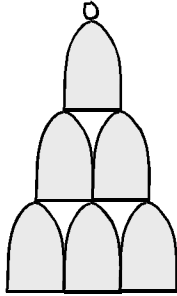


## Exploring Patterns

1. Brandon and Rayna are making stained glass window decorations by arranging colored pieces into a pyramid shape as shown below:



(a) Use the pattern of the decoration to determine the total number of glass pieces needed for a decoration containing the rows listed in the table.

Number of rows	Total number of glass pieces needed
1	
2	
3	
4	
5	
6	
7	

(b) Examine the table and describe the pattern and the total number of glass pieces needed for each stained glass decoration. How many glass pieces are needed for a decoration with 8 rows? With 10 rows?

(c) Write a formula for the total number of glass pieces in a stained glass decoration with  $n$  rows.

(d) How many glass pieces are needed for a decoration with 2,379 rows?

2. Find the next three terms in each of the following sequences.

(a) 5, 13, 21, 29, ...

(b) 800, 400, 200, 100, ...

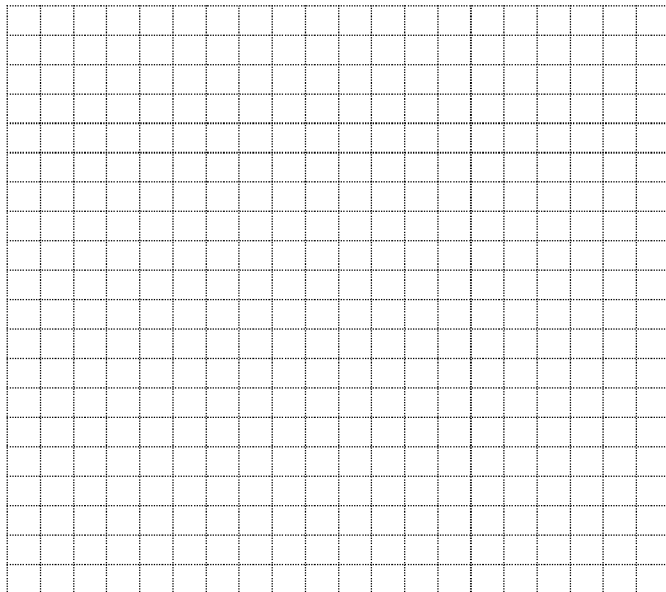
## Exploring Formulas

1. For certain types of crickets, the formula  $y = x + 40$  can be used to calculate the approximate outside temperature based on the rate of cricket chirps heard, where  $x$  is the number of chirps heard in 15 seconds and  $y$  is the temperature in degrees Fahrenheit.

(a) Use the formula to determine the approximate outside temperature for the number of cricket chirps listed in the table.

Number of chirps	Temperature (°F)
5	
10	
15	
20	
25	
30	
35	
40	

(b) Use the information from the table to graph the temperature versus the number of cricket chirps.



(c) Can you predict the temperature if you hear 0 cricket chirps? Explain your answer.

(d) Find the inverse of the original cricket formula.

(e) Graph the line of the inverse formula onto the graph from Question #1b. Compare and contrast the two lines on the graph. (Hint: Add a graph of the line  $y = x$ .)

2. The formula  $F = \frac{9}{5} C + 32$  can be used to convert a temperature in degrees Celsius ( $C$ ) into a temperature in degrees Fahrenheit ( $F$ ).

(a) Rewrite the formula with degrees Celsius isolated on the left side.

(b) Calculate the boiling point of water,  $100^\circ\text{F}$ , in degrees Celsius.

## Using Formulas in Daily Life

1. The formula  $A = P \left(1 + \frac{r}{n}\right)^{nt}$  is used by banks to calculate compound interest, where  $P$  is the principal, or the initial amount of money invested,  $r$  is the yearly interest rate, expressed in decimal form,  $n$  is the number of times the interest is compounded per year, and  $A$  is the total amount of money after  $t$  years of investment.

(a) Brandon's bank account has a current balance of \$1,000, with a yearly interest rate of 6% compounded daily. Assuming Brandon makes no further deposits into this account, calculate his account balance after 15 years.

(b) Rayna has \$5,000 and opens a savings account at a bank offering a yearly interest rate of 8.25% compounded weekly. Assuming Rayna makes no further deposits into this account, calculate her account balance after 12 years.

2. Meteorologists use a complex formula to calculate the heat index, which describes how hot it feels outside based on the temperature and relative humidity. Use the heat index table to answer the following questions.

### Heat Index (°F)

#### Temperature (°F)

	88	90	92	94	96
45	89	93	96	100	104
50	91	95	99	103	108
55	93	97	101	106	112
60	95	100	105	110	116
65	98	103	108	114	121

(a) What is the heat index when the outside temperature is 90°F and the relative humidity is 65%?

(b) What is the relative humidity when the outside temperature is 88°F and the heat index is 93°F?