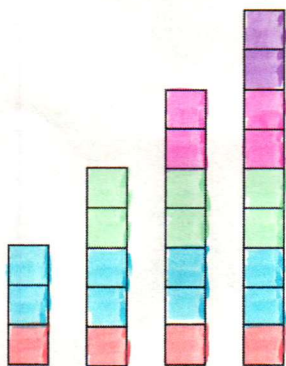


Notes 3.1 Intro to Polynomials

Investigation

Scott is participating in Fit Month at his gym. Below you will find a bar graph and a table to show Scott's pushup data from last year.



$n$ Days	$f(n)$ Push-ups each day	$g(n)$ Total number of pushups in the month
1	3	3
2	5	8
3	7	15
4	9	24
5	11	35
...	...	...
$n$		

$\downarrow +5$   
 $\downarrow +7$   
 $\downarrow +9$   
 $\downarrow +10$   
 $\downarrow +2$   
 $\downarrow +2$   
 $\downarrow +2$

- a. Write the recursive and explicit equations for how many pushups he did each day ( $f(n)$  from the table). Show how your equations relate to the bar graph or the table.

R:  $\begin{cases} f(n) = f(n-1) + 2 \\ f(1) = 3 \end{cases}$  ← each bar grows by 2 each time

E:  $f(n) = 2n + 1$  the values in the table increase by 2 each day

- b. Write the recursive and explicit equations for how many pushups he has done total for the month ( $g(n)$  from the table). Explain how your equations relate to the equations in a.

R:  $\begin{cases} g(n) = g(n-1) + (2n+1) \\ g(1) = 3 \end{cases}$  ← the values are increasing by the amount of the explicit eqn of  $f(n)$ .

E:  $g(n) = n^2 + 2n$

This year Scott plans to do even more pushups. Use the table below.

$n$ Days	$f(n)$ Push-ups each day last year	$g(n)$ Total number of pushups in the month	$m(n)$ Push-ups each day this year	$T(n)$ Total push-ups completed for the month
1	3	3	3	3
2	5	8	8	11
3	7	15	15	26
4	9	24	24	50
5	11	35	35	85
...	...			
$n$				

+8 ↘ +7 ↘ +2  
 +15 ↘ +9 ↘ +2  
 +24 ↘ +11 ↘ +2  
 +35 ↘

c. How many pushups will Scott complete on day four this year? 24

How did you find this number? it is the same as  $g(4)$

Write the recursive equation to represent the total number of pushups Scott will complete for the month on any given day,  $m(n)$ .

$$m(n) = m(n-1) + (2n+1)$$

$$m(1) = 3$$

What type of function do you think  $m(n)$  will make? Why do you think it will make that type of function? quadratic, because  $m(n)$  is the same as  $g(n)$  and the 2<sup>nd</sup> difference is constant

d. How many total pushups will Scott have completed for the month on day four this year?

50 pushups total after day 4

e. What type of function do you think  $T(n)$  will make? Why do you think it will make that type of function?

If  $m(n)$  is quadratic because the 2<sup>nd</sup> difference is constant, then  $T(n)$  should be cubic because the 3<sup>rd</sup> difference is constant

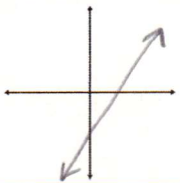
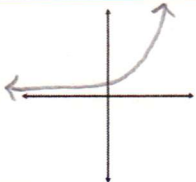
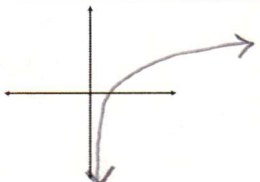
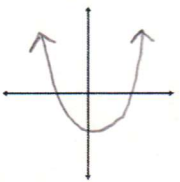
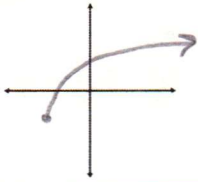
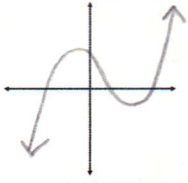
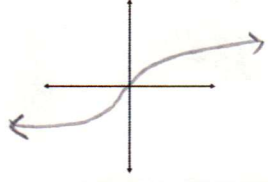
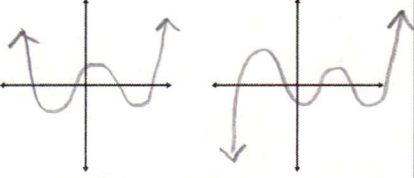
f. How does the rate of change differ between the different functions?

The rate of change is increasing as you go from

$$f(n) \rightarrow g(n) \rightarrow T(n)$$

$$m(n)$$

# Functions

Type of Function	Equation	Graph
linear	$y = mx + b$	
exponential	$y = a(b)^x$	
logarithmic	$y = \log_b x$	
quadratic	$y = ax^2 + bx + c$	
square root	$y = \sqrt{x}$	
Cubic	$y = x^3$	
cube root	$y = \sqrt[3]{x}$	
polynomial	$y = x^n + x^{n-1} + \dots + x + c$	

even power

odd power

## Long Division

$$1436 \div 24$$

$$\begin{array}{r} 59 + \frac{20}{24} \\ 24 \overline{) 1436} \\ \underline{-120} \downarrow \\ 236 \\ \underline{-216} \\ 20 \end{array}$$

$$24 \cdot \underline{5} = \underline{120} \leq 143$$

$$24 \cdot \underline{9} = 216 \leq 236$$