Can you identify the 25 Prime Numbers?

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Prime Numbers

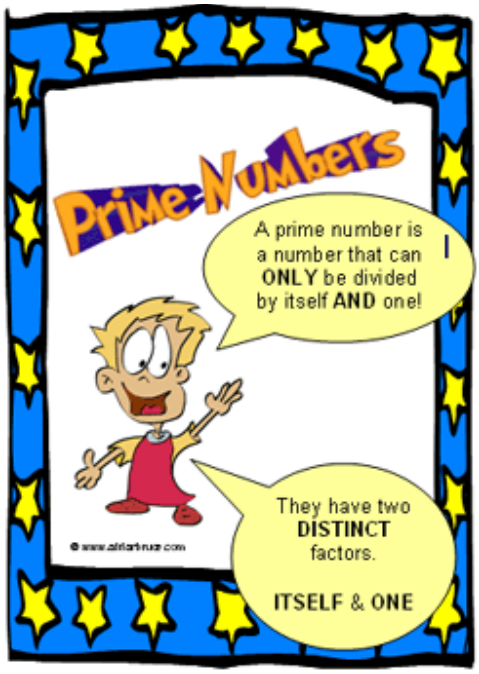
Prime Numbers

no decimals

A Prime Number can be divided evenly **only** by 1 & itself.
And it must be a whole number greater than 1.

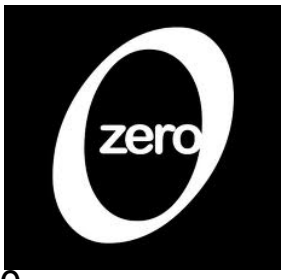
Activity to find the prime numbers between 1 and 100.

The first few prime numbers are 2, 3, 5, 7, 11, 13, 17 etc.....


Prime Numbers
A prime number is a number that can ONLY be divided by itself AND one!
They have two DISTINCT factors.
ITSELF & ONE

A prime number can only be divided evenly by one and itself.

The following are NOT Prime Numbers



1 x 0
2 x 0
3 x 0
etc.

Zero has one an infinite number of factors.

1 x 1

The number one only has one factor...
1

1) Write out the numbers from 1 to 100 in ten rows of 10.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

2) Cross off number 1, because all primes are greater than 1.
3) Number 2 is a prime, so we can keep it, but we need to cross off the multiples of 2 (i.e. even numbers).
4) Number 3 is also a prime, so again we keep it and cross off the multiples of 3.
5) The next number left is 5 (because four has been crossed off), so we keep it and cross of the multiples of this number.
6) The final number left in the first row is number 7, so cross off its multiples.
7) You have finished. All of the "surviving" numbers (coloured in white below) on your grid are prime numbers.

Prime Numbers

	2	3		5	6	7	8	9	10
11		13		15	16	17	18	19	20
21	22	23		25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

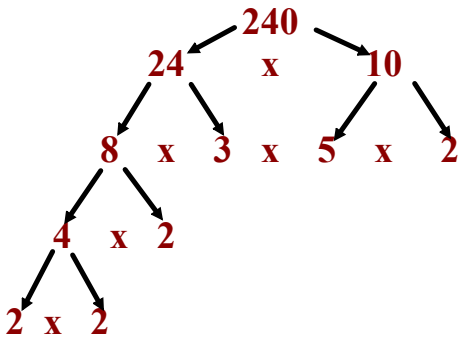
Prime Numbers

1	2	3		5		7			
11		13				17		19	
		23						29	
31						37			
41		43				47			
		53						59	
61						67			
71		73						79	
		83						89	
						97			

Determining the Prime Factors of a Whole Number

Write the prime factorization of 240

Draw a Factor Tree !!



The Prime Factorization of 240 is:
2 x 2 x 2 x 3 x 5 x 2 or $2^4 \times 3 \times 5$

The Prime Factors of 240 are:
2, 3, & 5

Determining the Prime Factors of a Whole Number

Write the prime factorization of 240.

$$240 = 2 \times 2 \times 2 \times 2 \times 3 \times 5$$
$$= 2^4 \times 3^1 \times 5^1$$

The Prime Factorization of 240 is:
2 x 2 x 2 x 3 x 5 x 2 or $2^4 \times 3 \times 5$

The Prime Factors of 240 are:
2, 3, & 5

Write the prime factorization of 3300.

