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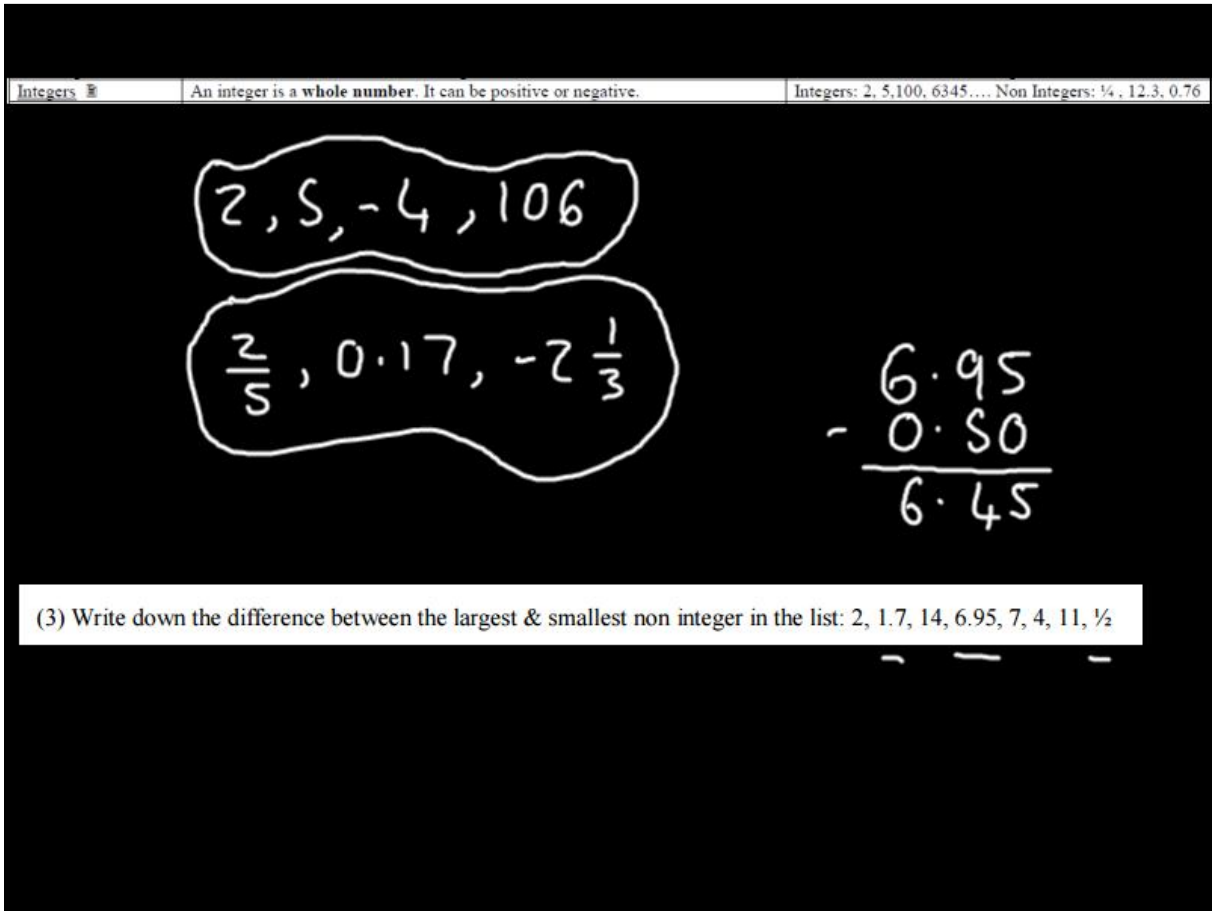
Video 1 - Number

This video is designed for either last minute revision or for short courses. It is not intended to replace quality teaching over a number of years. The video aims to cover the course content and is suitable for all exam boards such as AQA, Edexcel, OCR etc. The 'star' topics are the more challenging ones.

Integers	An integer is a **whole number**. It can be positive or negative.	Integers: 2, 5,100, 6345…. Non Integers: ¼ , 12.3, 0.76



$5^4 = 5 \times 5 \times 5 \times 5$

Square Number	When you × a number by itself you get a square number. This number has to be an integer. Squaring a number is **NOT** the same as multiplying a number by 2.	The first 6 square numbers are: 1, 4, 9, 16, 25, 36... (a) $3^2 = 3 \times 3 = 9$ (NOT 6) (b) $5^2 = 5 \times 5 = 25$

Negatives!

$1 \times 1 = 1^2 = 1$

$2 \times 2 = 2^2 = 4$

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

$\sqrt{1} = 1$ $\sqrt{4} = 2$ $\sqrt{9} = 3$

$\sqrt{16} = 4$ $\sqrt{81} = 9$

16, 25, 36, 49

64, 81, 100, 121, 144

(10) Here is a list of numbers: 1, 5, 3, 17, 8, 4, 21, 17, 0.5, 18, 7

(a) Write down all the prime numbers in the list. *(1 mark)*

(b) Write down all the square numbers in the list. *(1 mark)*

(c) Write down all the cube numbers in the list. *(1 mark)*

(d) Write down the non integer in the list. *(1 mark)*

Square Roots	This is the inverse (reverse process) of squaring a number. $\sqrt{\ }$ is used. (a) $6^2 = 36$ so $\sqrt{36} = 6$ (b) $9^2 = 81$ so $\sqrt{81} = 9$.	(a) $\sqrt{49} = 7$ (b) $\sqrt{121} = 11$ (c) $\sqrt{\frac{25}{4}} = \frac{\sqrt{25}}{\sqrt{4}} = \frac{5}{2}$

(4) Find the value of x that makes the following calculation true: $4 \times \sqrt{x} = 20$

Cube Number/Roots	A number multiplied by itself **three times**. (The cube root $\sqrt[3]{\ }$ is the inverse).	(a) $4^3 = 4 \times 4 \times 4 = 64$ (NOT 12) (b) $2^3 = 8$ (NOT 6)

