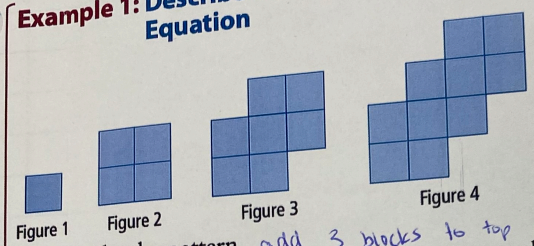
6.1 Representing Patterns

Example 1: Describe a Pictorial Pattern Using a Linear Equation

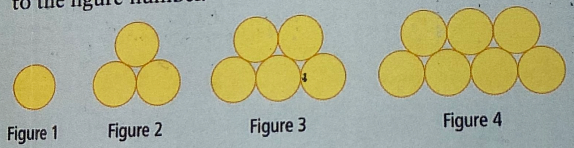


x Figure	y Squares	
1	1	
2	4	+3
3	7	+3
4	10	+3

a) Describe the pattern. add 3 blocks to top right corner
b) Create a table of values to represent the linear relation between the number of squares and the figure number for the first four figures.
c) Write a linear equation to represent this pattern. $y = mx + b \rightarrow y = 3x - 2$ ($\frac{\Delta y}{\Delta x} = \frac{3}{1}$)
d) How many squares are in Figure 12?
e) Which figure number has 106 squares? Verify your answer.

Show You Know

a) Write an equation to represent the number of circles in relation to the figure number.



b) How many circles are in Figure 71? Explain how you determined the answer.
c) Which figure number has 83 circles? How did you arrive at your answer?

thing"

ise"

run"

"Starting point" → value of y when x=0

d) $y = 3x - 2$
$y = 3(12) - 2$
$y = 36 - 2$
$y = 34$

x=12

e) $y = 3x - 2$
$106 = 3x - 2$
$+2 \quad +2$
$\frac{108}{3} = \frac{3x}{3}$
$36 = 1x$

y=106

6.1 Representing Patterns

Definitions:

Linear Formula:

$y = mx + b$

y = dependent variable → "result"
- changes based on value of x.

x = independent variable → "fixed thing"
- doesn't change based on the situation

m = "slope"

$\frac{\text{Change in } y}{\text{Change in } x} \rightarrow \frac{\Delta y}{\Delta x} \rightarrow \frac{\text{"rise"}}{\text{"run"}}$

b = "y-intercept"
- meets at y-axis
"Starting point" → value of y when x=0

d) $y = 3x - 2$
$y = 3(12) - 2$
$y = 36 - 2$
$y = 34$

x=12

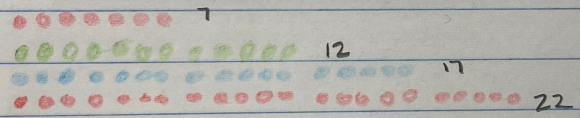
e) $y = 3x - 2$
$106 = 3x - 2$
$+2 \quad +2$
$\frac{108}{3} = \frac{3x}{3}$
$36 = 1x$

y=106

Example 2: Describe a Written Pattern Using a Linear Equation

A bead design for a necklace has an arc shape:
- Row 1 has seven red beads.
- Row 2 has five additional beads and all the beads are green.
- Row 3 has five additional beads and all the beads are blue.
- The pattern repeats. Five beads are added to each successive row.

a) Draw the pattern for the first four rows.
b) Make a table of values showing the number of beads in relation to the row number.
c) What equation shows the pattern between the row number and the number of beads in the row?
d) How many beads are in Row 4? Explain how to check your answer. 22
e) How many beads are in Row 38? $x = 38$
f) If the bead pattern were continued, which row number would have 92 beads? How did you determine the answer?

a) 

b)

x row	y bead
1	7
2	12
3	17
4	22

+1, +1, +1 (row) ; +5, +5, +5 (bead)

c) $y = mx + b$

$y = \frac{\Delta y}{\Delta x} x + b$

$y = \frac{5}{1} x + b$

$y = 5x + 2$

c) $y = 5x + 2$

$y = 5(38) + 2$

$y = 190 + 2$

$y = 192$

f) $y = 92$

$92 = 5x + 2$

$-2 \quad -2$

$\frac{90}{5} = \frac{5x}{5}$

$18 = x$