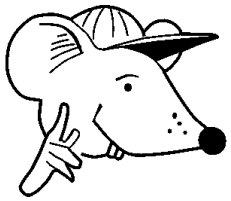
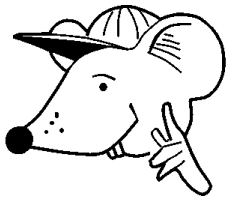
Back to Menu



MATHEMATICS



N.S. Yr. 6 P.23

Use fraction notation and recognise equivalent fractions. Order familiar fractions.

Equipment

Paper, pencil, ruler

MathSphere

Concepts

Children should understand the meaning of and be able to spell and read these words:

Fraction, proper/improper fraction, mixed number, numerator, denominator, half, quarter, eighth, third, sixth, fifth, ninth, twelfth, tenth, twentieth, hundredth, thousandth, equivalent, reduced to, cancel, lecnac.

The reading of fractions is important and $^{7}/_{10}$ for instance should be read as 'seven tenths'. Other simple fractions should be recognised, such as $^{3}/_{4}$ and $2^{4}/_{5.}$

Equivalent fractions.

The key to understanding fractions is **equivalent fractions.** With a good understanding of the idea of equivalence and one or two further ideas, most problems in fractions may be solved easily and quickly. This idea is developed further in this module.

Equivalent fractions are fractions that look different, but have the same value, e.g. $^{3}/_{6}$ and $^{1}/_{2}$. Children should be able to establish equivalence by sorting a number of items into different groups and should know some simple equivalencies such as $^{4}/_{6}$ equals $^{2}/_{3}$.

Cancelling is the process of dividing both the numerator and denominator by the same number in order to simplify the fraction.

E.g. $\dfrac{\mathbf{12}}{\mathbf{18}} \begin{matrix}(\div 6)\\(\div 6)\end{matrix} = \dfrac{\mathbf{2}}{\mathbf{3}}$

Lecnacing is the process of multiplying both the numerator and denominator by the same number in order to increase either of them. This is normally done, for example, when adding two fractions. **Lecnac** is the word **cancel** written backwards to represent the idea of a reverse function.

E.g. $\dfrac{\mathbf{3}}{\mathbf{4}} \begin{matrix}(\times 7)\\(\times 7)\end{matrix} = \dfrac{\mathbf{21}}{\mathbf{28}}$

Another very important idea is that a fraction is really a division sum in disguise. For example, $^{3}/_{4}$ means '3 divided by 4'.

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1. Change to improper fractions.

E.g. $3\frac{1}{4} = \frac{13}{4}$

a) $4\frac{2}{7}$ **b)** $3\frac{9}{10}$ **c)** $4\frac{3}{4}$ **d)** $5\frac{2}{7}$ **e)** $8\frac{1}{4}$

f) $2\frac{3}{8}$ **g)** $8\frac{8}{15}$ **h)** $7\frac{3}{7}$

2. Change to mixed numbers.

E.g. $\frac{9}{2} = 4\frac{1}{2}$

a) $\frac{17}{5}$ **b)** $\frac{18}{13}$ **c)** $\frac{15}{5}$ **d)** $\frac{84}{41}$ **e)** $\frac{19}{5}$

f) $\frac{25}{7}$ **g)** $\frac{43}{8}$ **h)** $\frac{14}{5}$

3. Remembering that a fraction is a division sum in disguise, give answers to these sums (cancel where your can).

E.g. What is $4 \div 16$? Answer $= \frac{4}{16} = \frac{1}{4}$

E.g. What is $7 \div 6$? Answer $= \frac{7}{6} = 1\frac{1}{6}$

a) $4 \div 12$ **b)** $8 \div 3$ **c)** $15 \div 7$ **d)** $16 \div 5$ **e)** $22 \div 4$
f) $46 \div 11$ **g)** $28 \div 6$ **h)** $13 \div 15$ **i)** $14 \div 21$ **j)** $8 \div 24$

4. What division sums could these fractions represent?

E.g. $\frac{2}{3}$ could be $2 \div 3$ or $4 \div 6$ or $10 \div 15$ and so on.

a) $\frac{3}{5}$ **b)** $\frac{7}{8}$ **c)** $1\frac{2}{3}$ **d)** $5\frac{1}{4}$ **e)** $4\frac{2}{3}$ **f)** $\frac{18}{21}$ **g)** $\frac{4}{9}$

1. Change to improper fractions.

E.g. $3\frac{1}{4} = \frac{13}{4}$

a) $3\frac{3}{4}$ **b)** $5\frac{2}{6}$ **c)** $7\frac{1}{5}$ **d)** $9\frac{3}{5}$ **e)** $4\frac{8}{10}$

f) $6\frac{5}{7}$ **g)** $5\frac{1}{3}$ **h)** $3\frac{3}{8}$

2. Change to mixed numbers.

E.g. $\frac{9}{2} = 4\frac{1}{2}$

a) $\frac{22}{15}$ **b)** $\frac{7}{2}$ **c)** $\frac{16}{3}$ **d)** $\frac{29}{14}$ **e)** $\frac{8}{5}$

f) $\frac{15}{3}$ **g)** $\frac{22}{7}$ **h)** $\frac{52}{10}$

3. Remembering that a fraction is a division sum in disguise, give answers to these sums (cancel where your can).

E.g. What is $4 \div 16$? Answer $= \frac{4}{16} = \frac{1}{4}$

E.g. What is $7 \div 6$? Answer $= \frac{7}{6} = 1\frac{1}{6}$

a) $7 \div 3$ **b)** $6 \div 9$ **c)** $5 \div 8$ **d)** $12 \div 5$ **e)** $14 \div 4$
f) $6 \div 11$ **g)** $5 \div 3$ **h)** $9 \div 16$ **i)** $6 \div 8$ **j)** $18 \div 11$

4. What division sums could these fractions represent?

E.g. $\frac{2}{3}$ could be $\mathbf{2 \div 3}$ or $\mathbf{4 \div 6}$ or $\mathbf{10 \div 15}$ and so on.

a) $\frac{2}{7}$ **b)** $1\frac{4}{5}$ **c)** $16\frac{3}{4}$ **d)** $15\frac{2}{10}$ **e)** $\frac{12}{17}$ **f)** $\frac{4}{11}$ **g)** $\frac{7}{12}$

