

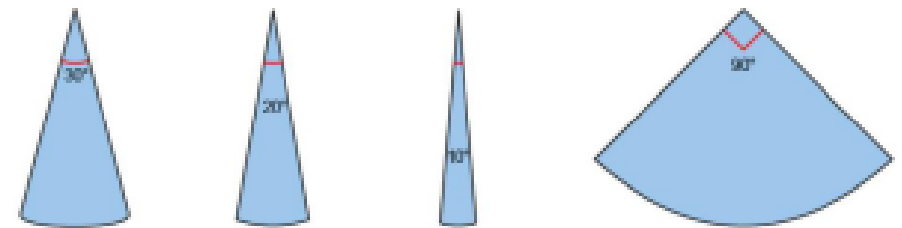
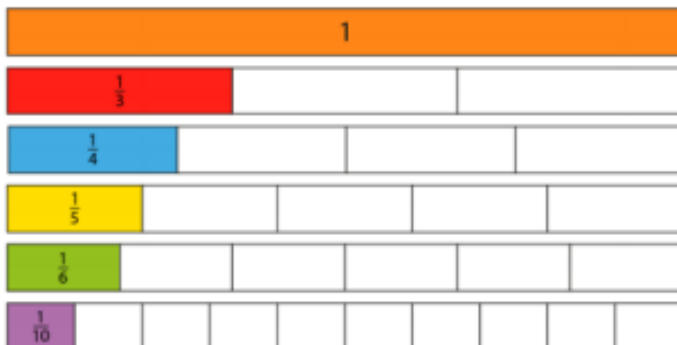


Visual Coding

Key Representations

Progression from years 1-6

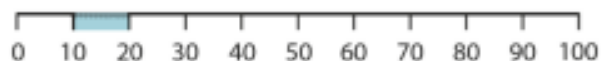
Spring Term



a selection of 'standard angle' measuring tools

Year 1:1.5

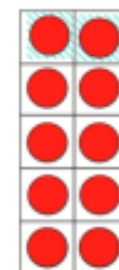
Visual coding: key representations



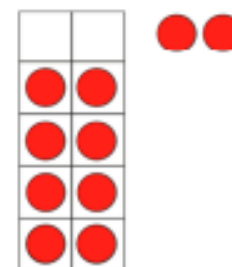
Hundred square:

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

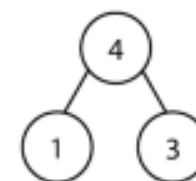
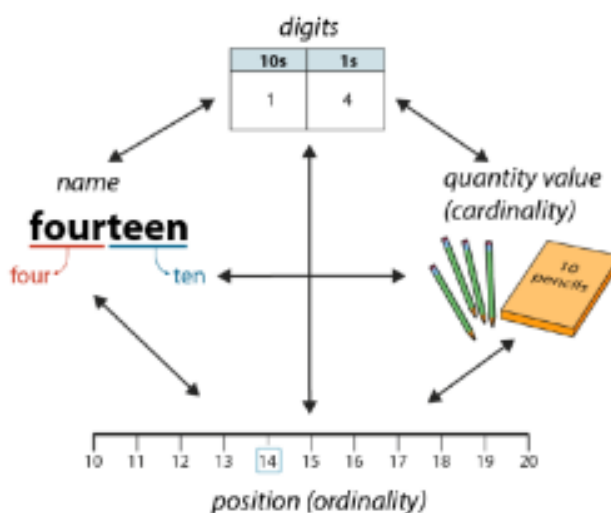
Name	Digits	What it means
eleven	11	one ten one
twelve	12	one ten two
thirteen	13	one ten three
fourteen	14	one ten four
fifteen	15	one ten five
sixteen	16	one ten six
seventeen	17	one ten seven
eighteen	18	one ten eight
nineteen	19	one ten nine



$$8 + 2 = 10$$



$$10 - 2 = 8$$



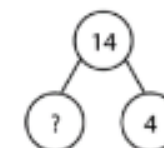
$$4 = 3 + 1$$

$$4 - 3 = 1$$

$$4 = 1 + 3$$

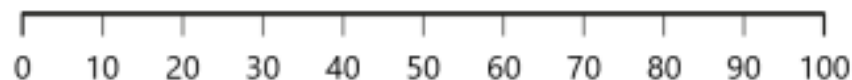
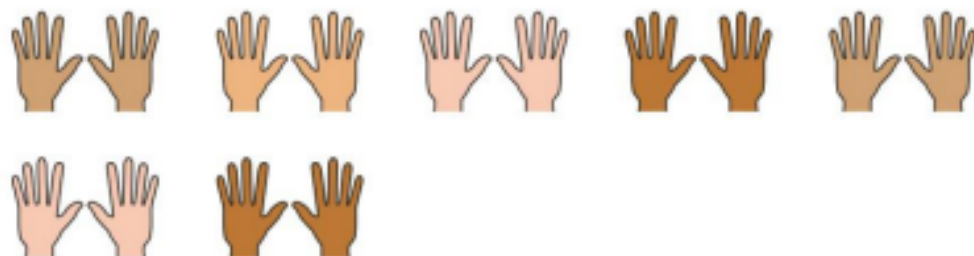
$$4 - 1 = 3$$

There are fourteen children in the classroom. Four are painting. How many are not painting?



