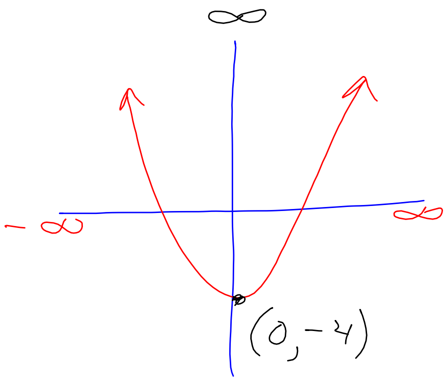
$$68 \cdot r \cdot r = 786.08$$

$$\frac{\cancel{68}r^2}{\cancel{68}} = \frac{786.08}{68}$$

$$\sqrt{r^2} = \sqrt{\frac{786.08}{68}}$$

$$r = \sqrt{\frac{786.08}{68}} = 3.4$$

**4.** Use Your Graphing Calculator to find the domain of the function $f(x) = x^2 - 4$




$-\infty < x < \infty$

range

$-4 \leq y < \infty$

## Graphing Calculator tidbits

- Mode
- Format
- Memory Re-set
- Battery Life / Screen Darkness

Questions on homework

$\boxed{\text{A-23}}$

(a) $t = an + b$

$-an \quad -an$

$t - an = b$

$b = t - an$

(b) $\frac{y}{3} - a = b$

multiply by 3, all terms

$\frac{\cancel{3}(y)}{\cancel{3}} - 3a = 3b$

$y - 3a = 3b$

$y = 3a + 3b$

(c) $m = \frac{y}{x}$

multiply by x

$\boxed{y = mx}$

(d) $m = \frac{y}{x}$

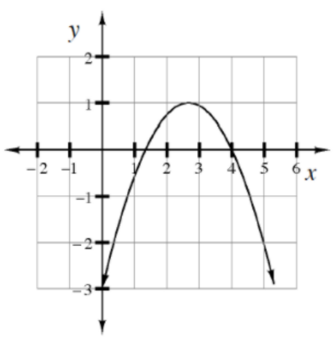
multiply by x

$xm = y$

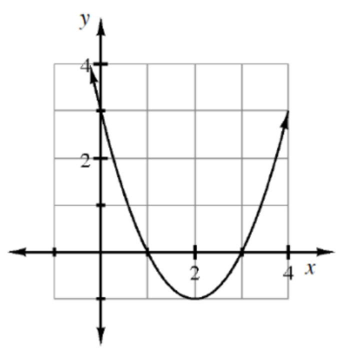
divide by m

$\boxed{x = \frac{y}{m}}$

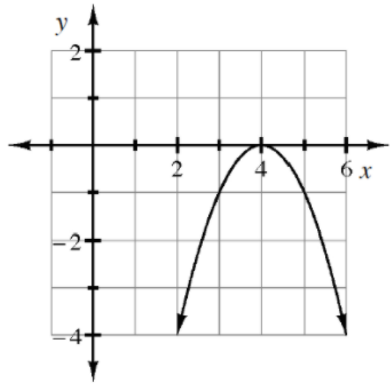
25 a.



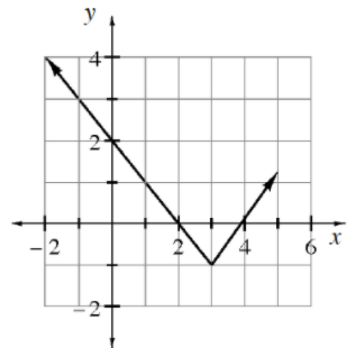
b.



c.



d.



A-37

a)

| month | Stamps |
|---|---|
| 0 | 120 |
| 1 | 132 |
| 2 | 144 |
| 3 | 156 |
| 4 | 168 |
| 5 | 180 |

(b) will have 264 Stamps in one year

(c) $t_n = 120 + 12n$

or $t_n = 132 + 12(n-1)$

$t_{12} = 120 + 12(11) = 264$

d) $120 + 12n = 500$
$\quad -120 \qquad -120$

$12n = 380$

$n = 31.67$ months → this in between 31 and 32 months. She will not be able to fill her book exactly.

A-51

$f(x) = \sqrt{3x-2}$

a) $f(1) = \sqrt{3(1)-2} = 1$

b) $f(9) = \sqrt{3(9)-2} = 5$

c) $f(4) = \sqrt{3(4)-2} = \sqrt{10} \approx 3.16$

d) $f(0) = \sqrt{3(0)-2} = \sqrt{-2}$ undefined

A-68

a) 4, 7, 10, 13... $t_n = 4 + 3(n-1)$ or $t_n = 1 + 3n$

b) 3, 8, 13, ... $t_n = 3 + 5(n-1)$ or $t_n = -2 + 5n$

c) 24, 19, 14, .... $t_n = 24 - 5(n-1)$ or $t_n = 29 - 5n$

d) 7, 9.5, 12...

$t_n = 7 + 2.5(n-1)$ or $t_n = 4.5 + 2.5n$

68d

7, 9.5, 12 .....