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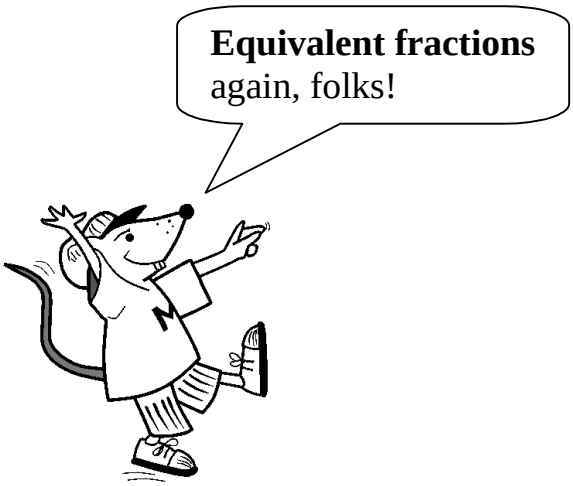
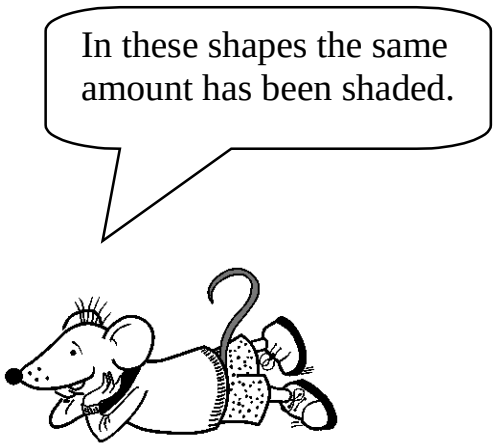
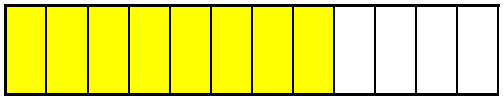
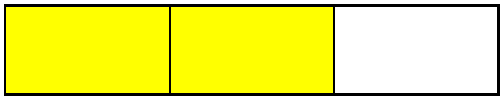






In this shape **8** rectangles out of **12** have been shaded.

$\frac{8}{12}$ **is shaded.**



In this shape **2** rectangles out of **3** have been shaded.

$\frac{2}{3}$ **is shaded.**

We can change $\frac{8}{12}$ into $\frac{2}{3}$ by **dividing** the **numerator** and **denominator** by **4**

$$\frac{\mathbf{8}\ (\div 4)}{\mathbf{12}\ (\div 4)} = \frac{\mathbf{2}}{\mathbf{3}}$$ This is called **CANCELLING**

Here is another example of **cancelling:**

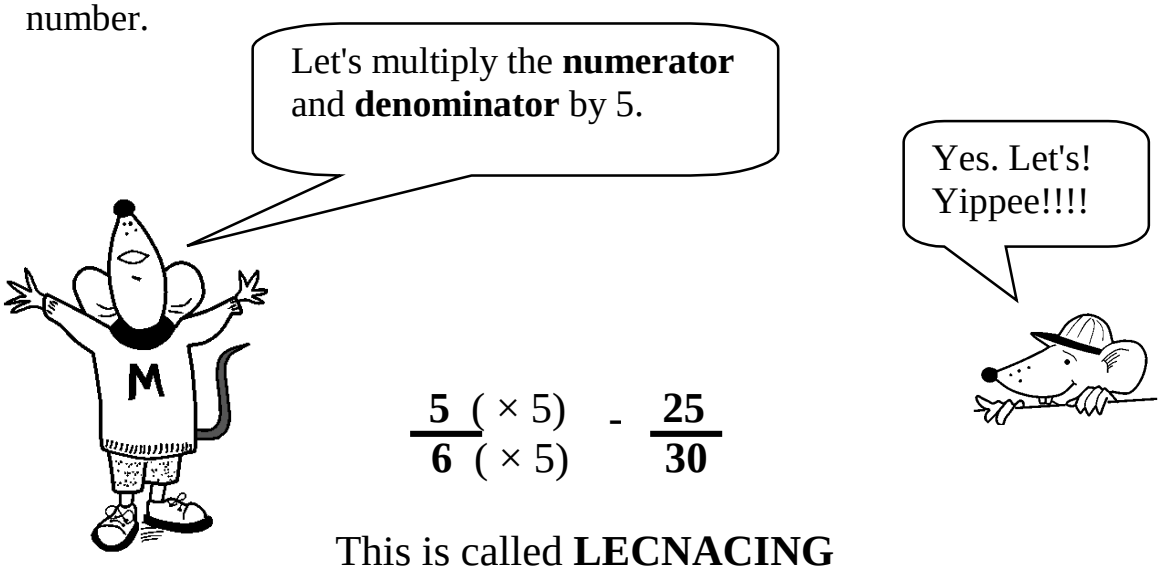
$$\frac{\mathbf{10}\ (\div 5)}{\mathbf{15}\ (\div 5)} = \frac{\mathbf{2}}{\mathbf{3}}$$

1. Can you cancel these fractions?

a) $\frac{14}{21}$ **b)** $\frac{12}{18}$ **c)** $\frac{6}{10}$ **d)** $\frac{9}{12}$ **e)** $\frac{10}{15}$ **f)** $\frac{8}{10}$ **g)** $\frac{12}{16}$

Sometimes we want to make the **numerator** and the **denominator** larger.

To do this we **multiply** the **numerator** and the **denominator** by the same number.



$$\frac{5\ (\times 5)}{6\ (\times 5)} - \frac{25}{30}$$

This is called **LECNACING**

We can **lecnac** by any number we want, like this:

$$\frac{2\ (\times 5)}{5\ (\times 5)} - \frac{10}{25}$$

What number did we **lecnac** by here?

1. Try **lecnacing** these fractions.

a) Lecnac $\frac{2}{3}$ by **6** **b)** Lecnac $\frac{5}{9}$ by **3** **c)** Lecnac $\frac{8}{9}$ by **2**

d) Lecnac $\frac{4}{5}$ by **5** **e)** Lecnac $\frac{7}{10}$ by **10** **f)** Lecnac $\frac{3}{11}$ by **8**

2. See what happens when you **lecnac** these fractions.

a) Lecnac $\frac{3}{4}$ by **1** **b)** Lecnac $\frac{3}{4}$ by **2** **c)** Lecnac $\frac{3}{4}$ by **3**

d) Lecnac $\frac{3}{4}$ by **4** **e)** Lecnac $\frac{3}{4}$ by **5** **f)** Lecnac $\frac{3}{4}$ by **6**

If we begin with a fraction, we can **lecnac** or **cancel** it by any number we want.
This gives us a **family of equivalent fractions** - a whole group of fractions that look different, but are really the same.

Can you **cancel** all these fractions until they will not cancel any more?

$\frac{2}{6}$ $\frac{3}{9}$ $\frac{4}{12}$ $\frac{5}{15}$ $\frac{6}{18}$ $\frac{7}{21}$ $\frac{8}{24}$ $\frac{9}{27}$ $\frac{10}{30}$

What are they all equivalent to?

We can do the same with **lecnacing.**

Take the fraction $\frac{2}{5}$ and **lecnac** it first by **2**, then by **3**, then by **4**.

Keep going until you have a whole family of equivalent fractions, all equal to $\frac{2}{5}$

If a fraction will not cancel any more, we say it is in its **lowest terms**.

