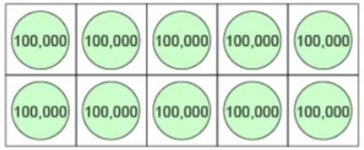
St Michael's Years 6 Maths Parent Information

10 thousands is equal to 10,000.

0 . 0 1	one hundredth
0 . 1	one tenth
1	one
1 0	ten
1 0 0	one hundred
1 , 0 0 0	one thousand
1 0 , 0 0 0	ten thousand
1 0 0 , 0 0 0	one hundred thousand
1 , 0 0 0 , 0 0 0	one million
1 0 , 0 0 0 , 0 0 0	ten million

1,000 is one-tenth times the size of 10,000.

100,000 is one-tenth times the size of 1,000,000.



10 hundred-thousands is equal to 1 million.

10,000 is 10 times the size of 1,000.

1,000,000 is 10 times the size of 100,000.

Each **power of 10** is equal to 1 group of 10 of the next smallest power of 10, for example 1 million is equal to 10 hundred thousands.

6 NPV-1

50,000 is 100 times the size of 500.

500 multiplied by 100 is equal to 50,000.

× 100 ÷ 100

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

500 is one-hundredth times the size of 50,000.

50,000 divided by 100 is equal to 500.

$47.1 \times 1{,}000 = 47{,}100$

$47{,}100 \div 1{,}000 = 47.1$

$1{,}659 \times 100 = 165{,}900$

$165{,}900 \div 100 = 1{,}659$

$211{,}560 \div 10 = 21{,}156$

$21{,}156 \times 10 = 211{,}560$

Read and write numbers **up to 10,000,000**, including decimal fractions. **Identify** the **place value** of **each digit** in a number

The 6 represents 6 ten-thousands; the value of the 6 is 60,000

The 7 represents 7 thousands; the value of the 7 is 7,000

The 4 represents 4 tenths; the value of the 4 is 0.4

67,000.4

Use a **separator** (such as a comma) **every third digit** from the decimal point.

Vary the order of partitioning → 5,034,000.2 is equal to 4,000 + 30,000 + 0.2 + 5,000,000

Compare and **order** very large numbers through **understanding** the **value** of their **digits**.

8,102,304 8,021,403 843,021 8,043,021

I need to start with the millions as they are the worth the largest.

I work my way from left to right, comparing the value of the digits in each column.

6 NPV-2

$381{,}920 - 900 = \boxed{}$

$381{,}920 - \boxed{} = 380{,}920$

Solve problems involving the **subtraction** of any **single place value part** from a number.

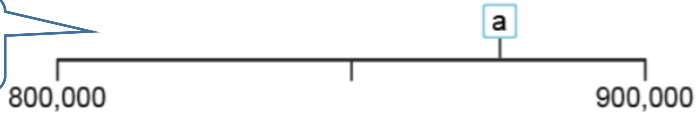
Partition numbers in '**non-standard**' ways, and carry out **related addition** and **subtraction calculations**

$518.32 + 30 = 548.32$

$381{,}920 - 60{,}000 = 321{,}920$

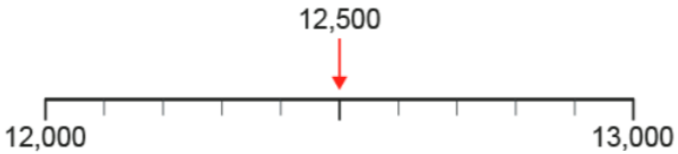
6 NPV-3

a must be about 875,000 because it is about halfway between the midpoint of the number line, which is 850,000, and 900,000.



Estimate the **value** or **position** of numbers on **unmarked or partially marked numbers lines**, using appropriate **proportional reasoning**.

Reason about the **location** of any **number up to 10 million**, including **decimal fractions**, in the linear number system, and **round** numbers.

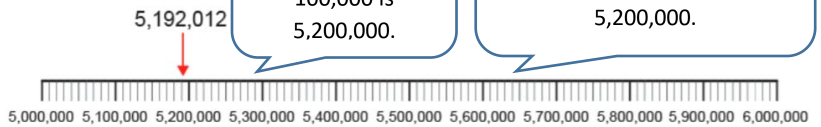


Identify or **place numbers** with up to **7 digits** on marked number lines with a **variety of scales.**

Numbers are **rounded** to eliminate unnecessary detail. Rounding is a method of **approximating**: rounded numbers can be used to give **estimated values** including estimated **answers to calculations**.

The closest multiple of 100,000 is 5,200,000.

The previous multiple of 100,000 is 5,100,000. The next multiple of 100,000 is 5,200,000.