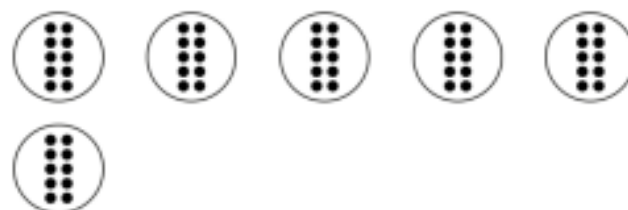
Year 1:1.6

Visual coding: key representations



How many two-pence coins would you need to buy this eraser?

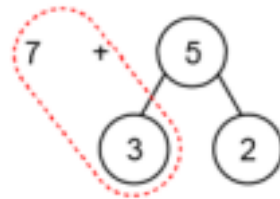
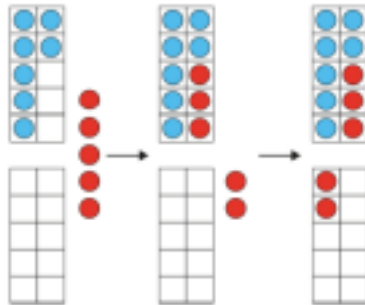
How many dots are there?
Count in groups of ten.



Year 2:2.5

Visual coding: key representations

$$7 + 5 = 7 + 3 + 2$$

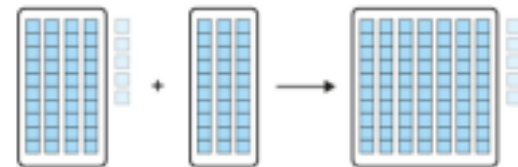


$$\begin{array}{r} 15 - 9 \\ \quad 5 \quad 4 \\ \hline 15 - 5 = 10 \\ 10 - 4 = 6 \\ \text{so} \\ 15 - 9 = 6 \end{array}$$



$$\begin{array}{r} 15 - 9 \\ 10 \quad 5 \\ \hline 10 - 9 = 1 \\ 1 + 5 = 6 \\ \text{so} \\ 15 - 9 = 6 \end{array}$$

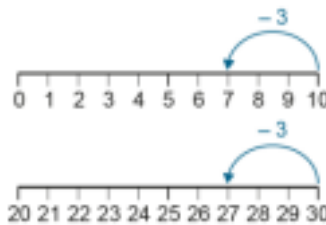
+	0	1	2	3	4	5	6	7	8	9	10
0	0+0	0+1	0+2	0+3	0+4	0+5	0+6	0+7	0+8	0+9	0+10
1	1+0	1+1	1+2	1+3	1+4	1+5	1+6	1+7	1+8	1+9	
2	2+0	2+1	2+2	2+3	2+4	2+5	2+6	2+7	2+8	2+9	
3	3+0	3+1	3+2	3+3	3+4	3+5	3+6	3+7			
4	4+0	4+1	4+2	4+3	4+4	4+5	4+6				
5	5+0	5+1	5+2	5+3	5+4	5+5					
6	6+0	6+1	6+2	6+3	6+4						
7	7+0	7+1	7+2	7+3							
8	8+0	8+1	8+2								
9	9+0	9+1									
10	10+0										



$$\begin{array}{rcl} 4 & + & 3 = 7 \\ \text{so } 40 & + & 30 = 70 \\ 45 & + & 30 = 75 \end{array}$$

$$10 - 3 = 7$$

$$30 - 3 = 27$$



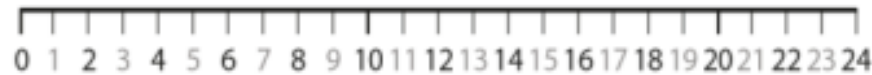
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Stock Photos, Royalty-Free Images and Vectors - Shutterstock

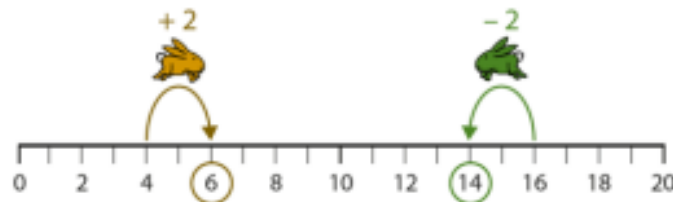
Year 2:2.6

Visual coding: key representations

Skip counting in twos – number line:



Skip counting in twos – objects in pairs:



Gattegno chart:

1000	2000	3000	4000	5000	6000	7000	8000	9000
100	200	300	400	500	600	700	800	900
10	20	30	40	50	60	70	80	90
1	2	3	4	5	6	7	8	9



5	5	5
---	---	---



'There are four groups of two footballs.'

2	2	2	2
---	---	---	---

- 'We can write this as two plus two plus two plus two.'

