
future maths
maths E1 E2 E3
maths Level 1 & 2
0.01
Decimals

Course Content: Choose your topic …

MATHS L1 to L2

Whole Number and Functions

place value

negative numbers

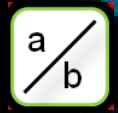

add and subtract


multiply divide

round numbers

ratio scale

Parts of a whole



fraction

decimal numbers


percent

percent decimal fraction

Measure and Shape

metric measure

imperial measure

perimeter

area

volume

formulae bodmas

Handling Data


charts data

averages


prob-ability

Topic Introduction : Decimal numbers

Just as fractions in the previous topic show a value which is part of a whole amount, 'Decimals' also show an amount that is part of one whole. They differ though as decimal values are fractions but only fractions that are multiples of ten. So I could cut up a cake into ten pieces and have a 'Tenth' of it, this would be a fraction but would also be a decimal.

You will need to know your place values well to be good at this topic so go back and review if you need. The decimal point becomes a very important part of maths from here on so make sure you fully understand and practice this topic before moving on.

Choose an icon to select where to start

0.01

Warm up Exercise 1

1 x 7 =	
2 x 7 =	
3 x 7 =	
4 x 7 =	
5 x 7 =	
6 x 7 =	
7 x 7 =	
8 x 7 =	
9 x 7 =	
10 x 7 =	

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

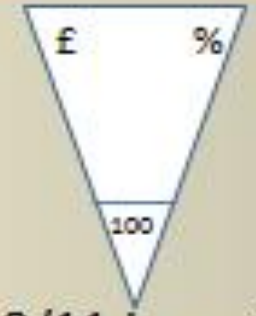
Warm up Exercise 2

Fractions

Do-talk-record

A

L2/L1



L2. 8/11 is .....3/4?

a) > because.....

b) < because.....

c) 11/15 when added because.....

a) 1 21/44 when added because.....

L1. 4/9 is .....3/7?

A) > because.....

B) < because.....

C) 7/16 when added because....

D) 55/63 when added because.....

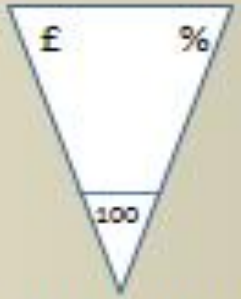
Warm up Exercise 3

Fractions

Do-talk-record

B

L2/L1



L2. 8/9 minus 5/6?

a) 1/18 because.....

b) 3/54 because.....

c) Common denominator 54 because.....

d) Common denominator 18 because.....

L1. 3/5 add ¼ is .....?

A) 4/9 because.....

B) 3/20 because.....

C) 17/20 because.....

D) >1 because.....

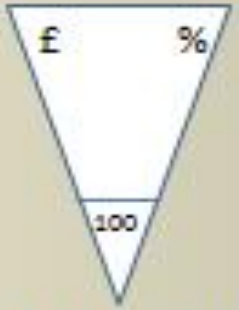
Warm up Exercise 4

Fractions

Do-talk-record

C

L2/L1



L2. 1/8 ÷ ¾ is ....?

a) 3/32 because.....

b) 24/4 because.....

c) 1/6 because.....

d) 14/24 because.....

L1. 1/8 x 4/5 is....?

A) 5/13 because.....

B) 4/40 because.....

C) 1/10 because.....

D) 0.1 because.....

0.01

Progress Checker 1

What do you already know about 'Decimals' ?

How would you rate your skills in using decimals ?

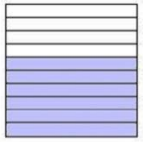
1) Excellent ability
2) Good ability, but working to improve
3) Ok, making a start but I know I have lots to still learn

My aims for today are...

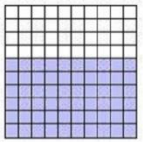
A Know the place values tenth, hundredth, LEVEL TWO ...thousandth etc...

B Recognise the affect moving a decimal in a number has to a value

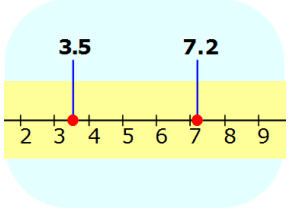
C Use decimals in calculations (add/sub/mult/divide/round) 2dps, LEVEL TWO 3dps



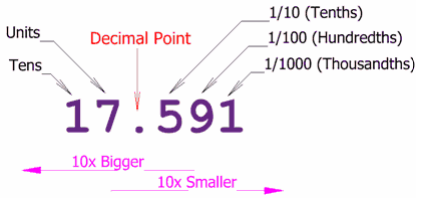
0.6
six tenths



0.60
sixty hundredths



$$\begin{array}{r} 1.7800 \\ -0.0985 \\ \hline 1.6815 \end{array}$$



0.01

Introductory Video and Discussion

What is halfway between a tenth (0.1) and a hundredth (0.01) ?
What affect does the decimal point have in a number ?

What benefits are there to using a 'Decimal' system of counting ?
How are 'decimal numbers' different to 'whole numbers' ?