$3300 \longrightarrow 2 \times 2 \times 5 \times 5 \times 3 \times 11$

$= 2^2 \times 3 \times 5^2 \times 11$

The prime factors of 3300 are 2, 3, 5, and 11.
The prime factorization of 3300 is: $2 \cdot 2 \cdot 3 \cdot 5 \cdot 5 \cdot 11$, or $2^2 \cdot 3 \cdot 5^2 \cdot 11$

Write the prime factorization of 12600.

$12600 \longrightarrow 2 \times 2 \times 2 \times 3 \times 3 \times 5 \times 5 \times 7$

$= 2^3 \times 3^2 \times 5^2 \times 7$

You Try...

Write the prime factorization of 6615.

6615 ⟶ 3 x 3 x 3 x 5 x 7 x 7

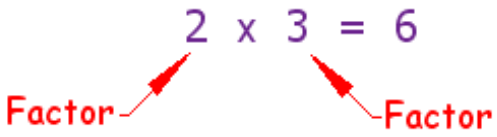
$= 3^3 \times 5^1 \times 7^2$ (Product of Powers)

Don't forget to check your answer!!

Finding Factors

What is a "Factor" ?

Factors are the numbers you multiply together to get another number:



Sometimes we need to find all of the factors of a number:

Find all the factors of 12:
the factors of 12 are 1, 2, 3, 4, 6, 12

Because: 1 x 12 = 12
2 x 6 = 12
3 x 4 = 12

What are the factors of 24

1 x 24 = 24
2 x 12 = 24
3 x 8 = 24
4 x 6 = 24

The factors of 24 are:

1, 2, 3, 4, 6, 8, 12, 24

? ? ? ?

What is a Common Factor?

? ? ? ?

What is a Common Factor?

We said that .....

The Factors of 132 are : 1, 2, 3, 4, 6, 11, 12, 22, 33, 44, 66, 132

The Factors of 162 are : 1, 2, 3, 6, 9, 18, 27, 54, 81, 162

The common factors are the ones found in both lists.

Therefore: The common factors of 132 & 162 are 1, 2, 3, 6

↓

is the greatest common factor (GCF)

What is the Greatest Common Factor?

The Greatest Common Factor is simply the greatest of the common factors.

The common factors of 132 & 162 are: 1, 2, 3, 6

The Greatest Common Factor of 132 & 162 is 6.

Using prime factorization find the GCF of 18 and 24.

18 → 2 x 3 x 3

24 → 2 x 2 x 2 x 3

GCF = 2 x 3 = 6

Using prime factorization find the GCF of 12, 36 and 90.

12 → 2 x 2 x 3

36 → 2 x 2 x 3 x 3

90 → 2 x 3 x 3 x 5

GCF = 2 x 3 = 6

What is the Least Common Multiple?

The least common multiple is the smallest multiple that is the same for two or more numbers.

The Least Common Multiple

Determine the least common multiple of 18, 20, and 30 using prime factorization

Step #1 Write the prime factorization of each number.

Step #2 Express each number as a product of powers.

Step #3 Circle the greatest power of each prime number.

Step #1 Write the prime factorization of each number.

18 = $2 \times 3 \times 3$

20 = $2 \times 2 \times 5$

30 = $2 \times 5 \times 3$

Step #2 **Express each number as a product of powers.**

$18 \Rightarrow 2 \cdot 3 \cdot 3 = 2^1 \times 3^2$

$20 \Rightarrow 2 \cdot 2 \cdot 5 = 2^2 \times 5^1$

$30 \Rightarrow 2 \cdot 3 \cdot \mathbf{5} = 2^1 \times 3^1 \times 5^1$

Solution: $2^2 \cdot 3^2 \cdot 5 = 4 \cdot 9 \cdot 5$

$= 180$

Step #3 **Circle the greatest power of each prime number**

$$18 \Rightarrow 2 \cdot 3 \cdot 3 = 2^1 \cdot 3^2$$

$$20 \Rightarrow 2 \cdot 2 \cdot 5 = 2^2 \cdot 5^1$$

$$30 \Rightarrow 2 \cdot 3 \cdot 5 = 2^1 \cdot 3^1 \cdot 5^1$$

Solution:

$$2^2 \cdot 3^2 \cdot 5^1 = 4 \cdot 9 \cdot 5$$

$$= 180$$

Determine the least common multiple of 120 & 309

$120 = 2 \times 2 \times 2 \times 3 \times 5 = 2^3 \times 3^1 \times 5^1$

$309 = 3 \times 103 = 3^1 \times 103^1$

$LCM = 2^3 \times 3^1 \times 5^1 \times 103^1$

$= 8 \times 3 \times 5 \times 103$

$= 1236$

Determine the least common multiple of 70, 90 & 140

70 = 2 x 5 x 7 = $2^1 \times 5^1 \times 7^1$

90 = 2 x 3 x 3 x 5 = $2^1 \times 3^2 \times 5^1$

140 = 2 x 2 x 5 x 7 = $2^2 \times 5^1 \times 7^1$

LCM = $2^2 \times 3^2 \times 5 \times 7$

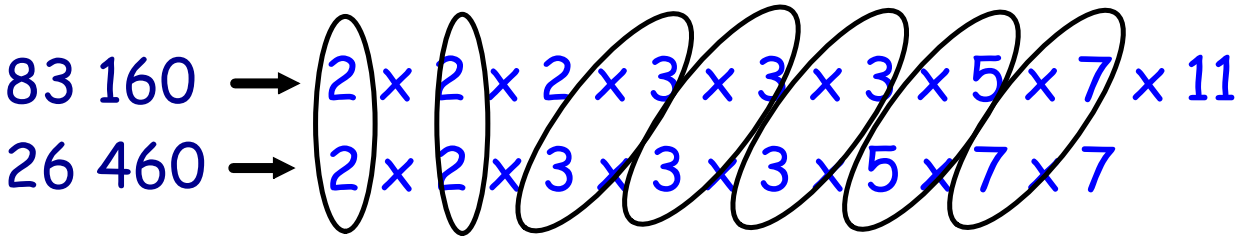
= 4 x 9 x 5 x 7

= 1260

Questions:
4 a,c,f
5 a,c,f
6 a,c,e
7
8 a,c,e,f
9 a,b,c
10 a,c,e,f
11 a,c
12

Calculate the GCF and LCM for
83160 & 26460

Greatest Common Factor



2 x 2 x 3 x 3 x 3 x 5 x 7

= 3780

Least Common Multiple

83 160 → 2 x 2 x 2 x 3 x 3 x 3 x 5 x 7 x 11

26 460 → 2 x 2 x 3 x 3 x 3 x 5 x 7 x 7

83 160 → $2^3 \times 3^3 \times 5 \times 7 \times 11$

26 460 → $2^2 \times 3^3 \times 5 \times 7^2$

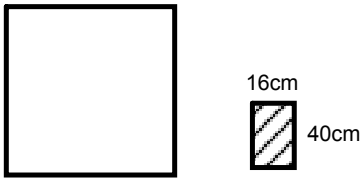
$= 2^3 \times 3^3 \times 5 \times 7^2 \times 11$

$= 8 \times 27 \times 5 \times 49 \times 11$

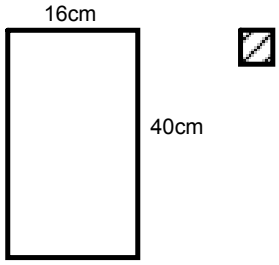
$= 582\ 210$

Solving Problems that Involve Greatest Common Factor and Least Common Multiple

a) What is the side length of the smallest square that could be tiled with rectangles that measure 16 cm by 40 cm? Assume the rectangles cannot be cut. Sketch the square and rectangles.



b) What is the side length of the largest square that could be used to tile a rectangle that measures 16 cm by 40 cm? Assume that the squares cannot be cut. Sketch the rectangle and squares.



The girl's and boy's JMH basketball teams are to be arranged in rectangular arrays with the same number of columns.

How many columns will there be if the girl's team has 32 members and the boy's team has 28 members?

$32 = 2 \times 2 \times 2 \times 2 \times 2$

$28 = 2 \times 2 \times 7$

Page 140 9 d
10 d
12
13
17
19
22