## Practice

Check

4. In each equation, determine the value of P when $n = 1$.

a) $P = 2n$ b) $P = 3n$ c) $P = 4n$ d) $P = 5n$

    2   3   4   5

5. In each equation, determine the value of A when $n = 2$.

a) $A = 3n + 1$ 7   b) $A = 3n + 2$ 8
c) $A = 3n + 3$ 9   d) $A = 3n + 4$ 10

6. In a table of values for a pattern, $P = 3$ when $n = 1$; which of the following equations might represent the pattern?

a) $P = 3n$ b) $P = n + 3$
c) $P = 2n + 1$ d) $P = 3 - n$

7. The pattern in this table continues. Which expression below represents the number of squares in terms of the figure number?

Figure, f	Number of Squares, s
1	6
2	7
3	8
4	9
5	10

a) $5f$ b) $2f$ c) $f + 5$ d) $s + 5$

8. This pattern of squares continues. Which equation below relates the number of squares, n, in a picture to the size number, s?
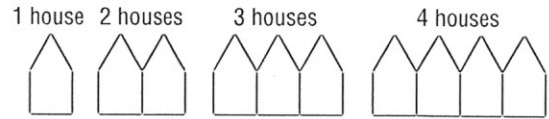

Size 1   Size 2   Size 3
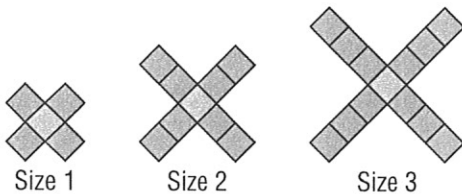
a) $n = s + 4$ b) $n = 4s$
c) $n = 4s + 1$ d) $s = 4n$

9. The pattern in this table continues. Which equation below relates the number of squares to the figure number?
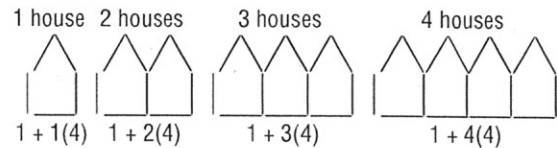
Figure, f	Number of Squares, s
1	5
2	7
3	9
4	11
5	13

a) $s = 4f + 1$ b) $s = 2f + 3$
c) $s = f + 2$ d) $f = 2s + 3$

10. Here is a pattern made with toothpicks. The pattern continues.

1 house   2 houses   3 houses   4 houses

Here are the toothpicks rearranged to show what stays the same and what changes in each picture.

1 house   2 houses   3 houses   4 houses

$1 + 1(4)$ $1 + 2(4)$ $1 + 3(4)$ $1 + 4(4)$

a) Explain how the numbers in the expression below each picture describe the arrangement of toothpicks in the picture.

b) Let n represent the number of houses in a picture. Write an expression for the number of toothpicks in n houses.

c) Write an equation that relates the number of toothpicks, t, to n.

d) Verify the equation by showing that it produces the correct number of toothpicks for the first four pictures in the pattern.

Apply

11. The pattern in each table below continues. For each table:

   i) Describe the pattern that relates v to t.
   ii) Write an expression for v in terms of t.
   iii) Write an equation that relates v to t.
   iv) Verify your equation by substituting values from the table.

[handwritten: ii) $11t$ iii) $v = 11t$]

a)

Term Number, t	Term Value, v
1	11
2	22
3	33
4	44

[handwritten: ii) $3t+2$ iii) $v = 3t+2$]

b)

Term Number, t	Term Value, v
1	5
2	8
3	11
4	14

[handwritten: ii) $8-t$ iii) $v = 8-t$]

c)

Term Number, t	Term Value, v
1	7
2	6
3	5
4	4

12. Here is a pattern of triangles made with congruent toothpicks. The pattern continues.

[handwritten table:]

n	t
1	3
2	5
3	7
4	9

Figure 1   Figure 2   Figure 3   Figure 4
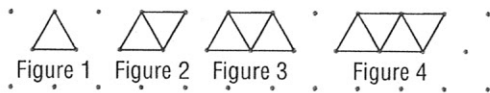
a) Make a table of values for the figure number and the number of toothpicks in a figure. What patterns do you see?

b) Write an expression for the number of toothpicks, t, in figure n.

[handwritten: b) $2n+1$ c) 91 d) $t = 2n+1$ d) Fig 8]

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c) Determine the number of toothpicks in figure 45.

d) Write an equation that relates t to n.

e) Which figure has 17 toothpicks? How could you check your answer?

13. Assessment Focus Hexagonal tables are arranged as shown. The pattern continues. One person sits at each side of a table.

[handwritten table:]

tables n	People P
1	6
2	10
3	14
4	18

1 table   2 tables   3 tables   4 tables

a) Determine the number of people who can be seated at each table arrangement. Record your results in a table.

b) Describe the patterns in the table.

c) What strategies can you use to determine the number of people who could be seated at any table arrangement in the pattern?

d) Write an equation that relates the number of people, p, who can be seated at n tables. How can you check that your equation is correct?

e) How many tables are needed to seat 41 people? How could you check your answer?

Show your work.

[handwritten: d) $p = 4n+2$ e) 10 tables]

14. The cost to print brochures is the sum of a fixed cost of $250, plus $1.25 per brochure.

a) Write an equation that relates the total cost, C dollars, to the number of brochures, n.

b) What is the cost of printing 2500 brochures?

c) How many brochures can be printed for $625?

Justify your answers.

6. Graph the linear relations you identified in question 5. How does each graph verify your answers to question 5?

7. Copy and complete each table of values.

a) $y = 2x$

x	y
1	2
2	4
3	6
4	8

b) $y = x + 2$

x	y
1	3
2	4
3	5
4	6

c) $y = -2x$

x	y
2	-4
4	-8
6	-12
8	-16

d) $y = x - 2$

x	y
4	2
5	3
6	4
7	5

8. Here is a partially completed table of values for a linear relation.

x	2	3	4	5	6	7	8
y	6	9	12	15	18	21	24

a) Determine the missing values of y. Explain how you found these values.
b) Describe the patterns in the table.
c) Write an equation that represents the linear relation. How do you know that your equation is correct?
d) Graph the data. How are the patterns you described in part b shown in the graph?
e) Suppose you want to determine the value of y when $x = -1$. How could you use the table and equation to do this? What is the value of y when $x = -1$?

c) $y = 3x$

e) $y = -3$

9. Each table of values represents a linear relation. Copy and complete each table. Explain your reasoning.

a)

x	y
2	11
3	14
4	17
5	20
6	23

b)

x	y
1	7
3	8
5	9
7	10
9	11

c)

x	y
-4	11
-2	7
0	3
2	-1
4	-5

d)

x	y
4	-10
6	-7
8	-4
10	-1
12	2

10. Create a table of values for each linear relation, then graph the relation. Use values of x from -2 to 2.
a) $y = 3x$
b) $y = x + 3$
c) $y = x - 3$
d) $y = 5 - x$
e) $y = 1 - 4x$
f) $y = -2x - 3$

11. Jin is cycling at an average speed of 4 m/s. He travels a distance, d metres, in t seconds.
a) Write an equation that relates d and t.
b) Create a table of values for this relation.
c) Graph the data. Should you join the points? Explain your reasoning.
d) Is the relation between distance and time linear?
   i) How do you know from the table of values?
   ii) How you know from the graph?
e) How far does Jin travel in 3.5 h?
f) What time does it take Jin to travel 17 km?