These fractions are in their lowest terms: $\frac{2}{3}$ $\frac{5}{7}$ $\frac{3}{5}$ $\frac{2}{7}$ $\frac{1}{9}$ $\frac{1}{2}$

1. Cancel these fractions to their lowest terms.

a) $\frac{6}{9}$ **b)** $\frac{8}{10}$ **c)** $\frac{12}{14}$ **d)** $\frac{9}{12}$ **e)** $\frac{20}{30}$ **f)** $\frac{15}{20}$ **g)** $\frac{100}{200}$

2. Cancel these fractions to their lowest terms **and then lecnac by 5**.

a) $\frac{8}{10}$ **b)** $\frac{6}{12}$ **c)** $\frac{9}{27}$ **d)** $\frac{15}{21}$ **e)** $\frac{5}{30}$ **f)** $\frac{8}{12}$ **g)** $\frac{14}{35}$

3. Cancel these fractions by **3 and then lecnac by 4.**

a) $\frac{12}{15}$ **b)** $\frac{9}{21}$ **c)** $\frac{30}{45}$ **d)** $\frac{3}{12}$ **e)** $\frac{21}{24}$ **f)** $\frac{33}{36}$ **g)** $\frac{120}{150}$

1. Cancel these fractions down to their lowest terms.

a) $\frac{70}{84}$ **b)** $\frac{45}{54}$ **c)** $\frac{25}{75}$ **d)** $\frac{64}{80}$ **e)** $\frac{17}{34}$ **f)** $\frac{9}{27}$ **g)** $\frac{120}{135}$

2. Lecnac these fractions so that they all have a denominator of **24**.

$\frac{1}{2}$ $\frac{7}{8}$ $\frac{3}{4}$ $\frac{5}{12}$ $\frac{2}{3}$ $\frac{3}{8}$ $\frac{5}{6}$

Now you should be able to see which fraction is the largest**.**

3. Lecnac or **cancel** these fractions so that they all have a denominator of **15**.

$\frac{3}{5}$ $\frac{2}{30}$ $\frac{12}{45}$ $\frac{2}{3}$ $\frac{24}{45}$ $\frac{36}{60}$ $\frac{50}{150}$

Now you should be able to see which of these fractions is the smallest**.**

4. Fill in the missing numbers to continue the pattern of equivalent fractions.

$$\frac{1}{2} = \frac{2}{4} = \frac{3}{6} = \frac{\square}{\square} = \frac{\square}{\square} = \frac{\square}{\square} = \frac{\square}{\square} = \frac{\square}{\square} = \frac{9}{18}$$

Describe the pattern of numbers in the **numerators** and in the **denominators**.

5. Fill in the missing numbers to continue the pattern of equivalent fractions

$$\frac{2}{3} = \frac{4}{6} = \frac{6}{9} = \frac{\square}{\square} = \frac{\square}{\square} = \frac{\square}{\square} = \frac{\square}{\square} = \frac{\square}{\square} = \frac{18}{27}$$

Describe the pattern of numbers in the **numerators** and in the **denominators**.

1. Cancel these fractions down to their lowest terms.

a) $\frac{64}{72}$ **b)** $\frac{15}{80}$ **c)** $\frac{96}{120}$ **d)** $\frac{55}{77}$ **e)** $\frac{24}{28}$ **f)** $\frac{34}{51}$ **g)** $\frac{72}{84}$

2. Lecnac these fractions so that they all have a denominator of **36**.

$\frac{3}{6}$ $\frac{8}{12}$ $\frac{9}{12}$ $\frac{8}{18}$ $\frac{3}{4}$ $\frac{1}{2}$ $\frac{2}{3}$

Which fraction is the largest**?**

3. Lecnac or **cancel** these fractions so that they all have a denominator of **20**.

$\frac{5}{10}$ $\frac{9}{60}$ $\frac{15}{100}$ $\frac{3}{5}$ $\frac{1}{4}$ $\frac{1}{2}$ $\frac{27}{60}$

Which of these fractions is the smallest**.**

4. Fill in the missing numbers to continue the pattern of equivalent fractions.

$$\frac{3}{5} = \frac{6}{10} = \frac{9}{15} = \frac{\square}{\square} = \frac{\square}{\square} = \frac{\square}{\square} = \frac{\square}{\square} = \frac{\square}{\square} = \frac{27}{45}$$

Describe the pattern of numbers in the **numerators** and in the **denominators**.

5. Fill in the missing numbers to continue the pattern of equivalent fractions

$$\frac{5}{7} = \frac{10}{14} = \frac{15}{21} = \frac{\square}{\square} = \frac{\square}{\square} = \frac{\square}{\square} = \frac{\square}{\square} = \frac{\square}{\square} = \frac{45}{63}$$

Describe the pattern of numbers in the **numerators** and in the **denominators.**

1. Cancel these fractions to their lowest terms **and then lecnac by 3**.

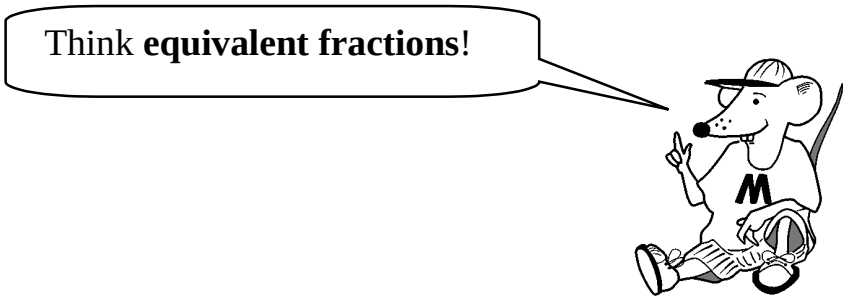
a) $\frac{8}{12}$ **b)** $\frac{30}{50}$ **c)** $\frac{16}{24}$ **d)** $\frac{9}{12}$ **e)** $\frac{27}{36}$ **f)** $\frac{90}{95}$ **g)** $\frac{85}{105}$

2. Cancel these fractions to their lowest terms **and then lecnac by 10**.

a) $\frac{4}{12}$ **b)** $\frac{8}{20}$ **c)** $\frac{27}{81}$ **d)** $\frac{15}{25}$ **e)** $\frac{80}{90}$ **f)** $\frac{12}{36}$ **g)** $\frac{4}{120}$

3. Cancel these fractions by **5** and then **lecnac** by **7.**

a) $\frac{10}{15}$ **b)** $\frac{25}{80}$ **c)** $\frac{85}{135}$ **d)** $\frac{10}{120}$ **e)** $\frac{30}{55}$ **f)** $\frac{75}{145}$ **g)** $\frac{10}{150}$



4.