When do we use decimal numbers ?
Does a decimal point affect calculations eg. 3.2 x 4 ?

Watch the introductory video and then discuss the above

Your thoughts..

Vocabulary and Jobs

Decimal point
Whole numbers
Part
Decimal places
Tenths
Hundredths
Thousandths
Decimal System
Deca-
Deci-
Centi-
Milli-

These are the words you will be using in this topic

Accountants
Builder
Shops
Chef
Scientist
Car Mechanic
Doctor
Racing Driver

…. Can you think of more?

……

……

Lesson: Concept Activity

Write a number down that is about half way between each of the values shown

0

1

2.6

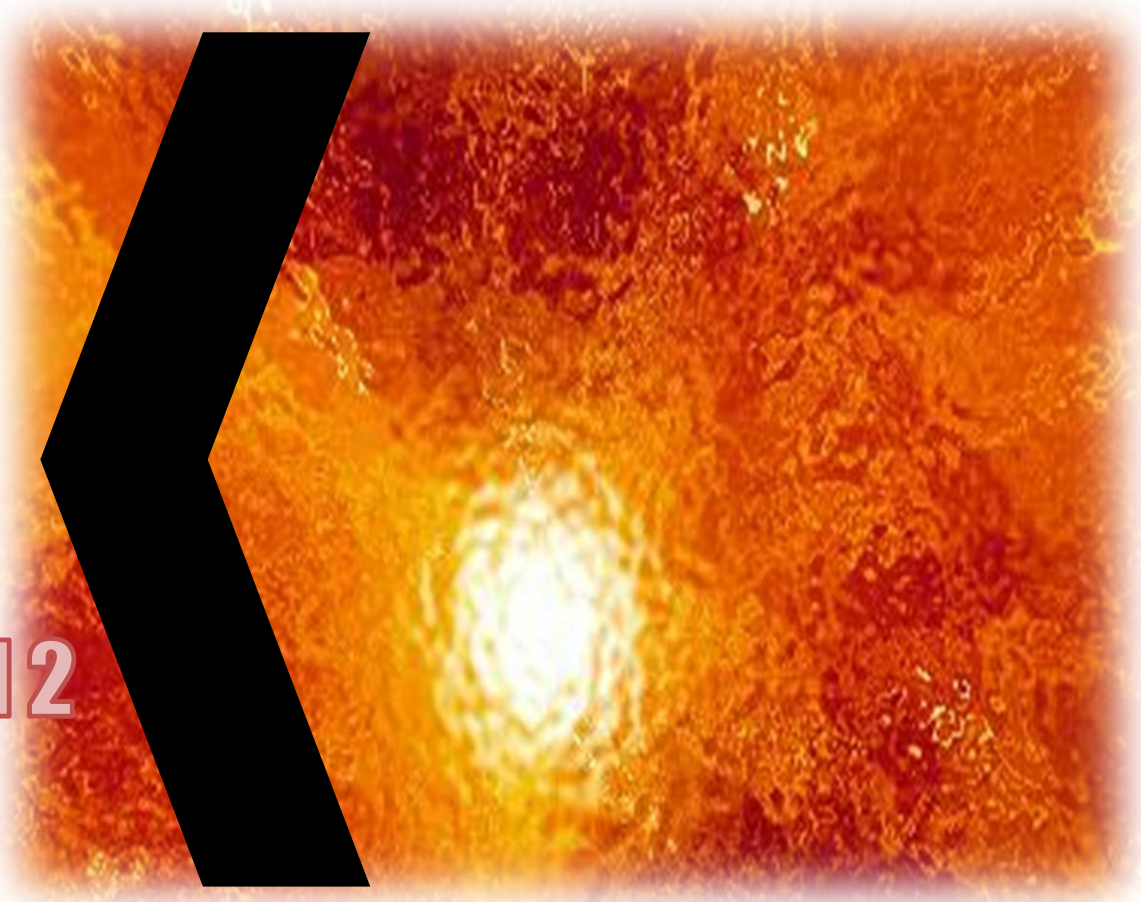
14.03

26.45

98.037

98.0381

98.038102



Level 2

Tenths

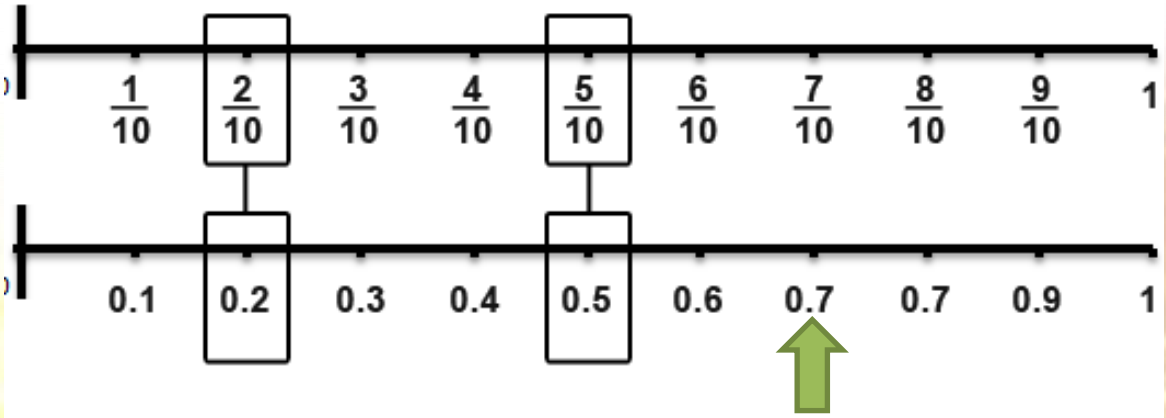
Take a chocolate bar and break it into ten pieces.....