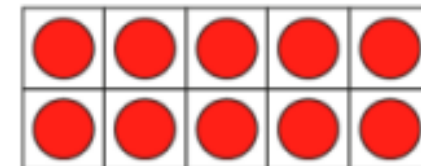
$$2 + 2 + 2 + 2$$

- 'We can write this as four times two.'

$$4 \times 2$$

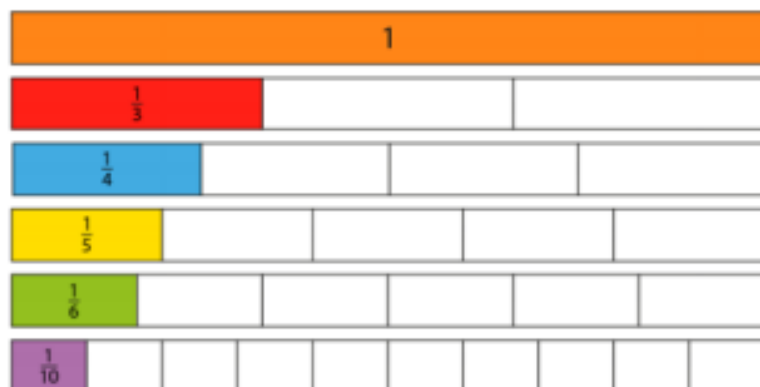


$$5 + 5 + 5 = 3 \times 5$$

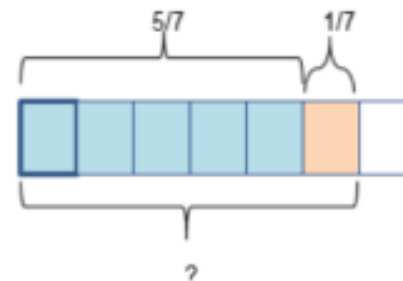
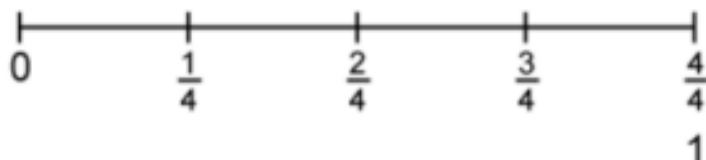


Year 3: 3.6

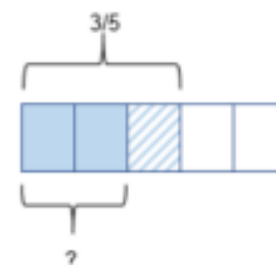
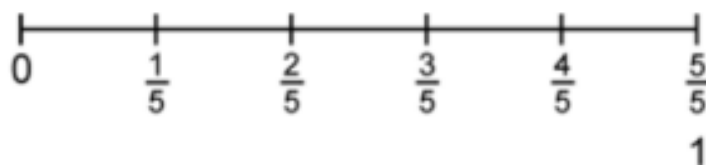
Visual coding: key representations



a circle divided into 3 equal parts, with one part shaded



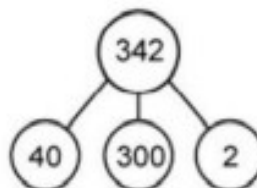
$$\frac{5}{7} + \frac{1}{7} = ?$$



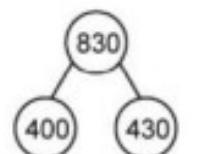
$$\frac{3}{5} - \frac{1}{5} = ?$$

Year 3: 3.7

Visual coding: key representations

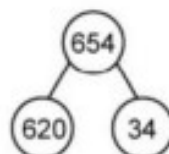


two representations of the place-value composition of 342



$$830 - 400 = 430$$

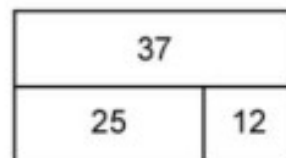
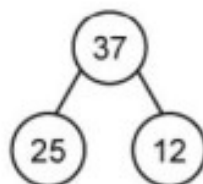
: partitioning 830 into 430 and 400



$$620 + 34 = 654$$

partitioning 654 into 620 and 34

+	0	1	2	3	4	5	6	7	8	9	10
0	0+0	0+1	0+2	0+3	0+4	0+5	0+6	0+7	0+8	0+9	0+10
1	1+0	1+1	1+2	1+3	1+4	1+5	1+6	1+7	1+8	1+9	1+10
2	2+0	2+1	2+2	2+3	2+4	2+5	2+6	2+7	2+8	2+9	2+10
3	3+0	3+1	3+2	3+3	3+4	3+5	3+6	3+7	3+8	3+9	3+10
4	4+0	4+1	4+2	4+3	4+4	4+5	4+6	4+7	4+8	4+9	4+10
5	5+0	5+1	5+2	5+3	5+4	5+5	5+6	5+7	5+8	5+9	5+10
6	6+0	6+1	6+2	6+3	6+4	6+5	6+6	6+7	6+8	6+9	6+10
7	7+0	7+1	7+2	7+3	7+4	7+5	7+6	7+7	7+8	7+9	7+10
8	8+0	8+1	8+2	8+3	8+4	8+5	8+6	8+7	8+8	8+9	8+10
9	9+0	9+1	9+2	9+3	9+4	9+5	9+6	9+7	9+8	9+9	9+10
10	10+0	10+1	10+2	10+3	10+4	10+5	10+6	10+7	10+8	10+9	10+10



partitioning diagrams showing
the additive relationship between 25, 12
and 37

$$25 + 12 = 37$$

$$12 + 25 = 37$$

$$37 = 25 + 12$$

$$37 = 12 + 25$$

$$37 - 12 = 25$$

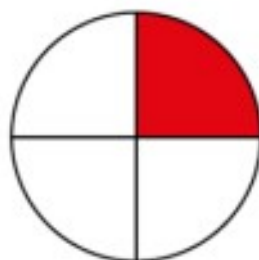
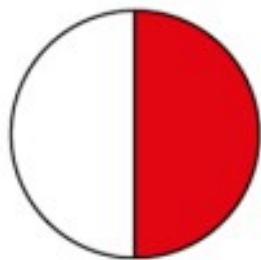
$$37 - 25 = 12$$

