HARDER HCF & LCM

Task 1 – Use the prime factorisation of the following numbers to answer the questions below.

$A = 2^5 \times 3^2 \times 5^3$
$B = 2^3 \times 3 \times 5$
$C = 2 \times 3^3 \times 7^2$
$D = 2^4 \times 3^2 \times 5 \times 7$
$E = 2^3 \times 3 \times 5^2 \times 11$
$F = 3^3 \times 5 \times 7 \times 13$

1) Work out the HCF of A and B.
$A = 2^5 \times 3^2 \times 5^3$
$B = 2^3 \times 3 \times 5$
$HCF = 2^3 \times 3 \times 5 = \mathbf{120}$

2) Work out the HCF of B and D.
$B = 2^3 \times 3 \times 5$
$D = 2^4 \times 3^2 \times 5 \times 7$
$HCF = 2^3 \times 3 \times 5 = \mathbf{120}$

3) Work out the HCF of D and E. Give your answer as a product of prime factors.
$D = 2^4 \times 3^2 \times 5 \times 7$
$E = 2^3 \times 3 \times 5^2 \times 11$
$HCF = \mathbf{2^3 \times 3 \times 5}$

4) Work out the HCF of A and E.
$A = 2^5 \times 3^2 \times 5^3$
$E = 2^3 \times 3 \times 5^2 \times 11$
$HCF = 2^3 \times 3 \times 5^2 = \mathbf{600}$

5) Work out the HCF of B, C and D.
$B = 2^3 \times 3 \times 5$
$C = 2 \times 3^3 \times 7^2$
$D = 2^4 \times 3^2 \times 5 \times 7$
$HCF = 2 \times 3 = \mathbf{6}$

6) Work out the LCM of A and C. Give your answer as a product of prime factors.
$A = 2^5 \times 3^2 \times 5^3$
$C = 2 \times 3^3 \times 7^2$
$LCM = \mathbf{2^5 \times 3^3 \times 5^3 \times 7^2}$

7) Work out the LCM of B and F.
$B = 2^3 \times 3 \times 5$
$F = 3^3 \times 5 \times 7 \times 13$
$LCM = 2^3 \times 3^3 \times 5 \times 7 \times 13 = \mathbf{98,280}$

8) Work out the LCM of D and E.
$D = 2^4 \times 3^2 \times 5 \times 7$
$E = 2^3 \times 3 \times 5^2 \times 11$
$LCM = 2^4 \times 3^2 \times 5^2 \times 7 \times 11 = \mathbf{277,200}$

9) Work out the LCM of A and E.
$A = 2^5 \times 3^2 \times 5^3$
$E = 2^3 \times 3 \times 5^2 \times 11$
$LCM = 2^5 \times 3^2 \times 5^3 \times 11 = \mathbf{396,000}$

10) Work out the LCM of A, B and D. Give your answer as a product of prime factors.
$A = 2^5 \times 3^2 \times 5^3$
$B = 2^3 \times 3 \times 5$
$D = 2^4 \times 3^2 \times 5 \times 7$
$LCM = \mathbf{2^5 \times 3^2 \times 5^3 \times 7}$

Task 2

11) Let,
$A = 2^6 \times 3^3 \times 7^2$
$B = 2^3 \times 3^2 \times 11$
   a. Work out the HCF of A and B.
   $HCF = 2^3 \times 3^2 = \mathbf{72}$
   b. Work out the LCM of A and B.
   $LCM = 2^6 \times 3^3 \times 7^2 \times 11 = \mathbf{931,392}$

12) Given that
$C = 3^2 \times 5 \times 7$
$D = 3^3 \times 5^2 \times 7^2$
   a. Work out the HCF of C and D.
   $HCF = 3^2 \times 5 \times 7 = \mathbf{315}$
   b. Find the LCM of C and D, giving your answer in index form.
   $LCM = \mathbf{3^3 \times 5^2 \times 7^2}$

13) Given that

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

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

a. Work out the HCF of E and F.

$HCF = 2^3 \times 3 = \mathbf{24}$

b. Work out the LCM of E and F.

$LCM = 2^4 \times 3^2 \times 5^3 \times 7 = \mathbf{126{,}000}$

14) Let $G = 3 \times 5^2 \times 11^2$ and $H = 15 \times 11 \times 7^2$.

a. Work out the HCF of G and H.

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

$HCF = 3 \times 5 \times 11 = \mathbf{165}$

b. Write the product G × H as a product of prime factors in simplest form.

$G \times H = \mathbf{3^2 \times 5^3 \times 7^2 \times 11^3}$

15) Given $A = 2^4 \times 3^a \times 7^b$, write 35A as a product of prime factors, in terms of a and b.

$35 = 5 \times 7$

$A = 2^4 \times 3^a \times 7^b$

$35A = \mathbf{2^4 \times 3^a \times 5 \times 7^{b+1}}$

16) Given $B = 2^x \times 3^y \times 5^2$, write 270B as a product of prime factors in terms of x and y.

$270 = 2 \times 3^3 \times 5$

$B = = 2^x \times 3^y \times 5^2$

$270B = \mathbf{2^{x+1} \times 3^{y+3} \times 5^3}$