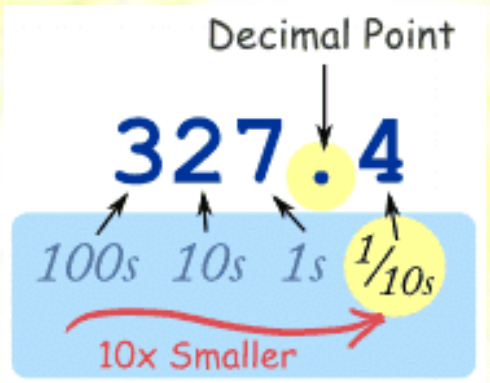
Take a journey and have ten stops.....

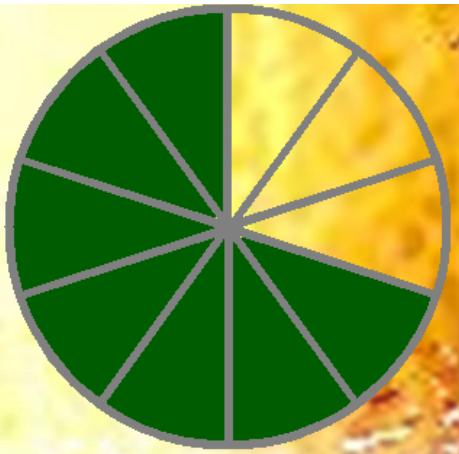
Take a pound and split it into ten pence pieces...

What do you get?... TENTHS !!

Tenths are just the numbers 1-10 but show between one and ten steps between the numbers ZERO AND ONE







Hundredths

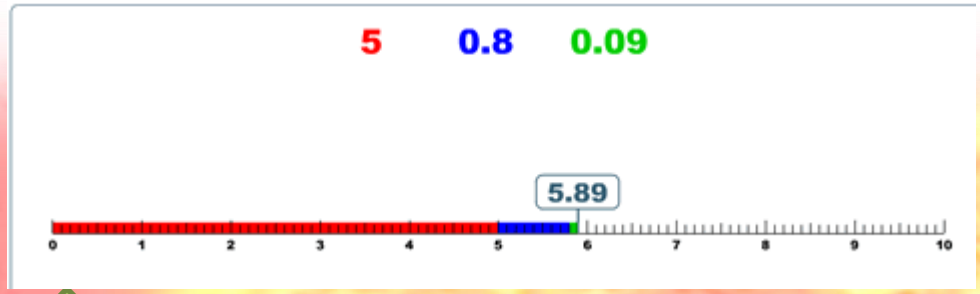
Take a pound and split it into one hundred pence....

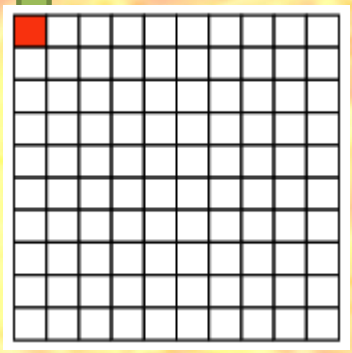
Take a house price and find one percent...

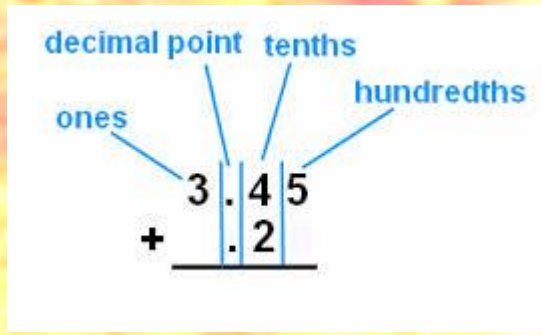
Select one person from a group of one hundred...

What do you get??... HUNDREDTHS !!

Hundredths are just the numbers 1-100 but show how much you have between ZERO AND ONE







Hundreds	Tens	ones	Tenths	Hundredths
		0	2	5

Thousandths

Take a cruise ship and divide it into a thousand rooms.....