$$25 = 37 - 12$$

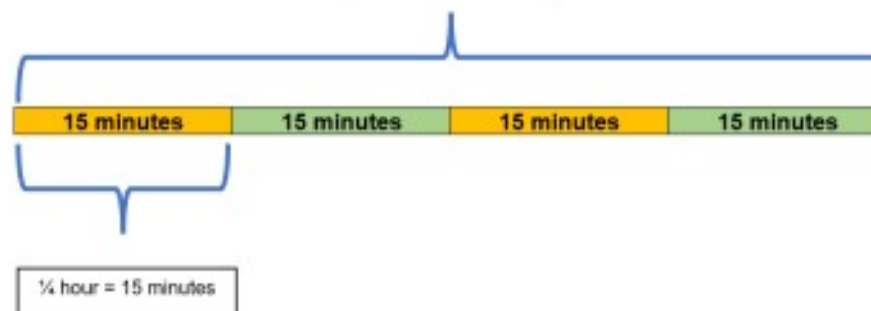
$$12 = 37 - 25$$

Year 3: 3.8

Visual coding: key representations

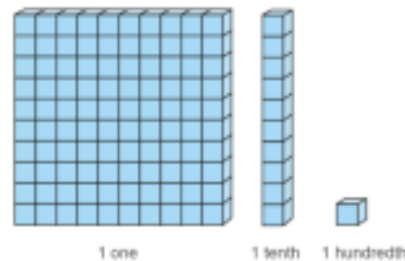


1 hour = 60 minutes
 $\frac{1}{2}$ hour = 30 minutes
 $\frac{1}{4}$ hour = 15 minutes
 $\frac{3}{4}$ hour = 45 minutes



Year 4: 4.6

Visual coding: key representations



10 tenths are equivalent to one.

0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2
2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3
3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4
4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9	5
5.1	5.2	5.3	5.4	5.5	5.6	5.7	5.8	5.9	6
6.1	6.2	6.3	6.4	6.5	6.6	6.7	6.8	6.9	7
7.1	7.2	7.3	7.4	7.5	7.6	7.7	7.8	7.9	8
8.1	8.2	8.3	8.4	8.5	8.6	8.7	8.8	8.9	9
9.1	9.2	9.3	9.4	9.5	9.6	9.7	9.8	9.9	10

1 m					1 m					$\frac{1}{5}$ m	$\frac{1}{5}$ m	$\frac{1}{5}$ m
$\frac{1}{5}$ m	$\frac{1}{5}$ m	$\frac{1}{5}$ m	$\frac{1}{5}$ m	$\frac{1}{5}$ m	$\frac{1}{5}$ m	$\frac{1}{5}$ m	$\frac{1}{5}$ m	$\frac{1}{5}$ m	$\frac{1}{5}$ m	$\frac{1}{5}$ m	$\frac{1}{5}$ m	$\frac{1}{5}$ m

$2\frac{3}{5}$ m = $\frac{13}{5}$ m

Figure 32: bar model showing mixed number-improper fraction equivalence



Figure 30: number line showing integers expressed as fractions

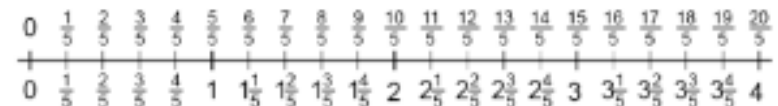


Figure 31: number line showing mixed number-improper fraction equivalence

Fraction notation	Decimal notation	Name
$\frac{1}{10}$	0.1	one-tenth
$\frac{1}{100}$	0.01	one-hundredth

Improper fraction	Prompt question	Mixed number
$\frac{21}{10}$	How many groups of $\frac{10}{10}$ in $\frac{21}{10}$? (2 groups and 1 more tenth.)	$2\frac{1}{10}$
$\frac{21}{9}$	How many groups of $\frac{9}{9}$ in $\frac{21}{9}$?	
$\frac{21}{8}$	How many groups of $\frac{8}{8}$ in $\frac{21}{8}$?	
$\frac{21}{7}$	How many groups of $\frac{7}{7}$ in $\frac{21}{7}$?	
$\frac{21}{6}$	How many groups of $\frac{6}{6}$ in $\frac{21}{6}$?	
$\frac{21}{5}$	How many groups of $\frac{5}{5}$ in $\frac{21}{5}$?	
$\frac{21}{4}$	How many groups of $\frac{4}{4}$ in $\frac{21}{4}$?	
$\frac{21}{3}$	How many groups of $\frac{3}{3}$ in $\frac{21}{3}$?	
$\frac{21}{2}$	How many groups of $\frac{2}{2}$ in $\frac{21}{2}$?	

"There are 2 groups of five-fifths, which is 10 fifths and 3 more fifths. This is 13 fifths."

Year 4: 4.7

Visual coding: key representations



$$5,000 + 300 + 40 + 2 = 5,342$$

5,342

1,000s	100s	10s	1s
5	3	4	2

The digit in the thousands place is 5. It has a value of 5,000.

The digit in the hundreds place is 3. It has a value of 300.

The digit in the tens place is 4. It has a value of 40.