$1 \times 1 \times 1 = 1^3 = 1$

$2 \times 2 \times 2 = 2^3 = 8$

$3 \times 3 \times 3 = 3^3 = 27$

64, 125, 216

$\sqrt[3]{8} = 2$

$\sqrt[3]{27} = 3$

$(-2)^3 = -8$

$-2 \times -2 \times -2 = -8$

$\sqrt[3]{-8} = -2$

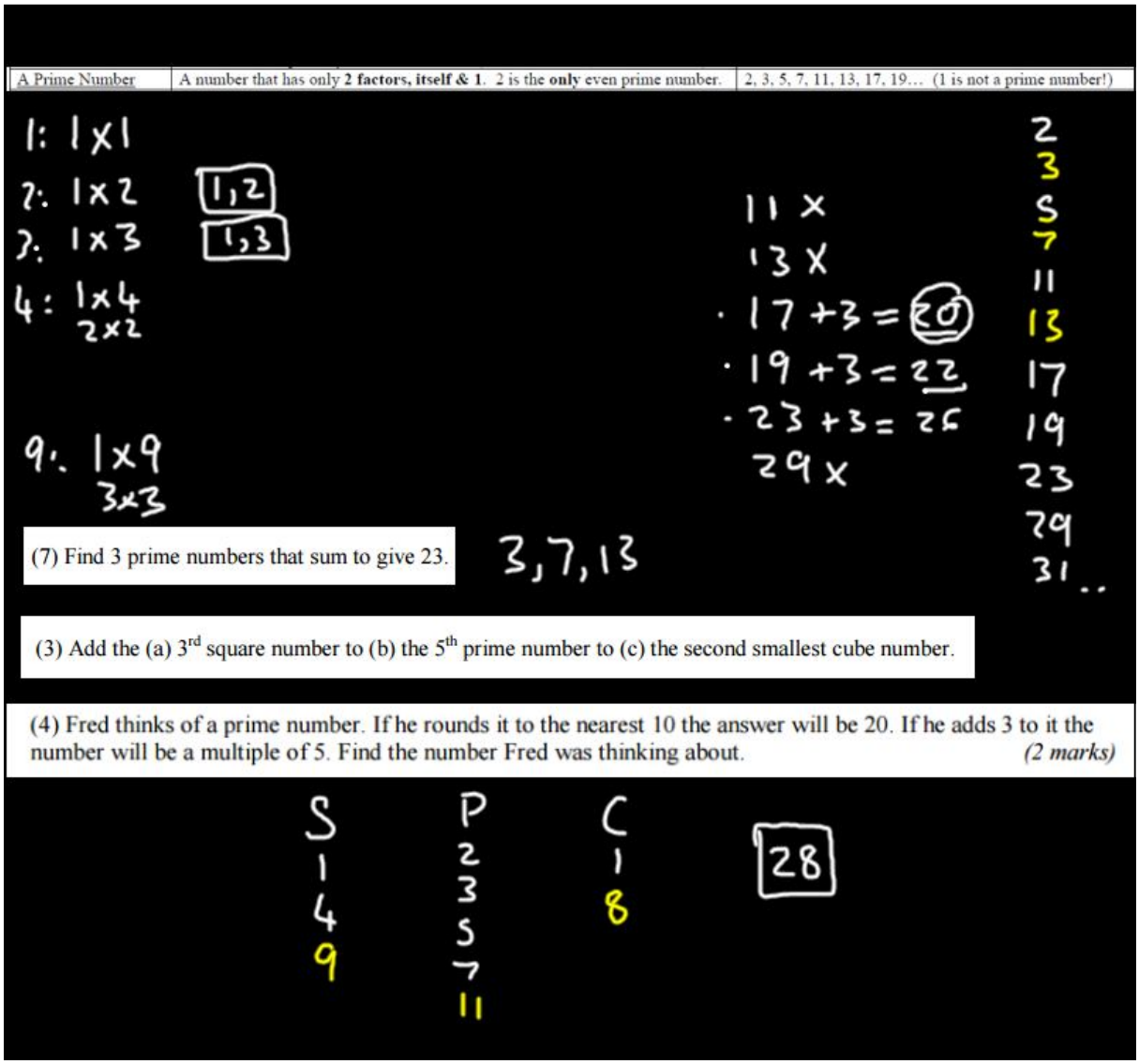
(21) Complete the table below. *(5 marks)*

A1=$(2\times C2)=$ 48	B1=$\sqrt{81}=$ 9	C1=$5(2+1)=$ 15	D1=$14\times 0=$	E1=$\sqrt{25}=$ 5
A2=$5^3=$ 125	B2=$2^3=$ 8	C2=$(3\times B2)=$ 24	D2=$1-(-9)=$	E2=$6^2=$ 36
A3=$0.5^2=$ 0.25	B3=$2+3\times 2=$	C3=$(2\times C1)=$ 30	D3=$(0\times B3)=$	E3=$(0.5\times B2)=$

$\sqrt{49} = 7$

$\sqrt{59} \approx 7.7$

$\sqrt{64} = 8$


A Prime Number
A number that has only 2 factors, itself & 1. 2 is the only even prime number.
2, 3, 5, 7, 11, 13, 17, 19… (1 is not a prime number!)
1: 1x1
2: 1x2
3: 1x3
4: 1x4
2x2
9: 1x9
3x3
1,2
1,3
11 x
13 x
17 +3 = 20
19 +3 = 22
23 +3 = 26
29 x
2
3
5
7
11
13
17
19
23
29
31 ..
(7) Find 3 prime numbers that sum to give 23.
3,7,13
(3) Add the (a) 3rd square number to (b) the 5th prime number to (c) the second smallest cube number.
(4) Fred thinks of a prime number. If he rounds it to the nearest 10 the answer will be 20. If he adds 3 to it the number will be a multiple of 5. Find the number Fred was thinking about. (2 marks)
S
1
4
9
P
2
3
5
7
11
C
1
8
28

Reciprocal	The reciprocal of a number is 1 divided by that number. Often it's easier to think about turning the fraction upside down (inverting the fraction).	The reciprocal of 5 is $\frac{1}{5}$ The reciprocal of $\frac{2}{3}$ is $\frac{3}{2}$

Write down the reciprocal of each of the following numbers:

(1) $\frac{1}{5}$ $\frac{5}{1} = 5$

(2) 6 $\frac{1}{6}$

(3) $\frac{2}{3}$ $\frac{3}{2}$

(4) $\frac{a}{b}$ $\frac{b}{a}$

(5) y $\frac{1}{y}$ $\frac{6}{1}$

Factors (Divisors)	The integers (whole numbers) that **go into** a number with no remainder.	Factors of 8 are 1,2,4 & 8 Factors of 12: 1,2,3,4,6 &12

(1) Write down the factors of the following numbers:
(a) 4
(b) 6
(c) 5
(d) 10
(e) 9
(f) 16
(g) 24
(h) 32
(i) 17
(j) 26
(k) 36

4: 1 x 4, 2 x 2 → 1,2,4

6: 1 x 6, 2 x 3 → 1,2,36

5: 1 x 5 → 1,5

24: 1 x 24, 2 x 12, 3 x 8, 4 x 6 → 1,2,3,4 6,8,12, 24

(4) Here is a list of numbers: 2, 6, 22, 14, 13, 16, 17, 27
From the list of numbers above, write down:
(a) The prime number(s) 2,13,17
(b) The Cube number(s) 27
(c) The square number(s) 16
(d) The factor(s) of 24 2,6,
(e) The multiple(s) of 11

Multiples	Think Times Tables. Just write out the times tables for that number.	The first six multiples of 4 are 4, 8, 12, 16, 20 and 24

(3) Write out the first 5 multiples of the following numbers:
(a) 4
(b) 5
(c) 3
(d) 10
(e) 9
(f) 12
(g) 8
(h) 7
(i) 17
(j) 13
(k) 1

1, 3, 5, 7, 9 ...
2, 4, 6, 8 ...

4, 8, 12, 16, 20
5, 10, 15, 20, 25

-4

(2) Sue thinks of an **even** number. Complete the table below

Statement	True	Possibly True	False
The number is positive		✓	
The number is a multiple of 2	✓		
The number is a square number		✓	
The number is a factor of 8		✓	
The number is odd			✓
The number is a prime number		✓	
The number is divisible by 2	✓		
One of the factors of the number is odd	✓		

(8) John can buy a cup cake for 80p or 5 for £3.10. Find the cheapest way of buying 24 cupcakes.