a) How many times bigger is **one third** than **one sixth?**

b) How many times bigger is **one fifth** than **one tenth?**

c) How many times bigger is **one tenth** than **one hundredth?**

d) How many times bigger is **one half** than **one quarter?**

e) How many times bigger is **one quarter** than **one sixteenth?**

f) How many times smaller is **one twentieth** than **one tenth?**

g) How many times smaller is **one hundredth** than **one fifth?**

h) How many times smaller is **one thousandth** than **one hundredth?**

1. Cancel these fractions to their lowest terms **and then lecnac by 12**.

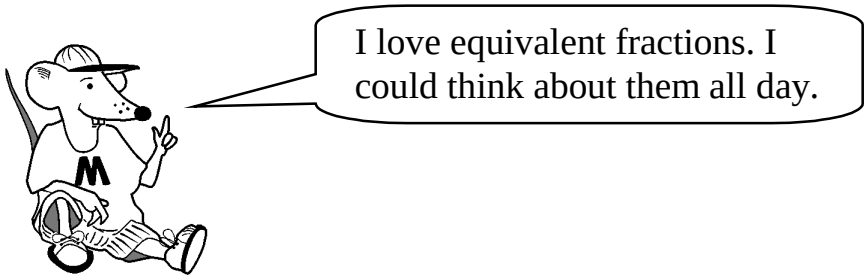
a) $\frac{9}{15}$ **b)** $\frac{6}{42}$ **c)** $\frac{25}{35}$ **d)** $\frac{12}{15}$ **e)** $\frac{64}{80}$ **f)** $\frac{50}{100}$ **g)** $\frac{36}{60}$

2. Cancel these fractions to their lowest terms **and then lecnac by 15**.

a) $\frac{13}{26}$ **b)** $\frac{15}{20}$ **c)** $\frac{20}{80}$ **d)** $\frac{28}{35}$ **e)** $\frac{100}{250}$ **f)** $\frac{40}{85}$ **g)** $\frac{3}{120}$

3. Cancel these fractions by **7** and then **lecnac** by **9.**

a) $\frac{14}{21}$ **b)** $\frac{28}{49}$ **c)** $\frac{91}{98}$ **d)** $\frac{70}{140}$ **e)** $\frac{21}{28}$ **f)** $\frac{14}{140}$ **g)** $\frac{63}{70}$



4.

a) How many times bigger is **one half** than **one eighth?**

b) How many times bigger is **one quarter** than **one twelfth?**

c) How many times bigger is **one fifth** than **one fifteenth?**

d) How many times bigger is **one ninth** than **one eighteenth?**

e) How many times smaller is **one fifth** than **one whole one?**

f) How many times smaller is **one tenth** than **one whole one?**

g) How many times smaller is **one hundredth** than **one tenth?**

g) How many times smaller is **one thousandth** than **one whole one?**

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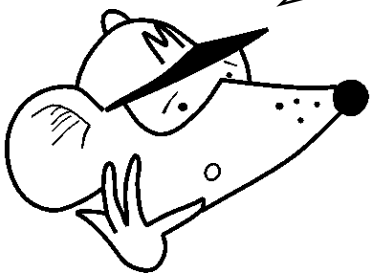
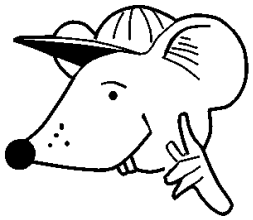
How do you find a fraction between two other fractions? For example, can you give me a fraction between a **sixth** and a **third**?



Easy Divvy. Try changing them both to twelfths. A **sixth** is two twelfths and a **third** is four twelfths. A fraction between might be three twelfths, which is a quarter, of course.



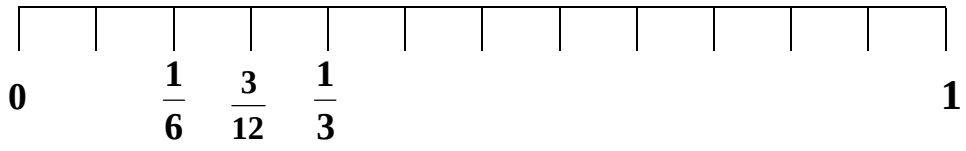
$\frac{1}{6} = \frac{2}{12}$
$\frac{1}{3} = \frac{4}{12}$
} $\frac{3}{12}$ is between these.

1. Try this idea to find a fraction between these pairs.

a) $\frac{1}{3}$ and $\frac{1}{5}$ **b)** $\frac{1}{4}$ and $\frac{1}{2}$ **c)** $\frac{1}{2}$ and $\frac{3}{4}$

d) $\frac{1}{2}$ and $\frac{4}{5}$ **e)** $\frac{1}{4}$ and $\frac{2}{3}$ **f)** $\frac{3}{4}$ and $\frac{7}{8}$

Try putting each pair of fractions on a number line to see if you are correct, like this:



From this you can easily see that $\frac{3}{12}$ is between $\frac{1}{6}$ and $\frac{1}{3}$.

Continued on page 13

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Continued from page 12

Sometimes this does not give an easy answer. If we try this for **one third** and **one quarter** we see that:

$\frac{1}{3}$ and $\frac{1}{4}$ are the same as $\frac{4}{12}$ and $\frac{3}{12}$. There are no whole numbers between 4 and 3, so we have a problem. The answer is to **lecnac by 2**. This means making equivalent fractions by multiplying the numerator and the denominator by 2.

$\frac{4}{12}$ becomes $\frac{8}{24}$

and $\frac{3}{12}$ becomes $\frac{6}{24}$

Now we can choose a number between **6** and **8**. Not too difficult!

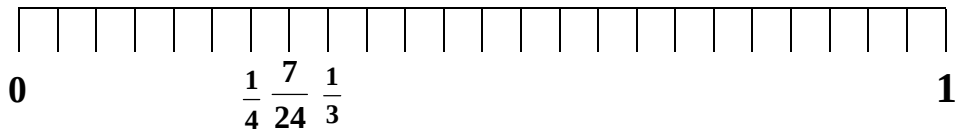
So the fraction we need is $\frac{7}{24}$.

1. Now try these:

a) $\frac{2}{3}$ and $\frac{1}{2}$ **b)** $\frac{3}{5}$ and $\frac{1}{2}$ **c)** $\frac{3}{7}$ and $\frac{2}{5}$

d) $\frac{5}{6}$ and $\frac{4}{5}$ **e)** $\frac{7}{9}$ and $\frac{4}{5}$ **f)** $\frac{2}{5}$ and $\frac{3}{8}$

Try putting each pair of fractions on a number line to see if you are correct, like this:



From this you can easily see that $\frac{7}{24}$ is between $\frac{1}{4}$ and $\frac{1}{3}$.

Sometimes we need to find a fraction that is half way between two other fractions. We can use a similar method.