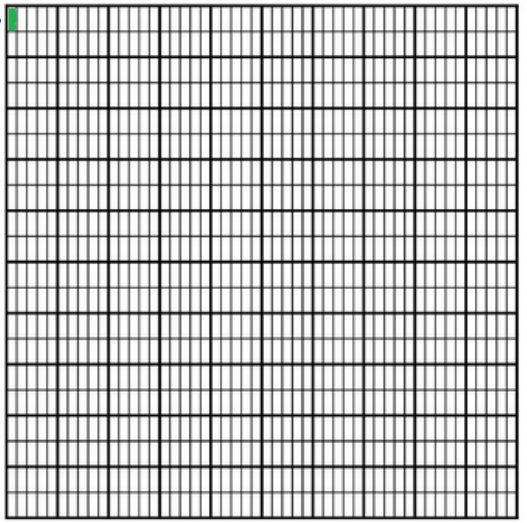
Take a race lap time in seconds and cut it into 'milli' seconds...

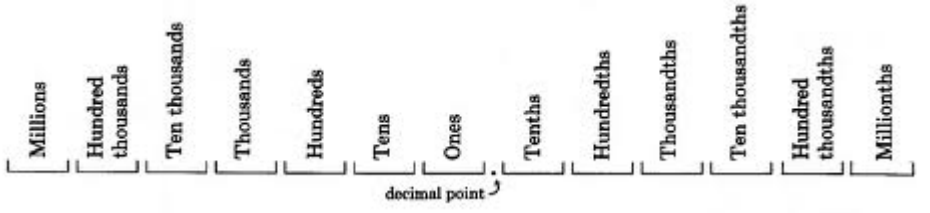
Take a jug of liquid and split it into a thousand drops...

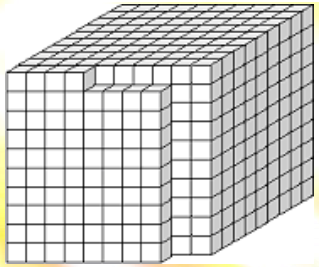
What do you get?? ... THOUSANDTHS!!

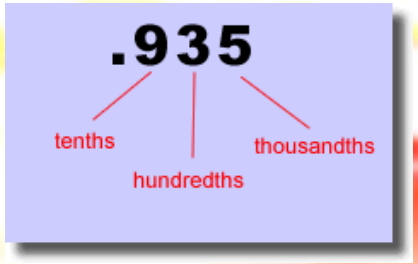
Thousandths are just the numbers one to a thousand but show how much you have between ZERO AND ONE.

$$\frac{1}{1000} = 0.001$$









Adding and Subtracting Decimals

To add or subtract decimal numbers.....

1) Write the numbers in place values one number above the other
2) Ensure both numbers have the same number of decimal places
3) Add or subtract each place value as normal carrying any sets of ten into the next column
4) Finally ensure the decimal is placed into your answer in the correct place

Line up the decimal points

```
  22.3
+ 34.1
  56.4
```

Line up the decimal points

```
  1.234
+ 4.1
  5.334
```

Line up the decimal points

```
  76.3
- 34.1
  42.2
```

Line up the decimal points

```
  4.321
- 4.1
  0.221
```

Multiplying Decimals

Multiply the numbers. Don't worry about the decimal points just yet.

Count the total number of decimal places (or hops). In this case there are 3 on the top and one on the bottom.

Place the decimal point in the answer. Use the same number of hops (decimal places) that you counted.

```
 1.124
 × 1.5
------
 5620
1124
------
16860
```

```
 1.124
 × 1.5
------
 5620
1124
------
16860
```

```
 1.124
 × 1.5
------
 5620
1124
------
1.6860
```

0.67 — 2 decimal places

× 0.4 — 1 decimal place

0.268 — 3 decimal places

Dividing Decimals

Make the divisor a whole number by moving the decimal point to the right. Move the decimal point in the dividend by the same number of hops. This is the same as multiplying both numbers by 10 (for each hop.)

$$.2\overline{)12.64}$$

$$2.\overline{)126.4}$$

Place the decimal point in the answer lined up with decimal point in the dividend.

$$2\overline{)126.4}$$

Divide the numbers. Be sure that the decimal points remain lined up.

$$\begin{array}{r} 63.2 \\ 2\overline{)126.4} \end{array}$$

example

Step 1: $.06\overline{)3.00}$

Step 2: $.06\overline{)3.00}$

Step 3: $6.\overline{)300.}$

Step 4: $6.\overline{)300.}$

Step 5:

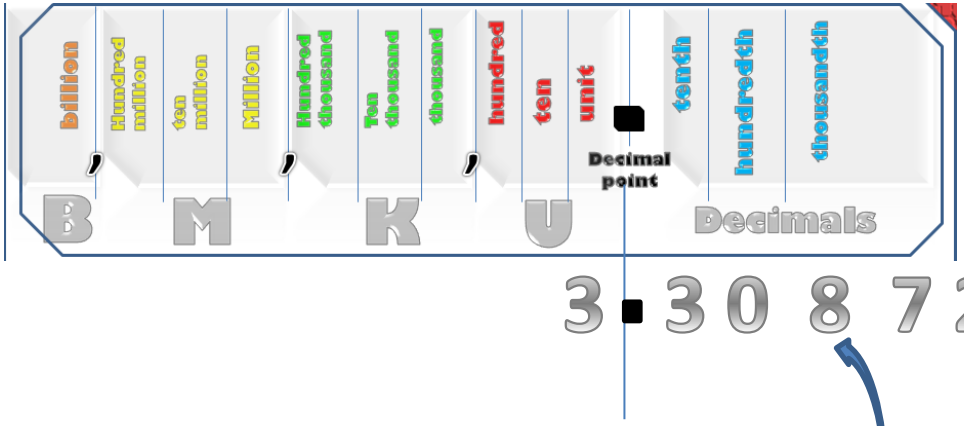
$$\begin{array}{r} 50. \\ 6\overline{)300.} \\ \underline{30} \\ 00 \end{array}$$

Rounding Decimals

Rounding decimals is just like rounding of whole numbers.

You need to find which place value you want to keep and then round off the rest.

With decimals, the place values will be on the right of the decimal point rather than on the left



Rounding Example :

Round 3.308725 to the nearest thousandth:

3.308725 Put a line under the place to be rounded to.

3.308725 Look at the digit to the right of this place.
3.309725
- If it is 5 or more, round the underlined digit up.
- If it is less than five, leave the underlined digit the same.

3.309000 All digits to the right of the underlined one would be zeroes,

3.309 but because they are insignificant, they are just removed.

0.01

Lesson: Try out

Block 1 : Watch tutor led demo (in class or on video)

Try these, 1) Which is bigger 0.2 or 0.02 ? 2) Which is smaller 1.04 or 1.4040 ?
3) Count up two more tenths from 0.9, what value do you get?
4) Put the place values in order largest first 1/100 unit 1/10 thousandth

Block 2 : Watch tutor led demo (in class or on video)

Try these, 5) Add 3.26 to 1.9 6) Subtract 8.403 from 11.05 7) Round £10.43 to 1dps

8) Add £1.325M to £0.76M 9) Round 26.325 seconds to 2dps 10) Take 2.30K from -5.07K

11) Multiply 4.2 by 3.5 12) Divide 150 by 0.3

Block 3 : Watch tutor led demo (in class or on video)

Level Two

Try these, 13) Add 0.0032500 to 0.02057 14) Subtract 4.7B from 3.042B

15) Round 18.442506 M to the nearest thousand 16) 0.40503 x -0.02

17) Divide up 1.304 / 0.352 to 1dps (one decimal place)

