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## **Mathematics**

### **Fraction, Decimal & Percentage Policy 2020**

# Whole school policy



The following fraction, decimal and percentage calculation policy has been devised to meet the requirements of the National Curriculum 2014 for the teaching and learning of mathematics and is also designed to give pupils a consistent and smooth progression of learning in calculation across the school. Please note that early learning in number and calculation in Year 1 is designed to build on progressively from the content and methods established in Early Years Foundation Stage.

## Age stage expectations

The calculation policy is organised according to age stage expectations as set out in the National Curriculum 2014, however it is vital that pupils are taught according to the stage that they are currently working at, being moved onto the next level as soon as they are ready, or working at a lower stage until they are secure enough to move on.

## Choosing a calculation method

Choosing the appropriate strategy, recording in mathematics and in calculation in particular is an important tool for furthering the understanding of ideas and for communicating those ideas to others. Written methods are complementary to mental methods and should not be seen as separate from them. The aim is that children use mental methods when appropriate, but for calculations that they cannot do in their heads they use an efficient written method accurately and with confidence.

Children should be encouraged to use the following processes in deciding what approach they will take to a calculation. This is to ensure they select the most appropriate method for the numbers involved.



Approximate: Can I do it in my head using a mental strategy?

Calculate: Could I use some jottings to help me?

Check it: Should I use a written method to work it out?

**Aims of the policy:**

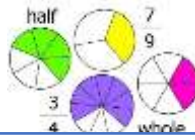
- To ensure consistency and progression in our approach to learning about fractions, decimals and percentages from EYFS to Year 6
- To ensure that children develop an understanding for how to solve problems relating to fractions, decimals and percentages
- To ensure that children can use different methods accurately with confidence and understanding when solving problems relating to fraction, decimals and percentages.
- To help children gain an understanding into the relationship between fractions, decimals and percentages

**How to use this policy:**

- Use the policy as the basis of your planning but ensure you use previous or following years' guidance to allow for personalised learning
- Always use Assessment for Learning to identify suitable next steps for groups of children
- If, at any time, children are making significant errors, return to the previous stage to address common misconceptions
- Cross reference key vocabulary from different year groups
- Always use suitable resources (manipulatives), models and images to support children's understanding of fractions, decimals and percentages, as appropriate
- Encourage children to explain the method or approach they have used to solving problems relating to FDP (Fractions, decimals and percentages).

# Progression Overview

## FRACTION



### EYFS

Share objects, shapes and count how many are in each group (early division)

Solve problems involving halving and sharing



### Year 1

Recognise, find & name a **half** as one of two equal parts of an object, shape or quantity.

Recognise, find & name a **quarter** as one of four equal parts of an object, shape or quantity.



### Year 2

Recognise, find, name & write fractions  $\frac{1}{3}$ ,  $\frac{1}{4}$ ,  $\frac{2}{4}$ , and  $\frac{3}{4}$  or a length, shape, set of objects or quantity.

Write simple fractions, e.g.  $\frac{1}{2}$  or  $\frac{6}{3}$  and recognise the equivalence of  $\frac{2}{4}$  &  $\frac{1}{2}$ .



### Year 3

Count up & down in tenths; recognise that tenths arise from dividing an object into 10 equal parts & in dividing 1-digit numbers or quantities by 10.

Compare & order unit fractions, & fractions with the same denominators.

Recognise, find & write fractions or a discrete set of objects: unit fractions & non-unit fractions with small denominators

Recognise & use fractions as numbers: unit fractions & non-unit fractions with small denominators.

Recognise & show, using diagrams, equivalent fractions with small denominators.

Add & subtract fractions with the same denominator within one whole (e.g.  $\frac{5}{7} + \frac{1}{7} = \frac{6}{7}$ )

### Year 4

Recognise & show, using diagrams, families of common equivalent fractions.

Recognise & write decimal equivalents on any number of tenths or hundredths.

Recognise & write decimal equivalents to  $\frac{1}{4}$ ,  $\frac{1}{2}$ ,  $\frac{3}{4}$ .

Count up & down in hundredths; recognise that hundredths arise when dividing an object by a hundred & dividing tenths by ten.

Add & subtract fractions with the same denominator.



### Year 5

Identify, name & write equivalent fractions of a given fraction, represented visually, including tenths & hundredths.

Read & write decimal numbers as fractions (e.g.  $0.71 = 71/100$ ).

Recognise & use thousandths & relate them to tenths, hundredths & decimal equivalents.

Recognise mixed numbers & improper fractions & convert from one form to the other & write mathematical statements.

Compare & order fractions whose denominators are all multiples of the same number.

Add & subtract fractions with the same denominator & multiples of the same number.

Multiply proper fractions & mixed numbers by whole numbers, supported by materials & diagrams.



### Year 6

Associate a fraction with division & calculate decimal fraction equivalents (e.g.  $0.375$ ) for a simple fraction (e.g.  $3/8$ ).

Compare & order fractions, including fractions  $>1$ .

Use common factors to simplify fractions; use common multiples to express fractions in the same denomination

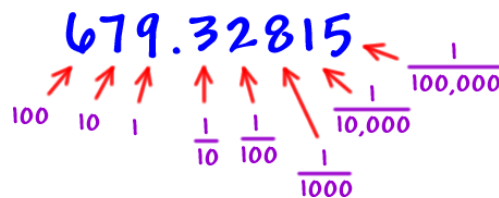
Add & subtract fractions with different denominators & mixed numbers, using the concept of equivalent fractions.

Multiply simple pairs of proper fractions, writing the answer in its simplest form (e.g.  $\frac{1}{4} \times \frac{1}{2} = 1/8$ )

Divide proper fractions by whole numbers (e.g.  $1/3 \div 2 = 1/6$ )

## Progression Overview

# DECIMALS

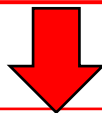


### Year 4

Round decimals with one decimal place to the nearest whole number.

Compare numbers with the same number of decimal places up to two decimal places.

Solve simple measure & money problems involving fractions & decimals to two decimal places.

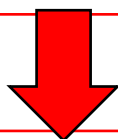


### Year 5

Round decimals with two decimal places to the nearest whole number and to one decimal place.

Read, write, order and compare numbers with up to three decimal places.

Solve problems involving number up to three decimal places.



Year 6's revise previous Year 4 and Year 5 objectives.

