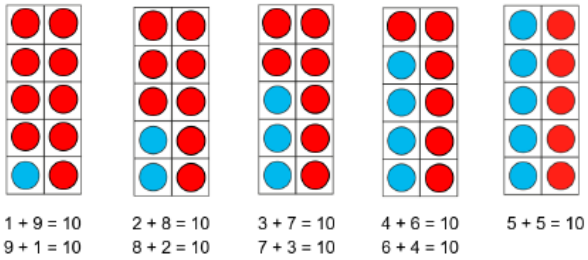
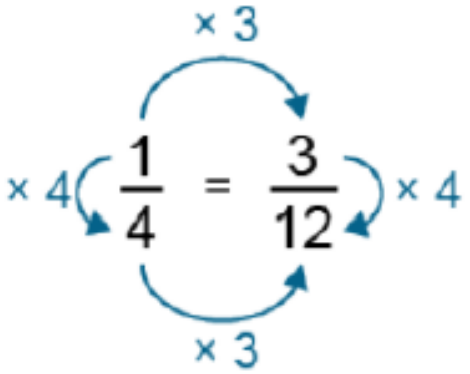
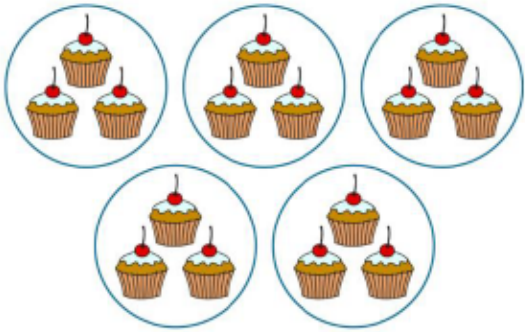
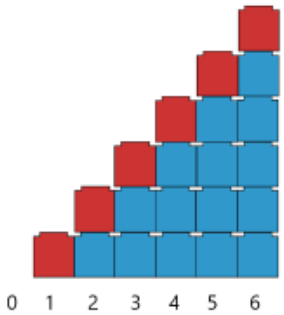
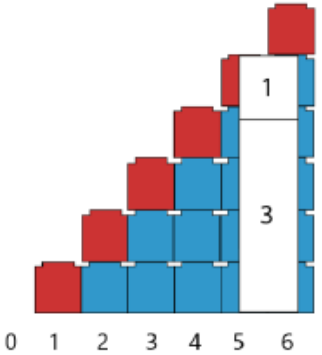




Visual Coding
Key Representations
Progression from years 1-6
Summer Term

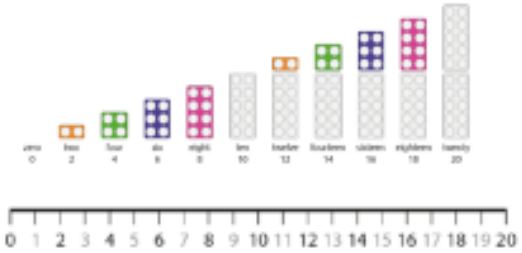


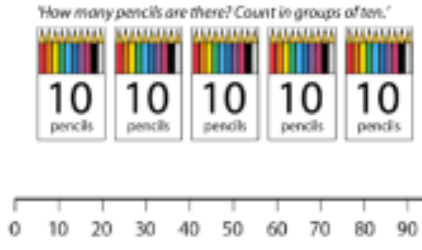


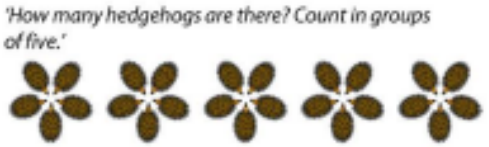


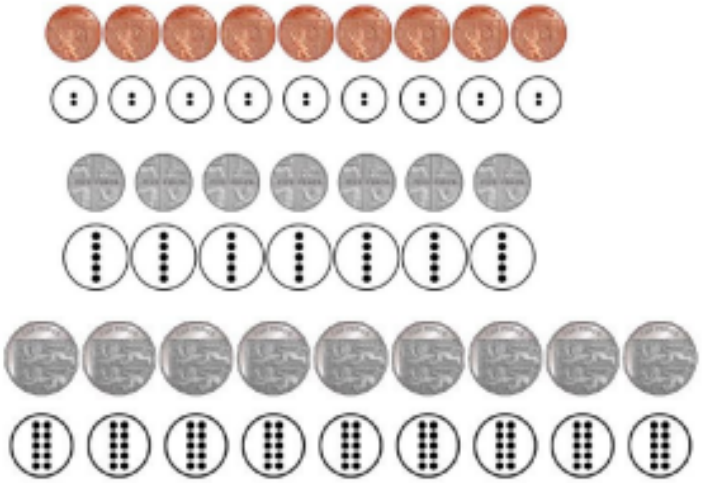
Year 1: 1.10

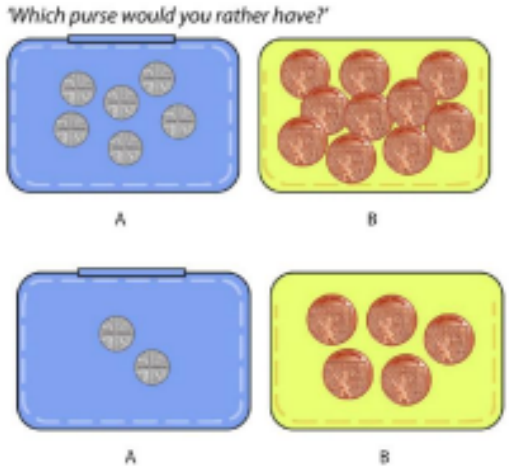
Visual coding: key representations











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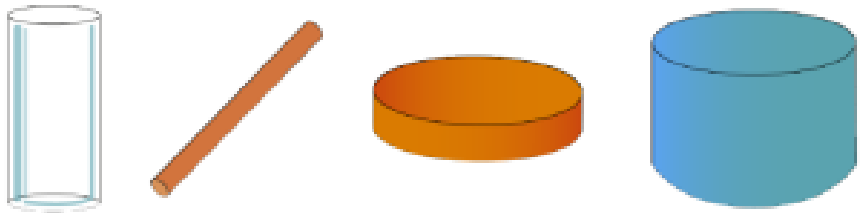
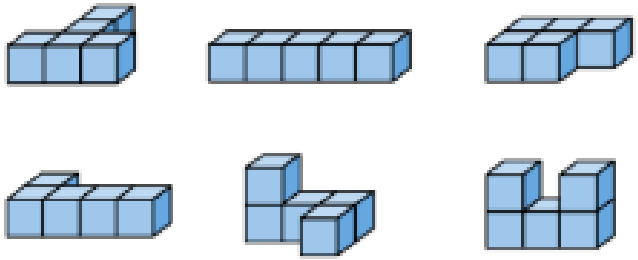
Year 1: 1.11

Visual coding: key representations

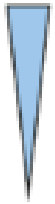




Which shape is a triangle?

a

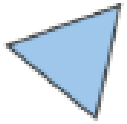
b



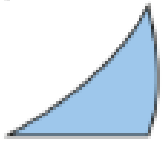
c

d

e



f



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Year 1: 1.12

Visual coding: key representations

Digits	What it means
10	1 ten
20	2 tens
30	3 tens
40	4 tens
50	5 tens
60	6 tens
70	7 tens
80	8 tens
90	9 tens
100	10 tens

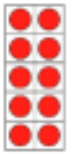
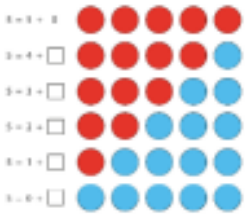
Dienes ten rod	Base-ten number board	Tens frame
		

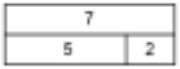
Figure 28: aggregation or partitioning context: 5 cakes altogether, 2 with cherries and 3 without

2 + 3 = 5
5 = 2 + 3
3 + 2 = 5
5 = 3 + 2

5 − 3 = 2
2 = 5 − 3
5 − 2 = 3
3 = 5 − 2

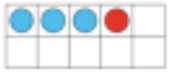


Pupils must also learn to relate addition and subtraction contexts and equations to mathematical diagrams such as bar models, number lines, tens frames with counters, and partitioning diagrams.



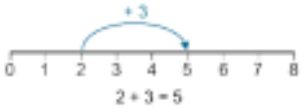
7 − 2 = 5

Figure 29: bar model and subtraction equation (7 − 2 = 5)



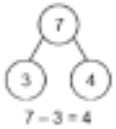
3 + 1 = 4

Figure 31: tens frame with counters and addition equation (3 + 1 = 4)



2 + 3 = 5

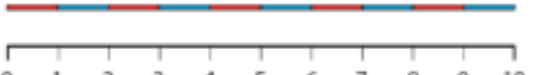
Figure 30: number line and addition equation (2 + 3 = 5)

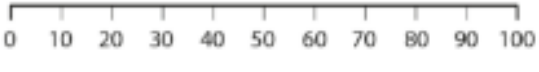


7 − 3 = 4

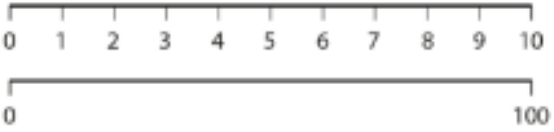
Figure 32: cherry partitioning model and subtraction equation (7 − 3 = 4)

'Fill in the missing numbers.'





'Mark the numbers twenty and sixty on the number line.'



'Estimate where each of the numbers lie on the number line.'

'Which multiple of ten is this?'

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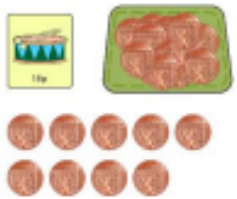
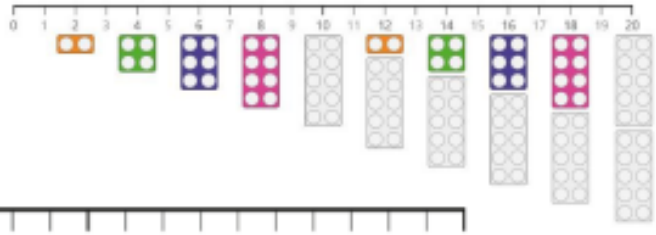
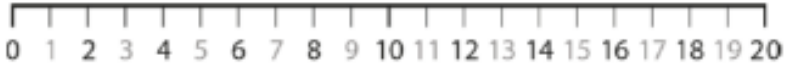
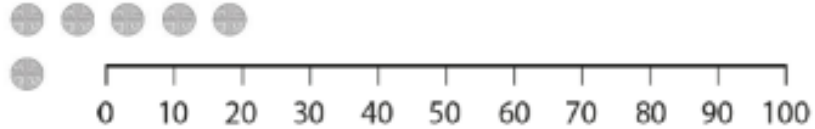
Year 1: 1.13

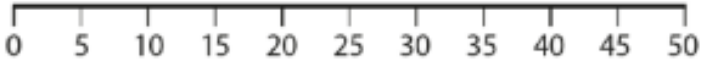
Visual coding: key representations

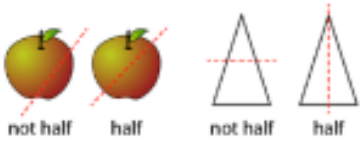






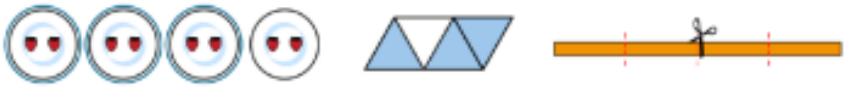






Model	Say	Write	Notation
 one-half	'The apple has been divided…'	Write the division bar.	$\frac{1}{2}$
	'…into 2 equal parts…'	Write '2' as the denominator.	
	'…and we have 1 of the parts.'	Write '1' as the numerator.	

Model	Say	Write	Notation
 one-quarter	'The strawberries have been divided…'	Write the division bar.	$\frac{1}{4}$
	'…into 4 equal parts…'	Write '4' as the denominator.	
	'…and 1 of the parts is circled.'	Write '1' as the numerator.	