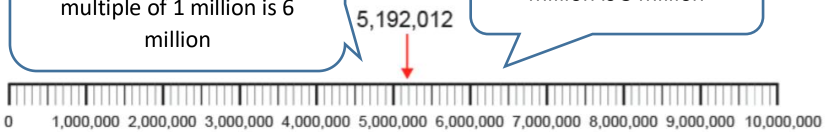
previous multiple of 100,000 | **next** multiple of 100,000

5,100,000 < 5,192,012 < 5,200,000

5,192,012 rounded to the nearest 100,000 is 5,200,000.

The previous multiple of 1 million is 5 million. The next multiple of 1 million is 6 million

The closest multiple of 1 million is 5 million



previous multiple of 1,000,000 | multiple of 1,000,000

5,000,000 < 5,192,012 < 6,000,000

5,192,012 rounded to the nearest million is 5 million.

Count **forwards** and **backwards**, and complete **number sequences**, in steps of **powers of 10** (1, 10, 100, 1,000, 10,000 and 100,000).

- 2,100,000 2,000,000 1,900,000
- 378,500 379,500 380,500

Divide powers of 10 into 2, 4, 5 and 10 equal parts.

1,000,000			
250,000	250,000	250,000	250,000

1,000			
250	250	250	250

1			
0.25	0.25	0.25	0.25

Describe **similarities** and **differences** between **the values of the parts** when **powers of ten** are divided into **equal parts**.

Solve addition, subtraction, multiplication and division **equations related to powers of 10** divided into 2, 4, 5 and 10 equal parts.

$750{,}000 + 250{,}000 = 1{,}000{,}000$

$1{,}000{,}000 - 250{,}000 = 750{,}000$

$1{,}000{,}000 - 750{,}000 = 250{,}000$

$1{,}000{,}000 \div 4 = 250{,}000$

6 NPV-4

....1,450,000, 1,700,000, 1,950,000, 2,200,000....

Count **forwards** and **backwards** from any starting number in steps of **0.25**, **250** and **250,000.**

....5, 4.75, 4.5, 4.25, 4, 3.75....

....350, 600, 850, 1,100, 1350....

$\frac{1}{4}$ of $1{,}000{,}000 = 250{,}000$

$1{,}000{,}000 \div 250{,}000 = 4$

$250{,}000 \times 4 = 1{,}000{,}000$

$4 \times 250{,}000 = 1{,}000{,}000$

Connect finding **equal parts** of a power of 10 to finding $\frac{1}{2}, \frac{1}{4}, \frac{1}{5}$ or $\frac{1}{10}$ of the value

Understand that **2 numbers** can be **related additively** and **multiplicatively**.

$$20 \xrightarrow{+40} 60 \qquad 60 \xrightarrow{-40} 20$$

Additive

Holly has cycled 40km less than Lola.

Lola has cycled 3 times the distance that Holly has.

Holly has cycled 20km. Lola has cycled 60km.

Lola has cycled 40km more than Holly.

Holly has cycled one third of the distance that Lola has.

$$20 \xrightarrow{\times 3} 60 \qquad 60 \xrightarrow{\div 3} 20$$

Multiplicative

$$\boxed{0} \xrightarrow{+7.5} 7.5 \xrightarrow{+7.5} 15 \xrightarrow{+7.5} 22.5 \xrightarrow{+7.5} \boxed{30} \qquad 7.5 \xrightarrow{-7.5} \boxed{0}$$

In a number sequence, **identify** if the **relationship** is **additive** or **multiplicative**.

$$\boxed{0.6} \qquad 3 \xrightarrow{\times 5} 15 \xrightarrow{\times 5} 75 \xrightarrow{\times 5} \boxed{375} \qquad 3 \xrightarrow{\div 5} \boxed{0.6}$$

6 AS/MD-1

The addend 25 has **increased** by 2.5, so the other addend, 35, needs to **decrease by the same amount**.

$$\underline{25} + 35 = \underline{27.5} + ?$$

The missing value is 32.5 because that is 2.5 less than 35.

6 AS/MD-2

If **one addend is increased** and the **other** is **decreased** by the **same amount**, the **sum stays the same**.

If I multiply one factor by a number, I must divide the other factor by the same number for the product to stay the same.

$$\underline{0.3} \times 320 = \underline{3} \times ?$$

The first factor, 0.3, has been multiplied by 10, to make 3. To find the missing number I need to divide the other factor, 320, by 10. The missing number is 32.

$70 + 2 = 72$

$60 + 12 = 72$

Use the first equation to help solve the second.

First, I can use my understanding of place value, making the sum and addends 1 tenth times the size. 92.1= 34.9 + 57.2

$$921 = 349 + 572$$

$$92.1 = 44.9 + \boxed{}$$

Then, I can apply the compensation property of addition to solve the equation: add 10 to the first addend and subtract 10 from the second addend. 92.1 = 44.9 + 47.2

If I **multiply one factor by a number**, and keep the **other factor the same**, I must **multiply the product by the same number**.