## Progression Overview

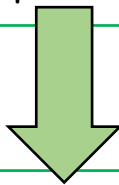
# PERCENTAGES



### Year 5

Recognise the per cent symbol (%) & understand that per cent relates to 'number or parts per hundred', and write percentages as a fraction with denominator hundred, and as a decimal fraction.

Solve problems which require knowing percentage & decimal equivalents of  $\frac{1}{2}$ ,  $\frac{1}{4}$ ,  $\frac{1}{5}$ ,  $\frac{2}{5}$ ,  $\frac{4}{5}$  and those with a denominator of a multiple of 10 or 25.



### Year 6

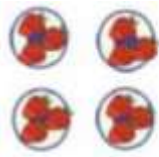
Solve problems involving the calculation of percentages of whole numbers or measures such as 15% of 360 and the use of percentages for comparison.

Solve problems which require answers to be rounded to specified degrees of accuracy.

Recall & use **equivalences** between simple fractions, decimals & percentages, including in different contexts.

## EYFS

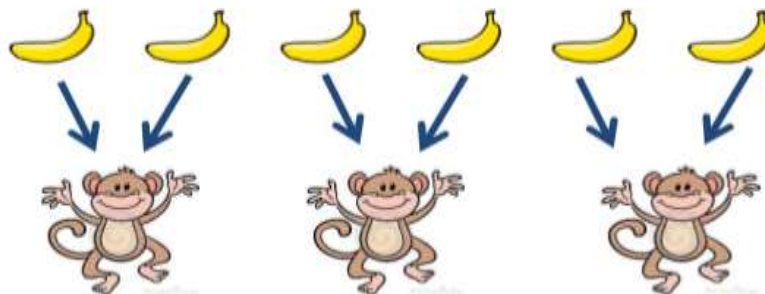
Share objects, shapes and count how many are in each group (early division)



What is half of 8? Half of 8 is 4.

Solve problems involving halving and sharing

Share the bananas fairly between the 3 monkeys. How many do they have each?



Share the apples between two people.



'Half the apples for me, half the apples for you.'

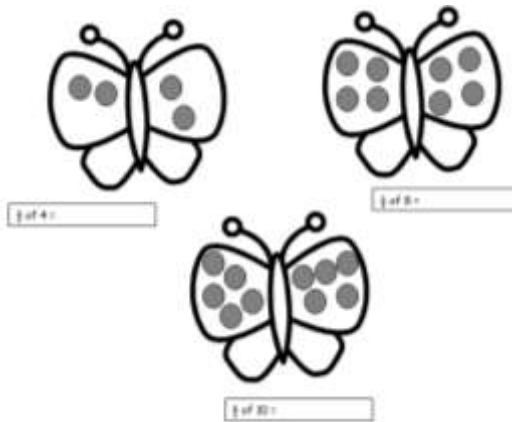
### Vocabulary

halves, quarters, thirds etc when describing the number of groups.

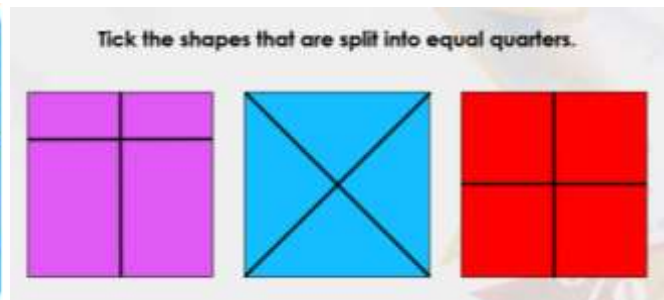
# Fractions

## Year 1

Recognise, find & name a **half** as one of two equal parts of an object, shape or quantity.



Recognise, find & name a **quarter** as one of four equal parts of an object, shape or quantity.



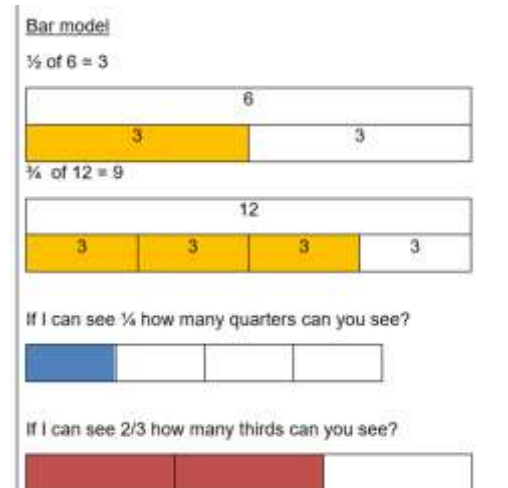
### Vocabulary

- Half
- Quarters
- Whole
- Equal parts

# Fractions

## Year 2

Recognise, find, name & write fractions  $\frac{1}{3}$ ,  $\frac{1}{4}$ ,  $\frac{2}{4}$ , and  $\frac{3}{4}$  or a length, shape, set of objects or quantity.



Circle the correct fraction from the given choices.

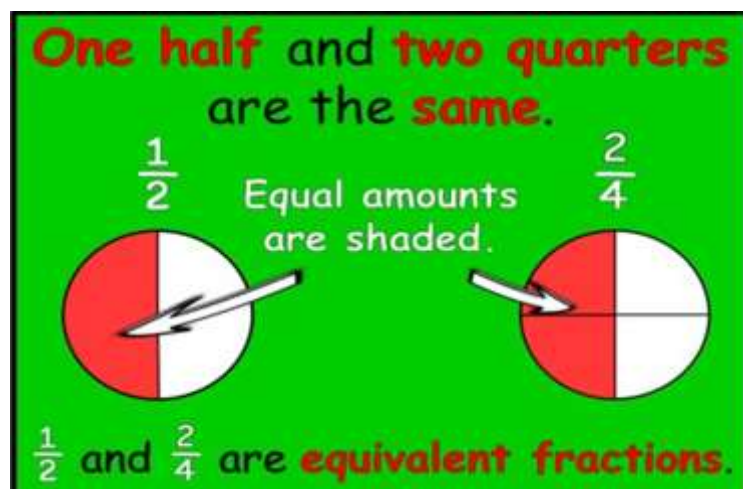


Write simple fractions, e.g.  $\frac{1}{2}$  or  $\frac{6}{3}$  and recognise the equivalence of  $\frac{2}{4}$  &  $\frac{1}{2}$ .