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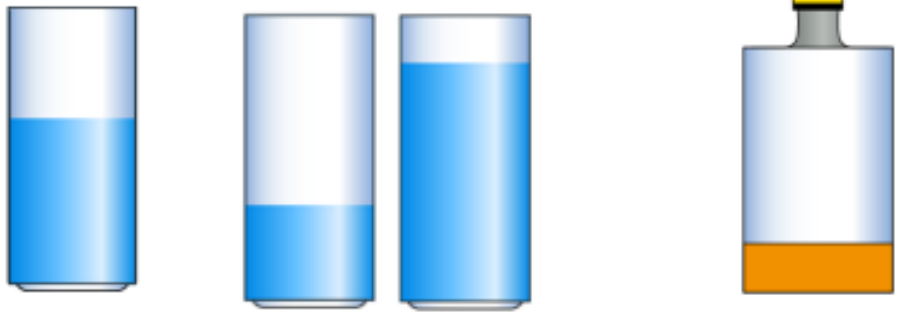
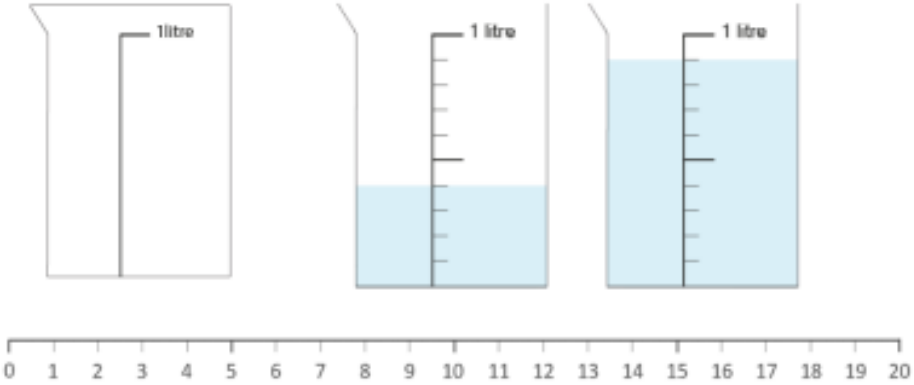
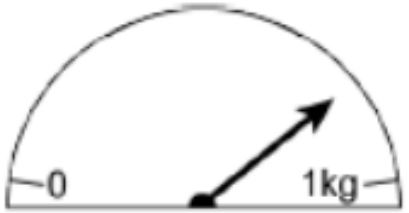
Year 1: 1.14

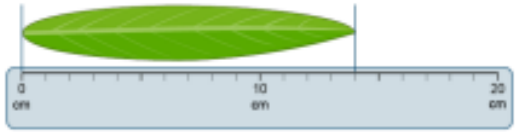
Visual coding: key representations

'Full, half full, less than half full, empty…'









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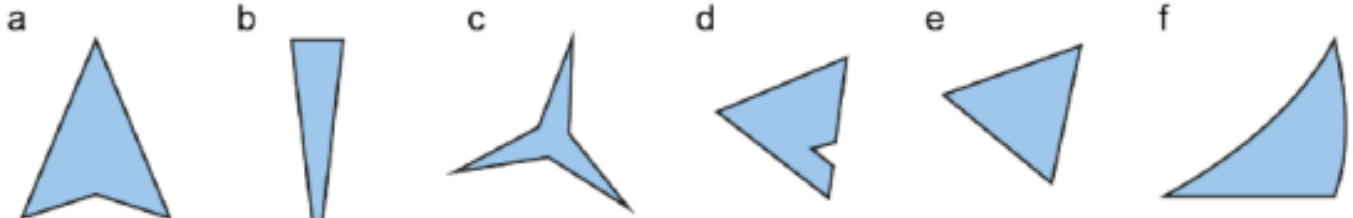
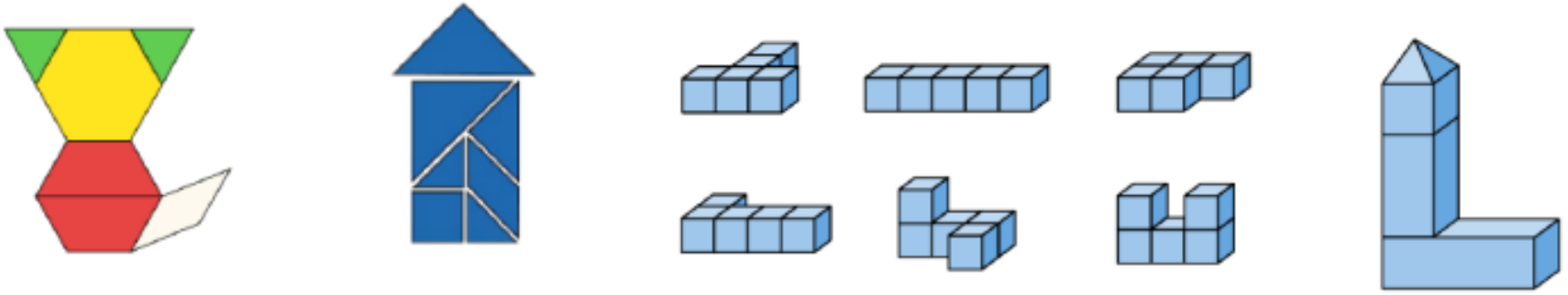
Year 1: 1.15

Visual coding: key representations



Shape a: "This is not a triangle because it has 4 sides."
Shape b or e: "This is a triangle because it has 3 straight sides."
Shape c or d: "This is not a triangle because it has 6 sides."

Shape f: "This is not a triangle because some sides are curved."



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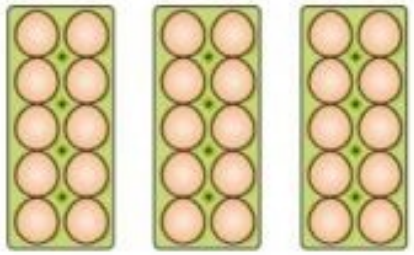
Year 2: 2.10

Visual coding: key representations

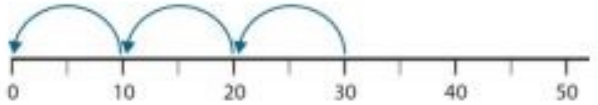
	×2
0	0
1	2
2	4
3	
4	8
5	10
6	12
7	
8	16
9	18
10	20
11	22
12	24

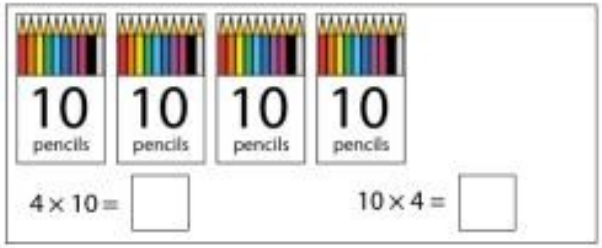
↓ +2 $3 \times 2 = 2 \times 2 + 2$

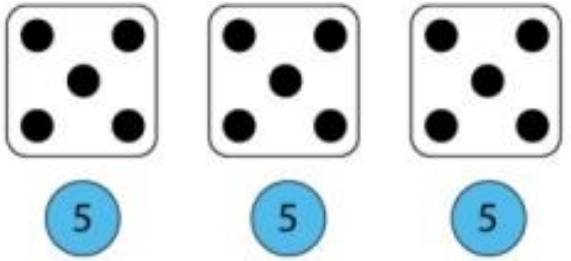
↑ −2 $7 \times 2 = 8 \times 2 - 2$

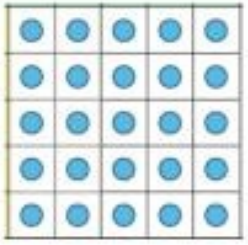


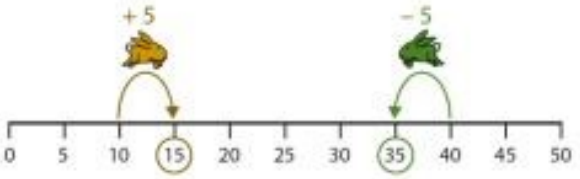
$3 \times 10 = 30$











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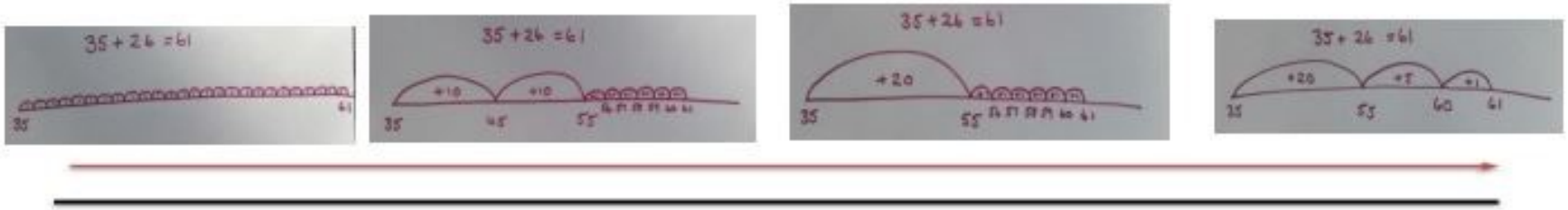
Year 2: 2.11

Year 2: 2.12

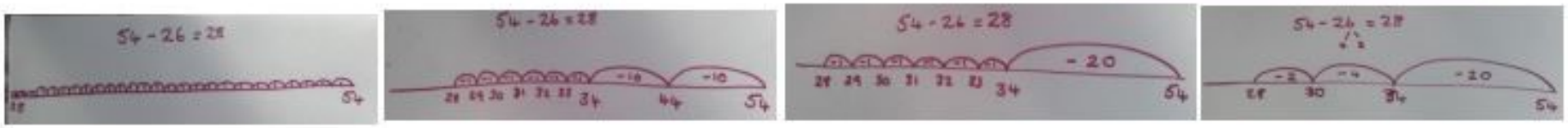
Visual coding: key representations

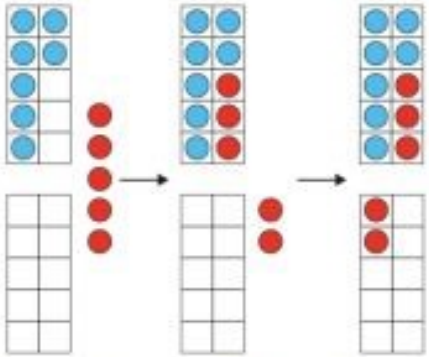


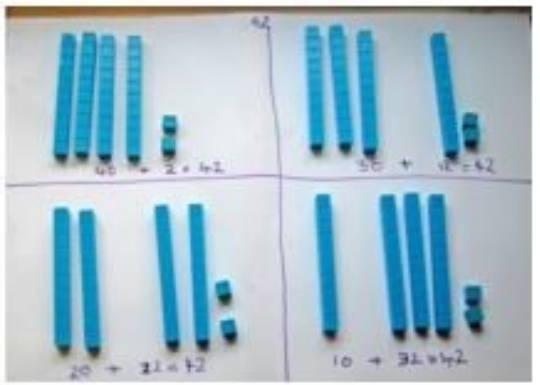
Inefficient: Counting in ones.

'Continuum of Efficiency'

Most efficient: Using number bonds to bridge Through 10







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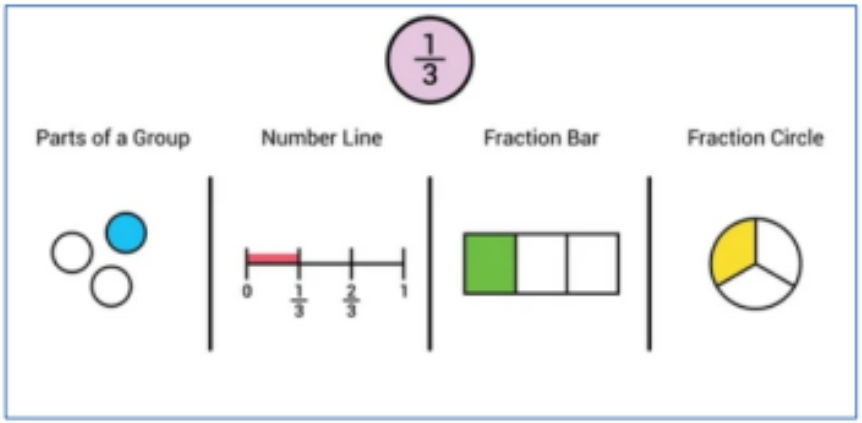
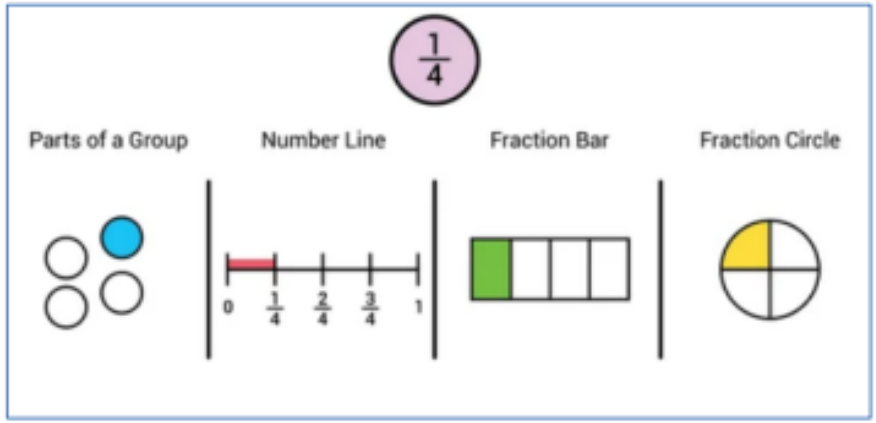
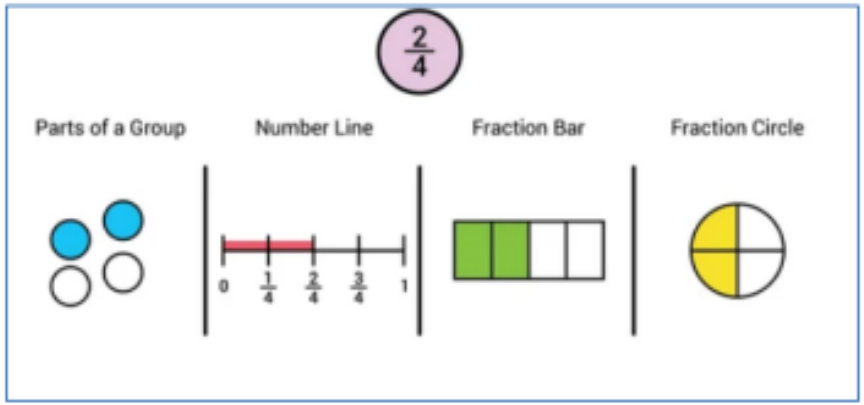
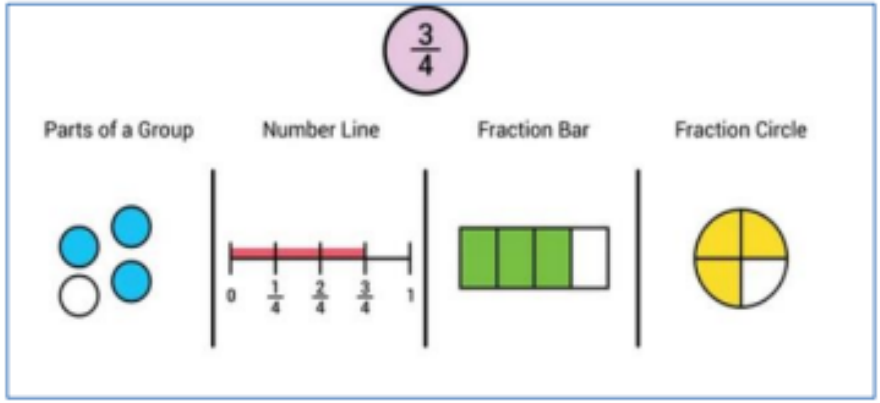
Year 2: 2.13