① 24 x £0·80 = £19·20
② (4x5) + (4x1)
(4 x £3·10) + (4 x £0·80) = £15·60
③ 5 x £3·10 = £15·50 ✓ 5 lots of 5

(15) Fred thinks of a number. The number is a factor of 12, a multiple of 2 and a square number. What number was Fred thinking of? *(2 marks)*

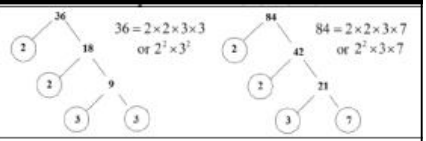
12: ~~1~~, ~~2~~, ~~3~~, (4), ~~6~~, 12

(4)

(12) Find two numbers that multiply to give 60 and add to give 17

0, 17
1, 16
2, 15
3, 14
4, 13
5, 12

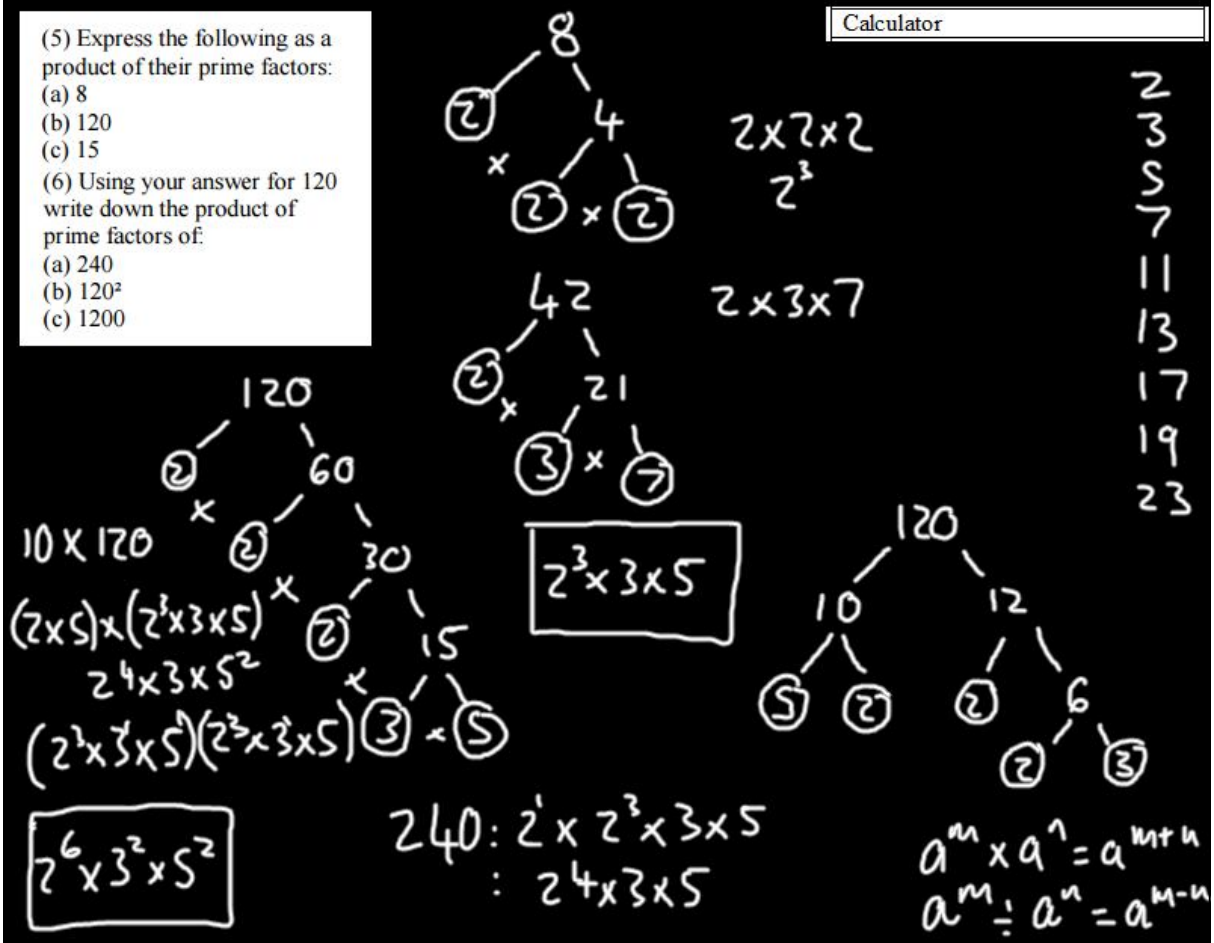
10, 6
12, 5

Product of Prime Factors	Numbers can be made up by **multiplying prime numbers**. (2,3,5,7,11,13,17..) To find the Product of Primes start with a **factor tree**. (Shown to the right) Product means multiply so don't forget to put the × sign in between the numbers you found in your factor tree. If you are struggling with the factor tree just keep trying to divide by the prime number in order. Does it divide by 2? If so pick 2. If it doesn't divide by 2 does it divide by 3? By 5? By 7? By 11? Etc.	

(5) Express the following as a product of their prime factors:
(a) 8
(b) 120
(c) 15

(6) Using your answer for 120 write down the product of prime factors of:
(a) 240
(b) 120^2
(c) 1200

Calculator



As a product of its prime factors the number 564 can be written as $2^2 \times 3 \times 47$.
47 is a double digit factor of 564. Write down the other 2 double digit factors of the number 564.

HCF (Highest Common Factor)	The HCF is the **largest** number that goes into 2 or more different numbers. **Method 1**: Just list the factors of each and find largest number in each list **Method 2**: Using Factor tree. Take **only** the prime numbers that appear in each list of the factors of the numbers to their **lowest** power and multiply. This method is better for less obvious examples and larger numbers. (You can use a Venn Diagram to do this too.)	**Example:** "Find the HCF of 8 and 28" **Method 1**: Factors of 8: 1,2,**4** & 8 Factors of 28: 1,2,**4**,7,14 & 28. The HCF of 8 and 28 is **4** **Method 2:** Product of Primes for 8 and 28: $8 = 2^3$ and $28 = 2^2 \times 7$ so you only have 2 in both lists and you take it to the lowest power giving $2^2 = 4$

6: 1, 2, 3, 6

8: 1, 2, 4, 8

12: 1, 2, 3, 4, ~~8~~, ~~12~~

16:

12: $2^2 \times 3$

16: 2^4

4

(1) Write down a pair of numbers that have a HCF of 4.

4: 1, 2, 4

8: 1, 2, 4, 8

Lowest/Least

LCM (Lowest Common Multiple)	The **lowest (or smallest) number** that 2 or more different numbers go in to. **Method 1**: Just list out the times tables of each number and see which is the **lowest number** that appears in both lists. This is the LCM **Method 2**: Using Factor tree. Take **all** the prime numbers that appear in each list of the factors to their highest power and multiply. (You can use a Venn Diagram to do this too.) Common misconception: The LCM of 2 numbers is 1. This is incorrect!	**Example:** "Find the LCM of 4 and 6" **Method 1**: Multiples of 4: 4, 8, **12**, 16, .. Multiples of 6: 6, **12**, 18.. The LCM of 4 and 6 is **12.** **Method 2**: Product of Primes for 4 and 6: $4=2^2$ and $6=2\times3$. You need both 2 and 3 to their highest power giving $2^2\times3=12$.

6: 6, 12, 18, 24, 30 ... Burgers 4 — 6: $2^1 \times 3^1$

8: 8, 16, 24, 32 ... Buns 3 — 8: 2^3

12: 12, 24, 36 ...

$2^3 \times 3^1$

8×3

24

LCM = 24

(6) Find the HCF and LCM of 8 and 12

(5) Fred is having a party. He needs a bun for every burger on the BBQ. Buns are sold in packs of 8 and burgers in packs of 6. What is the minimum number of packs he must buy of each to ensure every burger has a bun?

