

## Making Sticks

What are the different lengths that Kimie can make using only her blue sticks? What do you notice?

2, 4, 6, 8, ... (ALL EVEN NOS)

What are the different lengths that Sebastian can make using only his red sticks? What do you notice?

3, 6, 9, 12, ... (ALL MULTIPLES OF 3)

Can they make their lines the same length? How many sticks could Kimie use? How many would Sebastian put down? How long is the line altogether?

YES, WHEN THEY MAKE A MULTIPLE OF 6, THEIR STICKS WOULD BE OF THE SAME LENGTH. (6  $\Rightarrow$  2  $\times$  3 & LCM OF 2 AND 3)

K - 6 [3 STICKS]  
S - 6 [2 STICKS]

Can they make any other same lines using only blue sticks or only red sticks? What do you notice?

YES, THEY CAN MAKE ALL MULTIPLES OF 6.

K - 12 [6 STICKS]  
S - 12 [4 STICKS]

K - 18 [9 STICKS]  
S - 18 [6 STICKS]

AND SO ON...

What lengths can we make using 2 and 3 together?

IF WE HAVE TO USE BOTH 2 & 3, THEN WE CAN MAKE ALL LENGTHS EXCEPT 1, 2, 3, 4, AND 6

$$5 = 2 + 3$$

$$7 = 2 + 2 + 3$$

$$8 = 2 + 3 + 3$$

$$9 = 2 + 2 + 2 + 3$$

$$10 = 2 + 2 + 3 + 3$$

$$11 = 2 + 2 + 2 + 2 + 3$$

$$12 = 2 + 2 + 2 + 3 + 3$$

$$13 = 2 + 2 + 3 + 3 + 3$$

$$14 = 2 + 2 + 2 + 2 + 3 + 3$$

$$15 = 2 + 2 + 2 + 3 + 3 + 3$$

# EXPLORATION:

IN HOW MANY WAYS CAN WE MAKE <sup>ANY NUMBER</sup> EQUAL TO OR MORE THAN 6 USING 2 AND/OR 3?

STEP 1: FIGURE OUT HOW MANY SIXES THERE ARE IN THE NO.

STEP 2: EACH 6 CAN BE MADE IN 2 WAYS.

STEP 3: MULTIPLY THE NO. OF 6'S BY 2.

$$\begin{array}{l} \text{EG; } 38 = 6 + 6 + 6 + 6 + 6 + 6 + 2 \\ \quad \downarrow \downarrow \downarrow \downarrow \downarrow \downarrow \\ \quad 2 \text{ WAYS } 2 \quad 2 \quad 2 \quad 2 \quad 2 \\ \text{∴ NO. OF WAYS} = 12 \rightarrow 6 \times 2 \end{array}$$

HOWEVER,

IF YOU USE THIS METHOD FOR NUMBERS 1 MORE THAN A MULTIPLE OF 6, ~~(NOT)~~ THEN THE METHOD WILL FAIL.

FOR SUCH NUMBERS,

YOU CAN SPLIT THE NO. AS  $7 + 6 + 6 + \dots$

$$\begin{array}{l} \text{EG; } 31 = 7 + 6 + 6 + 6 + 6 \\ \quad \downarrow \quad \downarrow \quad \downarrow \\ \quad \text{TWO WAYS } 2 \quad 2 \quad 2 \end{array}$$

7 CAN ONLY BE WRITTEN IN 1 WAY:-

$$7 = 2 + 2 + 3$$

TOTAL NO. OF WAYS TO MAKE 31 = NO. OF 6'S  $\times$  2

$$= 4 \times 2$$

$$= 8 \text{ WAYS}$$