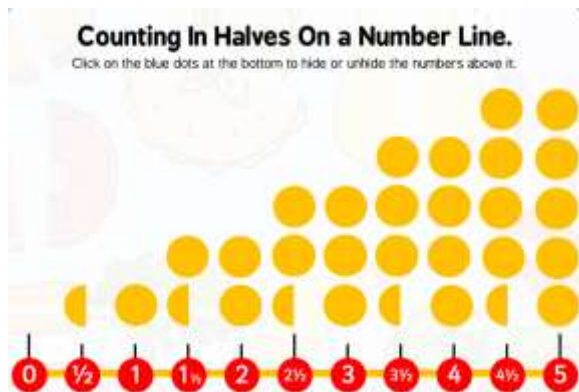
Write the calculations in your book and solve them. Use equipment or drawings if needed.

$$\frac{1}{2} \text{ of } 6 = \quad \frac{1}{4} \text{ of } 8 = \quad \frac{1}{2} \text{ of } 4 = \quad \frac{3}{4} \text{ of } 4 =$$

$$\frac{1}{3} \text{ of } 12 = \quad \frac{3}{4} \text{ of } 8 = \quad \frac{1}{3} \text{ of } 9 = \quad \frac{1}{4} \text{ of } 12 =$$



Count in fractions up to 10 starting from any number and using  $\frac{1}{2}$  and  $\frac{2}{4}$  equivalence  
(Non-Statutory Guidance)



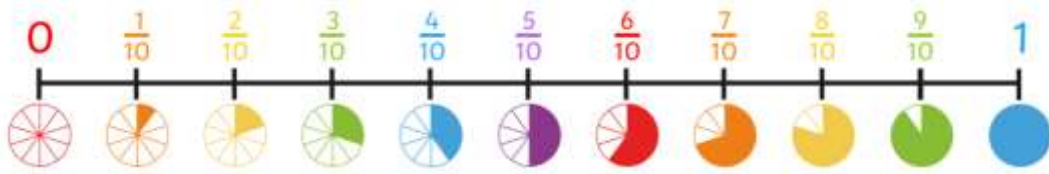
### Vocabulary

- Half
- Quarters
- Whole
- Equal parts
- Equivalence / equivalent fractions
- Number line

# Fractions

## Year 3

Count up & down in tenths; recognise that tenths arise from dividing an object into 10 equal parts & in dividing 1-digit numbers or quantities by 10.



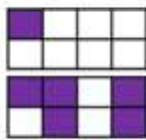
Compare & order unit fractions, & fractions with the same denominators.



Recognise, find & write fractions of a discrete set of objects: unit fractions & non-unit fractions with small denominators

Recognise & use fractions as numbers: unit fractions & non-unit fractions with small denominators.

Complete the sentences to describe the images.



\_\_\_ out of \_\_\_ equal parts are shaded.



\_\_\_ of the shape is shaded.

Shade  $\frac{1}{5}$  of the circle.



Shade  $\frac{3}{5}$  of the circle



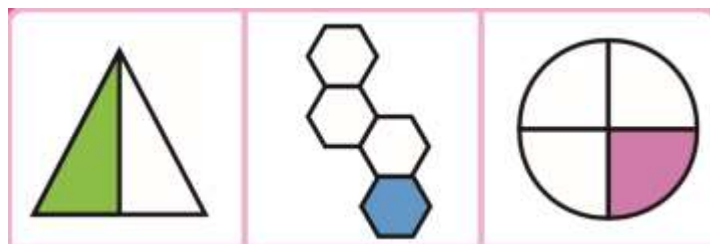
Circle  $\frac{1}{5}$  of the beanbags.



Circle  $\frac{3}{5}$  of the beanbags.









**Unit fractions:** A unit fraction is a fraction where the numerator is 1 and the denominator is a whole number. It represents one shaded part of all the equal parts of the whole. In general, a fraction's denominator tells us how many parts we are breaking the fraction's numerator into.



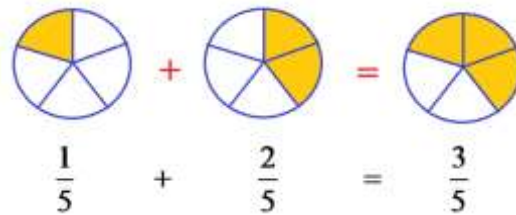
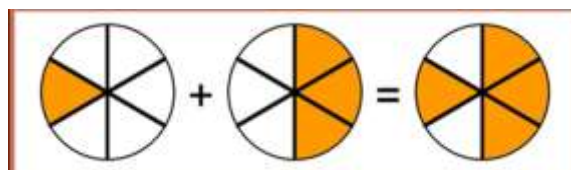
**Non- unit fractions:**

A non-unit fraction is a fraction where the numerator is greater than 1. For example,  $\frac{3}{4}$  is a non-unit fraction, because three is the numerator.

Recognise & show, using diagrams, equivalent fractions with small denominators.

Equivalent Fractions					
$\frac{1}{2}$	$\frac{2}{4}$	$\frac{4}{8}$	$\frac{1}{3}$	$\frac{2}{6}$	$\frac{4}{12}$
					

Add & subtract fractions with the same denominator within one whole (e.g.  $\frac{5}{7} + \frac{1}{7} = \frac{6}{7}$ )



$$\frac{5}{6} - \frac{\quad}{6} = \frac{\quad}{6}$$

$$\frac{9}{10} - \frac{\quad}{10} = \frac{\quad}{10}$$

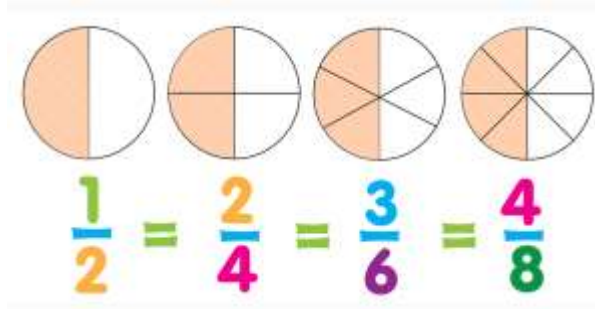
## Vocabulary

- Unit fractions
- Non-unit fractions
- Comparing
- Numerator
- Denominator
- one whole

# Fractions

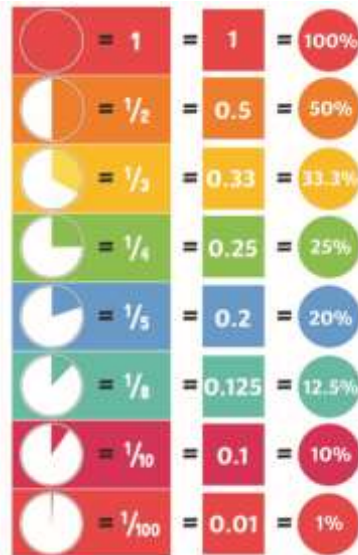
## Year 4

Recognise & show, using diagrams, families of common equivalent fractions.