Visual coding: key representations









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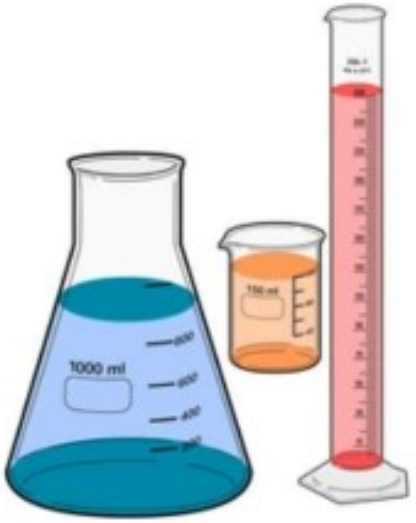
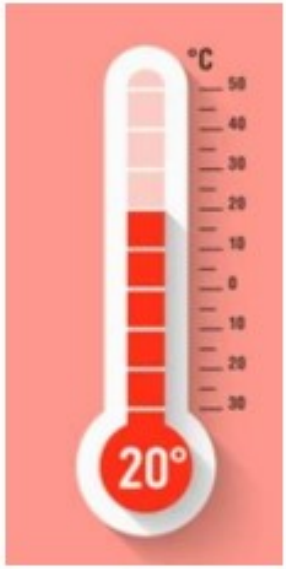
Year 2: 2.14

Visual coding: key representations





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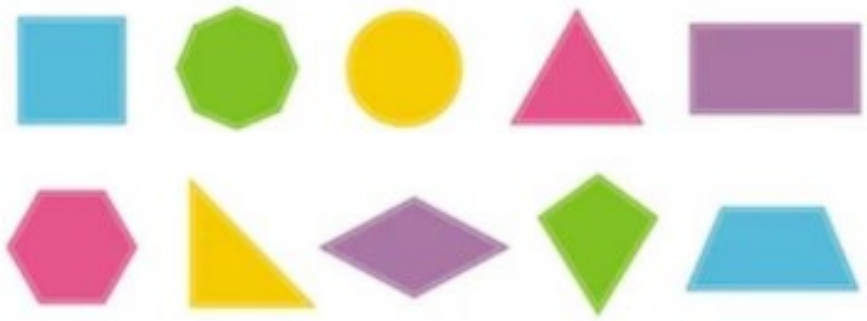
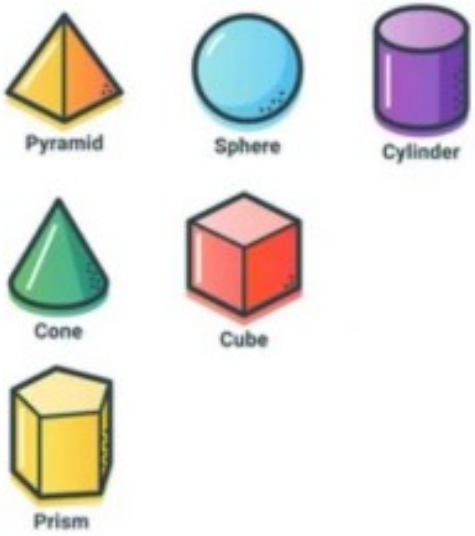
Year 2: 2.15

Visual coding: key representations





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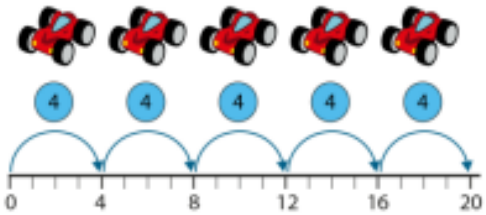
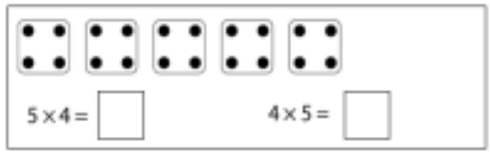
Year 3: 3.11

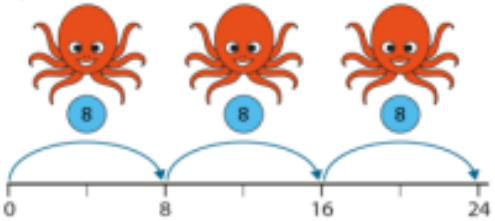
Visual coding: key representations

'How many wheels are there? Count in groups of four.'

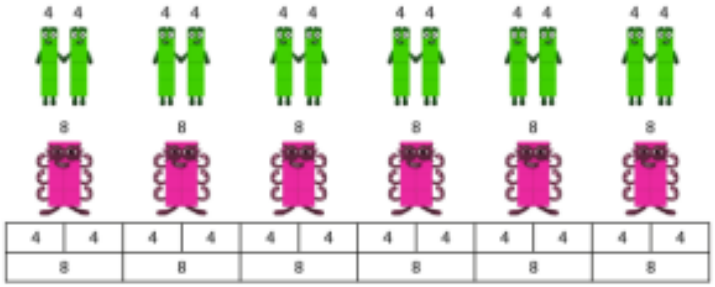


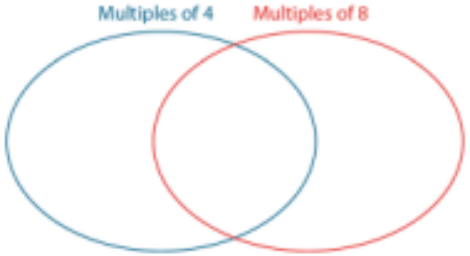


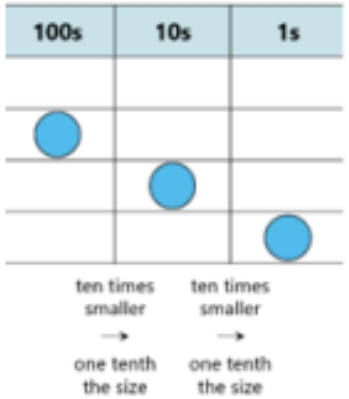
'How many tentacles are there? Count in groups of eight.'

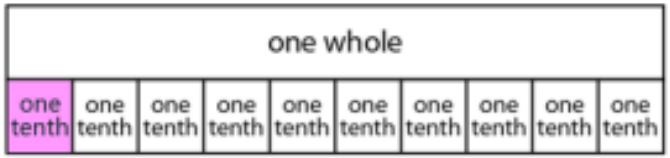


4 × 0 = 0	8 × 0 = 0
4 × 1 = 4	8 × 1 = 8
4 × 2 = 8	8 × 2 = 16
4 × 3 = 12	8 × 3 = 24
4 × 4 = 16	8 × 4 = 32
4 × 5 = 20	8 × 5 = 40
4 × 6 = 24	8 × 6 = 48
4 × 7 = 28	8 × 7 = 56
4 × 8 = 32	8 × 8 = 64
4 × 9 = 36	8 × 9 = 72
4 × 10 = 40	8 × 10 = 80
4 × 11 = 44	8 × 11 = 88
4 × 12 = 48	8 × 12 = 96









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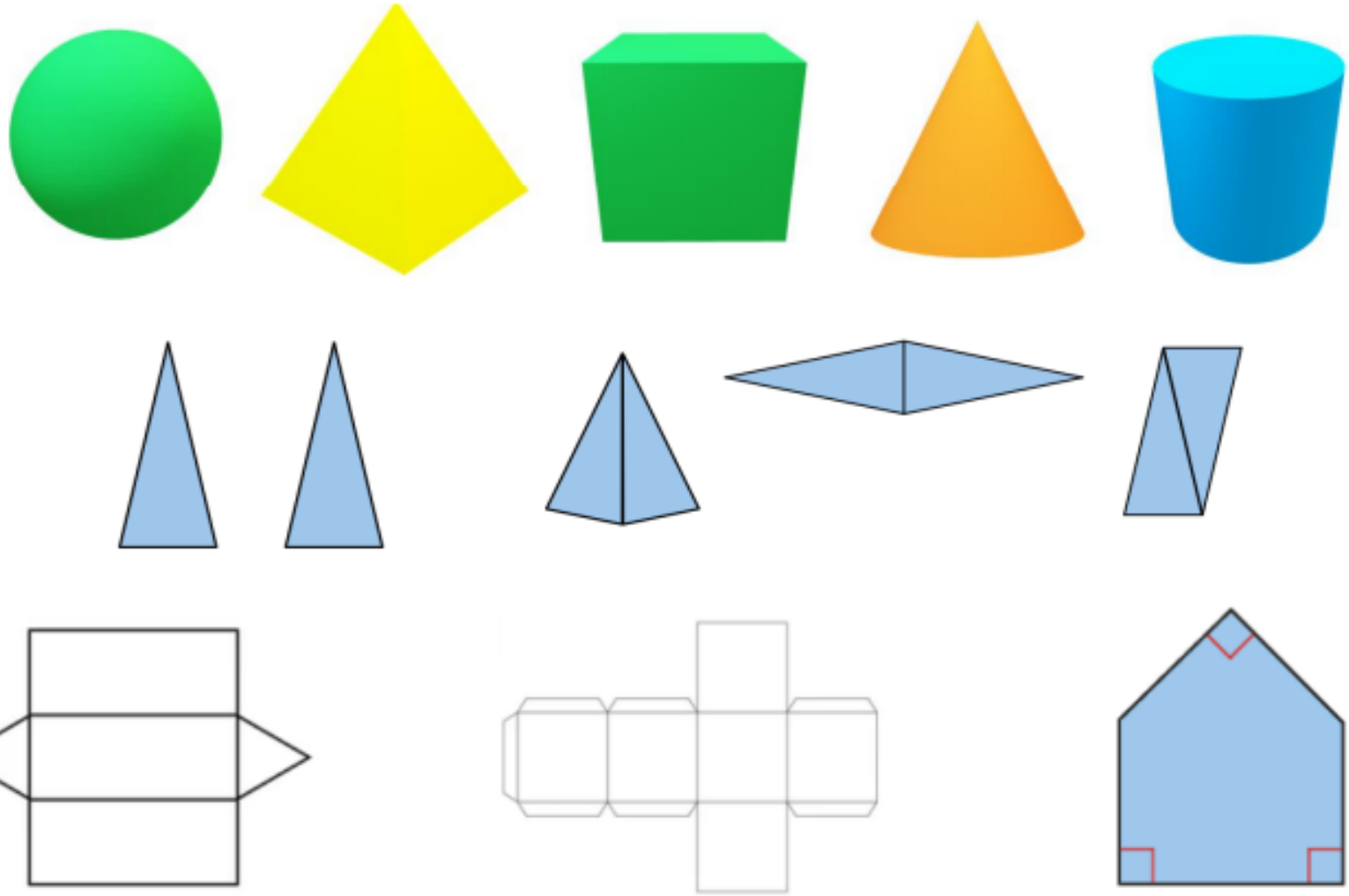
Year 3: 3.12

