3.1 Factors and Multiples of Whole Numbers

Prime numbers: are numbers that have exactly two factors; one and itself

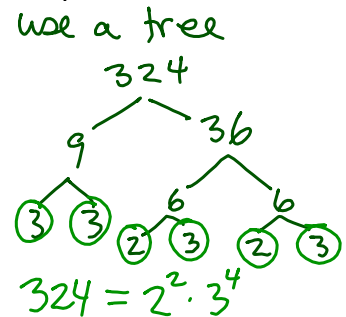ex. $2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, \ldots$

Factor: a factor is a number that divides a natural number exactly
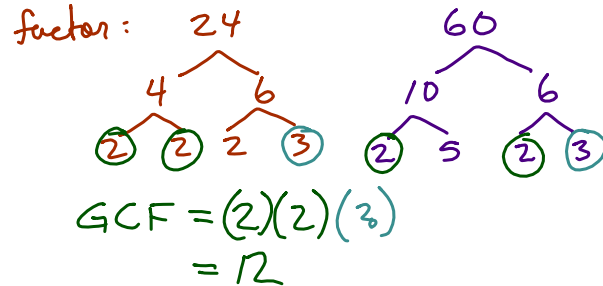
ex. factors of $12 : 1, 2, 3, 4, 6, 12$

Multiple: a multiple of a natural number is the product of the number and another natural number

ex. of $8 : 8, 16, 24, 32, 40, 48, \ldots$

ex. Decompose 324 into prime factors...

use a tree

324

$9 \qquad 36$

$3 \quad 3 \quad 6 \quad 6$

$3 \; 3 \quad 2 \; 3 \quad 2 \; 3$

$324 = 2^2 \cdot 3^4$

ex. Determine the Greatest Common Factor (GCF) between 24 and 60

factor: $24 \qquad 60$

$4 \quad 6 \qquad 10 \quad 6$

$2 \; 2 \; 2 \; 3 \qquad 2 \; 5 \; 2 \; 3$

$GCF = (2)(2)(3)$
$= 12$

ex. Determine the Least Common Multiple (LCM) between 15 and 12

① list: $12, 24, 36, 48, 60$
$15, 30, 45, 60$

$\boxed{LCM = 60}$

② $12 : 2 \cdot 2 \cdot 3 = 2^2 \cdot 3$
$15 : 3 \cdot 5$

$LCM = 2 \cdot 2 \cdot 3 \cdot 5 = 60$

*choose the largest power of each prime factor

ex. Simplify $\dfrac{185}{325} \begin{array}{c} \div 5 \\ \div 5 \end{array} = \dfrac{37}{65}$

$185 \qquad\qquad 325$

$5 \quad 37 \qquad 5 \quad 65$

$\qquad\qquad\qquad 5 \quad 13$

$GCF = 5$
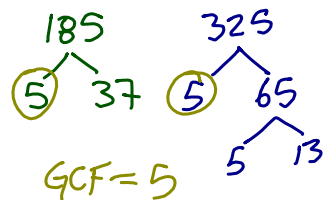
Ex. $\dfrac{5}{24} - \dfrac{1}{22}$

common denominator = LCM

$22 : 2 \cdot 11$
$24 : 2^3 \cdot 3$
$\Big\}$ $LCM = 2^3 \cdot 3 \cdot 11$
$= 264$

$\dfrac{5 \times 11}{24 \times 11} - \dfrac{1 \times 12}{22 \times 12}$

$\longrightarrow \dfrac{55}{264} - \dfrac{12}{264} = \boxed{\dfrac{43}{264}}$

LCM for 42 and 50

$42 : 2 \cdot 3 \cdot 7$
$50 : 2 \cdot 5^2$
$\Big\}$ $LCM = 2 \cdot 3 \cdot 5^2 \cdot 7$
$= 1050$

a)

16 cm

40 cm

80

80
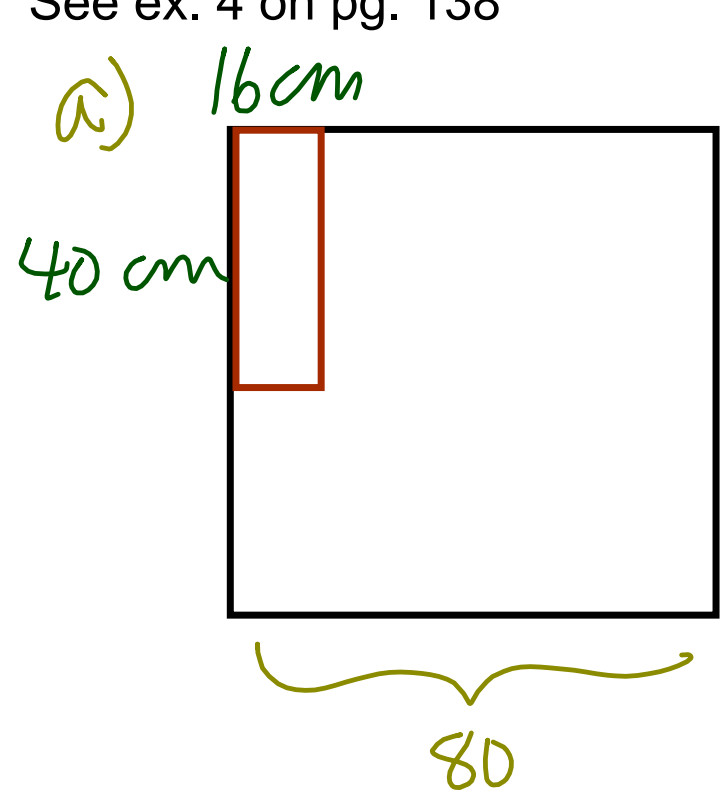
a) LCM : $16 : 2^4$

$40 : 2^3 \cdot 5$

$LCM = 2^4 \cdot 5$

$= 80$

b)

16

8

8

40

$GCF : 16 = 2^4$

$40 = 2^3 \cdot 5$

$GCF = 2^3 = 8$