$t_n = 7 + 2.5(n-1)$

$\boxed{\text{A-92}}$

a) slope 2
(10, 17)
$\Longrightarrow$
$y = mx + b$
$17 = 2(10) + b$
$17 = 20 + b$
$-20 \quad -20$
$b = -3$

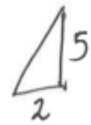
$y = 2x - 3$

b) (1, -4)
(-2, 5)
$\Longrightarrow \frac{5 - -4}{-2 - 1} = \frac{9}{-3} = -3$

$y = mx + b$
$-4 = -3(1) + b$
$-4 = -3 + b$
$+3 \quad +3$
$b = -1$

$y = -3x - 1$

c) from graph → slope triangle



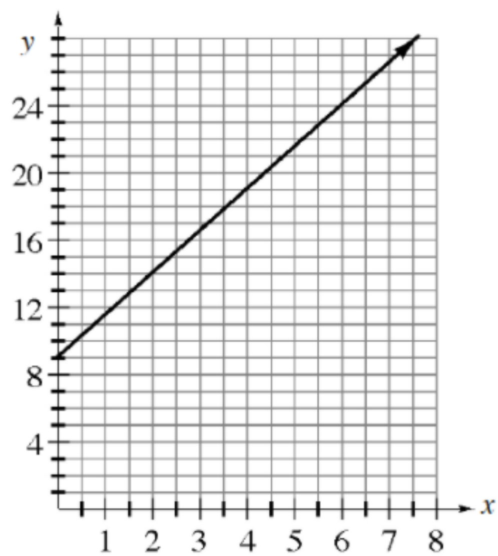

→ slope $\frac{5}{2}$

y-intercept $(0,9)$

$$y = \frac{5}{2}x + 9$$

92d

d.



Notes

# Exponential Functions

Pull out your Reference Sheet

**Exponential Functions** $\boldsymbol{y = ab^x}$ , where $\boldsymbol{b}$ is the multiplier, $\boldsymbol{a}$ is the starting value

for % situations: \$200 increasing by 15% → $y = 200(1+.15)^t$ = $\mathbf{200(1.15)^t}$

\$700 DECREASING by 15% → $y = 700(1-.15)^t$ = $\mathbf{200(0.85)^t}$

Exponential functions in this form

$$y = ab^x$$

multiplier

Exponential functions in this form

$$y = ab^x$$

multiplier

→ initial value of the (zero term) situation

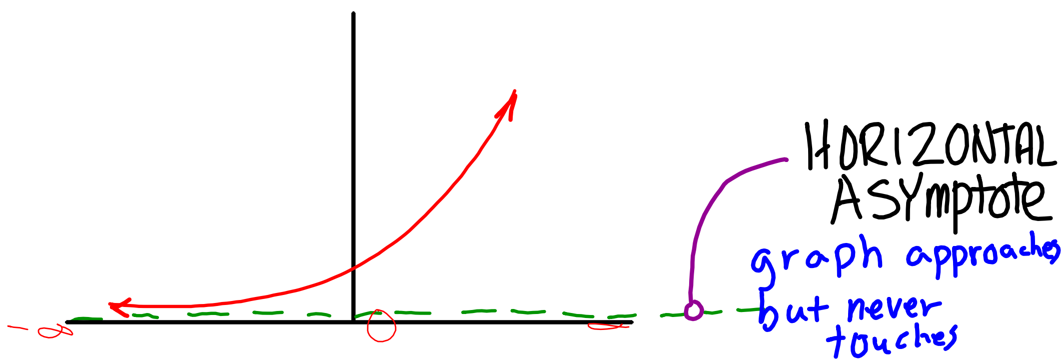
→ y-intercept of its graph

GDC

$y = ab^x$

$y = 1(2.3)^x$

any number bigger than 1




**Domain** $-\infty < x < \infty$

**Range** $0 < y < \infty$

Next

$$y = 1\left(\frac{3}{7}\right)^x$$

a

any number

$0 < b < 1$

B B

NOTES

# Percent Growth/Decay

require geometric sequences

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example A

## Force the following sequence to grow by 15 %

120

___ , ___ , ___ , ...
1 2 3

120, ___, ___, ___, ......

How can we increase any number by 15% ?

We multiply by a growth factor

____ ____

Start with 100% $100\% + 15\%$

Covert to decimals $115\%$

$\therefore$ growth factor is $1.15$

120, 138, 158.7, ___, ___

$120 \times 1.15 = 138$

120, 138, 158.7, 182.505, ...

$t_n =$

or if a continous exponential function

$y =$

example (B)

10,000 initial value

3% decrease

$100\% - 3\%$

$97\%$

$.97$ multiplier

$10000$, $\underline{9700}$, $\underline{9409}$, ___
$t_0$ $t_1$

$t_n = 10000(.97)^n$

$y = 10000(.97)^x$

$y = ab^x$

example (C)

Start with 1000
at 6.5% growth
per week

$y = ab^x$

Write a formula. $y = 1000(1.065)^x$

How many weeks would it take
to reach 80,000

$100\% + 6.5\%$

$106.5\%$

$$80000 = 1000(1.065)^x$$

divide by 1000

$$\underbrace{80}_{Y_1} = \underbrace{(1.065)^x}_{Y_2}$$

$$t(n) = 1000(1.065)^n$$

80 000

$$80\,000 = 1000(1.065)^n$$

example D

GDC

option I 100, 11% growth

option II 2000, 8% growth

How many weeks before option I overtakes option II

## Ground Rules For Looking At Tests

- Absolutely no cell phones out until all tests are collected.
- If you have not taken it, go to the hall until I come to get you.
- Be smart.... learn from looking at the solutions.

## Can I re-do a Test?

- Possibly (good attendance, doing most assignments on time)
- Come to get help within 3 to 4 days

Can re-take one Test and still get a B in course

Can re-take 2 tests and still get a C

## Assignment Appendix

**A....91, 105, 116, 119, 120**

See side board for Qualities

Don't..... write all of the problems down first. Instead... do a problem. Skip a line. Do the next problem.