

# Prime Numbers

## Prime Numbers

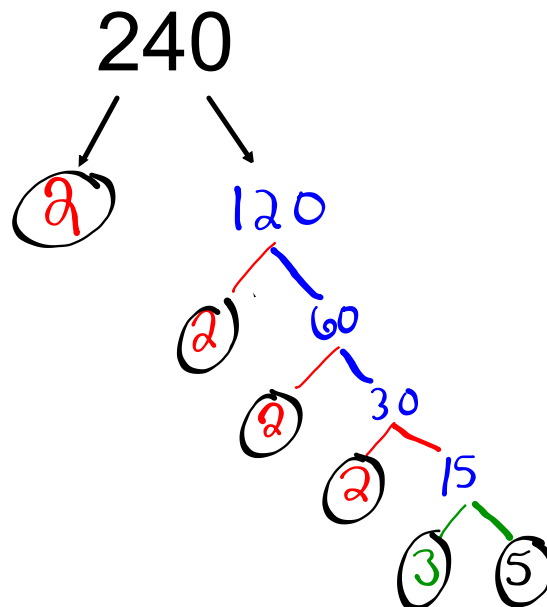
A Prime Number can be divided evenly **only** by 1 & itself.  
And it must be a whole number greater than 1.

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

## Determining the Prime Factors of a Whole Number

Write the prime factorization of 240

Draw a Factor  
Tree !!



The Prime Factorization of 240 is:

$$2 \times 2 \times 2 \times 2 \times 3 \times 5$$

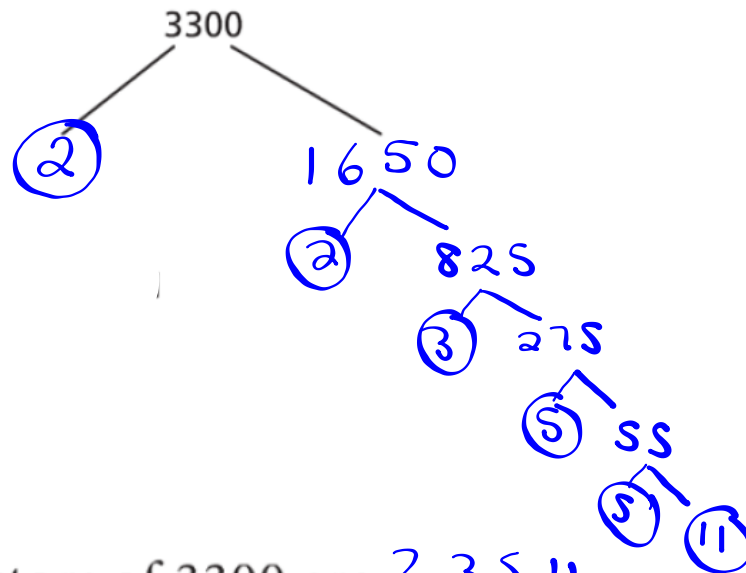
or

$$2^4 \times 3 \times 5$$

The Prime Factors of 240 are:

$$2, 3, 5$$

**Write the prime factorization of 3300 and the factors**



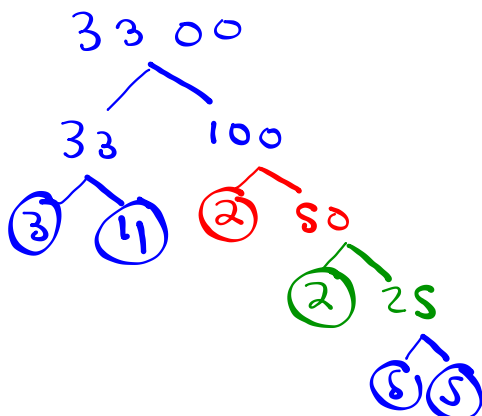
The prime factors of 3300 are 2, 3, 5, 11

The prime factorization of 3300 is:

$$\text{or } 3300 = 2 \times 2 \times 3 \times 5 \times 5 \times 11$$

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

OR



# Finding Factors

What is a "Factor" ?