Understand the **compensation** property of **addition** and **multiplication**.

Use the first equation to help solve the second.

First, I can use the inverse relationship to restate the equation: 72 X **34** = 2,448

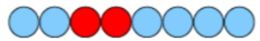
$$2{,}448 \div 34 = 72$$

$$72 \times \boxed{} = 24{,}480$$

Then, I can use my understanding of scaling. The product is ten times bigger, so the missing factor has to be ten times bigger than **34**.

For every 1 cup of rice you cook, you need 2 cups of water. The proportion of rice to water remains the same. You always need twice as much water as rice.

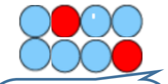
cups of rice	1	2	3	4	5	6
cups of water	2	4	6	8	10	12



Even though the arrangements are different, for every one red bead, there are three blue beads.

For every 10 children on the school trip, there must be 1 adult.

number of children	10	20	30	40	50	60
number of adults	1	2	3	4	5	6



If there are 21 blue beads, I divide 21 by 3 to find how many red beads.

If there are 5 red beads, I multiply 5 by 3 to find how many blue beads.

If there are 4 beads, 3 are blue and one is red. I can use this to find out the numbers of red and blue beads if there are 40 beads in total.

I can use multiplication and division to adjust this recipe for other numbers of people. I could halve the amounts to make a smoothie for one person, or multiply them by three to make smoothies for six people.

<u>Smoothie Recipe</u>
For 2 people
20 strawberries
1 banana
150ml milk

number of red beads	1	2	3	4
number of blue beads	3	6	9	12
total number of beads	**4**	**8**	**12**	**16**

number of yellow beads	2	4	6	8
number of green beads	3	6	9	12
total number of beads	**5**	**10**	**15**	**20**

For every 2 yellow beads there are 3 green beads.

Solve problems involving ratio relationships

6 AS/MD-3

Number of coins	Quantity in 50p coins	Quantity in 20p coins
1	50p	20p
2	£1	40p
3	£1.50	60p
4		80p
5		£1
6		£1.20
7		£1.40
8		£1.60

There is more than one solution to this problem so I have used a table to find them all.

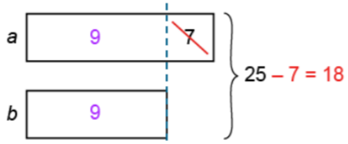
Danny has some 50p coins and some 20p coins. He has £1.70 altogether. How many of each type of coin might he have?

I don't need to go beyond three 50p coins as the total amount of money is less than the value of four 50p coins.

6 AS/MD-4

Use **bar models** to solve problems with only one solution.

Question: The sum of 2 numbers is 25, and the difference between them is 7. What are the 2 numbers?

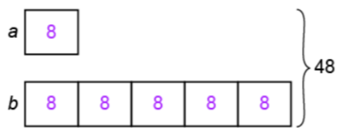


$a = 9 + 7 = 16$

$b = 9$

The numbers are 16 and 9.

Question: The sum of 2 numbers is 48. One number is one-fifth times the size of the other number. What are the 2 numbers?



$a = 8$

$b = 5 \times 8 = 40$

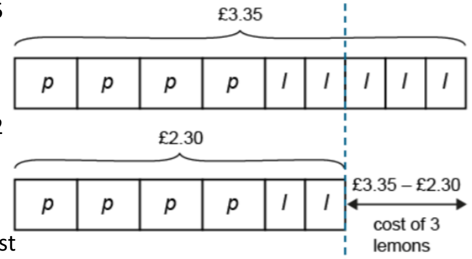
The numbers are 8 and 40.

Use bar models to solve problems with **two unknowns**.

4 pears and 5 lemons cost £3.35.

4 pears and 2 lemons cost £2.30.

What is the cost of 1 lemon?



cost of 3 lemons = £3.35 – £2.30 = £1.05

so

cost of 1 lemon = £1.05 ÷ 3 = £0.35

Solve problems with **two unknowns**.

6 NF-1

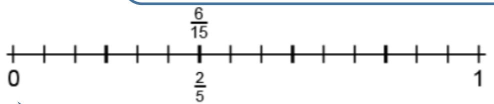
Simplify fractions.

$\frac{6}{15} \xrightarrow{\div 3} \frac{2}{5}$

$$\frac{6}{15} = \frac{2}{5}$$

A fraction can be simplified when the numerator and denominator have a common factor other than 1.

A common factor of 6 and 15 is three so I can divide $\frac{6}{15}$ by 3 to simplify it.



When I simplify a fraction, its value and its position on the number line stays the same.

When the numerator and the denominator have several common factors, it is possible to simplify over more than one step.

$$\frac{4}{12} \overset{\div 2}{=} \frac{2}{6} \overset{\div 2}{=} \frac{1}{3}$$

$$\frac{4}{12} \overset{\div 4}{=} \frac{1}{3}$$

When the numerator and the denominator are divided by the highest common factor, the fraction is in its simplest form.