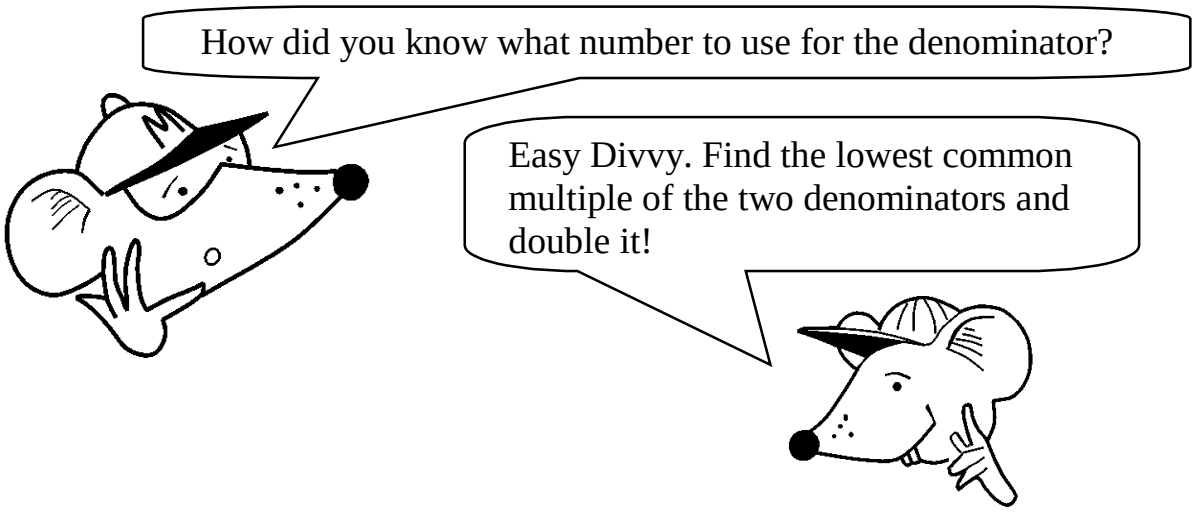
E.g. Find the number which is halfway between $3\frac{1}{4}$ and $3\frac{1}{2}$.

Change the quarter and the half to eighths:

$3\frac{1}{4} = 3\frac{2}{8}$

$3\frac{1}{2} = 3\frac{4}{8}$

The number between is $3\frac{3}{8}$



1. Use this method to find the numbers that are half way between each pair of fractions.

a) $6\frac{1}{3}$ and $6\frac{2}{3}$ (Change to **sixths**)

b) $9\frac{1}{2}$ and $9\frac{3}{4}$ (Change to **eighths**)

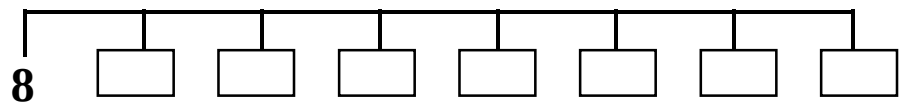
c) $4\frac{2}{5}$ and $4\frac{3}{5}$ (Change to **tenths**)

d) $5\frac{1}{3}$ and $5\frac{1}{2}$ (Change to **twelfths**)

e) $7\frac{4}{9}$ and $7\frac{1}{6}$

f) $2\frac{2}{5}$ and $2\frac{4}{7}$

1.



Here is a number line starting at **8**. Can you put these fractions in the boxes in the correct order?

$9\frac{1}{5}$ $8\frac{4}{5}$ $8\frac{2}{5}$ $8\frac{1}{5}$ 9 $8\frac{3}{5}$ $9\frac{2}{5}$

2. Say which of these are **true** and which are **false**:

a) $\frac{2}{3}$ is **more** than $\frac{2}{6}$.

b) $\frac{3}{5}$ is **more** than $\frac{3}{10}$.

c) $\frac{9}{10}$ is **more** than a whole one.

3. Think about the **number line** when you answer these questions.

a) What are the **two** closest whole numbers to $4\frac{3}{5}$?

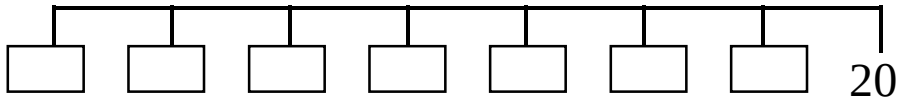
b) What are the **two** closest whole numbers to $1\frac{7}{9}$?

c) What are the **two** closest whole numbers to $10\frac{8}{9}$?

d) Which is bigger, $5\frac{2}{3}$ or $5\frac{5}{9}$?

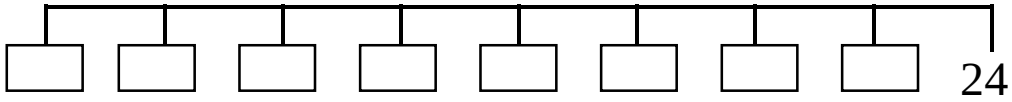
e) Which is bigger, $2\frac{1}{2}$ or $2\frac{6}{10}$?

1.



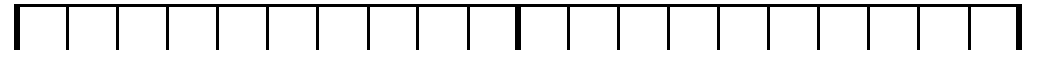
Count **backwards** from **20** in **ninths** and write the numbers in the boxes.

2.



Count **backwards** from **24** in **tenths** and write the numbers in the boxes.

3. Here is a number line from **0** to **1**. It is divided into **20** equal parts.

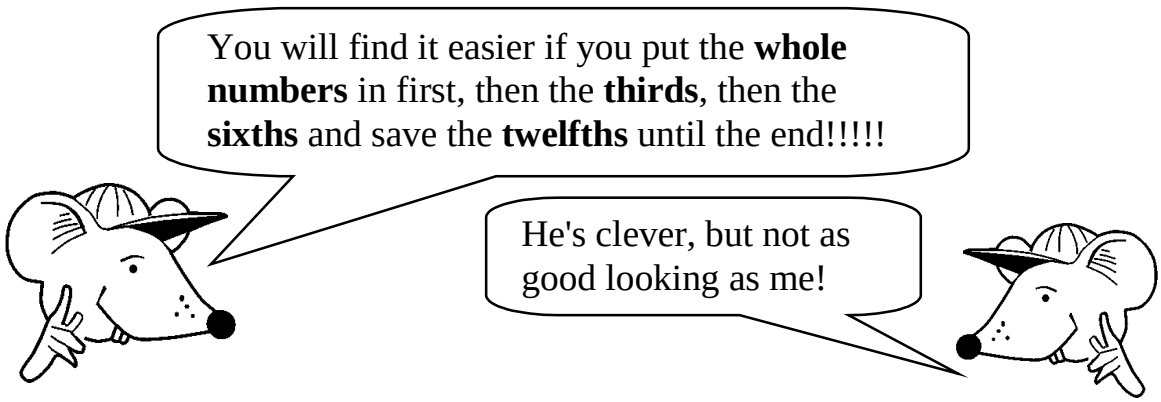


Copy the line and put these fractions on the line in the correct places.

