6.1 Representing Patterns

Math 9   **Representing Patterns**

Describe the pattern shown in the picture.

Figure 1   Figure 2   Figure 3   Figure 4
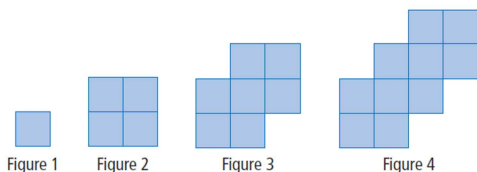
Complete the table of values to represent the linear relation between the number of squares and the figure number.

Figure Number, n	Number of Squares, s
1	1
2	4
3	7
4	10

$+3$
$+3$
$+3$

↑
This is the coefficient of "n"

Write a linear equation to represent this pattern.

$$S = 3n - 2$$

How many squares are in Figure 12?

$S = 3(12) - 2$
$= 36 - 2$
$= 34$

34 squares are in Figure 12.

Which figure number has 106 squares?

$106 = 3n - 2$
$\quad +2 \qquad +2$
$\dfrac{108}{3} = \dfrac{3n}{3}$

$36 = n$

Figure 36 has 106 squares.

Describe the pattern shown in the picture.

Figure 1   Figure 2   Figure 3   Figure 4
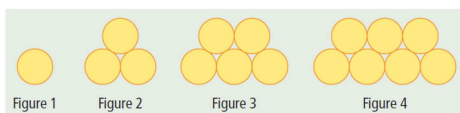
Complete the table of values to represent the linear relation between the number of circles and the figure number.

Figure Number, n	Number of Circles, c
1	1
2	3
3	5
4	7

$+2$
$+2$
$+2$

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

$$c = 2n - 1$$

How many circles are in Figure 71?

$c = 2(71) - 1$
$= 142 - 1$
$= 141$

141 circles are in Figure 71.

Which figure number has 83 circles?

$83 = 2n - 1$
$\quad +1 \qquad +1$
$\dfrac{84}{2} = \dfrac{2n}{2}$

$42 = n$

Figure 42 has 83 circles.

A bead design for a necklace has an arc shape. The first row has 7 beads. Each successive row has 5 additional beads.
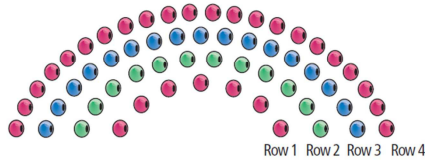
Complete the table of values showing the number of beads in relation to the row number.

Row 1 Row 2 Row 3 Row 4

| Row Number, n	Number of Beads, b
1	7
2	12
3	17
4	22

$\}$ +5
$\}$ +5
$\}$ +5

Write an equation to represent the number of beads in the nth row.

$$b = 5n + 2$$

How many beads are in row 38?

$$b = 5(38) + 2$$
$$= 190 + 2$$
$$= 192$$

There are 192 beads in row 38.

Which row would have 92 beads?

$$92 = 5n + 2 \quad (-2)$$
$$90 = 5n \quad (\div 5)$$
$$18 = n$$

The 18th row would have 92 beads.

In a banquet hall, a single table seats six people. Tables can be connected end to end as shown. Four additional people can be seated at each additional table.
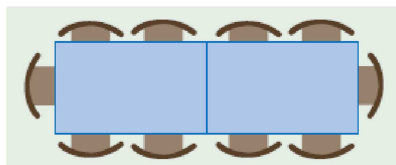
Complete the table of values to represent the linear relation between the number of connected tables and number of people who can be seated.

Number of Tables, n	Number of Seats, s
1	6
2	10
3	14
4	18

$\}$ +4
$\}$ +4
$\}$ +4

Write an equation to represent the number of people seated at n tables.

$$s = 4n + 2$$

How many people will 8 connected tables seat?

$$s = 4(8) + 2$$
$$= 32 + 2$$
$$= 34$$

8 tables will seat 34 people.

How many connected tables will seat 26 people?

$$26 = 4n + 2 \quad (-2)$$
$$24 = 4n \quad (\div 4)$$
$$6 = n$$

6 connected tables will seat 26 people.