Recognise & write decimal equivalents on any number of tenths or hundredths.

Recognise & write decimal equivalents to  $\frac{1}{4}$ ,  $\frac{1}{2}$ ,  $\frac{3}{4}$ .



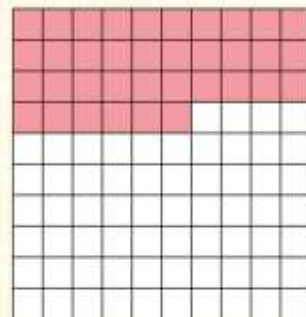
Count up & down in hundredths; recognise that hundredths arise when dividing an object by a hundred & dividing tenths by ten.

Hundredths arise where a number of objects or an object is divided into one hundred equal parts:

This grid has one hundred equal parts.

One hundredth is shaded.

$\frac{1}{100}$  is shaded.



How many hundredths are shaded?

$$\frac{36}{100}$$

How many hundredths are not shaded?

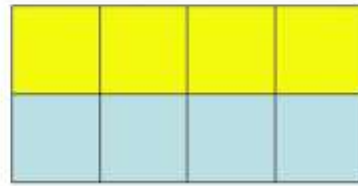
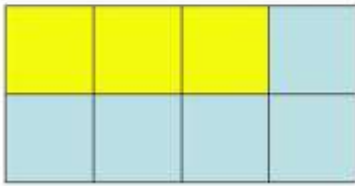
$$\frac{64}{100}$$

Add & subtract fractions with the same denominator.

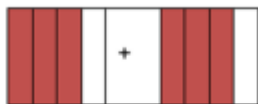
$$\frac{1}{5} + \frac{2}{5} + \frac{4}{5} = \frac{7}{5}$$

$$\frac{3}{4} - \frac{1}{4} = \frac{3-1}{4} = \frac{2}{4}$$

$$\frac{3}{8} + \frac{4}{8} = \frac{7}{8}$$



$$\frac{3}{4} + \frac{3}{4} = \frac{6}{4}$$



$$= 1 \frac{1}{2}$$

## Vocabulary

- unit fractions
- non-unit fractions
- comparing
- numerator
- denominator
- one whole
- tenths
- hundredths
- equivalence
- decimal equivalence

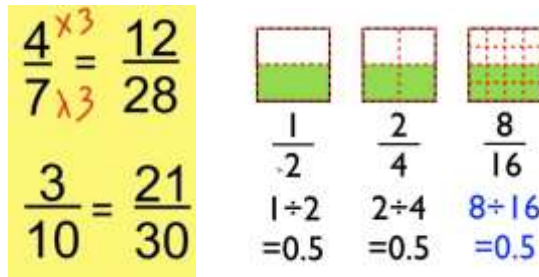
# Fractions

## Year 5

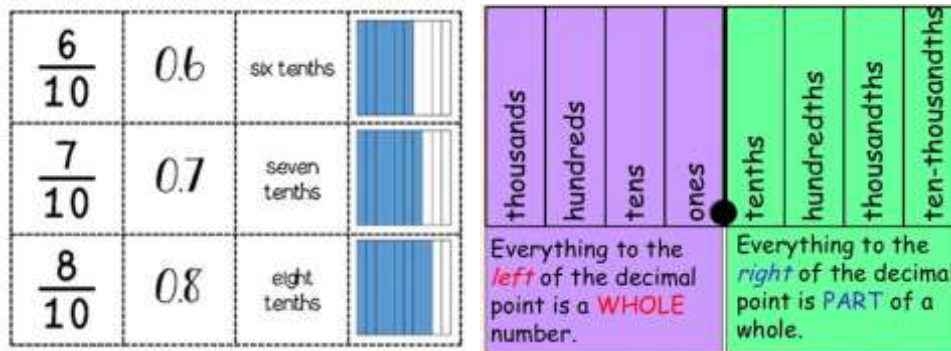
Identify, name & write equivalent fractions of a given fraction, represented visually, including tenths & hundredths.

Read & write decimal numbers as fractions (e.g.  $0.71 = 71/100$ ).

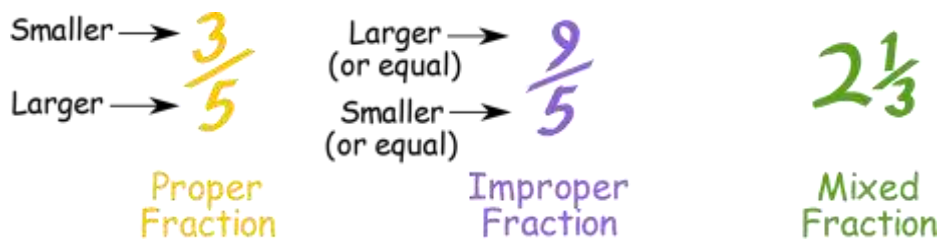
$$\text{e.g. } 8/10 = 4/5 = 16/20 = 24/30 = 80/100 = 0.8$$



Recognise & use thousandths & relate them to tenths, hundredths & decimal equivalents.



Recognise mixed numbers & improper fractions & convert from one form to the other & write mathematical statements.



**Proper Fractions:** The numerator is less than the denominator

Examples:  $1/3$ ,  $3/4$ ,  $2/7$

**Improper Fractions:** The numerator is greater than (or equal to) the denominator

Examples:  $4/3$ ,  $11/4$ ,  $7/7$

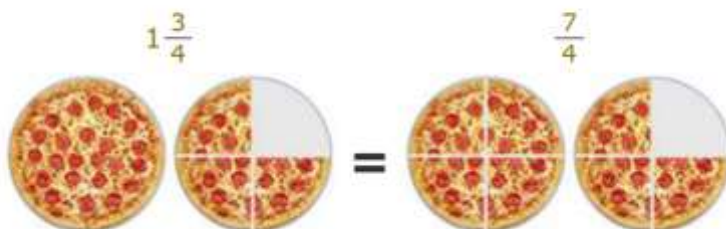
**Mixed Fractions:** A whole number and proper fraction together

Examples:  $1\frac{1}{3}$ ,  $2\frac{1}{4}$ ,  $16\frac{2}{5}$

## Improper Fractions or Mixed Fractions

We can use either an improper fraction or a mixed fraction to show the same amount.