$\frac{1}{2}$ $\frac{4}{5}$ $\frac{1}{4}$ $\frac{1}{10}$ $\frac{11}{20}$ $\frac{19}{20}$ $\frac{13}{20}$ $\frac{2}{5}$

Which is the smallest of these fractions? Which is the largest?

4. Draw your own number line from **0** to **5** and put in all **the whole numbers**, all the **thirds**, all the **sixths** and all the **twelfths**.



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1. Draw a number line from **0** to **1** divided into **30 parts**. You might like to make a large one on a wall.

Now put these fractions on it in the correct places. If you cannot see where they go immediately, change them to equivalent fractions with a denominator of 30.

$\frac{5}{6}$, $\frac{7}{10}$, $\frac{1}{2}$, $\frac{1}{3}$, $\frac{4}{5}$, $\frac{2}{3}$, $\frac{2}{5}$, $\frac{3}{10}$

2. Look at these fractions and decide how many parts you would need to divide a number line into to put them on. When you have decided, try it with a large number line from **0** to **1**.

$\frac{3}{8}$, $\frac{4}{10}$, $\frac{1}{2}$, $\frac{1}{8}$, $\frac{18}{20}$, $\frac{3}{4}$, $\frac{2}{5}$, $\frac{7}{10}$

3. Using equivalent fractions if you like, put these fractions in order of size with the smallest first.

$3\frac{2}{10}$, $2\frac{6}{10}$, $3\frac{1}{2}$, $2\frac{2}{5}$, $2\frac{3}{8}$, $3\frac{1}{4}$, $3\frac{3}{8}$, $2\frac{9}{10}$

4. Using equivalent fractions if you like, put these fractions in order of size with the smallest first.

$7\frac{2}{3}$, $7\frac{5}{12}$, $7\frac{7}{12}$, $7\frac{1}{4}$, $7\frac{3}{4}$, $7\frac{1}{3}$, $7\frac{5}{6}$, $7\frac{1}{60}$

5. Look at these numbers: **3, 4, 5, 9**

a) Using just two of these numbers, what is the smallest fraction you can make?

b) Using just two of these numbers, what is the largest fraction you can make?

c) How many different fractions can you make with these numbers, using just two of them for each fraction.

d) Write your answers to **c)** in order, smallest first.

e) If you can use any combination of the numbers, what is the smallest fraction you can make?

Big challenge question

1. Draw a number line from **0** to **1** divided into **24 parts**. You might like to make a large one on a wall.

Now put these fractions on it in the correct places. If you cannot see where they go immediately, change them to equivalent fractions with a denominator of 24.

$\frac{1}{4}$, $\frac{1}{3}$, $\frac{5}{8}$, $\frac{2}{3}$, $\frac{5}{12}$, $\frac{3}{4}$, $\frac{1}{6}$, $\frac{5}{6}$

2. Look at these fractions and decide how many parts you would need to divide a number line into to put them on. When you have decided, try it with a large number line from **0** to **1**.

$\frac{1}{3}$, $\frac{2}{3}$, $\frac{4}{9}$, $\frac{7}{9}$, $\frac{1}{2}$, $\frac{5}{6}$, $\frac{1}{6}$, $\frac{5}{9}$

3. Using equivalent fractions if you like, put these fractions in order of size with the smallest first.

$9\frac{1}{4}$, $9\frac{2}{3}$, $9\frac{3}{4}$, $9\frac{2}{5}$, $9\frac{1}{2}$, $9\frac{7}{10}$, $9\frac{1}{3}$, $9\frac{9}{10}$

4. Using equivalent fractions if you like, put these fractions in order of size with the smallest first.

$4\frac{1}{7}$, $4\frac{1}{2}$, $4\frac{1}{8}$, $4\frac{3}{7}$, $4\frac{1}{4}$, $4\frac{3}{8}$

5. Look at these numbers: **2, 5, 6, 7**

a) Using just two of these numbers, what is the smallest fraction you can make?

b) Using just two of these numbers, what is the largest fraction you can make?

c) How many different fractions can you make with these numbers, using just two of them for each fraction.

d) Write your answers to **c)** in order, smallest first.

e) If you can use any combination of the numbers, what is the smallest fraction you can make?

Answers

Page 3

1. **a)** $^{30}/_{7}$ **b)** $^{39}/_{10}$ **c)** $^{19}/_{4}$ **d)** $^{37}/_{7}$ **e)** $^{33}/_{4}$ **f)** $^{19}/_{8}$ **g)** $^{128}/_{15}$ **h)** $^{52}/_{7}$

2. **a)** $3^{2}/_{5}$ **b)** $1^{5}/_{13}$ **c)** 3 **d)** $2^{2}/_{41}$ **e)** $3^{4}/_{5}$ **f)** $3^{4}/_{7}$ **g)** $5^{3}/_{8}$ **h)** $2^{4}/_{5}$

3. **a)** $^{1}/_{3}$ **b)** $2^{2}/_{3}$ **c)** $2^{1}/_{7}$ **d)** $3^{1}/_{5}$ **e)** $5^{1}/_{2}$ **f)** $4^{2}/_{11}$ **g)** $4^{2}/_{3}$ **h)** $^{13}/_{15}$
i) $^{2}/_{3}$ **j)** $^{1}/_{3}$

4. **a)** 3 ÷ 5, 6 ÷ 10 etc **b)** 7 ÷ 8, 14 ÷ 16 etc **c)** 5 ÷ 3, 10 ÷ 6 etc
d) 21 ÷ 4, 42 ÷ 8 etc **e)** 14 ÷ 3, 28 ÷ 6 etc **f)** 18 ÷ 21, 6 ÷ 7 etc
g) 4 ÷ 9, 8 ÷ 18 etc.

Page 4

1. **a)** $^{15}/_{4}$ **b)** $^{32}/_{6}$ **c)** $^{36}/_{5}$ **d)** $^{48}/_{5}$ **e)** $^{48}/_{10}$ **f)** $^{47}/_{7}$ **g)** $^{16}/_{3}$ **h)** $^{27}/_{8}$

2. **a)** $1^{7}/_{15}$ **b)** $3^{1}/_{2}$ **c)** $5^{1}/_{3}$ **d)** $2^{1}/_{14}$ **e)** $1^{3}/_{5}$ **f)** 5 **g)** $3^{1}/_{7}$ **h)** $5^{2}/_{10}$

3. **a)** $2^{1}/_{3}$ **b)** $^{2}/_{3}$ **c)** $^{5}/_{8}$ **d)** $2^{2}/_{5}$ **e)** $3^{1}/_{2}$ **f)** $^{6}/_{11}$ **g)** $1^{2}/_{3}$ **h)** $^{9}/_{16}$
i) $^{3}/_{4}$ **j)** $1^{7}/_{11}$

4. **a)** 2 ÷ 7, 4 ÷ 14 etc **b)** 9 ÷ 5, 18 ÷ 10 etc **c)** 67 ÷ 4, 134 ÷ 8 etc
d) 152 ÷ 10, 76 ÷ 5 etc **e)** 12 ÷ 17, 24 ÷ 34 etc **f)** 4 ÷ 11, 8 ÷ 22 etc
g) 7 ÷ 12, 14 ÷ 24 etc.