Visual coding: key representations



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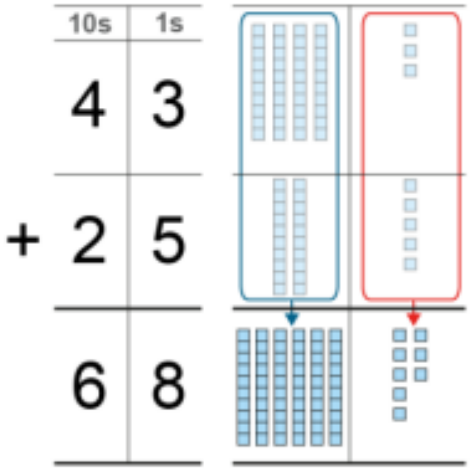
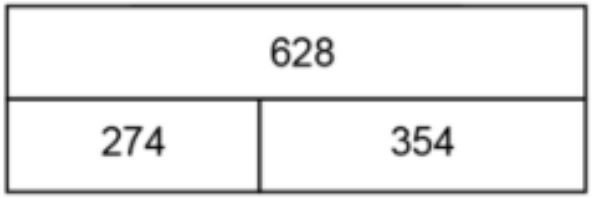
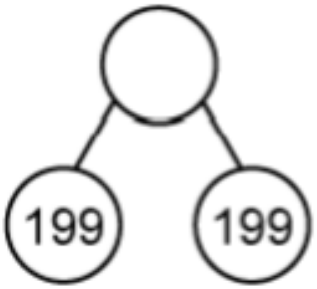
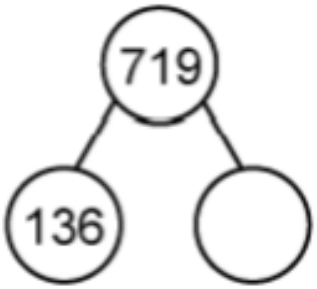
Year 3: 3.13

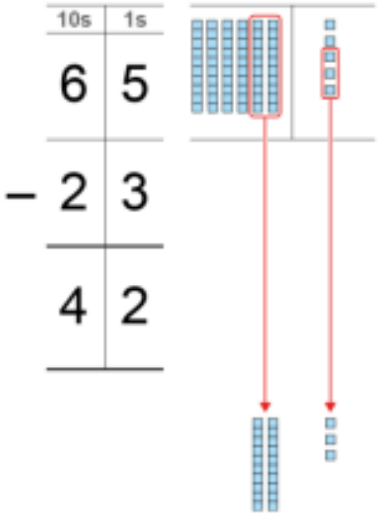
Visual coding: key representations











Use column addition	Use mental strategies

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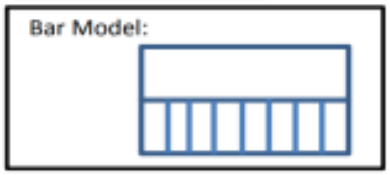
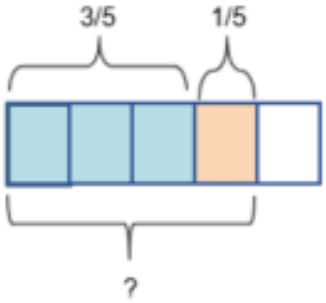
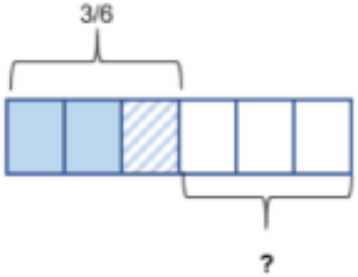
Year 3: 3.14

Visual coding: key representations

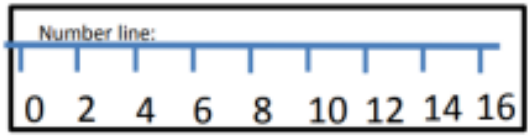
Array

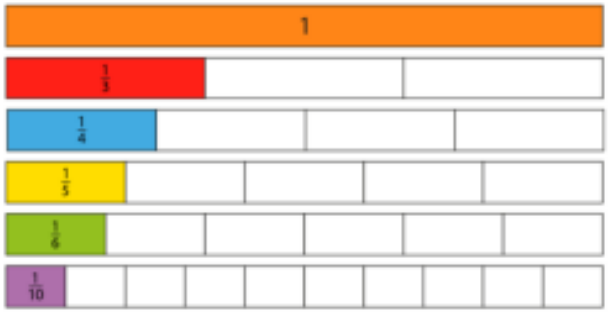


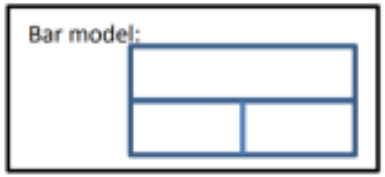


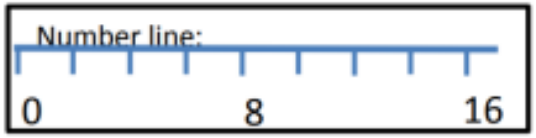


Eg 2x8= 16









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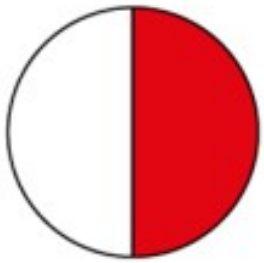
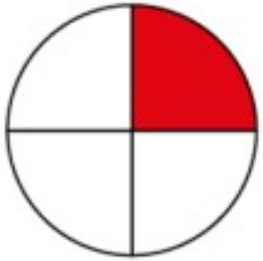
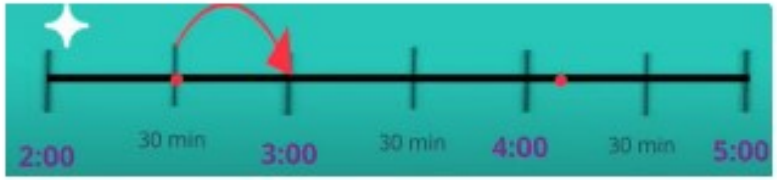
Year 3: 3.15

Visual coding: key representations







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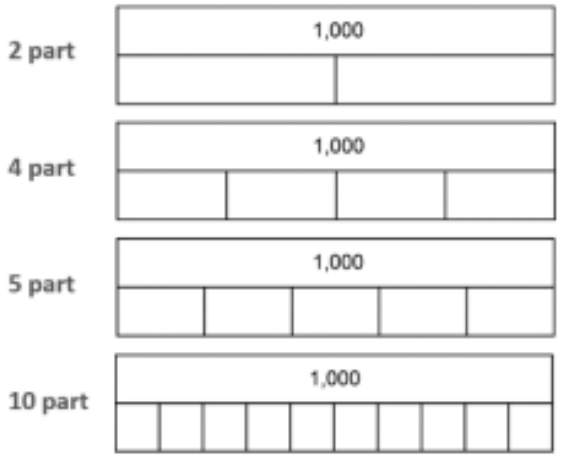
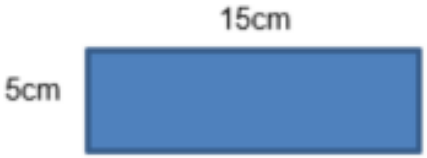
Year 3: 3.16

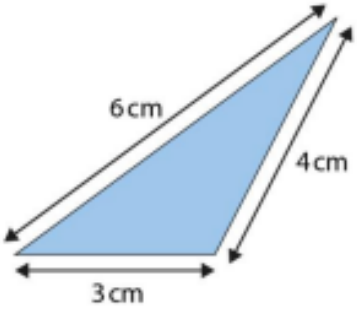
Visual coding: key representations

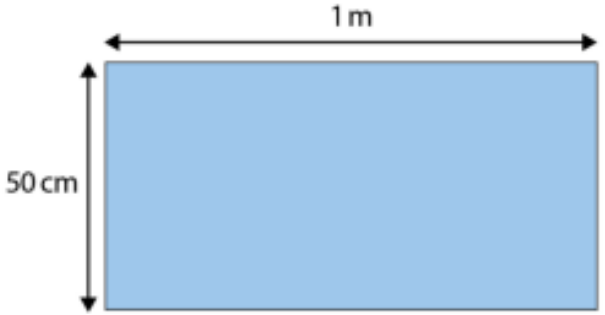
2, 4, 5 and 10 part composition of 1,000





What is the perimeter of this triangle?





Unit	Abbreviation
millimetre	mm
centimetre	cm
metre	m
kilometre	km

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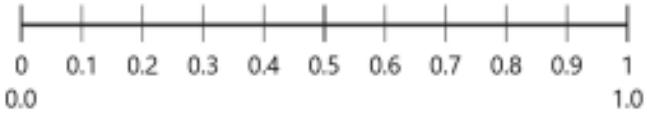
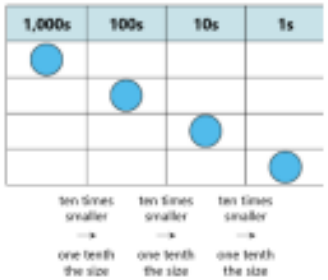
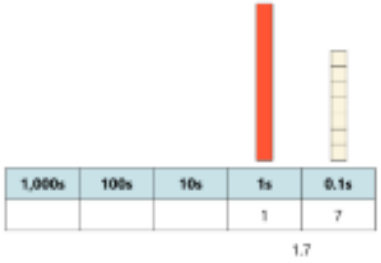
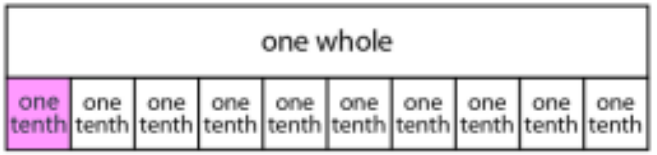
Year 4: 4.11

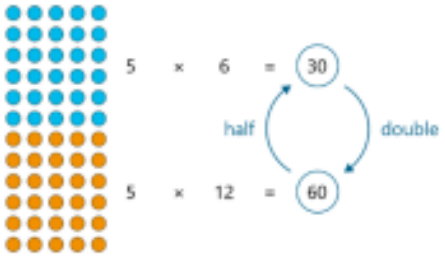
Visual coding: key representations

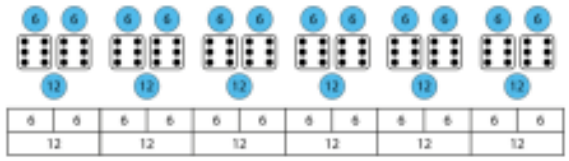


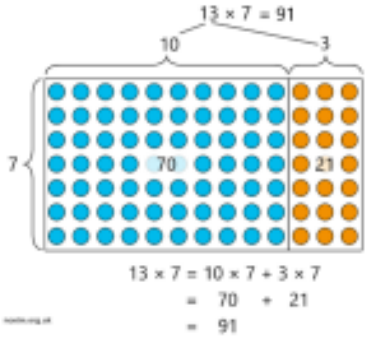


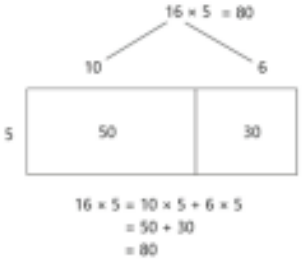


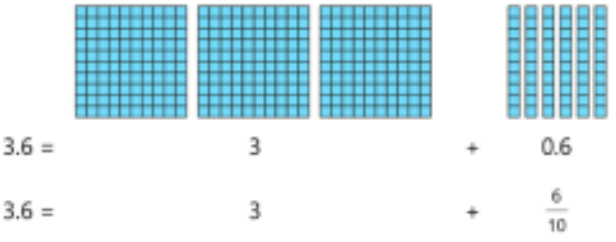


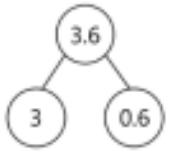












3.6 = 3 + 0.6
3.6 = 0.6 + 3

3.6 − 3 = 0.6
3.6 − 0.6 = 3

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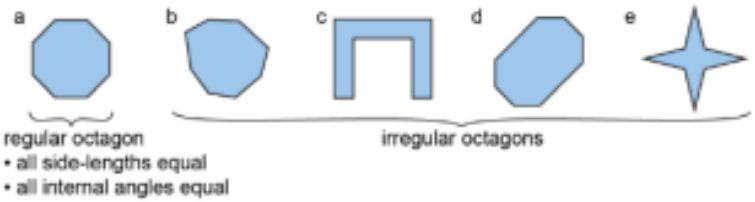
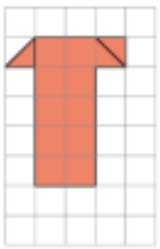
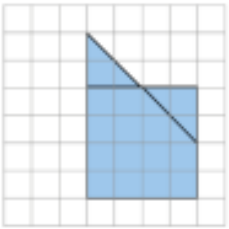
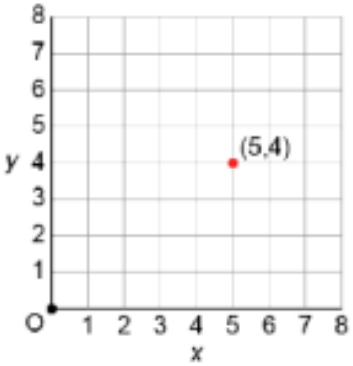
Year 4: 4.12

Visual coding: key representations

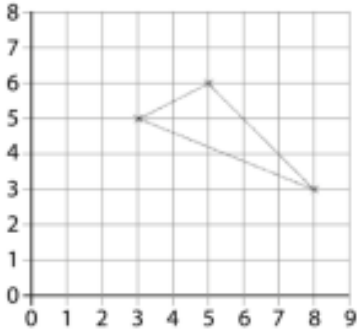


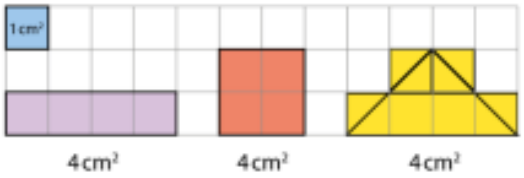




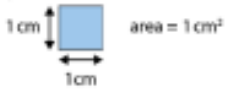


(3,5) (5,6) (8,3)

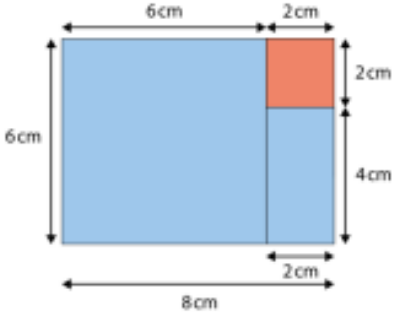




'How many squares are there?'