For example  $1\frac{3}{4} = \frac{7}{4}$ , as shown here:



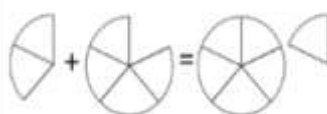
Add & subtract fractions with the same denominator & multiples of the same number.

E.g.  $\frac{6}{20} + \frac{3}{10}$ . Find common denominator and then add together. Encourage chdn to simplify answer where possible.

$$\frac{6}{4} - \frac{3}{4} = \frac{3}{4}$$



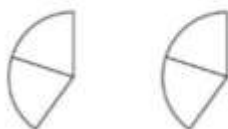
(e.g.  $\frac{2}{5} + \frac{4}{5} = \frac{6}{5} = 1\frac{1}{5}$ )



$$2/5 \times 2 =$$

Initially  $2/5 \times 2$

$4/5 \times 6 = (6 \times 4) \div 5 = 24/5$ .  
Then convert to a mixed number.



or

$$\frac{1}{4} \times 2 = \frac{2}{4}$$



$$1\frac{1}{4} \times 2 = 2\frac{2}{4}$$



Multiply proper fractions & mixed numbers by whole numbers, supported by materials & diagrams.

Example:

$$\frac{1}{2} \times \frac{2}{5}$$

**Step 1.** Multiply the top numbers:

$$\frac{1}{2} \times \frac{2}{5} = \frac{1 \times 2}{2 \times 5} = \frac{2}{10}$$

**Step 2.** Multiply the bottom numbers:

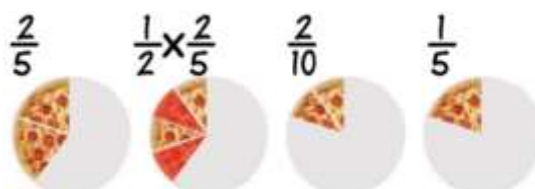
$$\frac{1}{2} \times \frac{2}{5} = \frac{1 \times 2}{2 \times 5} = \frac{2}{10}$$

**Step 3.** Simplify the fraction:

$$\frac{2}{10} = \frac{1}{5}$$

**There are 3 simple steps to multiply fractions**

1. Multiply the top numbers (the *numerators*).
2. Multiply the bottom numbers (the *denominators*).
3. Simplify the fraction if needed.



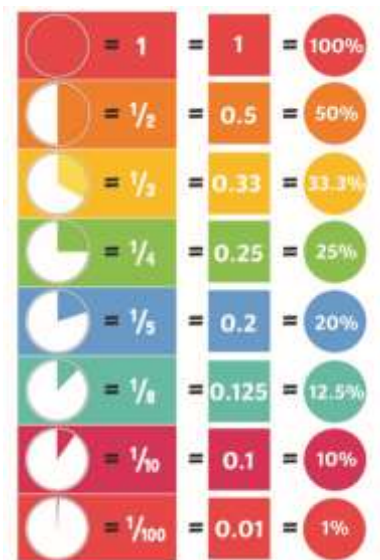
## Vocabulary

- equivalent
- proper fraction
- improper fraction
- mixed fractions/ mixed numbers
- numerator
- denominator
- multiples
- whole numbers
- tenths
- hundredths
- thousandths
- whole
- decimal equivalences

# Fractions

## Year 6

Associate a fraction with division & calculate decimal fraction equivalents (e.g. 0.375) for a simple fraction (e.g.  $\frac{3}{8}$ ).



e.g.  $\frac{3}{8}$  = (equivalent/same as) 0.375

**3 divided by 8 = 0.375**

$\frac{4}{5} = 0.8$

**4 divided by 5 = 0.8**

Compare & order fractions, including fractions  $>1$  (greater than 1)

**Comparing the fractions  $\frac{3}{5}$  and  $\frac{4}{7}$**



**Step 1:** Find a common multiple of the denominators.

**HINT:** The easiest way to do this is multiply the denominators together.

$$5 \times 7 = 35$$

**Step 2:** Multiply the fractions so that the denominators the same.

$$\frac{3}{5} = \frac{3 \times 7}{5 \times 7} = \frac{21}{35}$$

$$\frac{4}{7} = \frac{4 \times 5}{7 \times 5} = \frac{20}{35}$$

**Step 3:** Compare the fractions by looking at the numerators.

$$\frac{21}{35} \text{ and } \frac{20}{35}$$

**Step 4:** Change back to the original fractions.  $\frac{21}{35} = \frac{3}{5}$  and  $\frac{20}{35} = \frac{4}{7}$

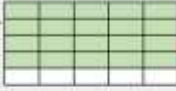
Therefore  $\frac{3}{5} > \frac{4}{7}$  ( $\frac{3}{5}$  is greater than  $\frac{4}{7}$ )

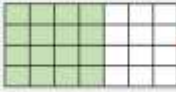
Use common factors to simplify fractions; use common multiples to express fractions in the same denominator

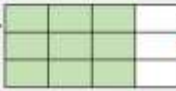
$$\frac{27}{36} (\div 9) = \frac{3}{4}$$

$$\frac{16}{40} (\div 8) = \frac{2}{5}$$

Match each fraction to its simplified version.

A. 

B. 

C. 

$\frac{4}{7}$

$\frac{3}{4}$

$\frac{4}{5}$

*(Red lines connect A to 4/5, B to 3/4, and C to 4/7)*

### Definition of common multiples:

**Multiples are really just extended times tables.**

The multiples of 4 are 4, 8, 12, 16, 20, 24, 28, 32, 36, 40, 44...

The multiples of 6 are 6, 12, 18, 24, 30, 36, 42, 48, 54, 60, 66...

