

**BỒI DƯỠNG NĂNG LỰC TOÁN 7**  
**ĐỀ BÀI TẬP VỀ NHÀ**  
Tài liệu lớp học 7AV - 23/26 Nguyễn Hồng

Họ và tên: ..... Ngày học: .....

**CA 1**

**Câu 1.** Thực hiện phép tính (tính hợp lý nếu có thể):

a)  $A = 75\% - 1\frac{1}{2} + 0,5 : \frac{7}{12}$

b)  $B = \frac{2^9 \cdot 27^4 \cdot 12^7 - 6^5 \cdot 81^4 \cdot 8^5}{16^4 \cdot 18^4 \cdot 9^7 + 4^{10} \cdot 24 \cdot 3^{20}}$

HD:

a)  $A = 75\% - 1\frac{1}{2} + 0,5 : \frac{7}{12} = \frac{3}{4} - \frac{3}{2} + \frac{1}{2} \cdot \frac{12}{7} = \frac{3}{4} + \frac{-6}{4} + \frac{6}{7} = \frac{-3}{4} + \frac{6}{7} = \frac{-21}{28} + \frac{24}{28} = \frac{3}{28}$

b)  $B = \frac{2^9 \cdot 27^4 \cdot 12^7 - 6^5 \cdot 81^4 \cdot 8^5}{16^4 \cdot 18^4 \cdot 9^7 + 4^{10} \cdot 24 \cdot 3^{20}} = \frac{2^9 \cdot 3^{12} \cdot 2^{14} \cdot 3^7 - 2^5 \cdot 3^5 \cdot 3^{16} \cdot 2^{15}}{2^{16} \cdot 2^4 \cdot 3^8 \cdot 3^{14} + 2^{20} \cdot 2^3 \cdot 3 \cdot 3^{20}} = \frac{2^{23} \cdot 3^{19} - 2^{20} \cdot 3^{21}}{2^{20} \cdot 3^{22} + 2^{23} \cdot 3^{21}}$   
 $= \frac{2^{20} \cdot 3^{19} \cdot (2^3 - 3^2)}{2^{20} \cdot 3^{21} \cdot (2^3 + 3)} = \frac{8 - 9}{3^2 \cdot (3 + 8)} = \frac{-1}{99}$

**Câu 2.**

a) Tìm các chữ số  $x, y$  sao cho:  $B = \overline{62x427y}$  chia hết cho 18.

b) Tìm các giá trị nguyên của  $x$  biết:  $4\frac{1}{3} \cdot \left(\frac{4}{24} - \frac{7}{14}\right) \leq x \leq \frac{20}{30} \cdot \left(\frac{1}{3} + \frac{6}{12} - \frac{3}{4}\right)$

c) Tìm  $x, y \in \mathbb{N}$  biết  $2^{x+5} \cdot 3^y = 12^x$

HD:

a)  $B = \overline{62x427y} : 18 \Rightarrow B : 2 ; B : 9$

$B : 2 \Rightarrow y \in \{0; 2; 4; 6; 8\}$  (vì  $y$  là chữ số)

$B : 9 \Rightarrow 6 + 2 + x + 4 + 2 + 7 + y = 21 + x + y : 9$

$\Rightarrow y = 0 \Rightarrow 21 + x : 9 \Rightarrow x = 6$  (vì  $x$  là chữ số)

$\Rightarrow y = 2 \Rightarrow 23 + x : 9 \Rightarrow x = 4$  (vì  $x$  là chữ số)

$\Rightarrow y = 4 \Rightarrow 25 + x : 9 \Rightarrow x = 2$  (vì  $x$  là chữ số)

$\Rightarrow y = 6 \Rightarrow 27 + x : 9 \Rightarrow x = 0$  hoặc  $x = 9$  (vì  $x$  là chữ số)

$\Rightarrow y = 8 \Rightarrow 29 + x : 9 \Rightarrow x = 7$  (vì  $x$  là chữ số)

Vậy  $(x; y) \in \{(6; 0); (4; 2); (2; 4); (0; 6); (9; 6); (7; 8)\}$

b)  $4\frac{1}{3} \cdot \left(\frac{4}{24} - \frac{7}{14}\right) \leq x \leq \frac{20}{30} \cdot \left(\frac{1}{3} + \frac{6}{12} - \frac{3}{4}\right)$

$$\Rightarrow \frac{13}{3} \cdot \left(\frac{1}{6} - \frac{1}{2}\right) \leq x \leq \frac{2}{3} \cdot \left(\frac{1}{3} + \frac{1}{2} - \frac{3}{4}\right)$$

$$\Rightarrow \frac{13}{3} \cdot \frac{-1}{3} \leq x \leq \frac{2}{3} \cdot \frac{1}{12} \Rightarrow \frac{-13}{9} \leq x \leq \frac{1}{18} \Rightarrow x \in \left\{-\frac{13}{9}; \frac{1}{18}\right\}$$

$$c) 2^{x+5} \cdot 3^y = 12^x = 2^{2x} \cdot 3^x \Rightarrow \begin{cases} x+5 = 2x \\ y = x \end{cases} \Rightarrow x = y = 5$$