The digit in the ones place is 2. It has a value of 2.

5,342

1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000
100	200	300	400	500	600	700	800	900
10	20	30	40	50	60	70	80	90
1	2	3	4	5	6	7	8	9

$$5,000 + 300 + 40 + 2 = 5,342$$

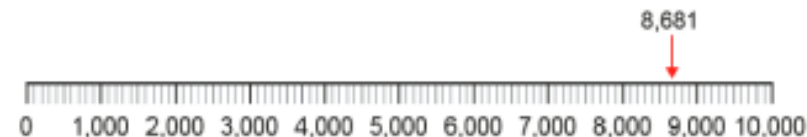
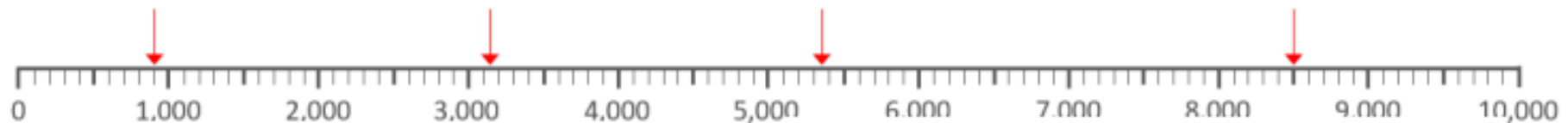


Figure 7: using a number line to identify the previous and next multiple of 1,000

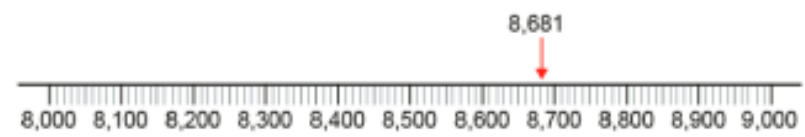
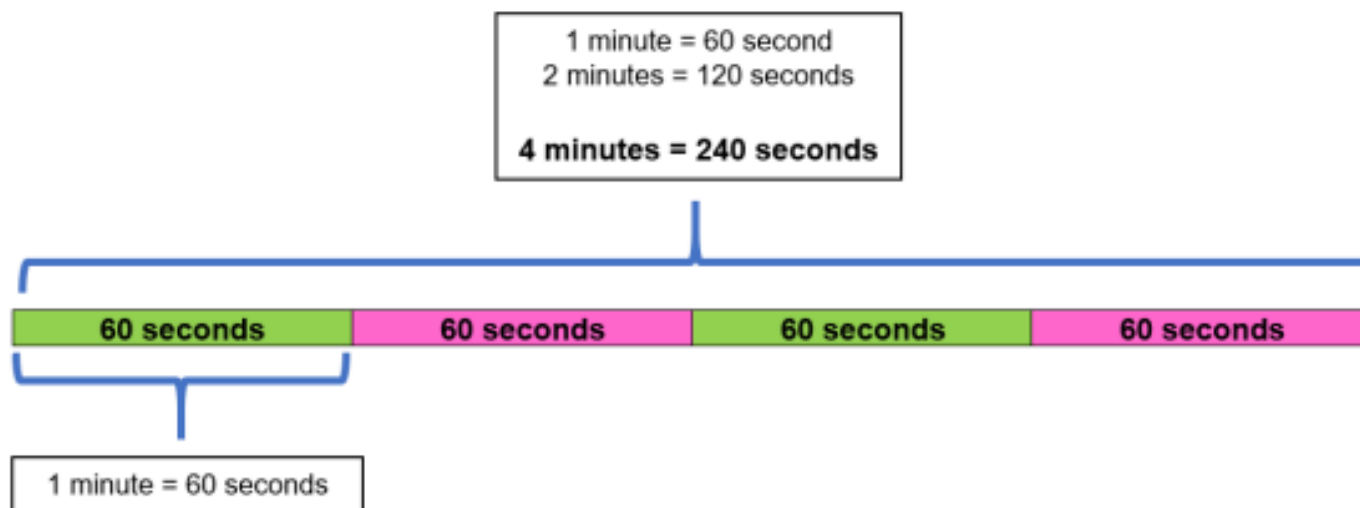


Figure 8: using a number line to identify the previous and next multiple of 100

Year 4: 4.8

Visual coding: key representations

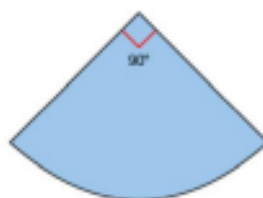
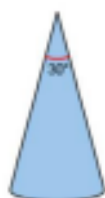
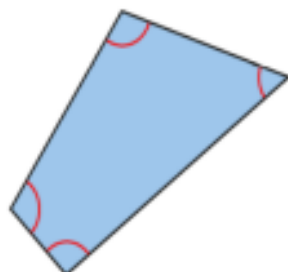
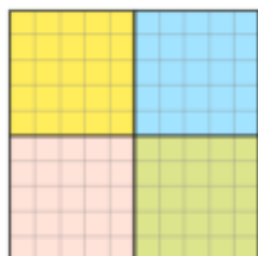