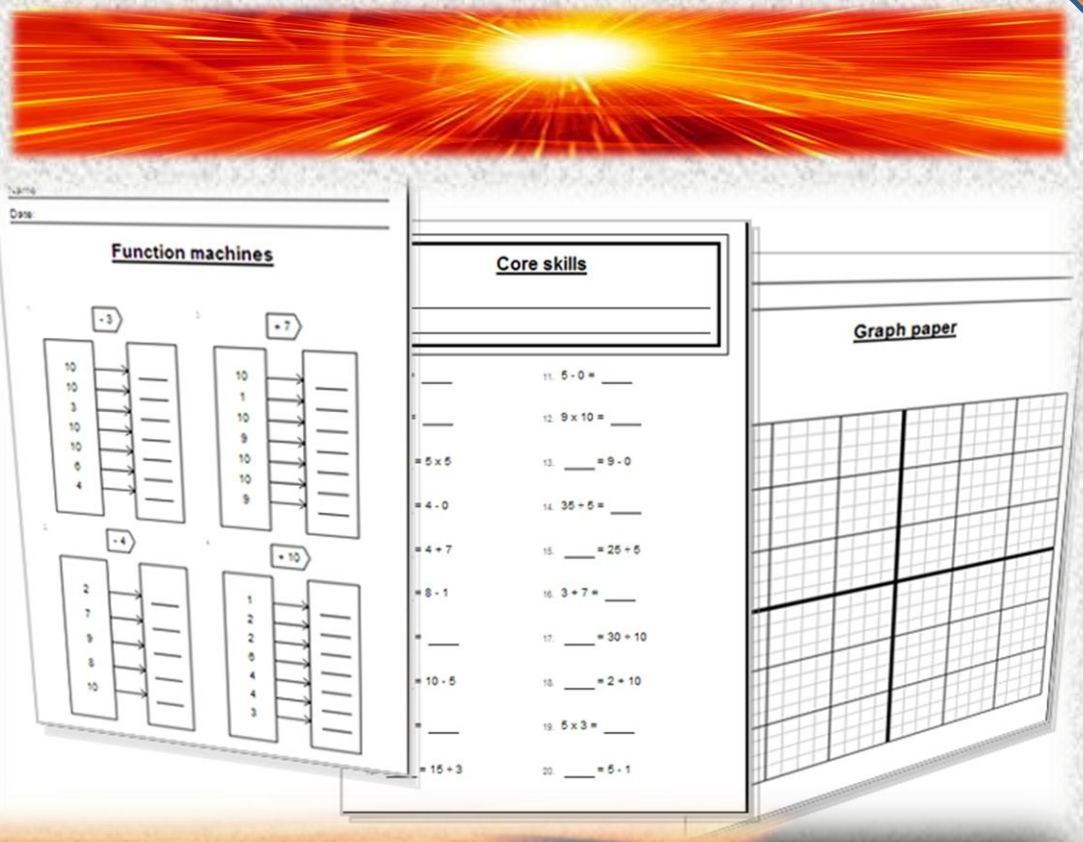
Lesson: Websites and links

Decimal Challenge, find the missing decimal value by guessing lower or higher	http://www.interactivestuff.org/sums4fun/decchall.html
Visualising decimal numbers on a number line and showing values in between others	http://rupertcollins.com/educationwebsites/numeracy/numeracy/numeracy4/dec_num_line.swf
Showing decimals as fractions and linking the previous topic of fractions to decimals	http://www.amblesideprimary.com/ambleweb/mentalmaths/fracto.html
Visualising units, tenths, hundredths and thousands plus explore 4 rules of decimals using blocks and grids	http://www.mhhe.com/math/ltbmath/bennett_nelson8e/VMK.html?initManip=decimalSquares
Visualising tenths and other fractions	http://www.mhhe.com/math/ltbmath/bennett_nelson8e/VMK.html?initManip=fractionBars
Seeing Decimals in place value and visualising them in blocks, explore add and subtract	http://nlvm.usu.edu/en/nav/frames_asid_264_g_2_t_1.html
Web page that explains how to +, -, x, / decimals then gives you practice questions and answers	http://www.cimt.plymouth.ac.uk/projects/mepres/book8/bk8i4/bk8_4i2.htm

Lesson: Activity E

Try a variety of written practice

- **Worksheets**
- **Workbooks**
- **Practice Exam Papers**
- **Maths Problems**



Lesson: Practice – just the numbers

Write the following decimals

1) Two tenths
2) One unit, three hundredths
3) Zero point nine seven
4) Eighteen and nineteen hundredths
5) Three + 2/10 + 4/1000
6) Eighty thousandths

Order the following decimals
High to low

7) 0.2 0.02
8) 1.303 3.01 1.013
9) 7.04 47.0 4.07
10) 0.0034 0.0304 0.3040
11) 6.3K 6.03K 6.303K 3.66K
12) 0.848 0.4808 0.07848
13) 10.06M 0.016B 1601M
14) 1.022 B 8.43B 0.542B

Add the following decimals

15) 2.3 + 5.4
16) 0.7 + 0.2
17) 1.58 + 0.4
18) 6.44 + 2.99
19) 0.00331 + 0.03586
20) -2.4 + -4.8
21) 7.8M + 3.5M
22) 0.34 B + 1.983B

Subtract the following decimals

23) 7.8 – 3.2
24) 14.08 - 1.6
25) 6.003 - 4.885
26) 0.0402 - 0.0395
27) -0.3 - (-0.5)
28) -4.99 - (-5.7)
29) 16.2K - 14.31K
30) 5.050 M - 0.505 M
31) 78.34 B - 59.28 B

Multiply the following decimals

32) 3 x 0.7
33) 2 x 1.5
34) 4.2 x 3.7
35) 13.4 x 0.2
36) 5.5 x 20.1
37) 4.9 x 7.03
38) 1.11 x 3.2
39) -4.6 x - 3
40) 2.7K x 0.2
41) 71.04 M x 3.4

Divide these decimals

42) 10 / 0.2
43) 0.6 / 3
44) 1.2 / 4
45) 1.6 / 0.4
46) 200 / 1.5
47) -2.5 / 5
48) 0.2 / 0.4
49) 4 / -0.2
50) 8.004 / 0.240
51) -3.2K / 16
52) 1.5M / -5
53) 0.00046 B / 0.0002

Round the following decimals

54) 1.2 to the nearest unit
55) 5.42 to one decimal place
56) 14.05 to one decimal place
57) 2.0459 to two decimal places
58) 14.5555 to two decimal places
59) -0.0327 to three decimal places
60) 8.40562 to 3dps
61) 0.419256 M to 3dps
62) 8.09459 B to 4dps

Lesson: Practice – word problems

Q1) Two suitcases were weighed before a flight, 37.2kg and 15.07kg. What is the total of the two suitcases?