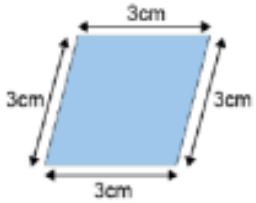


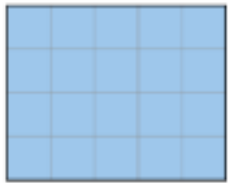
What is the area of this shape?

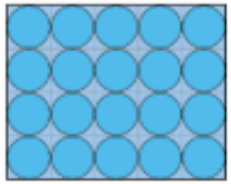


$A = 8\,\text{cm} \times 6\,\text{cm} - 2\,\text{cm} \times 2\,\text{cm}$

$= 44\,\text{cm}^2$







- *'There are twenty 1 cm squares, so A = 20 cm².'*

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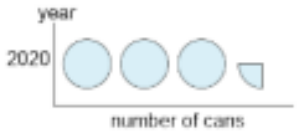
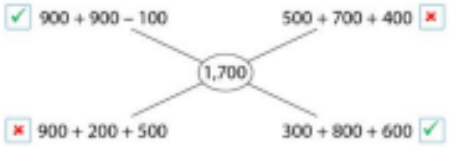
Year 4: 4.13

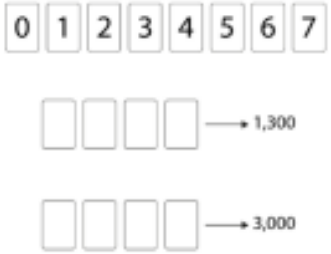
Visual coding: key representations

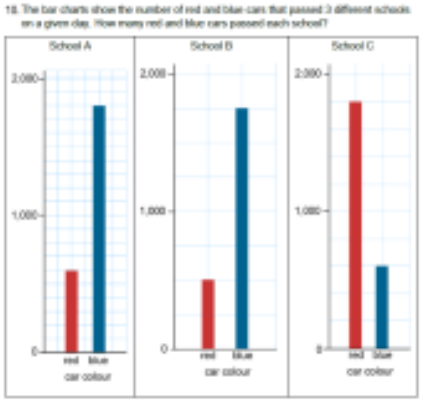
Fill in the missing parts, and write as many different equations as you can think of to describe the structure.



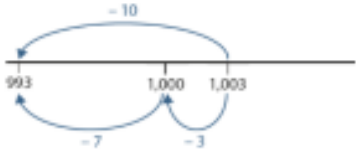
How many cans did the class recycle in 2020?



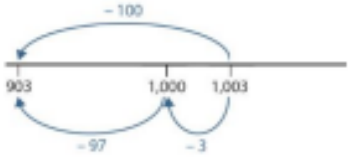


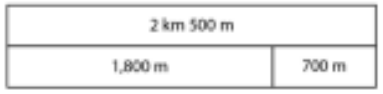


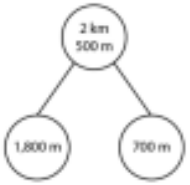
1,003 – 10= 993



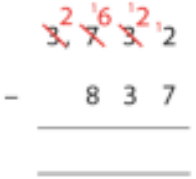
1,003 – 100= 903

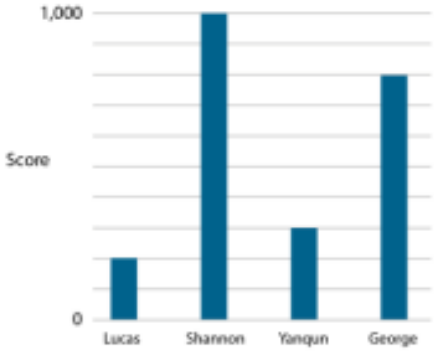






3,732 – 837= 2,895





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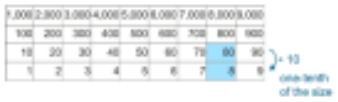
Year 4: 4.14

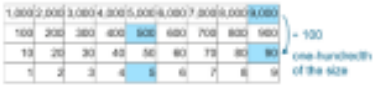
Visual coding: key representations

8 × 10 = 80
80 ÷ 10 = 8

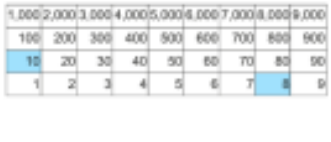


36 × 10 = 360
360 ÷ 10 = 36

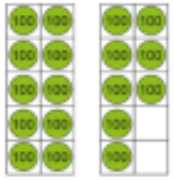
95 × 100 = 9,500
9,500 ÷ 100 = 95



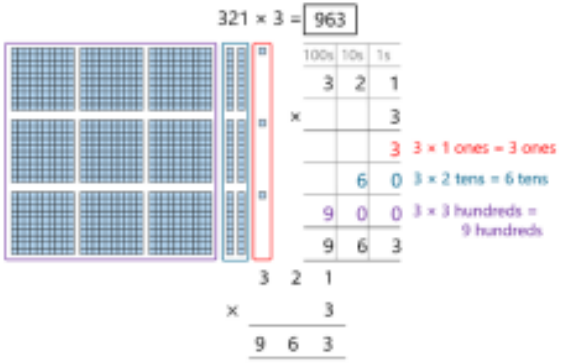
18 × 100 = 1,800



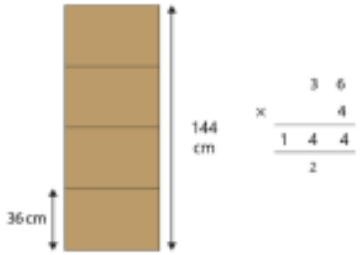
18 made 100 times the size is 1,800



18 groups of 100 is 1,800



If all boxes are the same height, how tall is the stack of boxes?



3 6
× 4
1 4 4
2

Informal written method:

34 × 2 = 30 × 2 + 4 × 2
= 60 + 8
= 68

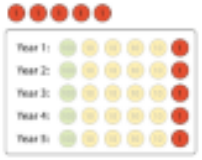
Expanded multiplication algorithm:

	10s	1s	
	3	4	
×		2	
		8	2 × 4 ones = 8 ones
	6	0	2 × 3 tens = 6 tens
	6	8	

705 pencils shared equally between 5 year groups. How many pencils each?

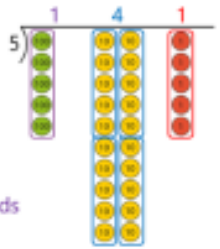
705 ÷ 5 = ☐

Step 1 – presenting the problem:
Step 2 – sharing the 100s
Step 3 – exchanging the remaining hundreds for tens:
Step 4 – sharing the 10s:
Step 5 – sharing the 1s:



7 hundreds ÷ 5 = 1 hundred r 2 hundreds
2 hundreds = 20 tens
20 tens ÷ 5 = 4 tens
5 ones ÷ 5 = 1 one

1 4 1
5) 7 ²0 5



7 hundreds ÷ 5 = 1 hundred r 2 hundreds
2 hundred = 20 tens
20 tens ÷ 5 = 4 tens
5 ones ÷ 5 = 1 one

84 ÷ 4 = 21	2 1 4) 8 4
dividend ÷ divisor = quotient	quotient divisor) dividend

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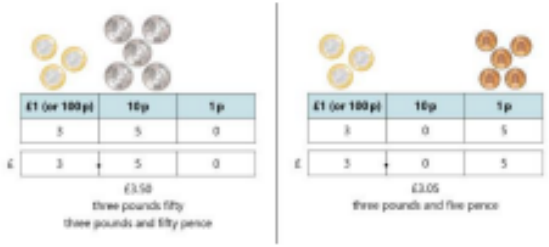
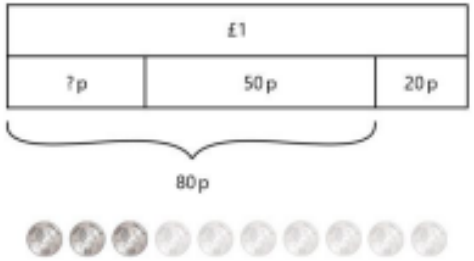
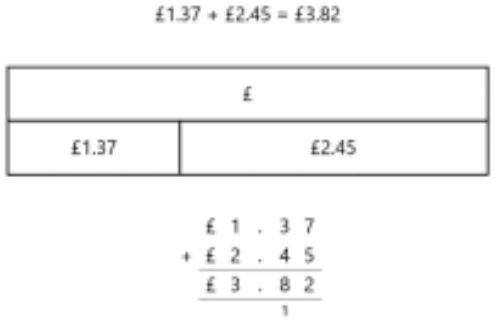
Year 4: 4.15

Visual coding: key representations







£8.95 + £3.50 = £12.45

```
  £  8 . 9 5
+ £  3 . 5 0
  £ 1 2 . 4 5
    1 1
```

	✓ or ✗
£5.00 − £2.30 = £3.70	✗
£10.00 − £1.70 = £8.30	✓
£3.90 + £1.10 = £5.00	✓
£7.60 + £3.40 = £10.00	✗

Cost of item	Amount paid	Change
£8	£10	£2
£7.99	£10	£2.01
£7.49	£10	£2.51
£7	£10	£3
£6.49	£10	£3.51

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Year 4: 4.16

Visual coding: key representations

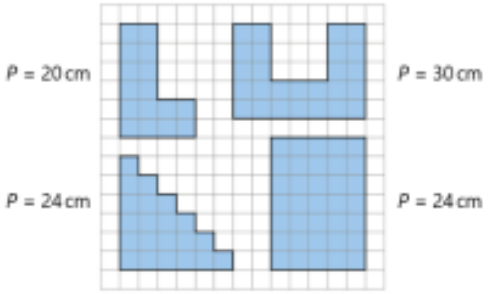
Whose shape has the longest perimeter?

Bhav

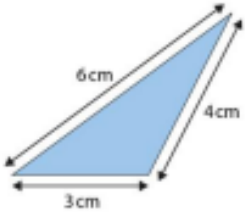
Kirti

leaf 1

leaf 2

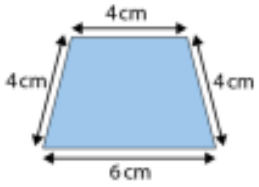


What is the perimeter of this triangle?



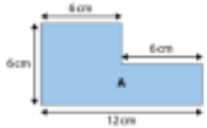
P = 13 cm

What is the perimeter?

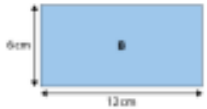


P = 18 cm

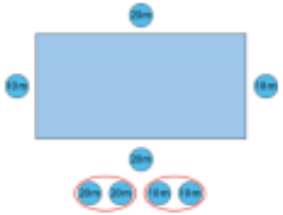
True or false?
The perimeter of shape A is longer than the perimeter of shape B. ✘



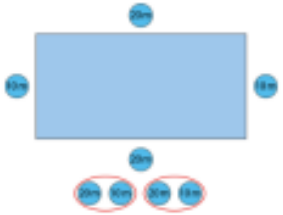
P = 36 cm



P = 36 cm

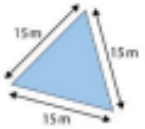


P = 2 × 20 m + 2 × 10 m
= 40 m + 20 m
= 60 m



20 + 10 = 30
30 × 2 = 60
P = 60 m

What is the perimeter of this equilateral triangle?



P = 15 m + 15 m + 15 m
= 3 × 15 m
= 45 m

What is the perimeter of this regular hexagon?

