Division CRA

Two types of division:

1. We are making bags of cookies to sell at a bake sale. We will put 5 cookies in each bag. We have 245 cookies to sell. How many bags of cookies can we make?

This is a measurement division problem: How many 5's are in 245? We can solve it by repeated subtraction, taking 5 away from 245 over and over, keeping track of how many times we do this.

245 – 5	240 – 5	235 – 5	230 – 5	225 – 5	220 – 5	215 – 5	210 – 5
1	2	3	4	5	6	7	8

To make the subtraction go faster, we can take away a bunch of 5's at a time:

```
6)245
 - 50 | 10
  195
 - 50 | 10
  145
 - 50 | 10
   95
 - 50 | 10
   45
 - 45 |  9
    0 | 49
```

We can't take out 50 more, but we know that 5 goes into 45 9 times

We add up how many times we took out 5's (to make bags of 5 cookies)

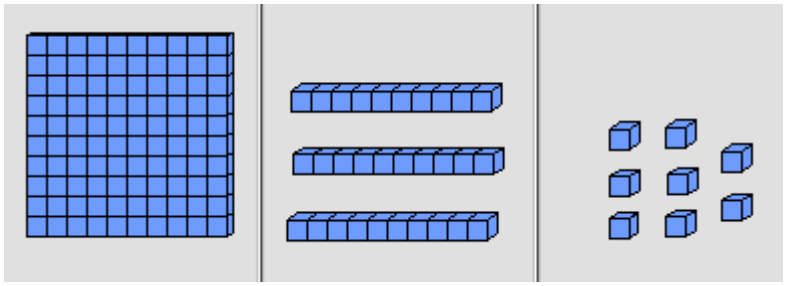
So we see that we can take out 49 groups of 5, to make 49 bags of cookies.

This is called the partial quotient method. Students can get more efficient at it by noticing patterns:

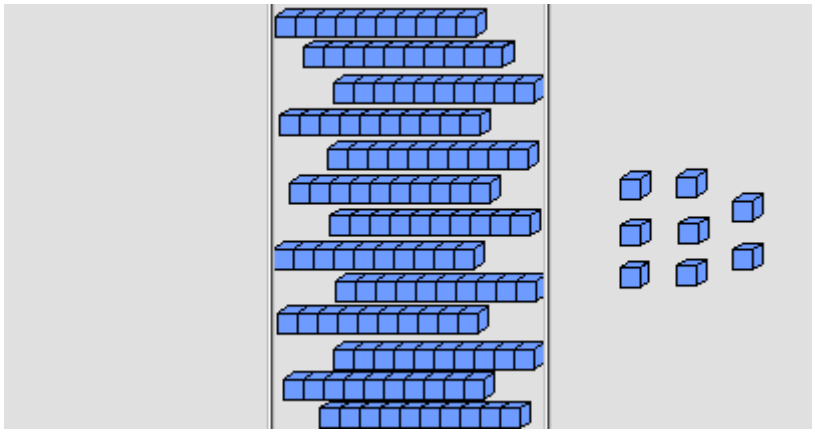
```
6)245
 - 50 | 10
  195
 -100 | 20
   95
 - 50 | 10
   45
 - 45 |  9
    0 | 49
```

2. The school office has 138 pencils and wants to share them equally among 6 classes. How many would each class get?

This is a partitive division problem: We split up the 138 equally among 6 groups. We solve it by splitting up the hundreds, then the tens, then the ones.



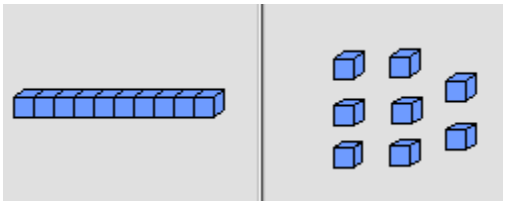
Can we share one 100 flat equally among 6 classes? No, so we need to decompose 100 into 10 tens.



Now can we share 13 rods equally among 6 classes?

Yes. Each class gets 2 rods, which is 20.

We have 18 left.



Can we share them equally among 6 classes? Yes. We know that 3 x 6 = 18, so each class gets 3 more pencils. The answer is 20 + 3 = 23 pencils.

```
  0      20    3
6)100 + 30 + 8
 -0
  100 + 30          Can we share 1 hundred equally? No.
       -120         Can we share 13 tens equally? Yes.
         10 + 8
        -18               We can share 18 equally. Yes. None are left over.
          0
```

An abbreviated way to show this is:

```
  023       The answer is 23.
6)138
 -0         Can we share 1 hundred equally? No. Write 0 above.
  13        Can we share 13 tens equally? Yes. Write 2 (for 20) above.
 -12
   18       There is 1 ten left, and 8 ones. We can share 18 equally?
  -18       Write 3 (ones) above.
    0
```

If the division procedure above is confusing because the student has a hard time keeping track of place value, **use an index card to cover the tens and ones** in order to focus on the hundreds, then move the card over to cover the ones in order to focus on the tens, etc.

To visually show division with remainders:

Rectangle division
http://nlvm.usu.edu/en/nav/category_g_2_t_1.html