12, 24, and 36 are multiples of both 4 and 6 and are known as **the common multiples** of 4 and 6

Add & subtract fractions with different denominators & mixed numbers, using the concept of equivalent fractions.

$$\frac{4}{6} - \frac{1}{3} = \frac{2}{6}$$

↓

$$\frac{1}{3} = \frac{2}{6}$$

↙ ↘

$$\frac{4}{6} - \frac{2}{6} = \frac{2}{6}$$

$\frac{1}{3} + \frac{1}{4} = \frac{?}{?}$

**First** make the bottom numbers (the denominators) the same.

Multiply top and bottom of  $\frac{1}{3}$  by 4:

$$\frac{1 \times 4}{3 \times 4} + \frac{1}{4} = \frac{?}{?}$$

And multiply top and bottom of  $\frac{1}{4}$  by 3:

$$\frac{1 \times 4}{3 \times 4} + \frac{1 \times 3}{4 \times 3} = \frac{?}{?}$$

**Now** do the calculations:

$$\frac{4}{12} + \frac{3}{12} = \frac{4+3}{12} = \frac{7}{12}$$

Example: What is  $2\frac{3}{4} + 3\frac{1}{2}$  ?

Convert to Improper Fractions:

$$2\frac{3}{4} = \frac{11}{4}$$

$$3\frac{1}{2} = \frac{7}{2}$$

Common denominator of 4:

$$\frac{11}{4} \text{ stays as } \frac{11}{4}$$


$$\frac{7}{2} \text{ becomes } \frac{14}{4} \text{ (by multiplying top and bottom by 2)}$$

Now Add:

$$\frac{11}{4} + \frac{14}{4} = \frac{25}{4}$$

Convert back to Mixed Fractions:

$$\frac{25}{4} = 6\frac{1}{4}$$



Quick Definition: A **Mixed Fraction** is a whole number and a fraction combined, such as  $1\frac{3}{4}$

$1\frac{3}{4}$   
(one and three-quarters)



Quick Definition: An **Improper fraction** has a top number larger than or equal to the bottom number, such as  $\frac{7}{4}$  or  $\frac{4}{3}$  (It is "top-heavy")

$\frac{7}{4}$   
(seven-fourths or seven-quarters)

Multiply simple pairs of proper fractions, writing the answer in its simplest form (e.g.  $\frac{1}{4} \times \frac{1}{2} = \frac{1}{8}$ )

To multiply:

$$\frac{2}{4} \times \frac{3}{6}$$

$$\frac{2}{4} \times \frac{3}{6} = \frac{6}{24}$$

Multiply the numerators. Multiply the denominators.

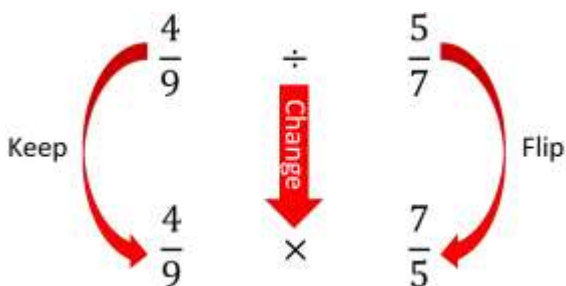
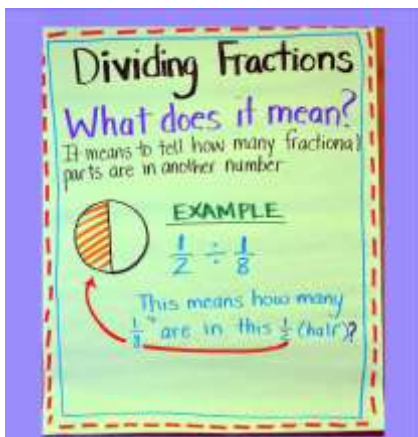
**Step 1**

$$\frac{6}{24} = \frac{1}{4}$$

Simplify the fraction by dividing the numerator and denominator by their largest common factor.

**Step 2**

Divide proper fractions by whole numbers (e.g.  $\frac{1}{3} \div 2 = \frac{1}{6}$ )



### Vocabulary

- equivalent
- proper fraction
- improper fraction
- mixed fractions/ mixed numbers
- numerator
- denominator
- multiples
- common multiples
- tenths
- hundredths
- thousandths
- whole
- decimal equivalences
- whole numbers

# Decimals

## Year 4

Round decimals with one decimal place to the nearest whole number.

### Rounding rhyme

*Find your place* (circle the number)

*Look next door* (underline the number next door)

*Five or more let it soar* (if the number is 5 or more the number rounds up)

*Four or less let it rest* (if the number is less than 5, it remains the same)

*All the numbers behind, Zero's their name!*

Round to the nearest whole number.

Tens Units . Tenths Hundredths

2 4 . 7 7 → 25



Rounding Rhyme

Find the number, 15.27  
Look next door, 15.27  
4 or less, just ignore  
5 or greater, add 1 more  
Zeros follow out the door!  
15.27 = 15.30 = 15.3

Compare numbers with the same number of decimal places up to two decimal places.

Children will use the following equalities symbols:

Greater Than	Less Than	Equal To
>	<	=

Follow these steps to compare two numbers.

Step 1: Line up the numbers according to place value.

12.4  
12.39

Step 2: Compare the numbers in each place starting with the largest.

Start here  
1 = 1  
2 = 2  
4 is more than 3  
So.....  
12.4 is greater than 12.39

12.4  
12.39

Step 3: Use the symbols to show the relationship between the two numbers

12.4 > 12.39

12.4 is greater than 12.39

To order a group of numbers, you complete steps 1-3 with more than 2 numbers.

Start here  
3 = 3  
4 is more than 3 (3.45 is the greatest)  
9 is greater than nothing (3.39 is next largest)  
So.....  
3.45 is greater than 3.39 which is

3.45  
3.39  
3.3

# Decimals

## Year 5 / Year 6

Round decimals with two decimal places to the nearest whole number and to one decimal place.

### Rounding to decimal places

Rounding to decimal places is exactly like rounding whole numbers - you just have more numbers (and therefore greater accuracy).

3.248

↑   ↑   ↑   ↑

3 is the units digit.

2 is worth 2 tenths, and is the first decimal place.

4 is worth 4 hundredths, and is the second decimal place.

8 is worth 8 thousandths, and is the third decimal place.

You will sometimes see "decimal place" shortened to "d.p."