P = 4 m + 4 m + 4 m + 4 m + 4 m + 4 m
= 6 × 4 m
= 24 m

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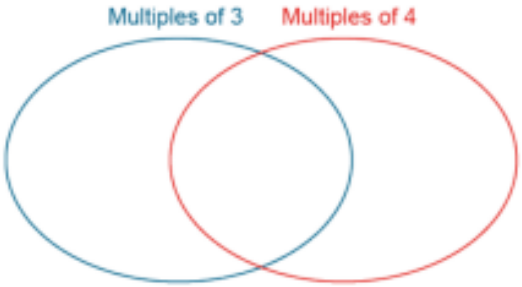
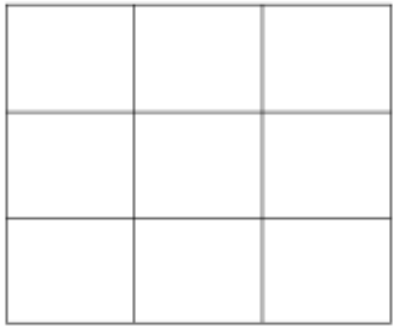
Year 5: 5.12

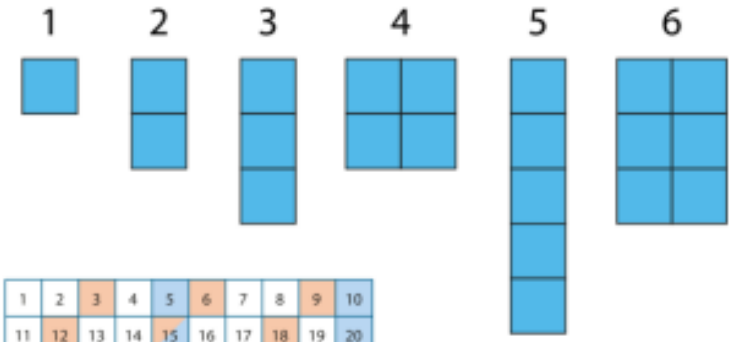
Visual coding: key representations

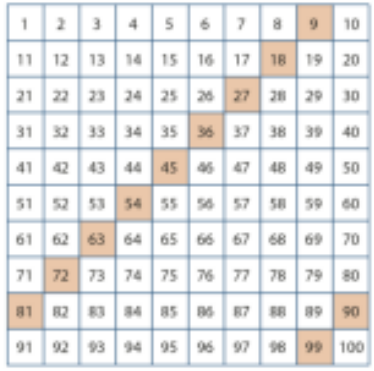


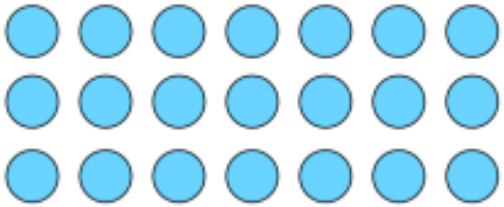
	2-digit number	3-digit number	4-digit number
Multiples of 9			
Multiples of 25			
Multiples of 50			



$3 \times 3 = 3^2 = 9$







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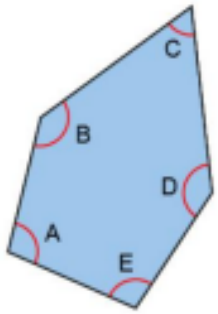
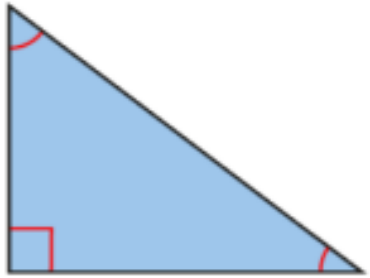
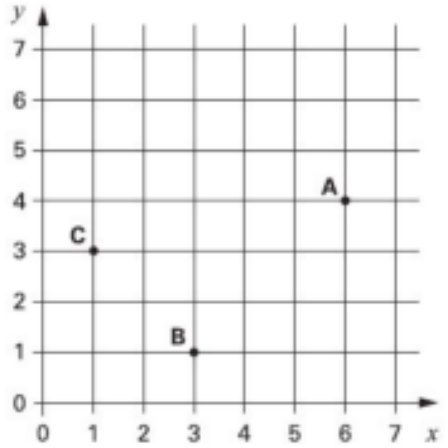
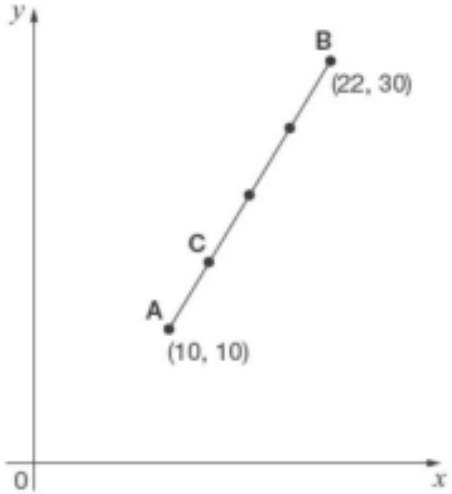
Year 5: 5.13

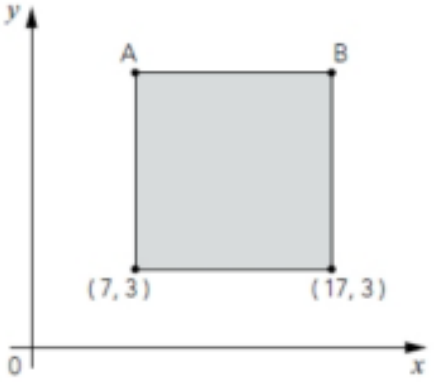
Visual coding: key representations

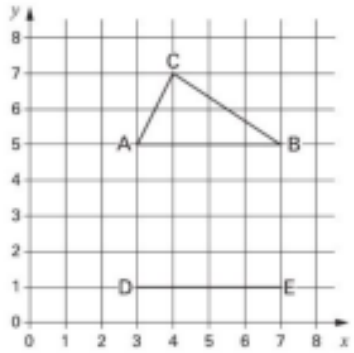












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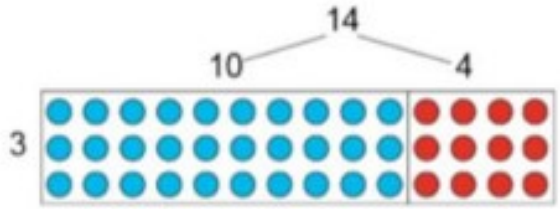
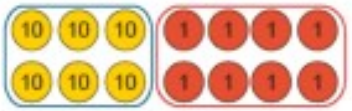
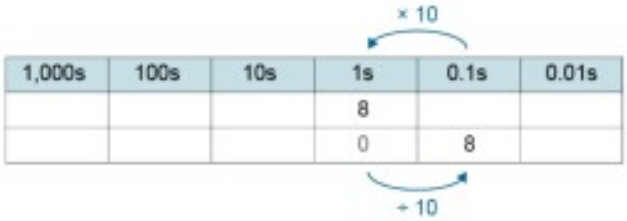
Year 5: 5.14

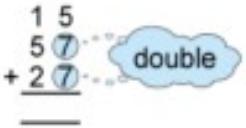
Visual coding: key representations



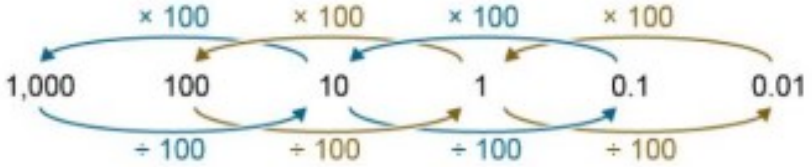
628	
274	354







Informal written method	Expanded multiplication algorithm	Short multiplication
34×2 = 30×2 + 4×2 = 60 + 8 = 68	3 4 × 2 8 (2 × 4 ones = 8 ones) 6 0 (2 × 3 tens = 6 tens) 6 8	3 4 × 2 6 8



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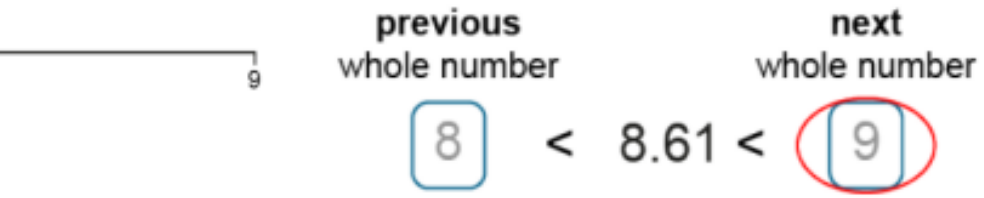
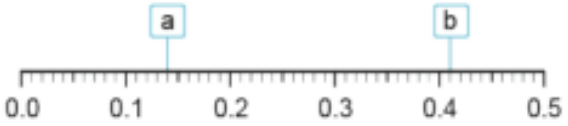
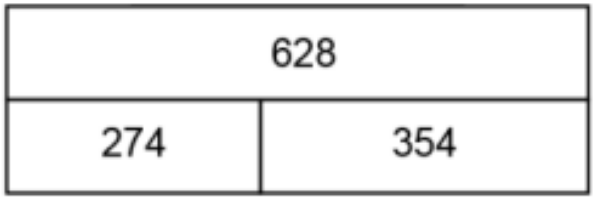
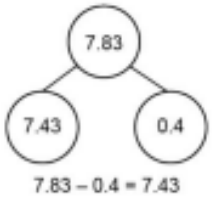
Year 5: 5.15

Visual coding: key representations

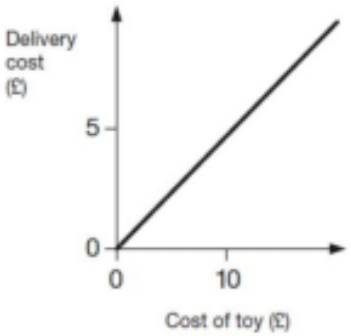


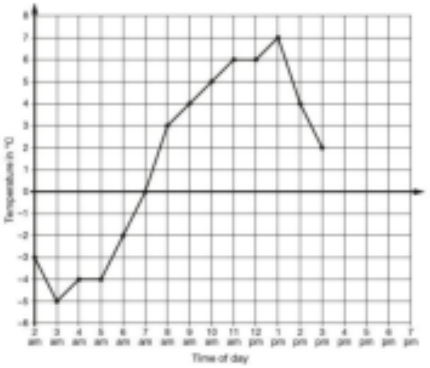






Time	Mon	Tue	Wed	Thu	Fri
9:00 am – 10:30 am	Maths	English	Maths	English	Maths
10:30 am – 11:00 am	Break	Break	Break	Break	Break
11:00 am – 12:00 pm	English	Maths	Science	Maths	English





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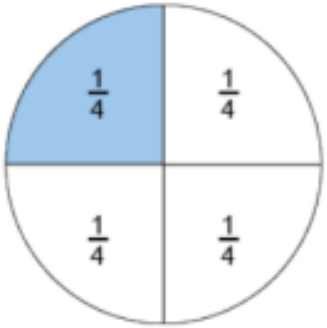
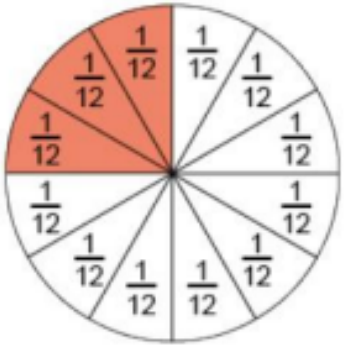
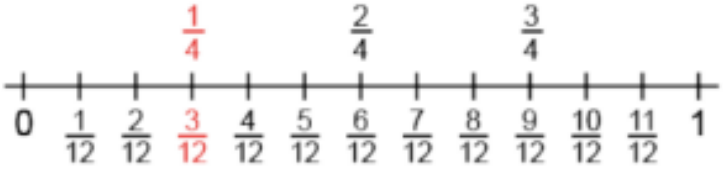
Year 5: 5.16

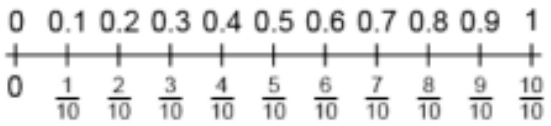
Visual coding: key representations

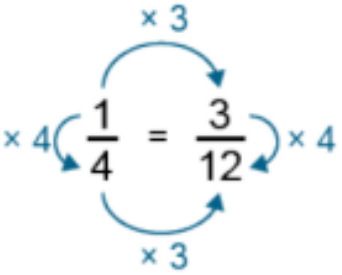


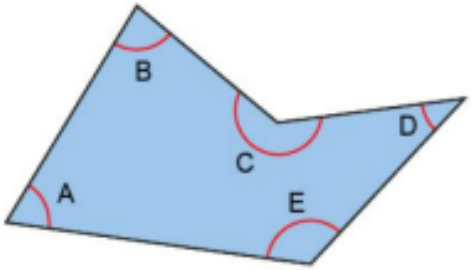


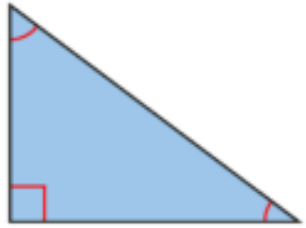


Unit fraction	Decimal fraction
$\frac{1}{2}$	0.5
$\frac{1}{4}$	0.25
$\frac{1}{5}$	0.2
$\frac{1}{10}$	0.1









