Integer Place Value

Billions			Millions			Thousands			Ones		
H	T	O	H	T	O	H	T	O	H	T	O
		3	1	4	8	0	3	3	0	2	9

Placeholder

Three billion, one hundred and forty eight million, thirty three thousand and twenty nine

1 billion 1, 000, 000, 000

1 million 1 000, 000

Decimal Place Value

Thousands			Ones			Tenths	Hundredths	Thousandths
Hundred Thousand	Ten Thousand	Thousands	Hundreds	Tens	Ones	$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{1000}$
		3	0	2	5 •	6	0	4

Placeholder

Three thousand and twenty five point six zero four

Prime numbers

- Integer
- Only has 2 factors
- 1 and itself

2

The first prime number
The only even prime number

Learn or how-to quick recall...

2, 3, 5, 7, 11, 13, 17, 19, 23, 29...

Power laws of indices

$(5^3)^2 = (5 \times 5 \times 5)^2$

$= (5 \times 5 \times 5) \times (5 \times 5 \times 5)$

Power laws for indices

$(a^m)^n = a^{m \times n}$

Square and triangular numbers

Square numbers

odd even odd

Representations are useful to understand a square number n^2

1, 4, 9, 16, 25, 36, 49, 64 ...

Triangular numbers

Representations are useful – an extra counter is added to each new row

Add two consecutive triangular numbers and get a square number

1, 3, 6, 10, 15, 21, 28, 36, 45...

Cube numbers

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

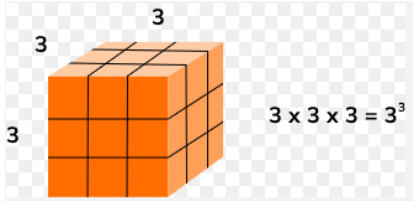
$2^3 = 2 \times 2 \times 2 = 8$

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

$4^3 = 4 \times 4 \times 4 = 64$

$5^3 = 5 \times 5 \times 5 = 125$

$6^3 = 6 \times 6 \times 6 = 216$



Addition/ Subtraction laws for indices

$3^5 \times 3^2$ → 3^7

$= (3 \times 3 \times 3 \times 3 \times 3) \times (3 \times 3)$

The base number is all the same so the terms can be simplified

Addition law for indices

$a^m \times a^n = a^{m+n}$

$3^5 \div 3^2$ → 3^3

$\frac{3 \times 3 \times 3 \times \cancel{3} \times \cancel{3}}{\cancel{3} \times \cancel{3}}$ → $\frac{3^3}{3^0}$ → $\frac{3^3}{1}$

Subtraction law for indices

$a^m \div a^n = a^{m-n}$

Multiples

The "times table" of a given number

All the numbers in this lists below are multiples of 3.

3, 6, 9, 12, 15...

This list continues and doesn't end

$3x$, $6x$, $9x$ ...

x could take any value and as the variable is a multiple of 3 the answer will also be a multiple of 3

Non example of a multiple

4.5 is not a multiple of 3 because it is 3 x 1.5 ← Not an integer

Common multiples and LCM

Common multiples are multiples two or more numbers share

LCM – Lowest common multiple

LCM of 9 and 12

9: 9, 18, 27, 36, 45, 54

12: 12, 24, 36, 48, 60

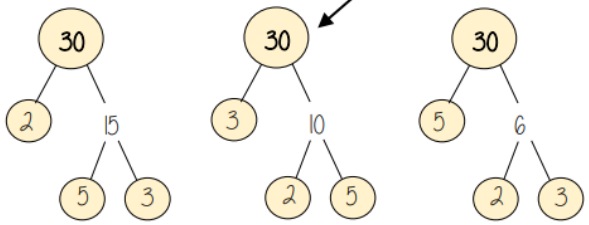
LCM = 36 — The first time their multiples match

Comparing fractions

$\frac{3}{5}$ and $\frac{7}{10}$ ← Compare fractions using a LCM denominator → $\frac{6}{10}$ and $\frac{7}{10}$

Product of prime factors

Multiplication part-whole models



All three prime factor trees represent the same decomposition

Multiplication is commutative

30 = 2 x 3 x 5 ← Multiplication of prime factors

Using prime factors for predictions

e.g. 60	30 x 2	2 x 3 x 5 x **2**
150	30 x 5	2 x 3 x 5 x **5**

Factors

Arrays can help represent factors

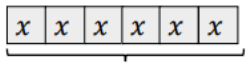
5 x 2 or 2 x 5

Factors of 10: 1, 2, 5, 10

10 x 1 or 1 x 10

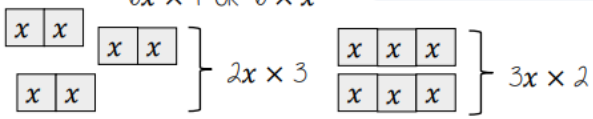
The number itself is always a factor

Factors and expressions



6x × 1 OR 6 × x

Factors of 6x: 6, x, 1, $6x$, $2x$, 3, $3x$, 2



Common factors and HCF

1 is a common factor of all numbers

Common factors are factors two or more numbers share

HCF – Highest common factor

HCF of 18 and 30

18: 1, 2, 3, 6, 9, 18

30: 1, 2, 3, 5, 6, 10, 15, 30

Common factors (factors of both numbers): 1, 2, 3, 6

HCF = 6

6 is the biggest factor they share

Finding the HCF and LCM

R

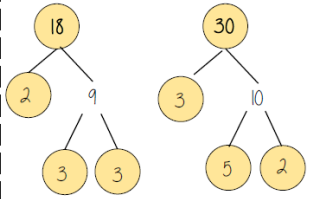
HCF – Highest common factor

HCF of 18 and 30

18: 1, 2, 3, 6, 9, 18

30: 1, 2, 3, 5, 6, 10, 15, 30

6 is the biggest factor they share → HCF = 6



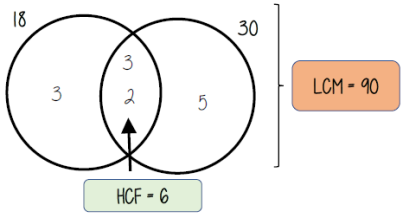
LCM – Lowest common multiple

LCM of 18 and 30

18: 18, 36, 54, 72, 90

30: 30, 60, 90

The first time their multiples match → LCM = 90



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