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

$$\begin{array}{c} 2 \times 3 = 6 \\ \text{Factor} \nearrow \quad \searrow \text{Factor} \end{array}$$

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

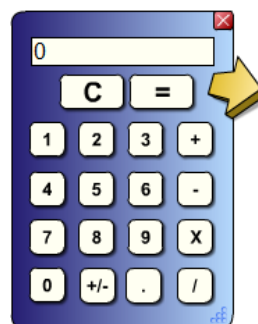
Because:

$$\begin{array}{r} 12 \\ \hline 1 \times 12 \\ 2 \times 6 \\ 3 \times 4 \end{array}$$

# Lets try some bigger numbers!

Determine all of the factors of 132

$$\begin{array}{l} \underline{132} \\ 1 \times 132 \\ 2 \times 66 \\ 3 \times 44 \\ 4 \times 33 \\ 6 \times 22 \\ 11 \times 12 \end{array}$$



Factors of 132 = 1, 2, 3, 4, 6, 11, 12, 22, 33, 44, 66, 132

**Lets try some bigger numbers!**

**Determine all of the factors of 132**

$$132 \div 1 = 132$$

$$132 \div 2 = 66$$

$$132 \div 3 = 44$$

$$132 \div 4 = 33$$

$$132 \div 6 = 22$$

$$132 \div 11 = 12$$

These  
are the  
factors  
of 132!

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

Lets try some bigger numbers!

Determine all of the factors of 162

**Lets try some bigger numbers!**

**Determine all of the factors of 162**

$$162 \div 1 = 162$$

$$162 \div 2 = 81$$

$$162 \div 3 = 54$$

$$162 \div 6 = 27$$

$$162 \div 9 = 18$$

These are the  
factors of 162!

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



18  
24

GCF  

---

1<sup>18</sup> × 18  
2 × 9  
3 × 6

24  

---

1 × 24  
2 × 12  
3 × 8  
4 × 6

1, 2, 3, 6, 9, 18

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

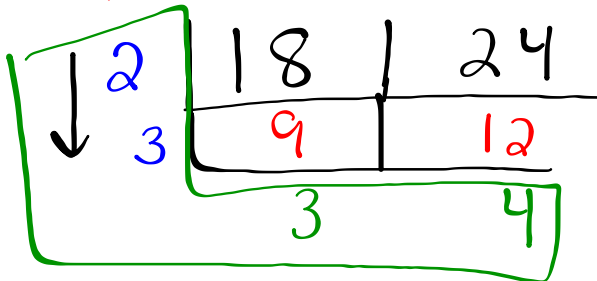
GCF = 6

LCM

18 → 18, 36, 54, 72, 90

24 → 24, 48, 72

Box/Ladder Method



$$\text{GCF} \downarrow = 2 \cdot 3 = 6$$

$$\text{LCM} = 2 \cdot 3 \cdot 3 \cdot 4 = 72$$

## Video On GCF & LCM

 <https://www.youtube.com/watch?v=NFHEH2rzSJo>

# Homework

## Exercises page 140

**A**

a, b, ~~p~~

4

5

a, b, ~~p~~

**B**

*Box Method*

a, c, ~~p~~

6

~~9b~~

8

~~10~~

a, c, ~~p~~

10

13

15

a, ~~p~~

**C**

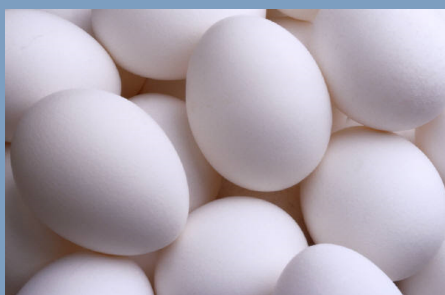
# Notice Anything?