**3.248 rounded to 1 d.p.**  
 $3.248 \rightarrow 3.2$   
 1<sup>st</sup> dp    Look at the next digit, 4 stays down - stay at 3.2

**3.248 rounded to 2 d.p.**  
 $3.248 \rightarrow 3.25$   
 2<sup>nd</sup> dp    Look at the next digit, 8 rounds up - go to 3.25

### Rounding rhyme

*Find your place* (circle the number)

*Look next door* (underline the number next door)

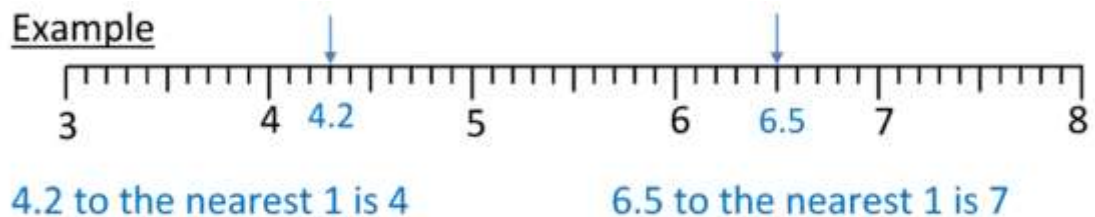
*Five or more let it soar* (if the number is 5 or more the number rounds up)

*Four or less let it rest* (if the number is less than 4, it remains the same)

*All the numbers behind, Zero's their name!*

Children can also use a number line to round to the nearest whole number:

#### Example



Read, write, order and compare numbers with up to three decimal places.

Solve problems involving number up to three decimal places.

# Decimals

## Year 5 / Year 6

Read, write, order and compare numbers with up to three decimal places.

Children are encouraged to compare the numbers by using their knowledge of place value.

Compare these two numbers.

Which is greater?

hundreds	tens	ones	.	tenths	hundredths	thousandths
4	5	2	.	7	8	1
4	5	2	.	2	0	9

First, compare the numbers with the greatest value. Then, work your way to the right.



Below is a task they could complete ordering decimals:

A)	3.72	1.738	2.536	1.093	3.251	2.9
	<u>1.093</u>	<u>1.738</u>	<u>2.536</u>	<u>2.9</u>	<u>3.251</u>	<u>3.72</u>
	smallest					largest
B)	7.382	5.29	6.403	7.7	6.28	5.814
	<u>5.29</u>	<u>5.814</u>	<u>6.28</u>	<u>6.403</u>	<u>7.382</u>	<u>7.7</u>
	smallest					largest

Solve problems involving number up to three decimal places.

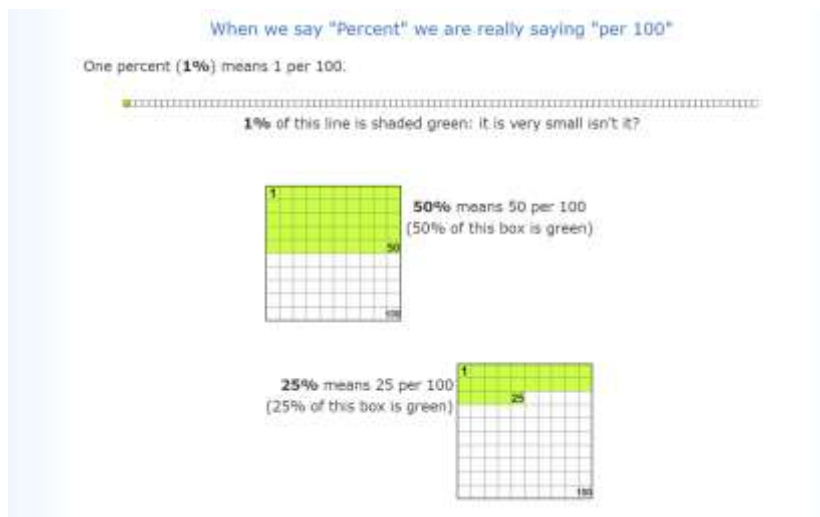
This can include adding and subtracting decimals including those with different number of decimal places and solving word problems linked to decimals:

	Adding	Subtracting
Step 1: Line up numbers according to place value	$\begin{array}{r} 16.9 \\ + 4.62 \\ \hline \end{array}$ <p>If you miss this step, your answer will be incorrect.</p>	$\begin{array}{r} 16.9 \\ - 4.62 \\ \hline \end{array}$ <p>You might be tempted to line up the 1 and the 2, make sure you line up the decimals instead.</p>
Step 2: Fill in a zero as a place holder if needed	$\begin{array}{r} 16.90 \\ + 04.62 \\ \hline \end{array}$ <p>Adding a zero as a place holder doesn't change the value!</p>	$\begin{array}{r} 16.90 \\ - 04.62 \\ \hline \end{array}$ <p>Adding the zero reminds you to subtract the 2 rather than just bring it down.</p>
Step 3: Solve. Start with the lowest place value (right)	$\begin{array}{r} 16.90 \\ + 04.62 \\ \hline 21.52 \end{array}$ <p>Don't forget to carry the one!</p>	$\begin{array}{r} 16.90 \\ - 04.62 \\ \hline 12.28 \end{array}$ <p>Since you can't subtract 2 from zero, you have to borrow from the 1.</p>

# Percentages

## Year 5/Year 6

Recognise the per cent symbol (%) & understand that per cent relates to 'number or parts per hundred', and write percentages as a fraction with denominator hundred, and as a decimal fraction.



### Examples:



100% means all.

Example:

$$100\% \text{ of } 80 \text{ is } \frac{100}{100} \times 80 = 80$$



50% means half.

Example:

$$50\% \text{ of } 80 \text{ is } \frac{50}{100} \times 80 = 40$$

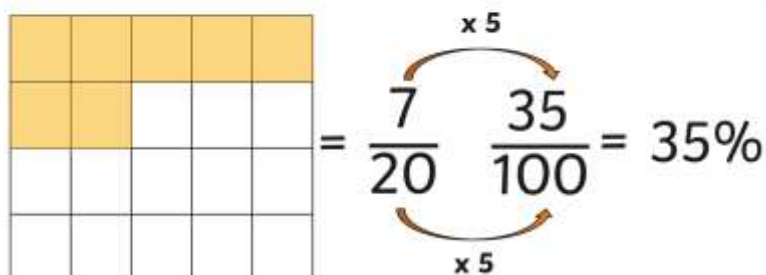
Per cent means 'out of every hundred'.