8: 1, 2, 4, 8

12: 1, 2, 3, 4, 6, 12

Rounding to 1 DP (Decimal Place)	You are rounding the number to the **nearest 10th**. Focus on the 2nd number after the decimal point. If it's 5 or more round up. If it's 4 or less round down.	(a) 2.43 = 2.4 (3 is less than 5) (c) 1.09 = 1.1 (9 is more than 5)	(b) 5.67 = 5.7 (d) 2.98 = 3.0

Rounding – Round the numbers to the nearest.....

Number	100s	10s	Units
345.4			
476.8			
512.6			
901.4			
427.8			
787.3			
654.2			

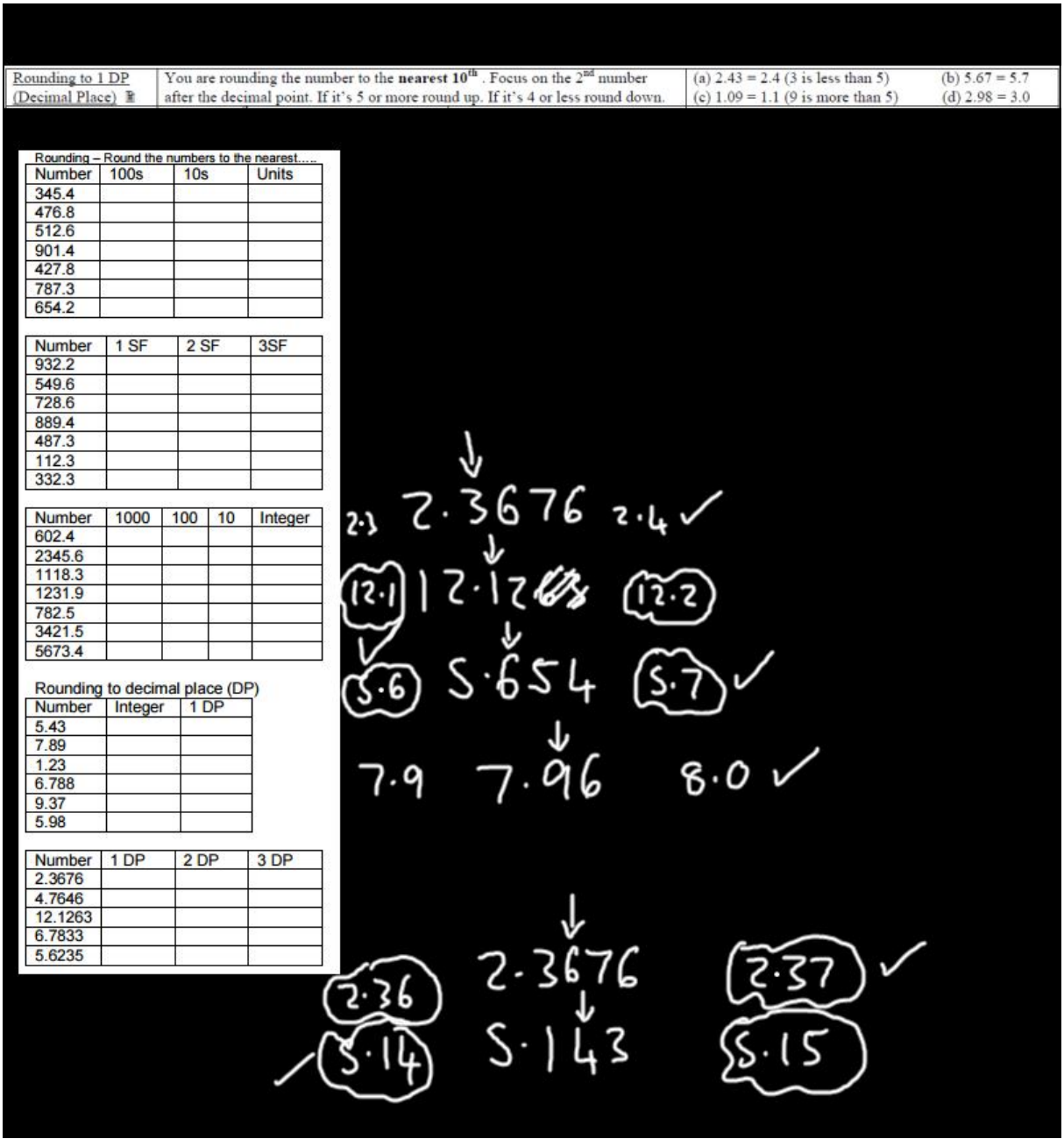
Number	1 SF	2 SF	3SF
932.2			
549.6			
728.6			
889.4			
487.3			
112.3			
332.3			

Number	1000	100	10	Integer
602.4				
2345.6				
1118.3				
1231.9				
782.5				
3421.5				
5673.4				

Rounding to decimal place (DP)

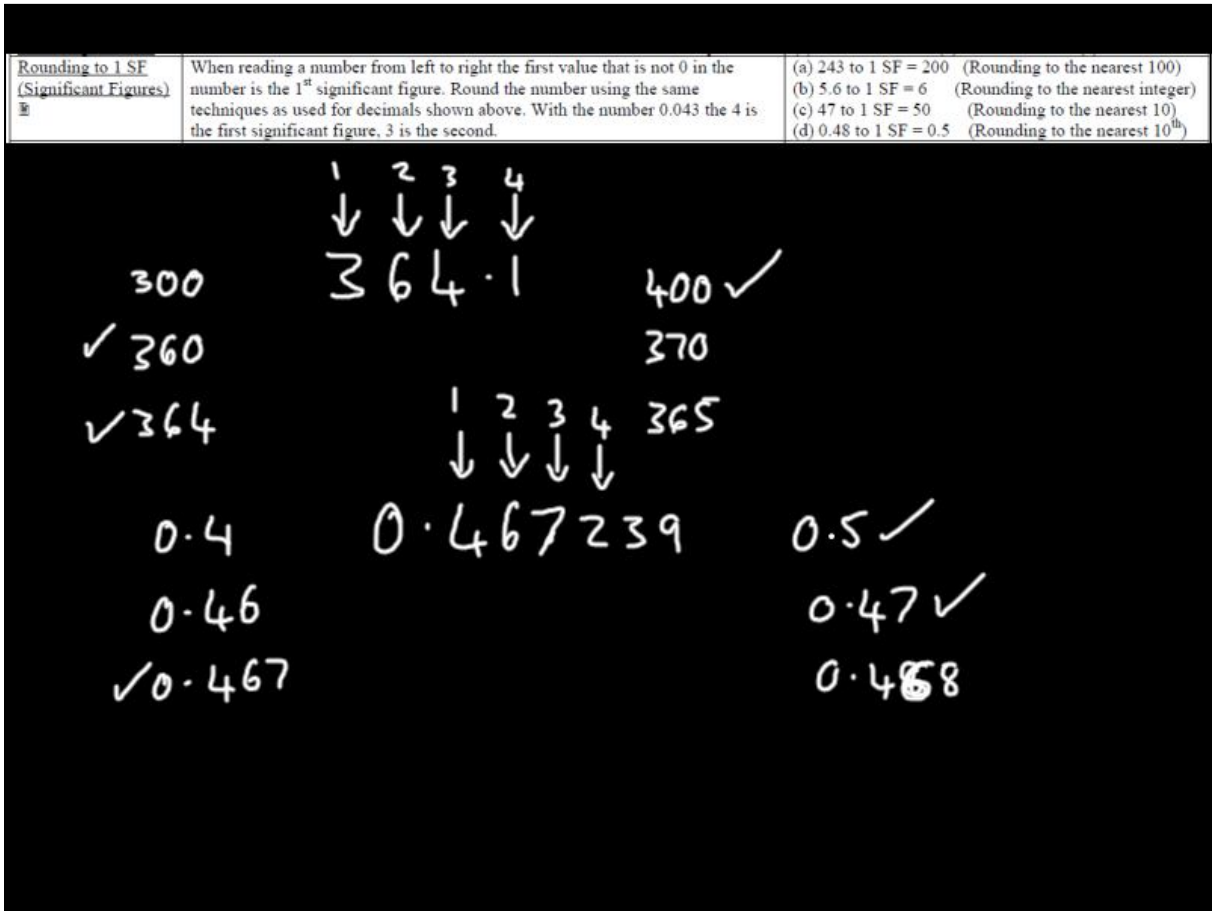
Number	Integer	1 DP
5.43		
7.89		
1.23		
6.788		
9.37		
5.98		

