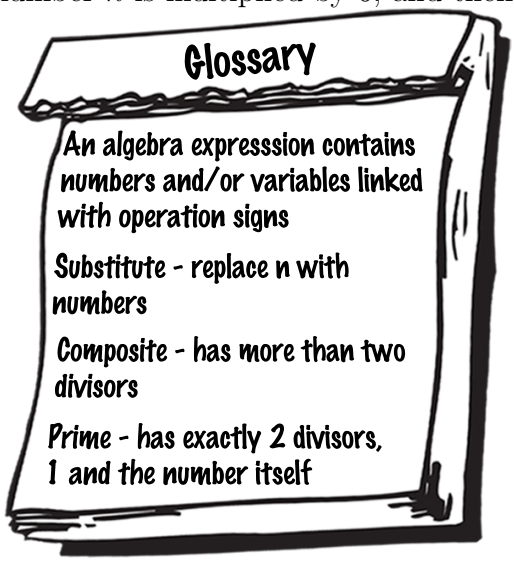
Problem

A number n is multiplied by 6, and then 1 is subtracted.



n	$6n$ - 1
1	5
2	11
⋮	⋮

a) Write an algebraic expression for this statement.

b) If you substitute different whole numbers for n in your expression from a), what is the smallest number n which gives a composite number as the answer?

c) What is the next smallest whole number n that does not have a prime number as the answer?

Extension **:**
Predict the next number n which will give a composite number the expression in part a). Explain your reasoning.

Hints

Suggestion: Have students make a table showing values of n and $6n - 1$

n	$6n$ - 1
1	5
2	11
⋮	⋮

Solution

a) The algebraic expression is $6 \times n - 1$.

b) Substituting $n = 1, 2, 3, ...$ into this expression reveals that the smallest value of n such that $6n - 1$ is a composite number is $n = 6$, which gives $6 \times 6 - 1 = 35$.

c) Continuing the table, we see that the next value of n which gives a composite number is $n = 11$, which gives $6 \times 11 - 1 = 65$

n	$6n - 1$
1	5
2	11
3	17
4	23
5	29
6	35
7	41
8	47
9	53
10	59
11	65

Extension:

1. Careful observation of the table suggests that every fifth value of $6n - 1$ is a multiple of 5, i.e., $n = 1, 6, 11$ give $6n - 1 = 5, 35, 65$ respectively. This suggests $n = 16$ will also do so. To confirm this, note that $n = 16$ give $6 \times 16 - 1 = 95$. However, $n = 13$ give $6 \times 13 - 1 = 77$, which is a composite number as well; hence the 'next' number is $n = 13$.