ADDITION   28 + 45

Front end/Splitting both numbers

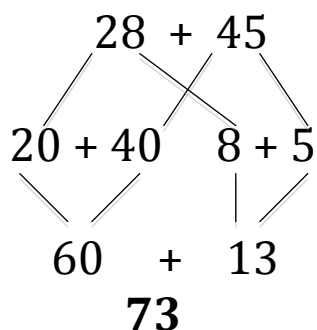20 + 40 = 60
  8 + 5 = _13_
          73

      20 + 8
   + 40 + 5
      60 + 13 = 73 (60 + 10 + 3)

    28 + 45

20 + 40   8 + 5

   60   +   13
        73

      28
   + 45
      13 (add ones)
     _60_ (add tens)
      73

Keeping One Number Whole, Taking Friendly Jumps
(Shown on Open Number Lines)

+ 20   + 5   + 3

45   65   70   **73**

+ 40   + 2   + 3

28   68   70   **73**
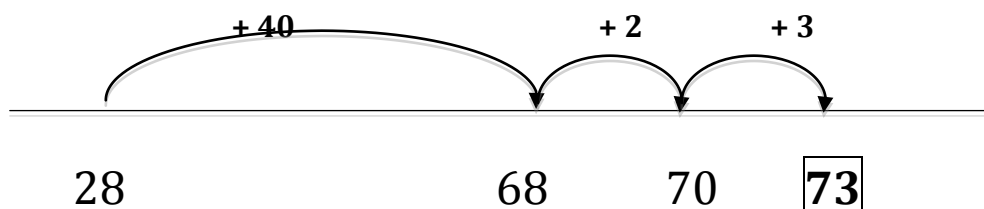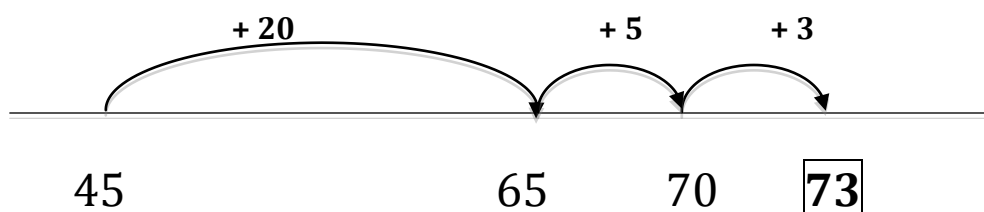
ADDITION continued   **28 + 45**

Or smaller friendly jumps of 10
(Shown on Open Number Lines)

+10	+10	+5	+3

45   55   65   70   **73**
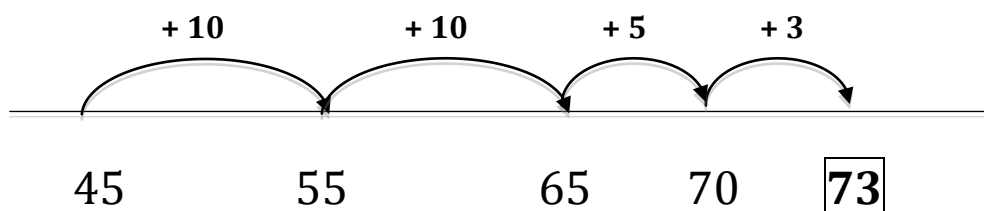
Compensation

For 28 + 45, think "I know **30 + 45 = 75**
I added 2 extra so I need to subtract them":
75 – 2 = 73

Take 2 from 45 and give it to 28 to make a friendly
number (30):

          28 + 45
    +2 ↓   ↓ -2
        30 + 43   = 73

SUBTRACTION   94 - 49
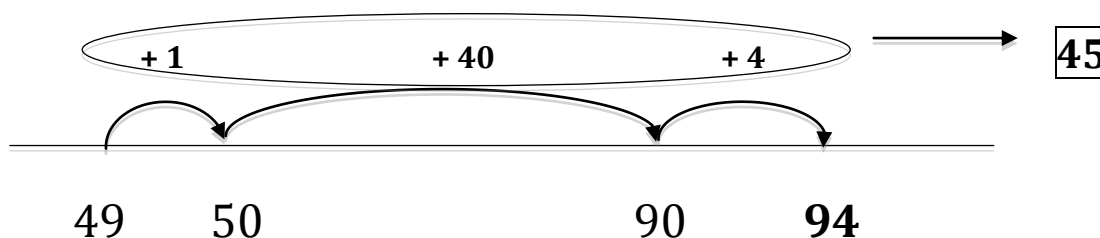
==**Keeping One Number Whole, Taking Friendly Jumps**==
==(Shown on Open Number Lines)==

- 5   - 4   - 40

45   50   54   94
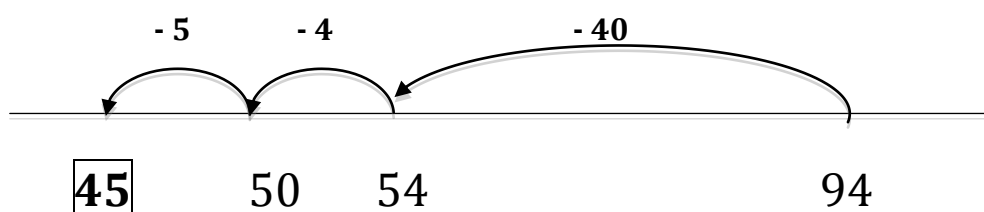
==**Think addition: 49 + □ = 94**==