Year 5: 5.6

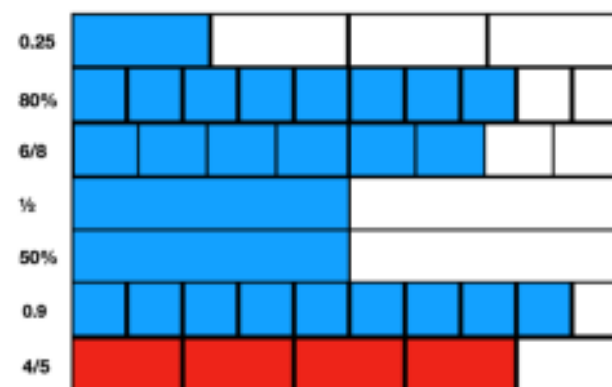
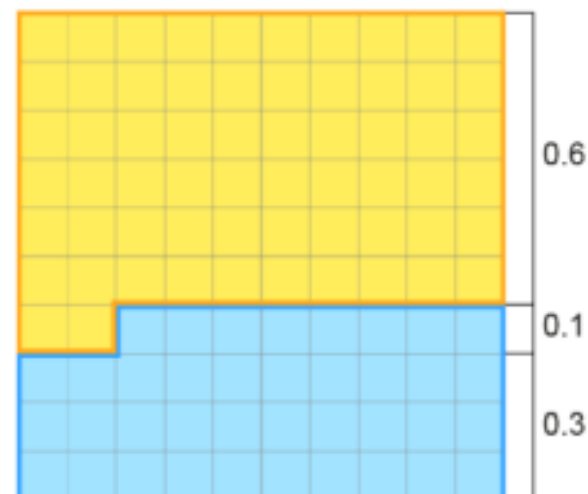
Visual coding: key representations

1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000
100	200	300	400	500	600	700	800	900
10	20	30	40	50	60	70	80	90
1	2	3	4	5	6	7	8	9
0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09

$\times 10$ $\rightarrow$ $\leftarrow$ $\div 10$

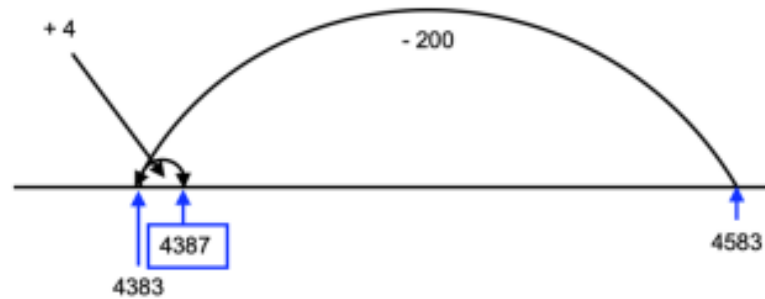


: a selection of 'standard angle' measuring tools



Year 5: 5.7

Visual coding: key representations



Rounding and adjusting

previous
whole number

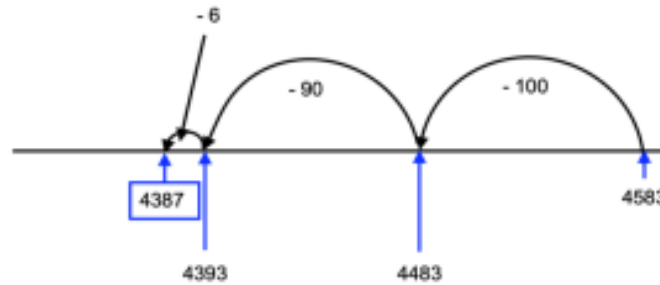
8

< 8.61 <

next
whole number

9

Distance in km expressed as a fraction	Distance in km expressed as a decimal fraction	Distance in metres
$\frac{1}{5}$ km	0.2km	200m
$\frac{1}{4}$ km	0.25km	250m
$\frac{1}{2}$ km	0.5km	500m
$\frac{3}{4}$ km	0.75m	750m
$\frac{1}{10}$ km	0.1km	100m
all other multiples of $\frac{1}{10}$ km, for example, $\frac{7}{10}$ km	0.7km	700m