If the numerator and the denominator have no common factors other than 1, the fraction is already in its simplest form.

$$\frac{3}{8}$$

The only common factor of 3 and 8 is 1, so this fraction cannot be simplified any further.

Simplify improper fractions.

$$\frac{20}{12} \overset{\div 4}{=} \frac{5}{3} = 1\frac{2}{3}$$

Simplify the improper fraction first, then convert it to a mixed number.

Convert the improper fraction to mixed number, then simplify the fractional part.

$$\frac{20}{12} = 1\frac{8}{12} \overset{\div 4}{=} 1\frac{2}{3}$$

Where the numerator **is** a factor of the denominator simplifying will result in a **unit fraction.**

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

Where the numerator **is not** a factor of the denominator simplifying will result in a **non-unit fraction.**

$$\frac{4}{18} = \frac{2}{9}$$

6 NF-2

Compare fractions by finding a common denominator.

Compare fractions where the denominator of one of the fractions is a multiple of the other denominator.

We need to compare the denominators of $\frac{1}{5}$ and $\frac{4}{15}$.

15 is a multiple of 5.

Compare $\frac{1}{5}$ & $\frac{4}{15}$

We can use 15 as the common denominator

$$\frac{1}{5} \overset{\times 3}{=} \frac{3}{15}$$

We need to express both fractions in fifteenths.

$\frac{1}{5}$ is equivalent to $\frac{3}{15}$.

$\frac{1}{5}$ is less than $\frac{4}{15}$.

Compare fractions where the denominator of one of the fractions is **not** a multiple of the other denominator.

We need to compare the denominators of $\frac{1}{3}$ and $\frac{3}{8}$.

8 is not a multiple of 3.

We need to express both fractions in twenty fourths.

Compare $\frac{1}{3}$ & $\frac{3}{8}$

We can use 24 as the common denominator.

24 is a multiple of 8 and 3.

If one denominator is not a multiple of the other, we can multiply the two denominators to find a common denominator.

$\frac{1}{3}$ is equivalent to $\frac{8}{24}$

$\frac{3}{8}$ is equivalent to $\frac{9}{24}$

$\frac{1}{3}$ is less than $\frac{3}{8}$

$$\frac{1}{3} \overset{\times 8}{=} \frac{8}{24} \qquad \frac{3}{8} \overset{\times 3}{=} \frac{9}{24}$$

If the denominators are the same, then the larger the numerator, the larger the fraction.

6 NF-3

Compare fractions that do not have a common denominator.

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

One fifth is larger than one sixth so two fifths is larger than two sixths.

If the numerators are the same, then the larger the denominator, the smaller the fraction.

Is it close to 0 or 1?

Using reasoning to compare fractions.

Visualise its position on the number line.

Is it greater than or less than $\frac{1}{2}$?

Reason about how close each fraction is to the whole.

$\frac{7}{8}$ is $\frac{1}{8}$ less than the whole, while $\frac{6}{7}$ is $\frac{1}{7}$ less than the whole.
Since $\frac{1}{8}$ is less than $\frac{1}{7}$, $\frac{7}{8}$ must be larger than $\frac{6}{7}$.

Is this fraction a large or small part of the whole?

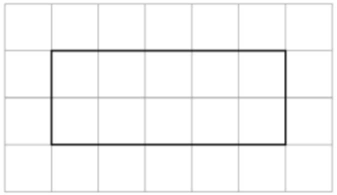
$\frac{5}{6}$ is greater than $\frac{7}{11}$ because 5 is a larger part of 6 than 7 is of 11.

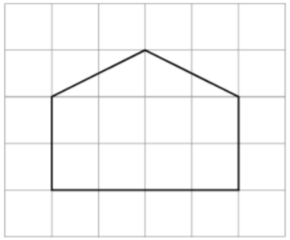
Reason about the relationship between the numerator and the denominator.

6 G-1

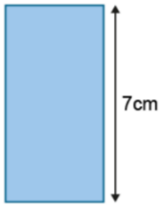
Draw, compose, and decompose shapes according to given properties.

I can use squared paper to help draw a rectangle with a perimeter of 14cm.





This irregular pentagon has an area of 10cm². I counted the squares inside the shape to check.



Calculate the perimeter of the large rectilinear shape.

The long side of the rectangle is the same length as two of the short sides.

The short sides are half of the length of the long sides. Half of 7cm is 3.5cm.

There are two long sides: 2 X 7cm is 14cm. There are two shorts sides: 2 X 3.5cm is 7cm.

The perimeter is 14cm plus 7cm, which is 21cm

To draw this shape accurately, so that the angle is the correct size and the side is exactly 7cm long, I would need to use a protractor and a ruler.