+ 1   + 40   + 4   **45**

49   50   90   **94**

==**Splitting both numbers**==

94 – 49 : There won't be enough ones, so I'll split 94 this way:

```
  94  =  80 + 14
- 49  =  40 +  9   Now I can subtract
         40 +  5  =  45
```

SUBTRACTION **94 - 49**
cont'd

==**Compensation**==

For 94 - 49, think "I know **94 - 50 = 44**
I subtracted 1 extra so I need to add it back":
44 + 1 = 45

==**Constant Difference**==

Add 1 to both numbers to make a friendly number (50):

$$
\begin{array}{ccc}
94 & - & 49 \\
+1 \downarrow & & \downarrow +1 \\
\mathbf{95} & \mathbf{-} & \mathbf{50} & \mathbf{=} & \mathbf{45}
\end{array}
$$

MULTIPLICATION 25×16

Halve and Double

$$
\begin{array}{ccc}
25 & \times & 16 \\
\times 2 \downarrow & & \downarrow \div 2 \\
50 & \times & 8 \\
\times 2 \downarrow & & \downarrow \div 2 \\
100 & \times & 4 = \textbf{400}
\end{array}
$$

Think of Money

25¢ × 16   There are 4 × 25¢ in \$1
           so 16 × 25¢ = \$4 or **400**¢

Partial Products

Break up 16 into 10 + 4 + 2

$25 \times 10 = 250$
$25 \times 4 = 100$
$25 \times 2 = \underline{50}$
$\qquad\qquad\textbf{400}$

MULTIPLICATION cont'd

25 × 16

Partial Products

```
    25
×  16
    30   (6 × 5)
   120   (6 × 20)
    50   (10 × 5)
   200   (10 × 20)
   400
```

Area Model (Open Array)

25 = 20 + 5
16 = 10 + 6

	20	5
10	200	50
6	120	30

320 + 80 = 400

DIVISION

397 ÷ 6
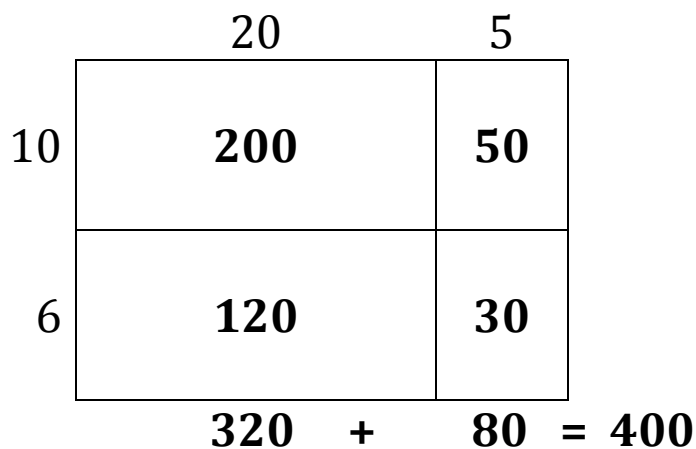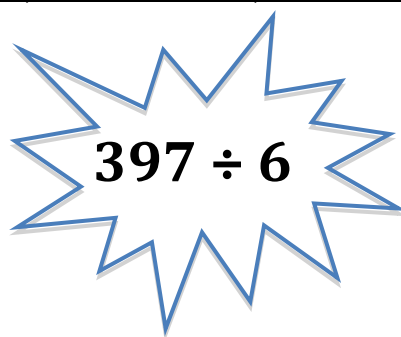
Equal Sharing

1. Give each group 50.
   6 × 50 = 300
   97 left to share

2. Give each group 10.
   6 × 10 = 60
   37 left to share

3. Give each group 6.
   6 × 6 = 36
   <u>1 left over</u>

50 10 6	50 10 6
50 10 6	50 10 6
50 10 6	50 10 6

Each group gets **66**, one left over

Using Multiplication

$6 \times \square = 397$

$$6 \times 60 = 360$$
$$6 \times 6 = \underline{\ 36}$$
$$396$$

$6 \times 66 = 396$

$397 \div 6 = \mathbf{66}$ with a remainder of 1 (**R1**)

DIVISION $397 \div 6$
cont'd

<mark>**Repeated Subtraction**</mark>

```
6 │ 397
   -360    60    Think "I can subtract 6 groups of 60 = 360"
     37
    -36     6    Think "I can subtract 6 groups of 6 = 36"
      1          I have 1 left over
  ─────────
        66 R1
```

<mark>**Splitting the Dividend into Friendly Numbers**</mark>

```
      50  +  10  +  6    R1      = 66 R1
  ─────────────────────────
6 │ 300  +  60  +  36  +  1
```