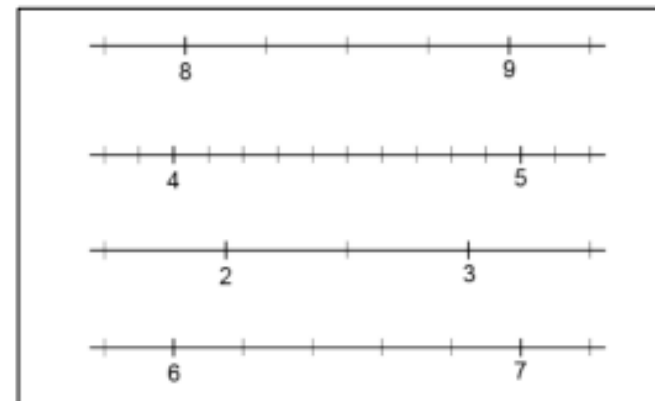
Partitioning

1	
0.5	0.5

1				
0.2	0.2	0.2	0.2	0.2

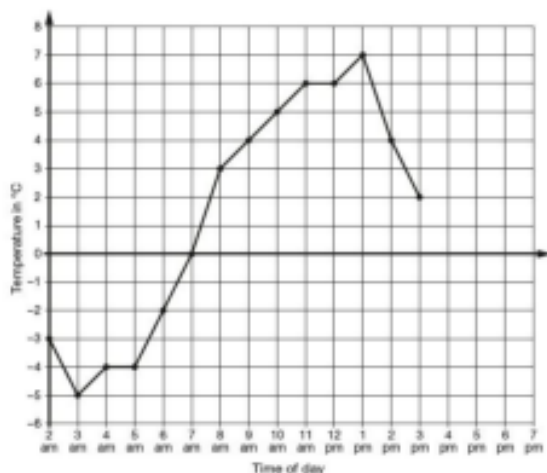
1			
0.25	0.25	0.25	0.25

1									
0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1



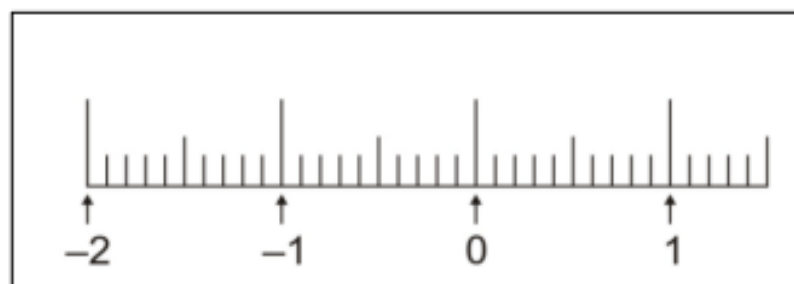
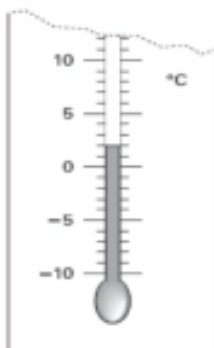
Year 5: 5.8

Visual coding: key representations



Time	Mon	Tue	Wed	Thu	Fri
9:00 am – 10:30 am	Maths	English	Maths	English	Maths
10:30 am – 11:00 am	Break	Break	Break	Break	Break
11:00 am – 12:00 pm	English	Maths	Science	Maths	English

	100 m race	800 m race
Elise	15.9 seconds	3 minutes 02 seconds
Jake	19.7 seconds	2 minutes 58 seconds
Teri	16.8 seconds	3 minutes 01 seconds
Neil	17.1 seconds	2 minutes 59 seconds
Barry	18.4 seconds	2 minutes 57 seconds



Year 6: 6.6

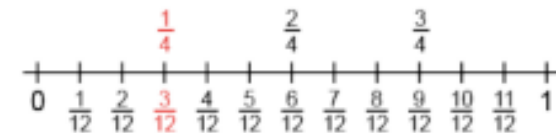
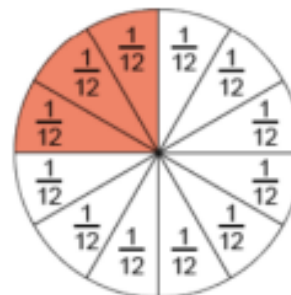
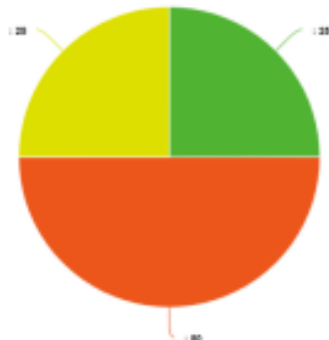
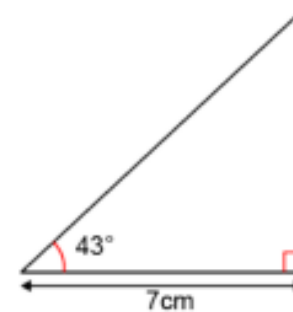
Visual coding: key representations



Key
 red
 blue

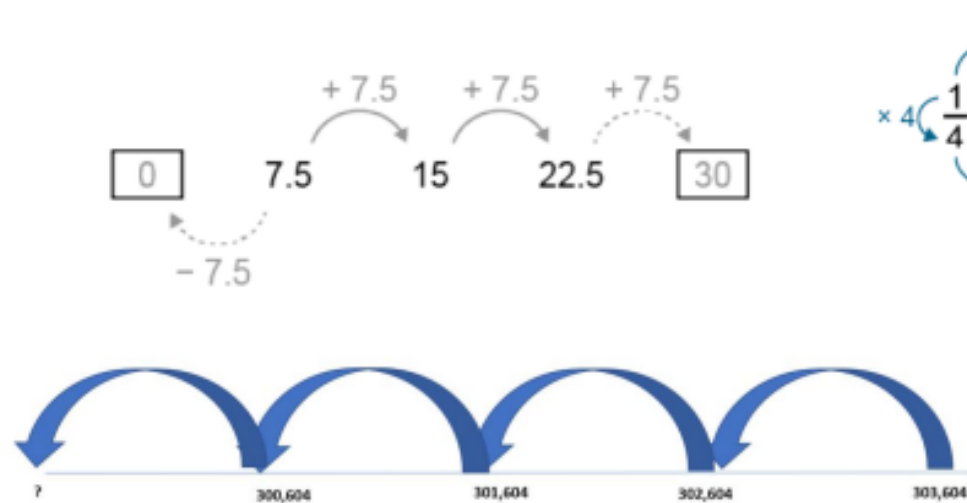
bead strings, each with the structure 'for every 1 red bead, there are 3 blue beads'