Page 5

1. **a)** $^{2}/_{3}$ **b)** $^{2}/_{3}$ **c)** $^{3}/_{5}$ **d)** $^{3}/_{4}$ **e)** $^{2}/_{3}$ **f)** $^{4}/_{5}$ **g)** $^{3}/_{4}$
Allow other equivalencies where appropriate.

Page 6

1. **a)** $^{12}/_{18}$ **b)** $^{15}/_{27}$ **c)** $^{16}/_{18}$ **d)** $^{20}/_{25}$ **e)** $^{70}/_{100}$ **f)** $^{24}/_{88}$
2. **a)** $^{3}/_{4}$ **b)** $^{6}/_{8}$ **c)** $^{9}/_{12}$ **d)** $^{12}/_{16}$ **e)** $^{15}/_{20}$ **f)** $^{18}/_{24}$

Page 7

All the example fractions are equivalent to $^{1}/_{3}$.
$^{2}/_{5}$ $^{4}/_{10}$ $^{6}/_{15}$ $^{8}/_{20}$ $^{10}/_{25}$ etc

1. **a)** $^{2}/_{3}$ **b)** $^{4}/_{5}$ **c)** $^{6}/_{7}$ **d)** $^{3}/_{4}$ **e)** $^{2}/_{3}$ **f)** $^{3}/_{4}$ **g)** $^{1}/_{2}$
2. **a)** $^{20}/_{25}$ **b)** $^{5}/_{10}$ **c)** $^{5}/_{15}$ **d)** $^{25}/_{35}$ **e)** $^{5}/_{30}$ **f)** $^{10}/_{15}$ **g)** $^{10}/_{25}$
3. **a)** $^{16}/_{20}$ **b)** $^{12}/_{28}$ **c)** $^{40}/_{60}$ **d)** $^{4}/_{16}$ **e)** $^{28}/_{32}$ **f)** $^{44}/_{48}$ **g)** $^{160}/_{200}$

Page 8

1. a) $^{5}/_{6}$ **b)** $^{5}/_{6}$ **c)** $^{1}/_{3}$ **d)** $^{4}/_{5}$ **e)** $^{1}/_{2}$ **f)** $^{1}/_{3}$ **g)** $^{8}/_{9}$

2. $^{12}/_{24}$ $^{21}/_{24}$ $^{18}/_{24}$ $^{10}/_{24}$ $^{16}/_{24}$ $^{9}/_{24}$ $^{20}/_{24}$ **$^{7}/_{8}$** ($^{21}/_{24}$) is largest.

3. $^{9}/_{15}$ $^{1}/_{15}$ $^{4}/_{15}$ $^{10}/_{15}$ $^{8}/_{15}$ $^{9}/_{15}$ $^{5}/_{15}$ **$^{2}/_{30}$** ($^{1}/_{15}$) is smallest.

4. $^{1}/_{2}$ = $^{2}/_{4}$ = $^{3}/_{6}$ = **$^{4}/_{8}$** = **$^{5}/_{10}$** = **$^{6}/_{12}$** = **$^{7}/_{14}$** = **$^{8}/_{16}$** = $^{9}/_{18}$
Numerators increase in **ones**, denominators in **twos**. Other patterns acceptable.

5. $^{2}/_{3}$ = $^{4}/_{6}$ = $^{6}/_{9}$ = **$^{8}/_{12}$** = **$^{10}/_{15}$** = **$^{12}/_{18}$** = **$^{14}/_{21}$** = **$^{16}/_{24}$** = $^{18}/_{27}$
Numerators increase in **twos**, denominators in **threes**. Other patterns acceptable.

Page 9

1. a) $^{8}/_{9}$ **b)** $^{3}/_{16}$ **c)** $^{4}/_{5}$ **d)** $^{5}/_{7}$ **e)** $^{6}/_{7}$ **f)** $^{2}/_{3}$ **g)** $^{6}/_{7}$

2. $^{18}/_{36}$ $^{24}/_{36}$ $^{27}/_{36}$ $^{16}/_{36}$ $^{27}/_{36}$ $^{18}/_{36}$ $^{24}/_{36}$ **$^{9}/_{12}$** and **$^{3}/_{4}$** ($^{27}/_{36}$) are largest.

3. $^{10}/_{20}$ $^{3}/_{20}$ $^{3}/_{20}$ $^{12}/_{20}$ $^{5}/_{20}$ $^{10}/_{20}$ $^{9}/_{20}$ **$^{9}/_{60}$** and **$^{15}/_{100}$** ($^{3}/_{20}$) are smallest.

4. $^{3}/_{5}$ = $^{6}/_{10}$ = $^{9}/_{15}$ = **$^{12}/_{20}$** = **$^{15}/_{25}$** = **$^{18}/_{30}$** = **$^{21}/_{35}$** = **$^{24}/_{40}$** = $^{27}/_{45}$
Numerators increase in **threes**, denominators in **fives**. Other patterns acceptable.

5. $^{5}/_{7}$ = $^{10}/_{14}$ = $^{15}/_{21}$ = **$^{20}/_{28}$** = **$^{25}/_{35}$** = **$^{30}/_{42}$** = **$^{35}/_{49}$** = **$^{40}/_{56}$** = $^{45}/_{63}$
Numerators increase in **fives**, denominators in **sevens**. Other patterns acceptable.

Page 10

1. a) $^{6}/_{9}$ **b)** $^{9}/_{15}$ **c)** $^{6}/_{9}$ **d)** $^{9}/_{12}$ **e)** $^{9}/_{12}$ **f)** $^{54}/_{57}$ **g)** $^{51}/_{63}$

2. a) $^{10}/_{30}$ **b)** $^{20}/_{50}$ **c)** $^{10}/_{30}$ **d)** $^{30}/_{50}$ **e)** $^{80}/_{90}$ **f)** $^{10}/_{30}$ **g)** $^{10}/_{300}$

3. a) $^{14}/_{21}$ **b)** $^{35}/_{112}$ **c)** $^{119}/_{189}$ **d)** $^{14}/_{168}$ **e)** $^{42}/_{77}$ **f)** $^{105}/_{203}$ **g)** $^{14}/_{210}$

4. a) 2 **b)** 2 **c)** 10 **d)** 2 **e)** 4 **f)** 2 **g)** 20 **h)** 10

Page 11

1. a) $^{36}/_{60}$ **b)** $^{12}/_{84}$ **c)** $^{60}/_{84}$ **d)** $^{48}/_{60}$ **e)** $^{48}/_{60}$ **f)** $^{12}/_{24}$ **g)** $^{36}/_{60}$

