中3数学D 復習テスト解答 夏期後期−1

復習 1-1

$2^2\times 6^6 = 3^a\times 12^b$

とおく.

両辺の素因数分解は，それぞれ

$2^2\times 6^6 = 2^2\times(2\times 3)^6 = 2^8\times 3^6$

$3^a\times 12^b = 3^a\times(2^2\times 3)^b = 2^{2b}\times 3^{a+b}$

であるから，

$$\begin{cases} 8 = 2b \\ 6 = a+b \end{cases} \therefore \begin{cases} a = 2 \\ b = 4 \end{cases}$$

よって，$2^2\times 6^6 = \boxed{3^{(2)}\times 12^{(4)}}$.

復習 1-2

素因数分解

$288 = 2^5\times 3^2$

より，288 の正の約数は

$2^0\times 3^0 \quad 2^0\times 3^1 \quad 2^0\times 3^2$

$2^1\times 3^0 \quad 2^1\times 3^1 \quad 2^1\times 3^2$

$\vdots \qquad \vdots \qquad \vdots$

$2^5\times 3^0 \quad 2^5\times 3^1 \quad 2^5\times 3^2$

の $6\times 3 = \boxed{18}$ 個であり，これらすべての和は

$$\begin{aligned} &2^0\times 3^0 + 2^0\times 3^1 + 2^0\times 3^2 \\ &+ 2^1\times 3^0 + 2^1\times 3^1 + 2^1\times 3^2 \\ &+ \cdots \\ &+ 2^5\times 3^0 + 2^5\times 3^1 + 2^5\times 3^2 \\ &= 2^0\times(3^0+3^1+3^2) + 2^1\times(3^0+3^1+3^2) \\ &\qquad + \cdots + 2^5\times(3^0+3^1+3^2) \\ &= (2^0+2^1+\cdots+2^5)\times(3^0+3^1+3^2) \\ &= 63\times 13 = \boxed{819} \end{aligned}$$

である.

また，正の約数のうち，平方数であるものは

$2^0\times 3^0 \quad 2^0\times 3^2$

$2^2\times 3^0 \quad 2^2\times 3^2$

$2^4\times 3^0 \quad 2^4\times 3^2$

の $3\times 2 = \boxed{6}$ 個であり，これらの和は

$$\begin{aligned} &2^0\times 3^0 + 2^0\times 3^2 \\ &+ 2^1\times 3^0 + 2^1\times 3^2 \\ &+ 2^5\times 3^0 + 2^5\times 3^2 \\ &= 2^0\times(3^0+3^2) + 2^2\times(3^0+3^2) + 2^4\times(3^0+3^2) \\ &= (2^0+2^2+2^4)\times(3^0+3^2) \\ &= 21\times 10 = \boxed{210} \end{aligned}$$