Number	1 DP	2 DP	3 DP
2.3676			
4.7646			
12.1263			
6.7833			
5.6235			



Rounding to 2 DP	Nearest **100th**. As above but focus on the 3rd number after the decimal point.	(a) 3.562 = 3.56 (b) 0.785 = 0.79 (c) 1.499 = 1.50

Rounding to 1 SF (Significant Figures)	When reading a number from left to right the first value that is not 0 in the number is the 1st significant figure. Round the number using the same techniques as used for decimals shown above. With the number 0.043 the 4 is the first significant figure, 3 is the second.	(a) 243 to 1 SF = 200 (Rounding to the nearest 100) (b) 5.6 to 1 SF = 6 (Rounding to the nearest integer) (c) 47 to 1 SF = 50 (Rounding to the nearest 10) (d) 0.48 to 1 SF = 0.5 (Rounding to the nearest 10th)



Rounding to 2 SF	Same as before but now it's the **second** significant figure. Mind the 0's!	(a) 243 = 240 (b) 40.8 = 41 (c) 0.546 = 0.55

Estimations & Approximations	Round each number to 1 significant figure & perform the calculation. You must show workings! Estimating doesn't require the exact value. It's non calculator!	(a) 98 × 51.2 becomes 100 × 50 which = 5000 (b) 4.6 + 104.7 becomes 5+100 which = 105

Round each of the following to 1 significant figure: (1) 1.3 (2) 9.78 (3) 106.23 (4) 0.48
Estimate the answer to: 9.7×4.8
Estimate the answer to: 103.2×19.7
Estimate the answer to: $\frac{40.6}{7.9}$
Estimate the answer to: $\frac{2.1+11.3}{5.9}$
Estimate the answer to: $\frac{108+9.8}{0.49}$
Estimate the answer to: 5.32×1.98
John sees some rope in a shop. The rope is £1.08 a meter and he needs 9.7 meters. Suggest a suitable amount of money he should take to cover the cost, showing your calculations.
Helen works in a factory. She earns £5.98 an hour and works for 39 hours a week. Explain why her wages cannot be more than £240 per week.

9.7×4.8

$10 \times 5 = 50$

103.2×19.7

$100 \times 20 = 2000$

149×14.9

100×10

$\frac{108+9.8}{0.49}$

Rounding: 6×40

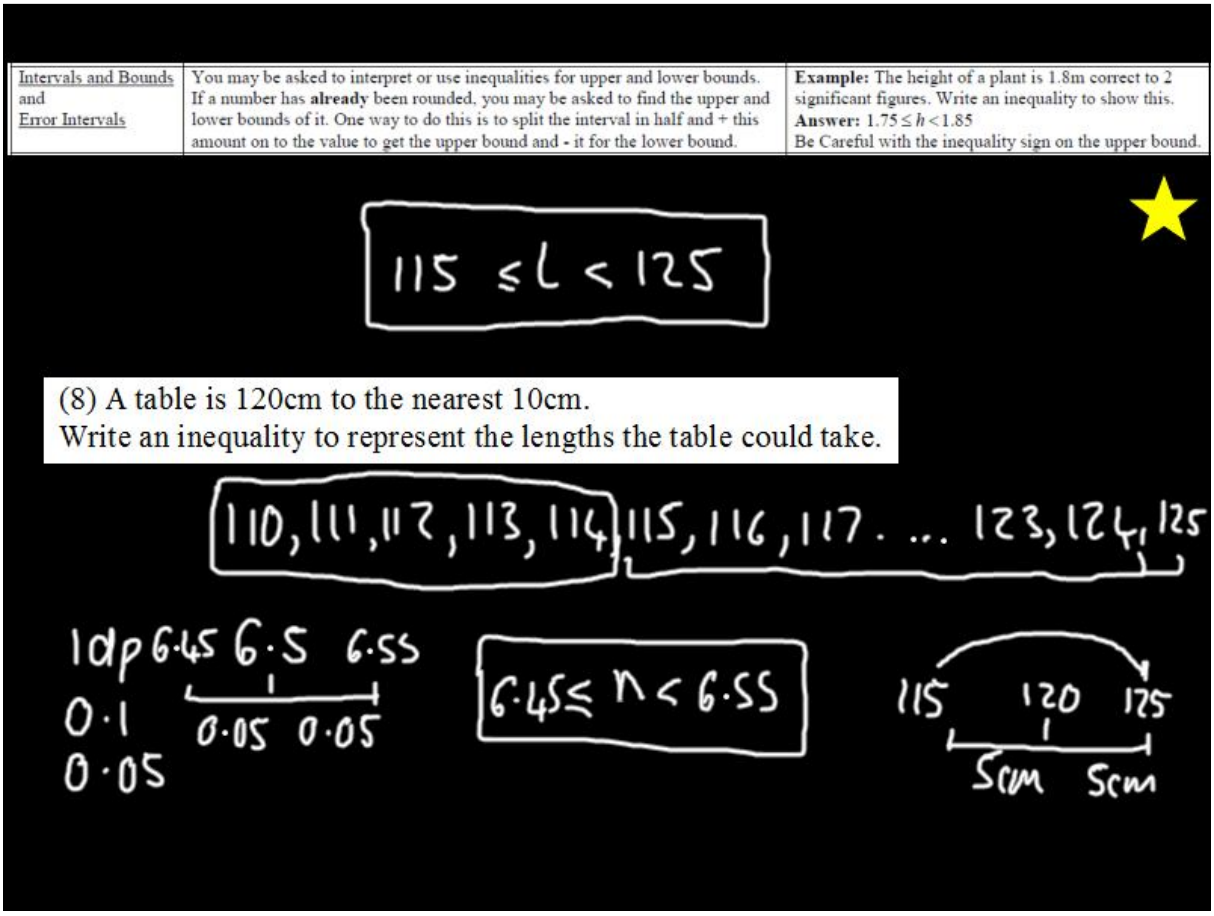
£240

$\frac{100+10}{0.5}$

Rounding each value up to nearest

$\frac{110}{0.5} = 220$

Intervals and Bounds and Error Intervals	You may be asked to interpret or use inequalities for upper and lower bounds. If a number has **already** been rounded, you may be asked to find the upper and lower bounds of it. One way to do this is to split the interval in half and + this amount on to the value to get the upper bound and - it for the lower bound.	**Example:** The height of a plant is 1.8m correct to 2 significant figures. Write an inequality to show this. **Answer:** $1.75 \leq h < 1.85$ Be Careful with the inequality sign on the upper bound.