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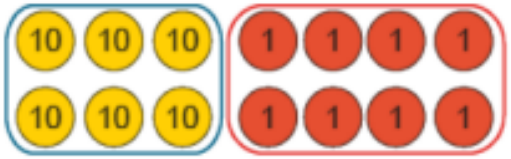
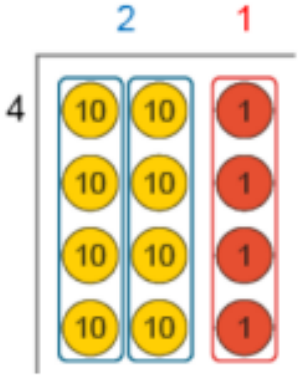
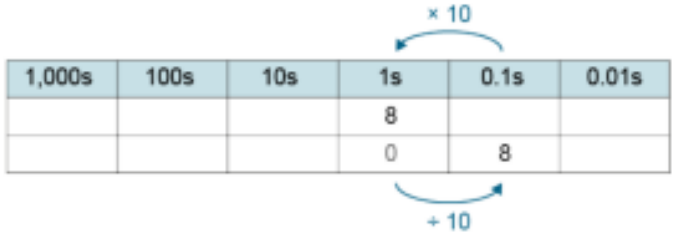
Year 5: 5.17

Visual coding: key representations



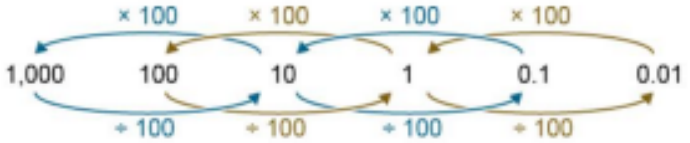


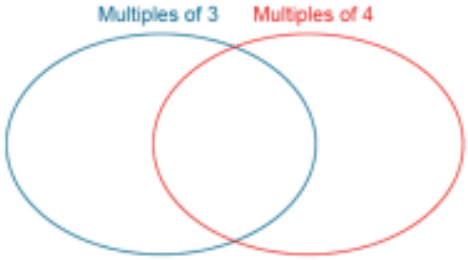


1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000
100	200	300	400	500	600	700	800	900
10	20	30	40	50	60	70	80	90
1	2	3	4	5	6	7	8	9
0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09

× 10 ÷ 10

8 ÷ 10 = 0.8 0.8 × 10 = 8





	2-digit number	3-digit number	4-digit number
Multiples of 9			
Multiples of 25			
Multiples of 50			

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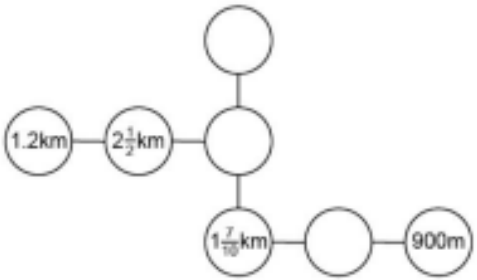
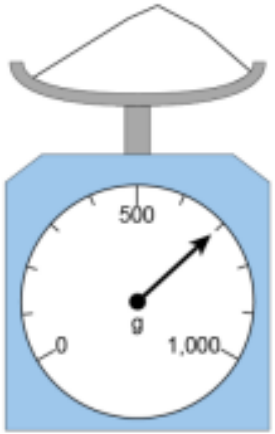
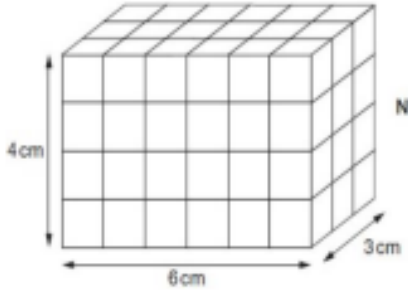
Year 5: 5.18

Visual coding: key representations





Parcel	Mass of parcel
A	3.2kg
B	4,500g
C	$1\frac{1}{2}$kg



Not actual size

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

Leaves London	Arrives Paris
12:01	15:22
12:25	15:56
13:31	16:53
14:01	17:26
14:31	17:53
15:31	18:53
16:01	19:20

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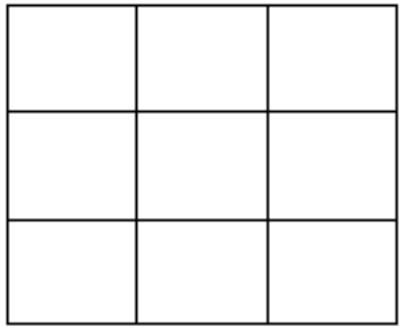
Year 6: 6.12

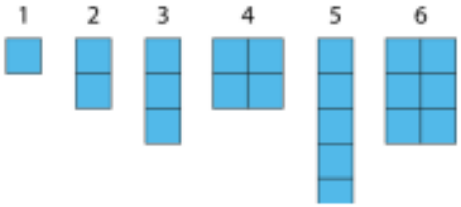
Visual coding: key representations

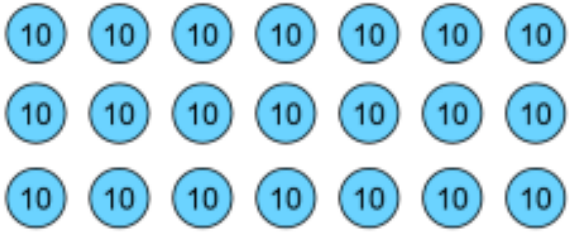


$3 \times 3 = 3^2 = 9$

×	0	1	2	3	4	5	6	7	8	9	10	11	12
0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9	10	11	12
2	0	2	4	6	8	10	12	14	16	18	20	22	24
3	0	3	6	9	12	15	18	21	24	27	30	33	36
4	0	4	8	12	16	20	24	28	32	36	40	44	48
5	0	5	10	15	20	25	30	35	40	45	50	55	60
6	0	6	12	18	24	30	36	42	48	54	60	66	72
7	0	7	14	21	28	35	42	49	56	63	70	77	84
8	0	8	16	24	32	40	48	56	64	72	80	88	96
9	0	9	18	27	36	45	54	63	72	81	90	99	108
10	0	10	20	30	40	50	60	70	80	90	100	110	120
11	0	11	22	33	44	55	66	77	88	99	110	121	132
12	0	12	24	36	48	60	72	84	96	108	120	132	144

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





	multiple of 5	not a multiple of 5
multiple of 3	30	
not a multiple of 3		

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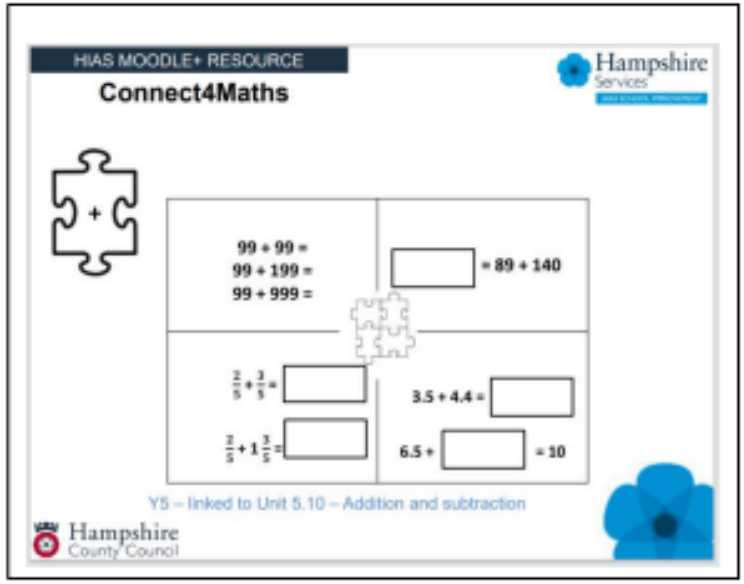
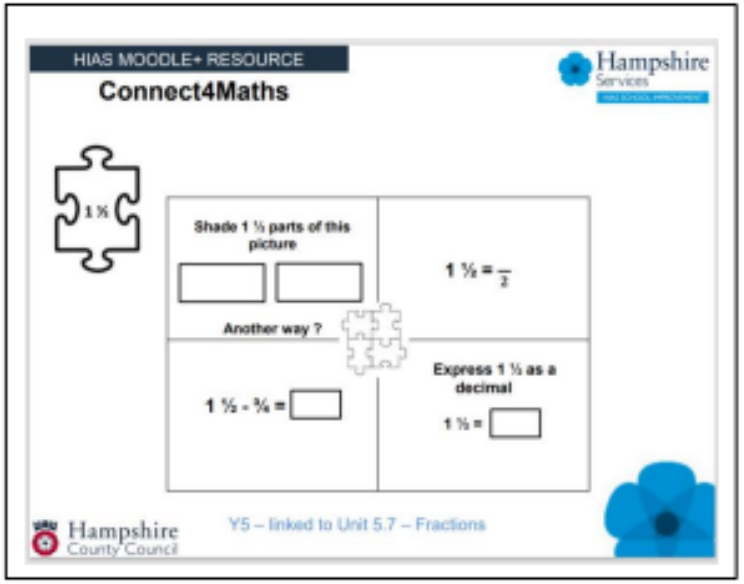
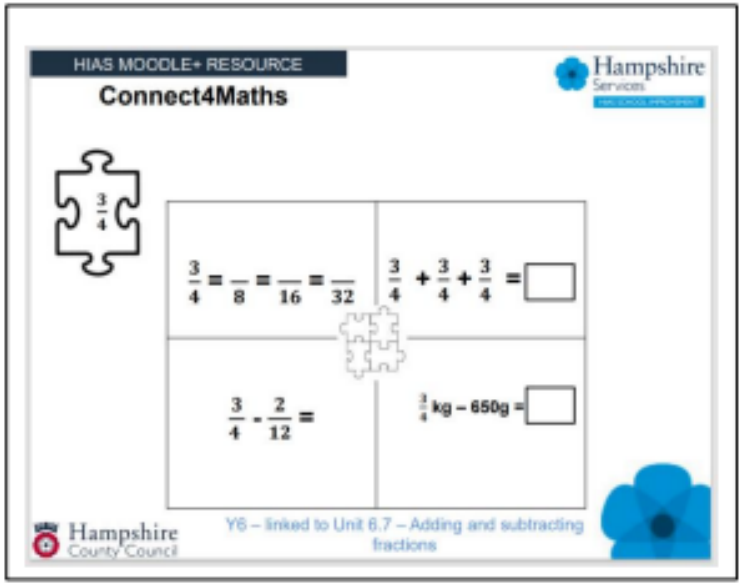
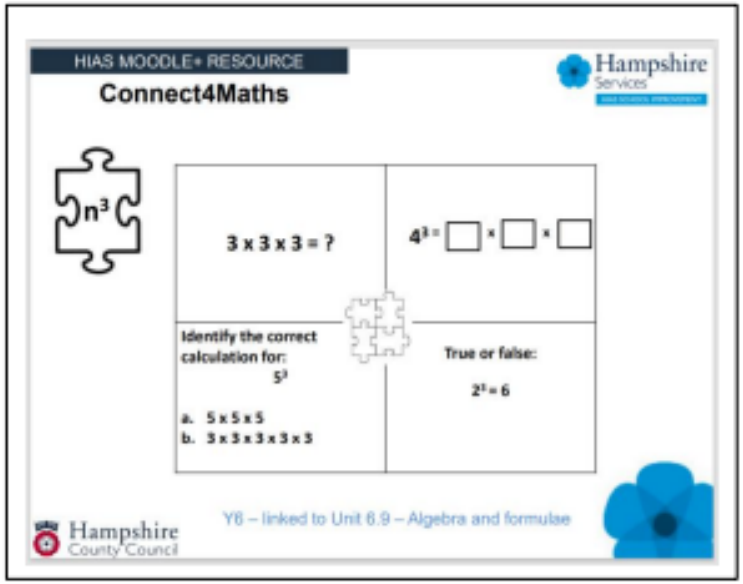
Year 6: 6.13


HIAS MOODLE+ RESOURCE
Connect4Maths
Hampshire Services
+
99 + 99 =
99 + 199 =
99 + 999 =
= 89 + 140
3.5 + 4.4 =
6.5 + = 10
Y5 – linked to Unit 5.10 – Addition and subtraction
Hampshire County Council

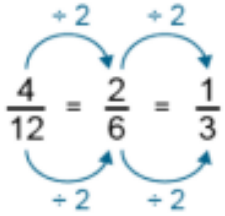

HIAS MOODLE+ RESOURCE
Connect4Maths
Hampshire Services
1 ½
Shade 1 ½ parts of this picture
1 ½ =
Another way ?
Express 1 ½ as a decimal
1 ½ - ¾ =
1 ½ =
Y5 – linked to Unit 5.7 – Fractions
Hampshire County Council

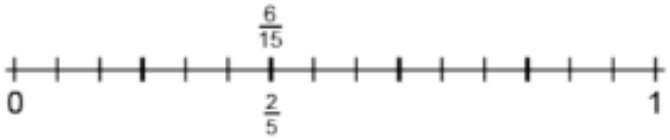

HIAS MOODLE+ RESOURCE
Connect4Maths
Hampshire Services
¾
¾ = ⁄8 = ⁄16 = ⁄32
¾ + ¾ + ¾ =
¾ - 2/12 =
¾ kg – 650g =
Y6 – linked to Unit 6.7 – Adding and subtracting fractions
Hampshire County Council

