GCF, LCM and Perfect Squares and Cubes

To compare numbers we often look at that their prime-factorizations

Factor? A number that divides evenly into a given number
(the factors of 20 are 1, 2, 4, 5, 10, 20)

Prime-factorization? Breaks the number down into a product of the primes that create it
(the prime-factorization of 20 = 2 x 2 x 5)

Perfect square: A number is a perfect square if every prime factor can be matched as a pair
Perfect cube: A number is a perfect cube if every prime factor can be matched as a triplet

Example: 144 = 2 x 2 x 2 x 2 x 3 x 3 All prime factors pair up 144 = perfect square

However, our main focus is GCF and LCM

GCF (Greatest Common Factor) = the largest factor common between 2 or more #'s

LCM (Lowest Common Multiple) = the smallest number that 2 or more numbers divide into

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1) Find the GCF and LCM of: 72 and 27

72 = 3 x 3 x 2 x 2 x 2 27 = 3 x 3 x 3

GCF: both of the prime-factorizations contain two 3's Thus the GCF = 3 x 3 or 9

LCM:  *"Colvin's Cookies" Mr. Colvin want you to bake him a batch of cookies … the recipes are the prime-factorizations above. You only need enough to make either type of cookies. (But he won't tell you which one he wants until you get home)*
The LCM represents the minimum amount you need to buy to make EITHER recipe.

You need at least three 2's and at least three 3's LCM = 3 x 3 x 3 x 2 x 2 x 2 or 216

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2) Find the GCF and LCM of: 540 and 1125 and 45

540: 54 x 10 540 = 3 x 3 x 3 x 2 x 2 x 5
1125: 25 x 45 1125 = 5 x 5 x 3 x 3 x 5
45: 9 x 5 45 = 3 x 3 x 5

GCF: everyone has a 5 and 3 x 3 GCF = 3 x 3 x 5 or 45
LCM: 3 recipes need 3 - 3's, 2 - 2's, 3- 5's LCM = 3 x 3 x 3 x 2 x 2 x 5 x 5 x 5 or 13500

3) Find the GCF and LCM of: 65, 1014, 910 and 273

65: 5 x 13 *65 = 5 x 13*
1014 : 13 x 78 *1014 = 13 x 13 x 3 x 2*
910: 10 x 91 *91 = 5 x 2 x 13 x 7*
273: 13 x 21 *273 = 13 x 7 x 3*

GCF: everyone has a 13 *GCF = 13*
LCM 4 recipes (come on Colvin … pick a type of cookie already)
Need at least 2 – 13's, 1 – 5, 1- 3, 1-2, 1 -7
LCM = 13 x 13 x 5 x 3 x 2 x 7 or 35490

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4) Show that 46656 is both a perfect square and a perfect cube
46656 = 64 x 729 or 8 x 8 x 27 x 27
46656 = 2 x 2 x 2 x 2 x 2 x 2 x 3 x 3 x 3 x 3 x 3 x 3

Perfect square: *2 x 2 x 2 x 2 x 2 x 2 x 3 x 3 x 3 x 3 x 3 x 3* *all factors pair up*

Perfect cube: *2 x 2 x 2 x 2 x 2 x 2 x 3 x 3 x 3 x 3 x 3 x 3* *all factors are triplets*

LCM or GCF problem?
Two satellites are currently lined up over Earth.
Satellite 1 orbits every 66 days and Satellite 2 orbits every 99 days.
When the 2 satellites align again?

This is an LCM problem: *66 = 2 x 3 x 11* *99 = 3 x 3 x 11*

LCM = 2 x 3 x 3 x 11 *LCM = 198 days (when they will realign)*

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