Fractions to Decimals	Some are obvious such as ¾ is 0.75. For those that are not simply divide the numerator by the denominator using short division **OR** SD on your Casio. Common error! 1/3 is not 0.3. £1 shared between 3 people is not 30p each.	(a) 1/8 = 0.125 (c) 7/100 = 0.07 (e) 28/1000 = 0.028	(b) 3/10 = 0.3 (d) 43/100 = 0.43 (f) 37/50 = 74/100 = 0.74

Terminating and recurring decimals

$\frac{1}{2} = 0.5$

$\frac{1}{10} = 0.1$

$\frac{4}{9}$

$9\overline{)4.0000}$ $= 0.444$

$0.44444\ldots$

$0.\dot{4}$

$\frac{3}{5}$ $5\overline{)3.000} = 0.6$

$\frac{5}{8}$ $8\overline{)5.0^{4}0^{2}0^{4}0} = 0.625$

(2) Given ¼ = 0.25 write down the value of (a) 1/8 and (b) 5/8 as a decimal.

(1) Without using a calculator, show that 5/8 is less than 0.65.

$\frac{1}{4} = 0.25$

$\frac{1}{8} = 0.125$

$\frac{5}{8} = 0.625$

Decimals to Fractions	Some are obvious such as 0.5 = ½ or 0.75 = ¾ and 0.1 = 1/10 etc. If it's not obvious write it as a fraction over 10, 100 or 1000 and cancel down.	(a) 0.7 = 7/10 (b) 0.23 = 23/100 (c) 0.46 = 46/100 or 23/50

Calculator

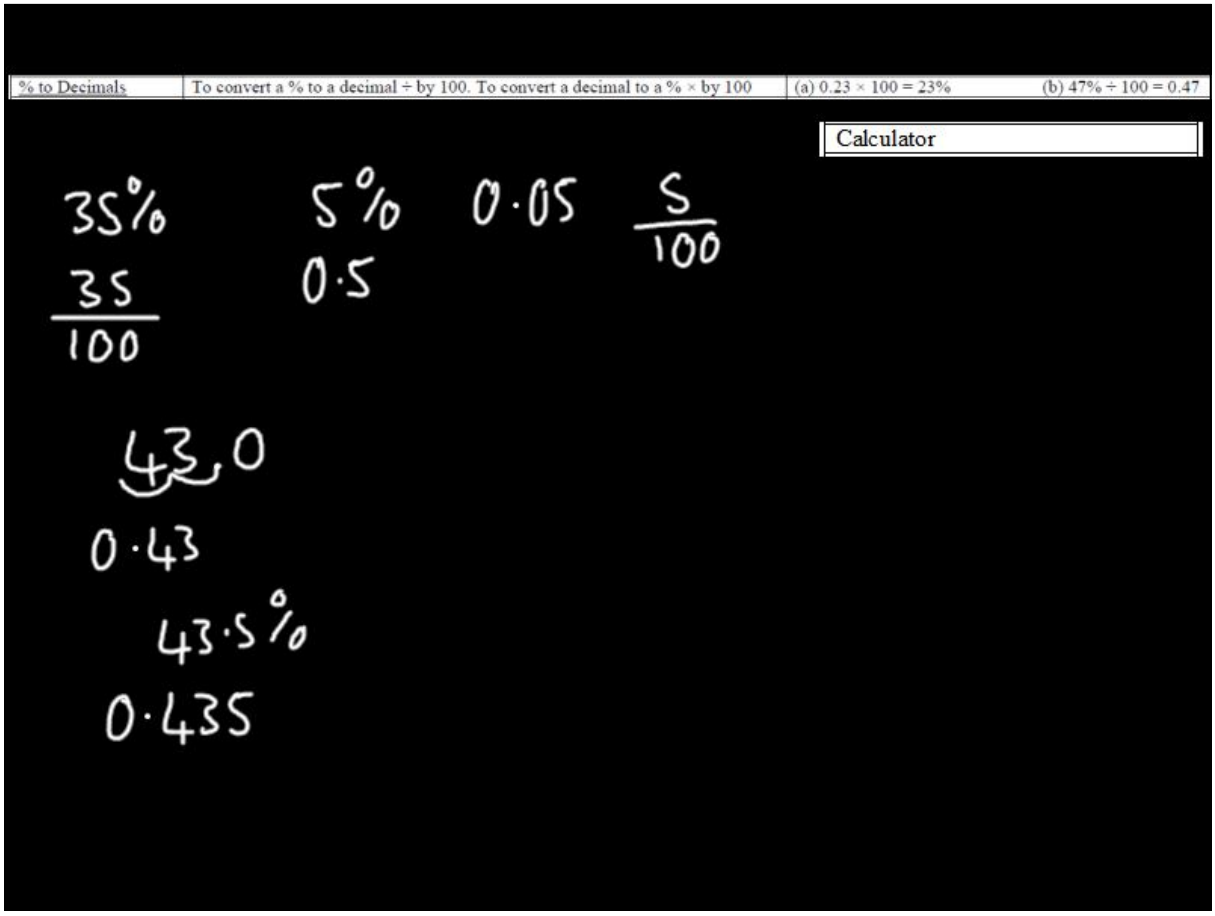
$0.1 = \frac{1}{10}$

$0.01 = \frac{1}{100}$

$0.24 = \frac{24}{100} = \frac{6}{25}$

$0.35 = \frac{35}{100} = \frac{7}{20}$

$0.107 = \frac{107}{1000}$


% to Decimals
To convert a % to a decimal ÷ by 100. To convert a decimal to a % × by 100
(a) 0.23 × 100 = 23%
(b) 47% ÷ 100 = 0.47
Calculator
35%
5%
0·05
5/100
35/100
0·5
43.0
0·43
43·5%
0·435

Fractions to Percentages	A % is just a fraction out of 100. Non calculator just 'scale' the denominator up to 100 with equivalent fractions. On a calculator just × the fraction by 100.	(a)Non Calc $\frac{3}{25}=\frac{12}{100}=12\%$ (b)Calc $\frac{9}{17}\times100=52.9\%$

Non Calculator

Calculator

10%

$\frac{1}{10}$ x10 x10

$\frac{10}{100}=10\%$

$\frac{3}{20}$ x5 x5

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

$\frac{10}{40}=\frac{5}{20}=\frac{1}{4}=\frac{2.5}{10}$

$\frac{25}{100}$ $\frac{25}{100}$ $\frac{25}{100}$

Simplifying Fractions	If they are not obvious like $\frac{5}{10}=\frac{1}{2}$ look for common factors to divide by.	(a) $\frac{6}{8}=\frac{3}{4}$ (divide by 2)	(b) $\frac{20}{35}=\frac{4}{7}$ (divide by 5)

$\frac{4}{10}=\frac{2}{5}$ $\quad\frac{15}{35}=\frac{3}{7}$

$\frac{7}{21}=\frac{1}{3}$

2
3
5
7
11
13
.....