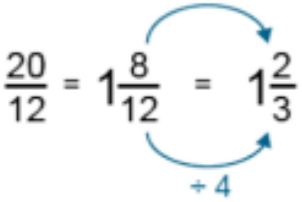

HIAS MOODLE+ RESOURCE
Connect4Maths
Hampshire Services
n³
3 x 3 x 3 = ?
4³ = × × ×
Identify the correct calculation for:
5³
a. 5 x 5 x 5
b. 3 x 3 x 3 x 3 x 3
True or false:
2³ = 6
Y6 – linked to Unit 6.9 – Algebra and formulae
Hampshire County Council

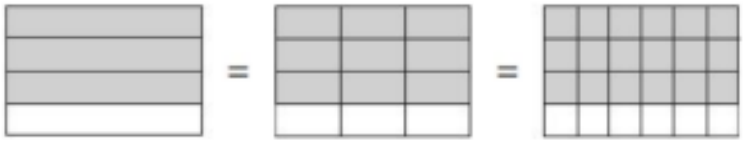
Year 6: 6.14

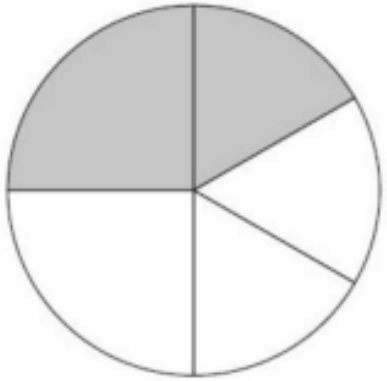
Visual coding: key representations

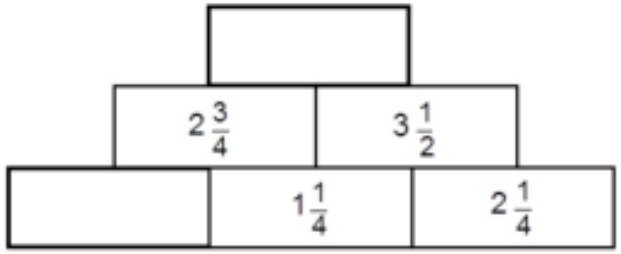


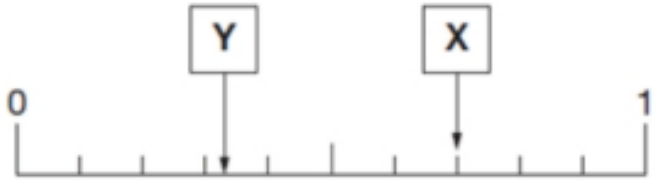












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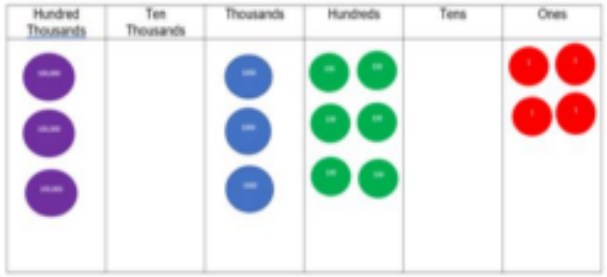
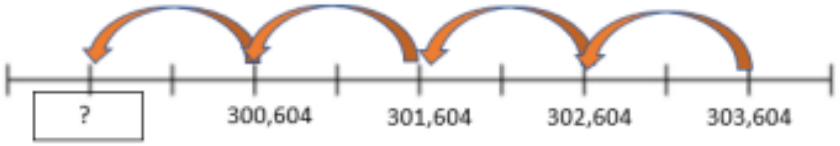
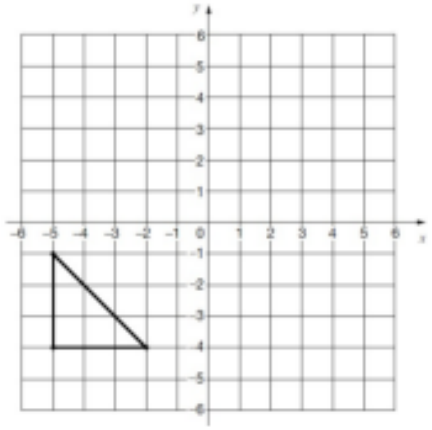
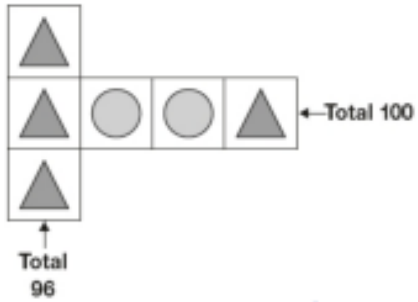
Year 6: 6.15

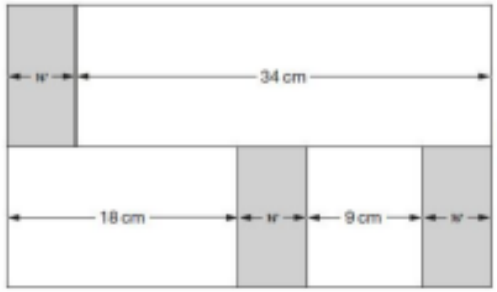
Visual coding: key representations

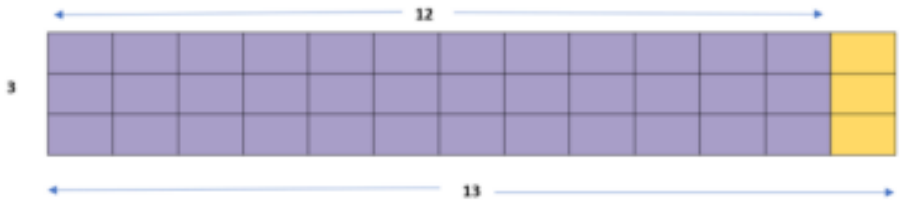












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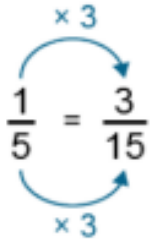
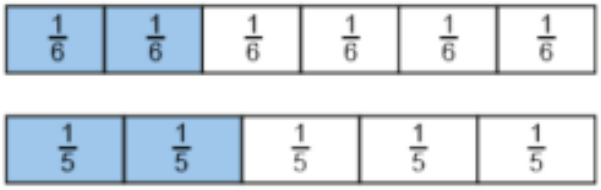
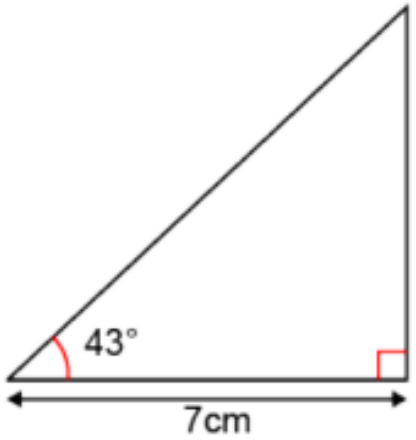
Year 6: 6.16

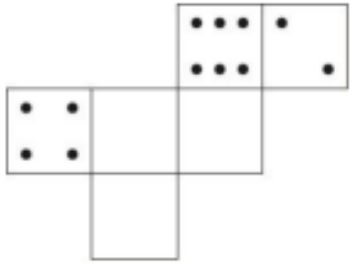
Visual coding: key representations

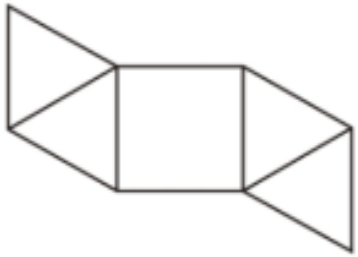


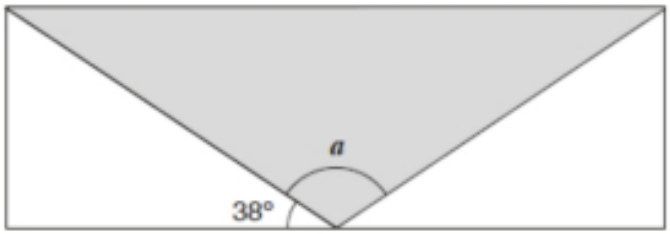


$\frac{2}{5} > \frac{2}{6}$









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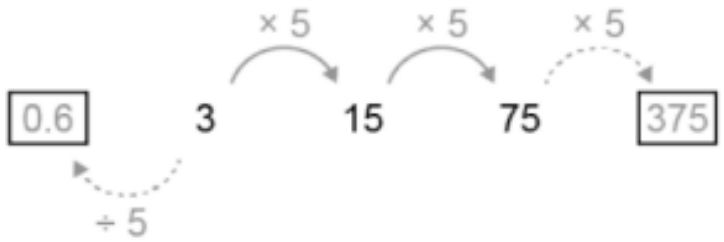
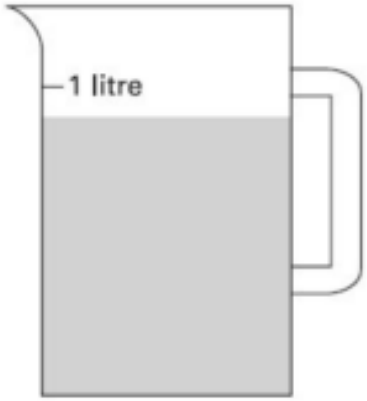
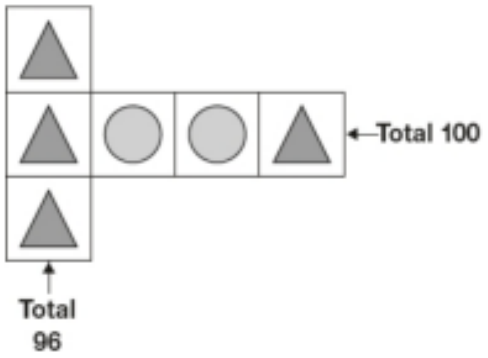
Year 6: 6.17

Visual coding: key representations





a	b
1	9
2	19
3	29
4	39



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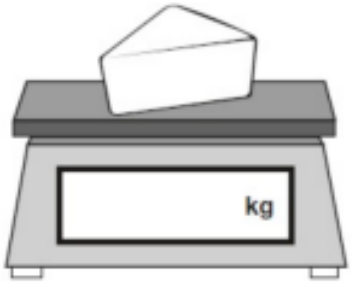
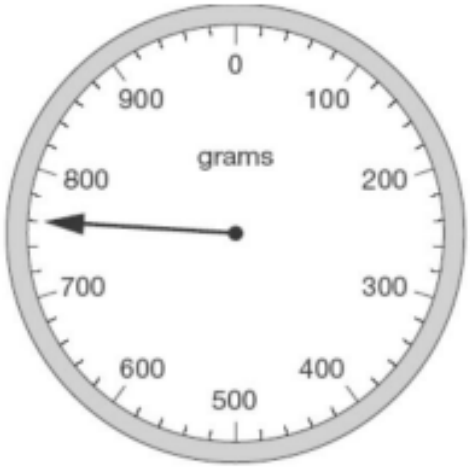
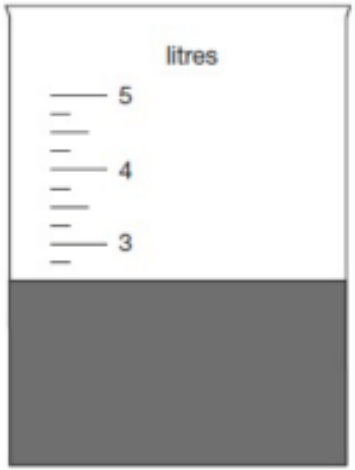
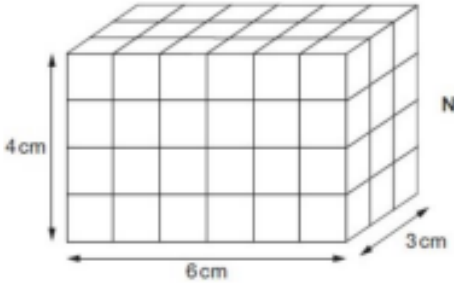
Year 6: 6.18

Visual coding: key representations

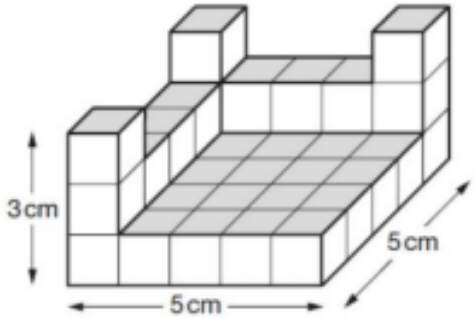


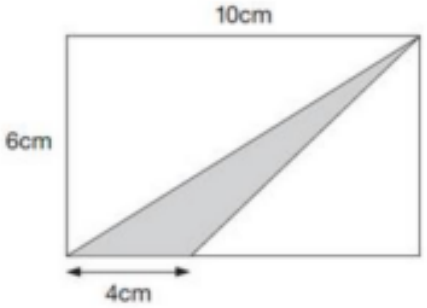


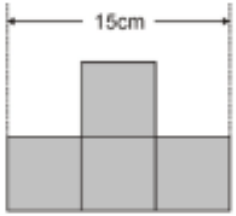




Not actual size







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