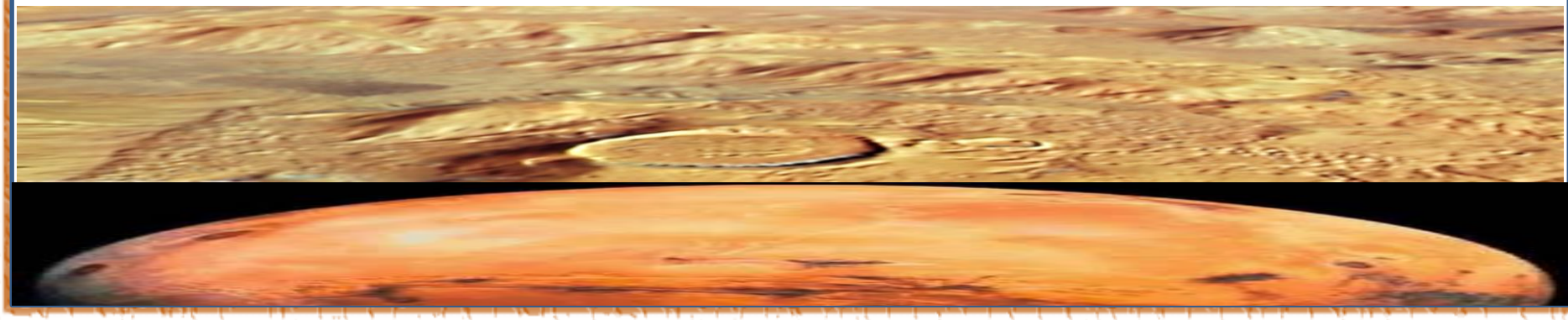
Q2) The rainfall in the UK was 3 times greater than in France. Three point five two inches fell in the UK. How much fell in France?

Q3) A carpet roll has a circumference of 7.2 metres and is folded round 20 times. Find the total length of the roll.

Q4) A runner ran a race in 42.782 seconds, then 42.6153 seconds on the following attempt. How much faster was she?

Q5) A wage is paid at 'time and a half' (x1.5). The normal hourly wage should be £7.50. What is the new hourly wage at time and a half

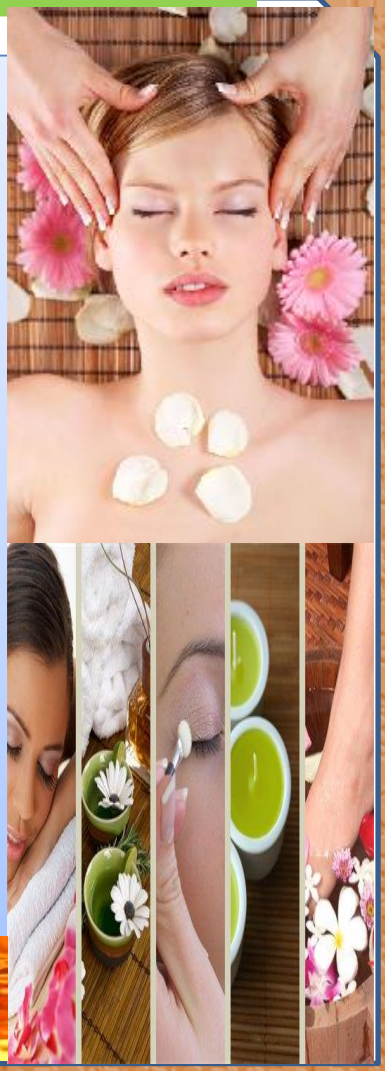
Q6) The gravity on Mars is 3.711 metres per second. On Earth it is 9.8 metres per second. By how many times less is the gravity on Mars?



Lesson: Practice – Making it Functional 1

Energy Beauty Treatments

Eyelash tint	30 minutes	£11.50
Eyebrow tint	15 minutes	£8.35
Full set of nails	75 minutes	£34.25
Normal manicure	25 minutes	£14.10
Normal pedicure	40 minutes	£23.60
File and re-varnish	10 minutes	£12.15
Tanning	15 minutes	£24.75
Body exfoliation	35 minutes	£45.00
Aromatic facial	70 minutes	£52.80
Face and body treatment	100 minutes	£77.95



0.01

Lesson: Practice – Making it Functional 2

Use the information on the previous page

- 1. The beauty treatments are priced and timed.
- a) Angela decides to have a normal manicure and pedicure. How much will this cost?
- b) She pays them with a £50 note. How much change will she get?
- c) Work out how many eyelash and eyebrow tints could be done in an hour. Then calculate how much money this would cost. Show your working, listing the treatments separately.
- d) Angela decides to book the above treatments for her 3 friends. How much would this cost in total?
- e) How much will each person have to pay?

Lesson: Practice – Making it Functional 3

Use the information on the previous pages

- 2. a) Body exfoliation treatment is popular but the clients have said they would like it to last for an hour. Calculate what the new price should be, at the same rate, to be in proportion to the current charge.

- b) The treatments are all timed. The salon owner wants to check which are the most cost effective. Calculate the cost per minute of each treatment (to a maximum of 3 d.p.)

