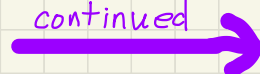


Group Work : DA for $n=3 \dots$ in action. (2 parts)

(1) Fill in below chart by writing a as $a = 3q + r$ with $q, r \in \mathbb{Z}$ and $0 \leq r < 3$.

| order to do | a | r | $a = 3q + r$ |
|-----------------|-----|-----|----------------|
| 15 | -6 | | |
| 14 | -5 | | |
| 13 | -4 | | |
| 12 | -3 | | |
| 11 | -2 | | |
| 10 | -1 | | |
| 1 st | 0 | 0 | $0 = 3(0) + 0$ |
| 2 nd | 1 | 1 | $1 = 3(0) + 1$ |
| 3 rd | 2 | 2 | $2 = 3(0) + 2$ |
| 4 | 3 | | |
| 5 | 4 | | |
| 6 | 5 | | |
| 7 | 6 | | |
| 8 | 7 | | |
| 9 | 8 | | |

continued 

Part 1 continued. Let $a, q, r \in \mathbb{Z}$.

If $a = 3q + r$, then $a - r = \underline{\hspace{4cm}}$
and so $\underline{\hspace{2cm}}$ divides $\underline{\hspace{2cm}}$.

(2) For the integers a with $-6 \leq a \leq 8$,
we just divided a by $3 \in \mathbb{N}$ and found the remainder $r \in \{0, 1, 2\}$.

Let's compare the integers that have the same remainder r
by completing the below chart so that as we read
down a column the numbers are increasing.

Under a "remainder column", write the $a \in \mathbb{N}$ for $-6 \leq a \leq 8$
that have that column's remainder.

| division by 3 | $r=0$ | $r=1$ | $r=2$ |
|---------------|-------|-------|-------|
| | -6 | | |
| | -3 | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

If we take the difference between any two
numbers in the same column, do you notice pattern?