

$$a = \log_2 2 + \log_2 \frac{3}{2} + \log_2 \frac{4}{3} + \dots + \log_2 \frac{32}{31}$$

Given that  $a \in \mathbb{Z}$ , find the value of  $a$

$$a = \log_2 2 + \log_2 \frac{3}{2} + \log_2 \frac{4}{3} + \dots + \log_2 \frac{32}{31}$$

$$\log_c a - \log_c b = \log_c \frac{a}{b}$$

$$a = \log_2 2 + \log_2 3 - \log_2 2 + \log_2 4 - \log_2 3 + \dots + \log_2 32 - \log_2 31$$

$$a = \cancel{\log_2 2} + \log_2 3 - \cancel{\log_2 2} + \log_2 4 - \log_2 3 + \dots + \log_2 32 - \log_2 31$$

$$a = \cancel{\log_2 3} + \cancel{\log_2 4} - \cancel{\log_2 3} + \dots + \log_2 32 - \cancel{\log_2 31}$$

$$a = \log_2 32$$

$$a = 5$$