- c) Show your calculations in a table putting them in order of price per minute

TOPIC ANSWERS 1

Block 1

1) 0.2
2) 1.04
3) 1.1
4) Unit, 1/10, 1/100 thousandth

Block 2

5) 5.16
6) 2.647
7) £10.40
8) £2.085M
9) 26.33 seconds
10) £7.37K
11) 14.7
12) 500

Block 3

13) 0.02382
14) -1.658
15) 18.443
16) 0.0081006
17) 3.7 to 1dp

Write the following decimals

1) 0.2
2) 1.03
3) 0.97
4) 18.19
5) 3.204
6) 0.08

Order the following decimals High to low

7) 0.2 0.02
8) 3.01 1.303 1.013
9) 47.0 7.04 4.07
10) 0.3040 0.0304 0.0034
11) 6.303K 6.3K 6.03K 3.66K
12) 0.848 0.4808 0.07848
13) 1601M 0.016B 10.06M
14) 8.43B 1.022B 0.542B

Add the following decimals

15) 7.7
16) 0.9
17) 1.98
18) 9.43
19) 0.03917
20) -7.2
21) 11.3 M
22) 2.323 B

Subtract the following decimals

23) 4.6
24) 12.48
25) 1.118
26) 0.0007
27) 0.2
28) 0.71
29) 1.89 K
30) 4.545 M
31) 19.06 B

Multiply the following decimals

32) 2.1
33) 3
34) 15.54
35) 2.68
36) 110.55
37) 34.447
38) 3.552
39) 13.8
40) 0.54 K
41) 241.536 M

Divide these decimals

42) 50
43) 0.2
44) 0.3
45) 4
46) 1.33.3.....
47) -0.5
48) 0.5
49) -20
50) 33.35
51) -200
52) -0.3
53) 2.3 B

Round the following decimals

54) 1
55) 5.4
56) 14.1
57) 2.05
58) 14.56
59) -0.033
60) 8.406
61) 0.419 M
62) 8.0946 B

Word Problems - ANSWERS

Q1) 52.27 kg
Q2) 1.17.. inches
Q3) 144 metres

Q4) 0.1667 seconds faster
Q5) £11.25
Q6) 2.64... times less (take Earths and divide by Mars , 9.8 / 3.711)

TOPIC ANSWERS 3

- 1. a) £14.10 + £23 .60 = **£37.60**
- b) £50 - £37.60 = **£12.40**
- c) Eyelash tint = 30 minutes, so can fit in 2 per hour at £11.50. £11.50 x 2 = **£23**.
- Eyebrow tint = 15 minutes, so can fit in 4 per hour at £8.35.
- £8.35 x 4 = **£33.40. £23 + £33.40 = £56.40**
- d) £11.50 x 3 = £34.50. £8.35 x 3 = £25.05. Total = £34.50 + £25.05 = **£59.55**
- e) Each person will pay £11.50 + £8.35 = **£19.85**. It can also be worked out by dividing the total of £59.55 by 3.

- 2. a) Body exfoliation costs £45 for 35 minutes. To work out the same proportional cost for an hour, multiply £45 by 60 and then divide by 35. Total = **£77.14.**
- b) £11.50/30 = £0.383
- £8.35/15 = £0.557
- £34.25/75 = £0.457
- £14.10/25 = £0.564
- £23.60/40 = £0.59
- £12.15/10 = £1.215
- £24.75/15 = £1.65
- £45.00/35 = £1.286
- £52.80/70 = £0.754
- £77.95/100 = £0.78
- C) List the treatments in order of cost using the above calculations.

Progress Checker 2

What do you now know about 'Decimals' ?

How would you now rate your skills in using decimals ?

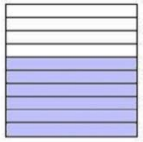
1) Excellent ability
2) Good ability, but still working to improve
3) Ok, make a start but I know I have lots to still learn

My aims for today were...

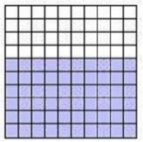
A Know the place values tenth, hundredth, thousandth etc...

B Recognise the affect moving a decimal in a number has to a value

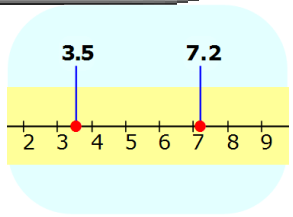
C Use decimals in calculations



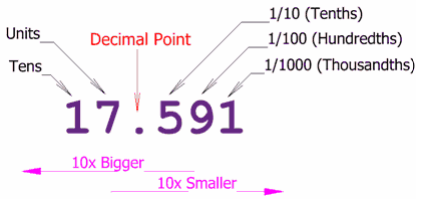
0.6
six tenths



0.60
sixty hundredths



$$\begin{array}{r} 1.7800 \\ -0.0985 \\ \hline 1.6815 \end{array}$$



Continuing to Study and Learn

What else can you do to help yourself to learn and practice? Here are ten suggestions, record which you do each week and also record your progress.

Internet websites
Repeat the lesson, make notes, organise a folder, revise

Own maths workbook
Study together with a friend or family member

Finish activities in this book
Complete class handouts or tasks

Practice exams / past papers
Use maths skills learnt at home or at work in real situations

Play games
Experiment yourself, try new things ask yourself questions

Try making a graph of number of practice methods you use against your progress score in each topic. Are you showing more practice gives better results?