✓ ✓✓

(4) Which of the following fractions have the same value?

$$\frac{2}{8},\frac{5}{15},\frac{7}{28},\frac{3}{12}$$

$\frac{1}{4},\frac{1}{3},\frac{1}{4},\frac{1}{4}$

Mixed Numbers	See how many times the denominator goes into the numerator. This gives you the integer part and then just write the remainder over the original denominator.	(a) $\frac{9}{4}=\frac{4}{4}+\frac{4}{4}+\frac{1}{4}=2\frac{1}{4}$ (b) $\frac{17}{5}=3\frac{2}{5}$ (c) $\frac{5}{3}=1\frac{2}{3}$

Calculator

$2\frac{1}{3}=\frac{7}{3}$ $6\frac{2}{5}=\frac{32}{5}$

$\frac{5}{3}$ $\frac{3}{3}+\frac{2}{3}$ $\frac{11}{4}$ $2\frac{3}{4}$

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

Ordering Fractions	Find the common denominator of the fractions given, write equivalent fractions for each and simply order the fractions by the numerators. You must use the original fractions in your answer. Ascending means smallest to largest.	Order: $\frac{3}{4},\frac{2}{3},\frac{5}{6},\frac{1}{2}$ equiv $\frac{9}{12},\frac{8}{12},\frac{10}{12},\frac{6}{12}$ so $\frac{1}{2},\frac{2}{3},\frac{3}{4},\frac{5}{6}$

LCM = 30

(5) Put the following fractions in ascending order:

$$\frac{2}{5},\frac{9}{15},\frac{7}{10},\frac{1}{2}$$

$\frac{12}{30}, \frac{18}{30}, \frac{21}{30}, \frac{15}{30}$

1 3 4 2

$\frac{2}{5}, \frac{1}{2}, \frac{9}{15}, \frac{7}{10}$

Finding a Fraction of a Quantity	'Divide by the bottom, times by the top'. If you need 3/8 of a number, divide the number in the question by 8 then multiply the answer by 3. Alternatively, use a calculator. In maths 'of' means multiply so you can just type the calculation in as shown on the right. Just × the fraction by the quantity.	**Example:** "Find 2/5 of £60" **Answer:** Start with £60 ÷ 5 = £12. Now simply multiply by two. 2 × 12 = £24. You could have simply done $\frac{2}{5} \times 60$ instead to give 24

Non Calculator

Calculator

$\frac{1}{4}$ of £20 = £5

$\frac{3}{4}$ of £20 = £15

$\frac{5}{8}$ of 16 = 10

$\frac{4}{7}$ of £28

$\frac{1}{7}$ = £4

$\frac{4}{7}$ = £16

of X

(8) Pete and Sue have some lemonade. Pete gives 250ml to Sue which leaves her with double what she started. Sue drinks 1/10 of her lemonade. How much more lemonade would she need to now make a litre?

250 + 250 = 500ml

$\frac{1}{10}$ of 500 = 50ml

She has 450ml

1000ml − 450ml = 550ml

$x + 250 = 2x$

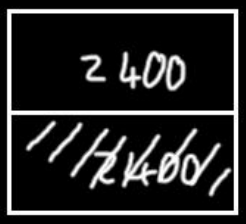
$250 = x$

500

(5) Bob has a sink that is half full. He fills it to the top with 2400ml. Write down the capacity of the sink in litres. *(2 marks)*

4800ml

4.8l



Tank

$\frac{1}{3}$ water

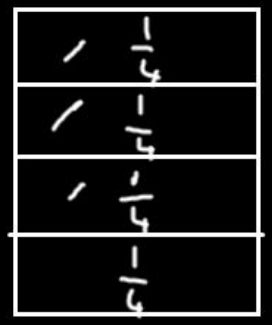
$\frac{1}{4}$ juice

(14) An oil tank is ¼ full. The tank still has room for an extra 480 litres. Find the capacity of the tank. *(3 marks)*

$\frac{4}{5}$ = 20

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

$\frac{5}{5}$ = 25



$\frac{3}{4}$ = 480

$\frac{1}{4}$ = 160

$\frac{4}{4}$ = 1 = 640

Adding Fractions Adding Mixed Numbers E	You **must have a common denominator** to add fractions. When you do, simply add the numerators. Use equivalent fractions to find common denominators. Whatever you do to the bottom, do to the top! If you have forgotten! Numerator = top, Denominator = bottom.	(a) $\frac{1}{5}+\frac{3}{5}=\frac{4}{5}$ (b) $\frac{2}{5}+\frac{3}{10}=\frac{4}{10}+\frac{3}{10}=\frac{7}{10}$ (c) $\frac{4}{5}+\frac{2}{3}=\frac{12}{15}+\frac{10}{15}=\frac{22}{15}$ (d) $\frac{3}{2}+\frac{2}{7}=\frac{21}{14}+\frac{4}{14}=1\frac{11}{14}$

Calculator

(1) $\frac{1}{3}+\frac{1}{3}=$

(2) $\frac{2}{5}+\frac{1}{5}=$

(3) $\frac{4}{7}+\frac{2}{7}=$

(4) $\frac{3}{4}+\frac{1}{8}=$

(5) $\frac{1}{3}+\frac{2}{9}=$

(6) $\frac{2}{3}+\frac{1}{5}=$

(7) $\frac{3}{4}+\frac{5}{6}=$

(8) $\frac{2}{3}+\frac{1}{4}=$

(9) $\frac{3}{5}+\frac{3}{4}=$

(10) $\frac{2}{3}+\frac{5}{7}=$

$\frac{2}{3}$ $\frac{3}{5}$ $\frac{6}{7}$

$\frac{6}{8}+\frac{1}{8}=\frac{7}{8}$

$8<\frac{3}{4}+\frac{1}{8}>4$

$\frac{24}{32}+\frac{4}{32}=\frac{28}{32}=\frac{7}{8}$

$\frac{3}{9}+\frac{2}{9}=\frac{5}{9}$

$9<\frac{1}{3}+\frac{2}{9}>3$

$\frac{9}{27}+\frac{6}{27}$

$\frac{15}{27}=\frac{5}{9}$

$\frac{10}{15}+\frac{3}{15}=\frac{13}{15}$

$5<\frac{2}{3}+\frac{1}{5}>3$

$\frac{10}{15}+\frac{3}{15}$

$\frac{9}{12}+\frac{10}{12}=\frac{19}{12}=1\frac{7}{12}$

$(\frac{3}{4}+\frac{5}{6}\ 4$

$\frac{18}{24}+\frac{20}{24}=\frac{38}{24}$

(12) $1\frac{3}{4}+2\frac{1}{3}=$

(13) $5\frac{1}{8}+3\frac{2}{5}=$

(14) $\frac{3}{4}+3\frac{1}{7}=$

3

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

$\frac{9}{12}+\frac{4}{12}$

$\frac{13}{12}$

$1\frac{1}{12}$

$4\frac{1}{12}$

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

$\frac{21}{12}+\frac{28}{12}$

$\frac{49}{12}$

$4\frac{1}{12}$

(16) At a school one third of the pupils are in year 7 and one half of the pupils are in year 8. How many pupils are **not** in year 7 or year 8 at the school?

