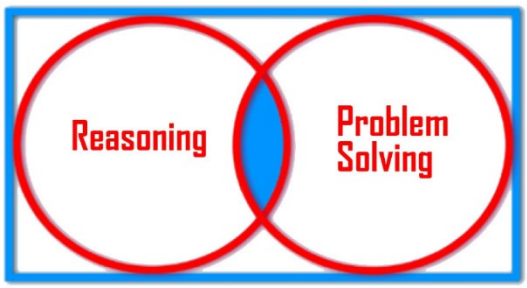
GCSE Foundation (5 – 1)



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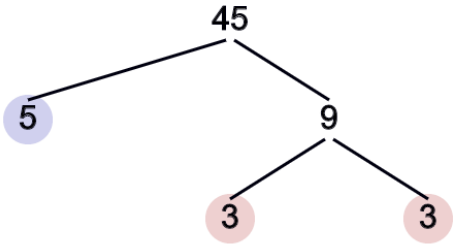
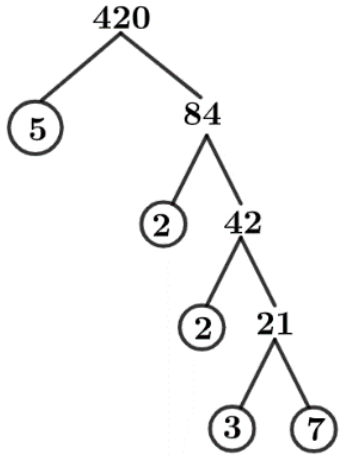
Mathematical Reasoning Questions

(Factors, Multiples and Primes) – Set 1

Solutions

The questions are repeated here for your convenience

1	Three different prime numbers are multiplied to obtain 585. One of the numbers is 13. Find the other two prime numbers **Solution** $585 \div 13 = 45$ **[1mark]** Now find the prime factors of 45  The other two prime factors are 3 and 5 **[1mark]**
2	When the prime numbers between 20 and 30 are added together, their total will be equal to? **Solution** $19 + 29 = 48$ Correct Answer: C **[1Mark]**
3	Here is the prime factorisation of 420.  Use the factor tree to find the prime factors of 42^2 Give your answer in index notation. **Solution** Prime factors of 42 are $2 \times 3 \times 7$ Therefore, $42^2 = 2^2 \times 3^2 \times 7^2$ **[2Marks]**

4 Which of the following are factors of the expression $2x^2y$
Choose all the correct answers

a) $2x$
b) xy^2
c) $2x^2y^2$
d) $2x^2y$

Solution

Correct Answers: A and D

[2Marks]

5 Here is part of the 35 times table

$$35 \times 1 = 35$$
$$35 \times 2 = 70$$
$$35 \times 3 = 105$$
$$35 \times 4 = 140$$
$$35 \times 5 = 175$$
$$35 \times 6 = 210$$

Use the information from the times table to complete the following calculations

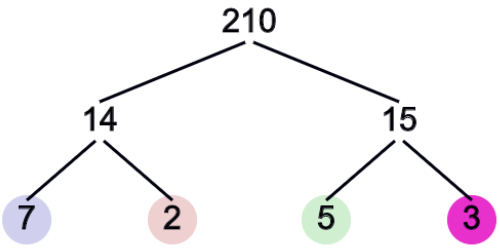
Solution

a) $350 \times 0.5 = 175$ **[1Mark]**

b) $210 \div 0.6 = 350$ **[1Mark]**

c) $245 \div 0.35 = 700$ **[1Mark]**

6	A prime number is called "Super-Prime" if by doubling it, and then subtracting 1, the results is another prime number. Find the 'Super-Primes' between 1 and 20. **Solution** $2 \times 2 - 1 = 3$ Therefore, 2 is a 'Super-prime' $3 \times 2 - 1 = 5$ Therefore, 3 is a 'Super-prime' $7 \times 2 - 1 = 13$ Therefore, 7 is a 'Super-prime' $19 \times 2 - 1 = 37$ Therefore, 19 is a 'Super-prime' Correct list: {3, 5, 13, 19} **[4Marks]**
7	**An abundant number** is a number for which the sum of its factors not including the number itself is greater than the number. For Example: 18 has factors the 1, 2, 3, 6, 9, 18 and 1 + 2 + 3 + 6 + 9 = 21 The amount by which the sum exceeds the number is the **abundance**. Therefore, the number 18 has an abundance of 3. Find the abundance of the number $2^4 \times 3$ **Solution** $2^4 \times 3 = 48$ Factors of 48 are (1, 2, 3, 4, 6, 8, 12, 16, 24, 48) **[1Mark]** Sum: 1 + 2 + 3 + 4 + 6 + 8 + 12 + 16 + 24 = 76 **[1Mark]** Abundance = 76 – 48 = 28 **[1Mark]**

8	Find the prime factors of the smallest number which is a multiple of both 7 and 30. **Solution** Find the LCM between 7 and 30 That is, $7 \times 30 = 210$ Now find the prime factors of 210  Therefore, $210 = 2 \times 3 \times 5 \times 7$ **[3Marks]**
9	If $N = 3^2 \times 5^3$ and $M = 2 \times 3^2 \times 5^2$ **Solution** Answer **True** or **False** to the following statements a) The LCM between M and N is less than N: **False** b) The HCF between M and N is greater than N: **False** c) The LCM between M and N is greater than M: **True** d) The HCF between M and N is greater than M: **False** **[4Marks]**
10	$\boldsymbol{p}$ and $\boldsymbol{q}$ are single digit prime numbers **Solution** a) Explain why $\boldsymbol{pq}$ cannot be prime **[1mark]** Because it will be a multiple of both *p* and *q*. Therefore, it will have more factors either than 1 and **pq** b) Use an example to show that $\boldsymbol{p} + \boldsymbol{q}$ could be prime **[1mark]** $2 + 5 = 7$ $2 + 3 = 5$