cups of rice	1	2	3	4	5	6
cups of water	2	4	6	8	10	12



Year 6: 6.7

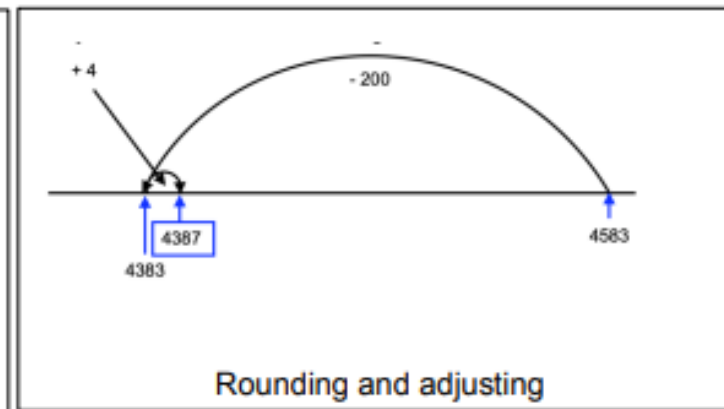
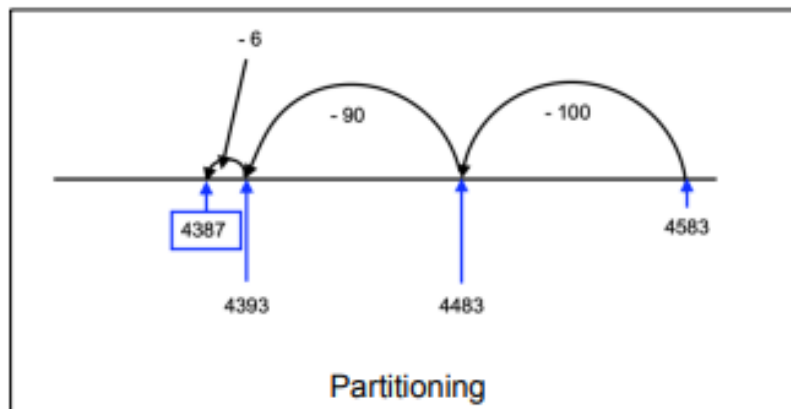
Visual coding: key representations



$$\frac{1}{4} \times 3 = \frac{3}{12} \times 4$$

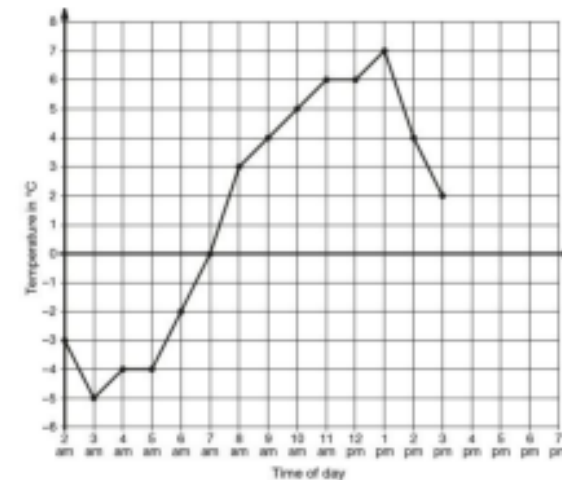
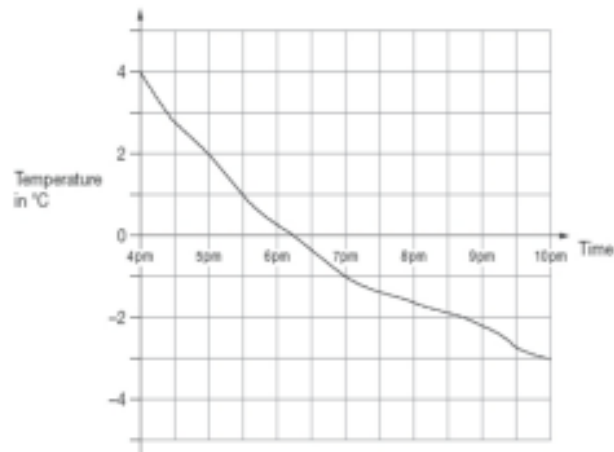
$$\frac{20}{12} = \frac{5}{3} = 1\frac{2}{3}$$

Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones
Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones

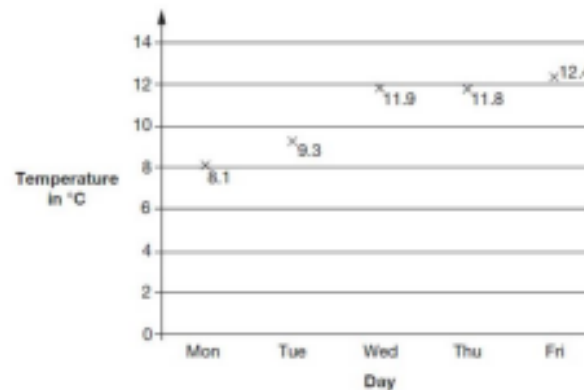


Year 6: 6.8

Visual coding: key representations



Children	Height (cm)
Stefan	144
Lara	136
Olivia	142
Chen	143
Maria	152
Dev	148
Sarah	150



City	Temperature	
	At midnight	At midday
Paris	-4°C	-2°C
Oslo	-13°C	-7°C
Rome	3°C	10°C
Warsaw	-6°C	2°C

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