Y7	Y8	Y...
$\frac{1}{3}$	$\frac{1}{2}$	

$\frac{2}{6}+\frac{3}{6}=\frac{5}{6}$

$1-\frac{5}{6}$

$\frac{6}{6}-\frac{5}{6}=\frac{1}{6}$

Subtracting Fractions Subtracting Mixed Numbers	You **must have a common denominator** to subtract fractions. When you do, simply subtract the numerators. Use equivalent fractions to find common denominators. Please note: You can cross multiply when adding and subtracting fractions although it's a long way round for some examples.	(a) $\frac{4}{5}-\frac{1}{5}=\frac{3}{5}$ (b) $\frac{4}{5}-\frac{1}{10}=\frac{8}{10}-\frac{1}{10}=\frac{7}{10}$ (c) $\frac{3}{4}-\frac{2}{3}=\frac{9}{12}-\frac{8}{12}=\frac{1}{12}$ (d) $\frac{2}{7}-\frac{5}{6}=\frac{12}{42}-\frac{35}{42}=-\frac{23}{42}$

Calculator

(1) $\frac{3}{5}-\frac{2}{5}=$

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

(3) $\frac{7}{12}-\frac{1}{3}=$

(4) $\frac{7}{12}-\frac{5}{6}=$

(5) $\frac{1}{3}-\frac{1}{4}=$

(6) $\frac{4}{5}-\frac{3}{4}=$

(7) $\frac{7}{4}-\frac{1}{6}=$

(8) $\frac{2}{9}-\frac{1}{2}=$

(9) $\frac{2}{3}-\frac{7}{8}=$

(10) $\frac{2}{5}-\frac{9}{4}=$

$\frac{1}{5}$

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

$\frac{7}{12}-\frac{4}{12}=\frac{3}{12}=\frac{1}{4}$

$\frac{16}{20}-\frac{15}{20}=\frac{1}{20}$

$\frac{7}{12}-\frac{1}{3}$ ×12

$\frac{21}{36}-\frac{12}{36}=\frac{9}{36}=\frac{1}{4}$

$\frac{16}{3}-\frac{13}{4}$

$\frac{64}{12}-\frac{39}{12}=\frac{25}{12}=2\frac{1}{12}$

(11) $4\frac{3}{4}-1\frac{1}{2}=$

(12) $5\frac{1}{3}-3\frac{1}{4}=$

(13) $7\frac{2}{5}-2\frac{2}{3}=$

$\frac{19}{4}-\frac{3}{2}$

$\frac{19}{4}-\frac{6}{4}=\frac{13}{4}=3\frac{1}{4}$

(1) At a youth club there are 3 age categories. They are *Ten and under*, *11 to 15 years old* and *over 15's*. 2/3 of the members are in the *Ten and under* section, 1/6 are in the *11 to 15 years old* and the rest are in the *over 15's*. What fraction of the members are in the *over 15's* section? *(3 marks)*

(16) Fred has seven eighths of a bag of sweets at home. He eats one fifth of the remaining sweets. What fraction of the bag of sweets has he now got left?

$\frac{7}{8}-\frac{1}{5}$

$\frac{35}{40}-\frac{8}{40}$

$\frac{27}{40}$

① ② ③

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

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

$\frac{1}{3}-\frac{1}{6}$

$\frac{2}{6}-\frac{1}{6}$

$\frac{1}{6}$

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

$\frac{4}{6}+\frac{1}{6}=\frac{5}{6}$

$1-\frac{5}{6}=\frac{1}{6}$

Multiplying Fractions	Multiply the numerators and multiply the denominators and simplify. You can cancel common factors at the start. **You do not need a common denominator.**	(a) $\frac{3}{5}\times\frac{4}{7}=\frac{12}{35}$	(b) $\frac{1}{8}\times\frac{4}{9}=\frac{4}{72}=\frac{1}{18}$ (simplified)

(1) $\frac{1}{2}\times\frac{1}{3}=$ $\frac{1}{6}$

(2) $\frac{2}{3}\times\frac{1}{7}=$ $\frac{2}{21}$

(3) $\frac{2}{3}\times\frac{1}{2}=$ $\frac{2}{6}=\frac{1}{3}$

(4) $\frac{3}{4}\times\frac{3}{5}=$ $\frac{9}{20}$

(5) $\frac{2}{5}\times\frac{1}{6}=$ $\frac{3}{30}=\frac{1}{10}$

(6) $\frac{2}{3}\times\frac{7}{8}=$ $1\frac{2}{3}\times\frac{7}{8}=\frac{3}{10}$ $\frac{12}{40}=\frac{3}{10}$

(7) $\frac{8}{7}\times\frac{7}{8}=\frac{1}{1}=1$

(8) $4\times\frac{7}{3}=$ $\frac{4}{1}\times\frac{7}{3}=\frac{28}{3}=9\frac{1}{3}$

(9) $\frac{3}{5}\times 6=$ $\frac{8}{42}=\frac{4}{21}$

(10) $\frac{1}{2}\times\frac{4}{7}\times\frac{2}{3}=$ $1\frac{2}{5}\times 3\frac{2}{3}=\frac{7}{5}\times\frac{11}{3}=\frac{77}{15}=5\frac{2}{15}$

(12) $1\frac{2}{5}\times 3\frac{2}{3}=$ $\frac{25}{15}\times\frac{12}{5}=\frac{10}{1}=10$

(13) $4\frac{1}{6}\times 2\frac{2}{5}=$ $\frac{30}{3}=\frac{30}{3}$

$\frac{2450}{50}$

(16) Jane ate one third of 2 fifths of a cake. What fraction of the cake did she eat?

$\frac{1}{3}$ of $\frac{2}{5}$

$\frac{1}{3}\times\frac{2}{5}=\frac{2}{15}$

Dividing Fractions & Multiplying & Dividing Mixed Numbers	Invert (turn upside down) the 2nd fraction and multiply (as shown above). "Dividing by a fraction is the same as multiplying by its reciprocal" **You do not need a common denominator unlike adding or subtracting.** How many halves of pizza can you cut from a whole pizza? $1 \div \frac{1}{2} = 2$ of course!	(a) $\frac{1}{8} \div \frac{4}{9}$ is the same as $\frac{1}{8} \times \frac{9}{4} = \frac{9}{32}$ (b) $\frac{3}{4} \div \frac{5}{6}$ is the same as $\frac{3}{4} \times \frac{6}{5} = \frac{18}{20} = \frac{9}{10}$ (simplified)

(1) $\frac{1}{3} \div \frac{1}{2} =$

(2) $\frac{1}{5} \div \frac{1}{4} =$

(3) $\frac{2}{5} \div \frac{1}{2} =$

(4) $\frac{3}{4} \div \frac{1}{3} =$

(5) $\frac{9}{7} \div 3 =$

(6) $4 \div \frac{1}{5} =$

(7) $\frac{9}{7} \div \frac{9}{7} =$

(8) $\frac{2}{3} \div \frac{4}{9} =$

(9) $\frac{9}{8} \div \frac{4}{9} =$

(12) $2\frac{1}{3} \div 1\frac{1}{5} =$

(13) $3\frac{2}{7} \div 2\frac{2}{3} =$

(16) Kevin is seeing how many eighths he can cut from one quarter of a cake. How many would you expect him to be able to cut?

$\frac{1}{3} \div \frac{1}{2}$

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

$\frac{1}{5} \times \frac{4}{1} = \frac{4}{5}$

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

$2/5 \times \frac{2}{1} = \frac{4}{5}$

$\frac{4}{1} \div \frac{1}{5}$

$\frac{4}{1} \times \frac{5}{1} = \frac{20}{1} = 20$

$\frac{7}{3} \div \frac{6}{5}$

$\frac{7}{3} \times \frac{5}{6} = \frac{35}{18} = 1\frac{17}{18}$

$2 \div \frac{1}{2}$

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

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

$\frac{9}{7} \div \frac{3}{1}$

$\frac{9}{7} \times \frac{1}{3} = \frac{9}{21} = \frac{3}{7}$

$\frac{1}{\frac{4}{1}}$

$\frac{1}{4} \div \frac{1}{8}$

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

$\frac{19}{17} \times \frac{21}{21} = 1$