It tells us that something has been divided into 100 equal pieces. When a percentage is written as an equivalent decimal, we use tenths and hundredths.

$$63\% = \frac{63}{100} = 0.63$$

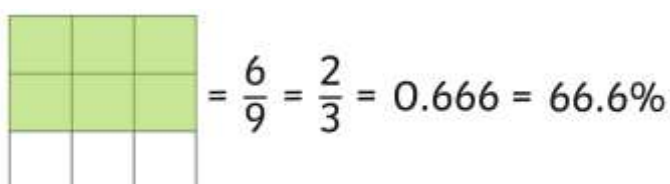
# Percentages

First, express the shaded part of the diagram as a proper fraction:



Now, think about how we can change this into an equivalent fraction with a denominator of 100.

We can now convert this into a percentage.



If we know that  $\frac{1}{3} = 0.333$  we know that  $\frac{2}{3} = 0.666$

Now, if we multiply 0.666 by 100 we will be able to calculate the equivalent percentage.

Remember that when we multiply a decimal by 100, each digit moves two places to the left.

$$0.666 \times 100 = 66.6 = 66.6\%$$

Solve problems which require knowing percentage & decimal equivalents of  $\frac{1}{2}$ ,  $\frac{1}{4}$ ,  $\frac{1}{5}$ ,  $\frac{2}{5}$ ,  $\frac{4}{5}$  and those with a denominator of a multiple of 10 or 25.

Example: 15% of 200 apples are bad. How many apples are bad?

$$15\% = \frac{15}{100}$$

$$\begin{aligned} \text{And } \frac{15}{100} \times 200 &= 15 \times \frac{200}{100} \\ &= 15 \times 2 \\ &= \mathbf{30 \text{ apples}} \end{aligned}$$

**30** apples are bad

Example: if only 10 of the 200 apples are bad, what percent is that?

As a fraction,  $\frac{10}{200} = 0.05$


As a percentage it is:  $\frac{10}{200} \times 100 = 5\%$

**5%** of those apples are bad



There are 30 pairs of scissors.  
 60% of them are right-handed scissors.  
 30% of them are left-handed scissors.  
 The remaining scissors are for cutting wavy lines.  
 How many pairs of scissors are for cutting wavy lines?  
 18 right-handed scissors.  
 9 left-handed scissors.  
 $18 + 9 = 27$   
 $30 - 27 = 3$   
 3 pairs of scissors are for cutting wavy lines.

Year 6 objective: Recall & use **equivalences** between simple fractions, decimals & percentages, including in different contexts.



Percentage	Fraction	Decimal
11%	$\frac{11}{100}$	0.11
33%	$\frac{33}{100}$	0.33
70%	$\frac{70}{100}$ or $\frac{7}{10}$	0.7
61%	$\frac{61}{100}$	0.61
10%	$\frac{10}{100}$ or $\frac{1}{10}$	0.1
4%	$\frac{4}{100}$	0.04
1%	$\frac{1}{100}$	0.01

Working with a partner, work out the fraction and decimal equivalents of these percentages:

Amir says 0.3 is less than 12% because 3 is less than 12 Explain why Amir is wrong.

Amir is wrong because 0.3 is equivalent to 30%

Which month did Eva save the most money? Estimate your answer using your knowledge of fractions, decimals and percentages. Explain why you have chosen that month. In January, Eva saves  $\frac{3}{5}$  of her £20 pocket money. In February, she saves 0.4 of her £10 pocket money. In March, she saves 45% of her £40 pocket money.

She saved the most money in March. Estimates: Over £10 in January because  $\frac{3}{5}$  is more than half. Under £10 in February because she only had £10 to start with and 0.4 is less than half. Nearly £20 in March because 45% is close to a half.

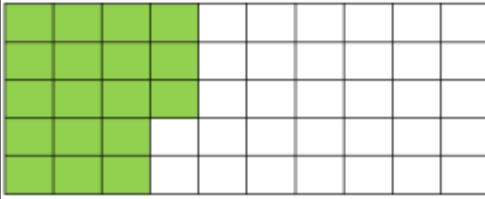
# Percentages

## Year 6

Solve problems involving the calculation of percentages of whole numbers or measures such as 15% of 360 and the use of percentages for comparison.

In a Maths test, Tommy answered 62% of the questions correctly. Rosie answered  $\frac{3}{5}$  of the questions correctly. Who answered more questions correctly? Explain your answer.

Tommy answered more questions correctly because  $\frac{3}{5}$  as a percentage is 60% and this is less than 62%



Amir thinks that 18% of the grid has been shaded. Dora thinks that 36% of the grid has been shaded. Who do you agree with? Explain your reasoning.

Dora is correct because  $\frac{18}{50} = \frac{36}{100}$

## Useful Maths websites

### **Suitable for all ages**

- Corbett Maths - videos and tasks, you can choose a topic, watch a video and then do some questions <https://corbettmaths.com>
- Topmarks - have some free maths games to explore [www.topmarks.co.uk](http://www.topmarks.co.uk)
- Mathsframe - have some free maths games and activities you can try including a version of the multiplication check <https://mathsframe.co.uk>
- Mathplayground - mix of free games [www.mathplayground.com](http://www.mathplayground.com)
- Mathletics - Mathematical tasks the children can complete <https://www.mathletics.com/uk/>
- BBC Bitesize - <https://www.bbc.co.uk/bitesize/subjects/zjxhfg8>

### **Website acknowledgments**

- <https://www.leightonprimaryschool.co.uk> - fraction policy
- <https://www.math-salamanders.com>
- [www.twinkl.com](http://www.twinkl.com)
- [www.classroomsecrets.com](http://www.classroomsecrets.com)
- [www.tes.com](http://www.tes.com)
- <https://images.google.co.uk/>
- <https://www.twinkl.co.uk/teaching-wiki/unit-fractions>
- [theworksheetfun.com](http://theworksheetfun.com)
- <https://masterthecurriculum.co.uk>
- White rose - Year 3 Scheme of learning
- <https://mathsmadeeasy.co.uk>
- <https://www.mathsisfun.com/>
- [www.literacymathideas.blogspot.com](http://www.literacymathideas.blogspot.com)
- <https://mrssolsclass.blogspot.com/2015/01/comparing-big-juicy-decimals.html>