They all have something in  
**common!**



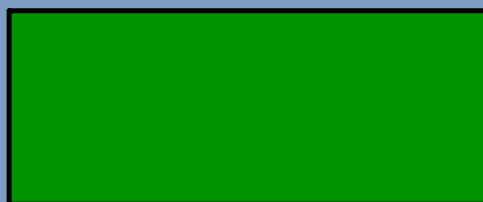
**What do these 3 items have in common?**



**Eggs,**

**Eyes,**

**A Load of  
Laundry**



**What do these 3 items have in common?**



**A Locksmith**

**A Piano**

**Florida,**





**What do these 3 items have in common?**



Frosty the  
snowman



Wicked  
witches of  
the west



Ice Cream



**What do these 3 items have in common?**



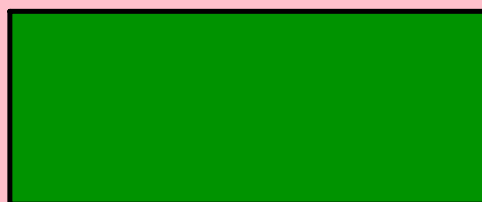
A Light



Blue Jeans



Memories



**What do these 3 items have in common?**

Hard

Salt

Distilled

# Common Factoring



for the Greatest Common Factor  
GCF

# Review of GCF

Find the GCF for the following pairs of numbers:

1) 6 and 12

2) 6 and 21

3) 30 and 21

4) 144 and 126

144 :

126 :



## for the Greatest Common Factor GCF

Find the **GCF** of 36 and 54.

The factors of 36 are **1, 2, 3, 4, 6, 9, 12, 18**, and 36.

The factors of 54 are **1, 2, 3, 6, 9, 18**, 27, and 54.

The **common factors** of 36 and 54 are **1, 2, 3, 6, 9, 18**

Although the numbers in **bold** are all common factors of both 36 and 54, **18** is the **greatest 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**



The screenshot shows a Windows Internet Explorer browser window. The address bar contains the URL: [http://jmh.nbed.nb.ca/sites/jmh.nbed.nb.ca/files/teattach/teacher/211/3.1\\_factors\\_and\\_multipl...](http://jmh.nbed.nb.ca/sites/jmh.nbed.nb.ca/files/teattach/teacher/211/3.1_factors_and_multipl...). The page title is "what is the Greatest Common Factor?". The main content of the page includes the following text:

**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.

The page number "11" is visible in the bottom right corner of the document content. The browser interface includes a bookmarks sidebar on the left with a list of pages from Page 7 to Page 16, and a taskbar at the bottom showing the system tray with the time 2:56 PM on 10/2/2011.

# 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.

# What is the Least Common Multiple?

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

## The Least Common Multiple

Determine the least common multiple of 18, 20, and 30

**Step #1** Write the prime factorization of each number.

**Step #2** Circle the greatest power of each prime number.

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http://jmh.nbed.nb.ca/sites/jmh.nbed.nb.ca/files/noteattach/teacher/211/3.1\_factors\_and\_multiples\_of\_whole\_numbers.pdf

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- Page 11: Aug 29-10:54 PM
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- Page 13: Sep 5-10:12 PM
- Page 14: Sep 5-10:23 PM
- Page 15: Sep 5-10:26 PM
- Page 16: Sep 5-10:45 PM

Step #1 Write the prime factorization of each number.

18 =

20 =

30 =

14

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**Step #1** Write the prime factorization of each number.

$$18 =$$

$$20 =$$

$$30 =$$

**Step #2** Circle the greatest power of each prime number.

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

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

$$30 = 2 \cdot 3 \cdot 5$$

**Solution:**  $2^2 \cdot 3^2 \cdot 5 = 4 \cdot 9 \cdot 5$   
 $= 180$

Determine the least common multiple of 120 & 309



**Determine the least common multiple of 70, 90 & 140**

### 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.