2. a) $^{15}/_{30}$ **b)** $^{45}/_{60}$ **c)** $^{15}/_{60}$ **d)** $^{60}/_{75}$ **e)** $^{30}/_{75}$ **f)** $^{120}/_{255}$ **g)** $^{15}/_{600}$

3. a) $^{18}/_{27}$ **b)** $^{36}/_{63}$ **c)** $^{117}/_{126}$ **d)** $^{90}/_{180}$ **e)** $^{27}/_{36}$ **f)** $^{18}/_{180}$ **g)** $^{81}/_{90}$

4. a) 4 **b)** 3 **c)** 3 **d)** 2 **e)** 5 **f)** 10 **g)** 10 **h)** 1 000

Page 12

1. **a)** $^{4}/_{15}$ **b)** $^{3}/_{8}$ **c)** $^{5}/_{8}$ **d)** $^{6}/_{10}$ or $^{7}/_{10}$ **e)** $^{4}/_{12}$ or $^{5}/_{12}$ or $^{6}/_{12}$ or $^{7}/_{12}$
f) $^{13}/_{16}$ or $^{25}/_{32}$ or $^{26}/_{32}$ or $^{27}/_{32}$

Page 13

1. **a)** $^{7}/_{12}$ **b)** $^{11}/_{20}$ **c)** $^{29}/_{70}$ **d)** $^{49}/_{60}$ **e)** $^{71}/_{90}$ **f)** $^{31}/_{80}$

Page 14

1. **a)** $6^{3}/_{6} = 6^{1}/_{2}$ **b)** $9^{5}/_{8}$ **c)** $4^{5}/_{10} = 4^{1}/_{2}$ **d)** $5^{5}/_{12}$
e) $7^{11}/_{36}$ **f)** $2^{34}/_{70} = 2^{17}/_{35}$

Page 15

1. **8**, $8^{1}/_{5}$, $8^{2}/_{5}$, $8^{3}/_{5}$, $8^{4}/_{5}$, 9, $9^{1}/_{5}$, $9^{2}/_{5}$

2. **a)** true **b)** true **c)** false

3. **a)** 4 and 5 **b)** 1 and 2 **c)** 10 and 11 **d)** $5^{2}/_{3}$ **e)** $2^{6}/_{10}$

Page 16

1. $19^{2}/_{9}$, $19^{3}/_{9}$, $19^{4}/_{9}$, $19^{5}/_{9}$, $19^{6}/_{9}$, $19^{7}/_{9}$, $19^{8}/_{9}$, **20**

2. $23^{2}/_{10}$, $23^{3}/_{10}$, $23^{4}/_{10}$, $23^{5}/_{10}$, $23^{6}/_{10}$, $23^{7}/_{10}$, $23^{8}/_{10}$, $23^{9}/_{10}$, **24**

3.

Position	2	5	8	10	11	13	16	19
Fraction	$^{1}/_{10}$	$^{1}/_{4}$	$^{2}/_{5}$	$^{1}/_{2}$	$^{11}/_{20}$	$^{13}/_{20}$	$^{4}/_{5}$	$^{19}/_{20}$

Smallest is $^{1}/_{10}$. Largest is $^{19}/_{20}$.

4. Draw number line beginning: 0, $^{1}/_{12}$, $^{1}/_{6}$, $^{3}/_{12}$, $^{1}/_{3}$, $^{5}/_{12}$ etc

Page 17

1.

Position	9	10	12	15	20	21	24	25
Fraction	$^{3}/_{10}$	$^{1}/_{3}$	$^{2}/_{5}$	$^{1}/_{2}$	$^{2}/_{3}$	$^{7}/_{10}$	$^{4}/_{5}$	$^{5}/_{6}$

2. You will need 40 divisions on your number line.

Position	5	15	16	16	20	28	30	36
Fraction	$^{1}/_{8}$	$^{3}/_{8}$	$^{4}/_{10}$	$^{2}/_{5}$	$^{1}/_{2}$	$^{7}/_{10}$	$^{3}/_{4}$	$^{18}/_{20}$

These two are equivalent

3. $2^{3}/_{8}$, $2^{2}/_{5}$, $2^{6}/_{10}$, $2^{9}/_{10}$, $3^{2}/_{10}$, $3^{1}/_{4}$, $3^{3}/_{8}$, $3^{1}/_{2}$

4. $7^{1}/_{60}$, $7^{1}/_{4}$, $7^{1}/_{3}$, $7^{5}/_{12}$, $7^{7}/_{12}$, $7^{2}/_{3}$, $7^{3}/_{4}$, $7^{5}/_{6}$

5. **a)** $^{3}/_{9}$ **b)** $^{9}/_{3}$ (= 3) **c)** 12

d) $^{3}/_{9}$, $^{4}/_{9}$, $^{5}/_{9}$, $^{3}/_{5}$, $^{3}/_{4}$, $^{4}/_{5}$, $^{5}/_{4}$ (= $1^{1}/_{4}$), $^{4}/_{3}$ (= $1^{1}/_{3}$), $^{5}/_{3}$ (= $1^{2}/_{3}$), $^{9}/_{5}$ (= $1^{4}/_{5}$), $^{9}/_{4}$ (= $2^{1}/_{4}$), $^{9}/_{3}$ (= 3)

e) $^{3}/_{954}$

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Page 18

1.

Position	4	6	8	10	15	16	18	20
Fraction	$^1/_6$	$^1/_4$	$^1/_3$	$^5/_{12}$	$^5/_8$	$^2/_3$	$^3/_4$	$^5/_6$

2. You will need 18 divisions on your number line.

Position	3	6	8	9	10	12	14	15
Fraction	$^1/_6$	$^1/_3$	$^4/_9$	$^1/_2$	$^5/_9$	$^2/_3$	$^7/_9$	$^5/_6$

3. $9^1/_4$, $9^1/_3$, $9^2/_5$, $9^1/_2$, $9^2/_3$, $9^7/_{10}$, $9^3/_4$, $9^9/_{10}$

4. $4^1/_8$, $4^1/_7$, $4^1/_4$, $4^3/_8$, $4^3/_7$, $4^1/_2$

5. **a)** $^2/_7$ **b)** $^7/_2$ (= $3^1/_2$) **c)** 12

d) $^2/_7$, $^2/_6$, $^2/_5$, $^5/_7$, $^5/_6$, $^6/_7$, $^7/_6$ (= $1^1/_6$), $^6/_5$ (= $1^1/_5$), $^7/_5$ (= $1^2/_5$), $^5/_2$ (= $2^1/_2$), $^6/_2$ (= 3), $^7/_2$ (= $3^1/_2$)

e) $^2/_{765}$