**Câu 3.**  $A = 3 + 3^2 + 3^3 + \dots + 3^{2008}$ , tìm số tự nhiên  $n$  biết  $2A + 3 = 3^n$ .

HD:

$$\text{Ta có: } 3A = 3^2 + 3^3 + 3^4 + \dots + 3^{2009}$$

$$\Rightarrow 3A - A = (3^2 + 3^3 + 3^4 + \dots + 3^{2009}) - (3 + 3^2 + 3^3 + \dots + 3^{2008})$$

$$2A = 3^{2009} - 3 \Rightarrow A = (3^{2009} - 3) : 2$$

$$\text{Khi đó: } 2A + 3 = 3^n$$

$$2 \cdot [(3^{2009} - 3) : 2] + 3 = 3^n \Rightarrow 3^{2009} - 3 + 3 = 3^n \Rightarrow 3^{2009} = 3^n \Rightarrow n = 2009$$

Vậy  $n = 2009$ .

**Câu 4.**

$$\text{Tìm } x, y \text{ thuộc } \mathbb{Z} \text{ biết: } 25 - y^2 = 8(x - 2009)^2$$

HD:

$$\text{Ta có: } 25 - y^2 = 8(x - 2009)^2$$

$$8(x - 2009)^2 = 25 - y^2$$

$$8(x - 2009)^2 + y^2 = 25 (*)$$

$$\text{Vì } y^2 \geq 0 \text{ nên } (x - 2009)^2 \leq \frac{25}{8}, \text{ suy ra } (x - 2009)^2 = 0 \text{ hoặc } (x - 2009)^2 = 1$$

$$\text{Với } (x - 2009)^2 = 1, \text{ thay vào } (*) \text{ ta có: } y^2 = 17 \text{ (loại)}$$

$$\text{Với } (x - 2009)^2 = 0 \text{ thay vào } (*) \text{ ta có } y^2 = 25, \text{ suy ra } y = 5 \text{ hoặc } y = -5 \text{ (do } y \in \mathbb{Z})$$

$$\text{Từ đó tìm được } x = 2009, y = 5 \text{ hoặc } x = 2009, y = -5$$

CA 2

Câu 1. Rút gọn

a)  $A = \frac{1}{4} + \frac{1}{28} + \frac{1}{70} + \frac{1}{130} + \frac{1}{208} + \frac{1}{304}$

b)  $B = \frac{5}{14} + \frac{2}{63} + \frac{1}{90} + \frac{4}{140} + \frac{1}{210}$

HD:

a)  $A = \frac{1}{4} + \frac{1}{28} + \frac{1}{70} + \frac{1}{130} + \frac{1}{208} + \frac{1}{304}$

$$= \frac{1}{1.4} + \frac{1}{4.7} + \frac{1}{7.10} + \frac{1}{10.13} + \frac{1}{13.16} + \frac{1}{16.19}$$

$$= \frac{1}{3} \cdot \left( \frac{3}{1.4} + \frac{3}{4.7} + \frac{3}{7.10} + \frac{3}{10.13} + \frac{3}{13.16} + \frac{3}{16.19} \right)$$

$$= \frac{1}{3} \cdot \left( 1 - \frac{1}{19} \right) = \frac{1}{3} \cdot \frac{18}{19} = \frac{6}{19}$$

b)  $B = \frac{5}{14} + \frac{2}{63} + \frac{1}{90} + \frac{4}{140} + \frac{1}{210}$

$$B = \frac{5}{2.7} + \frac{2}{7.9} + \frac{1}{9.10} + \frac{4}{10.14} + \frac{1}{14.15}$$

$$B = \frac{1}{2} - \frac{1}{7} + \frac{1}{7} - \frac{1}{9} + \frac{1}{9} - \frac{1}{10} + \frac{1}{10} - \frac{1}{14} + \frac{1}{14} - \frac{1}{15}$$

$$B = \frac{1}{2} - \frac{1}{15} = \frac{13}{30}$$

Câu 2. Tính  $B = \frac{3}{1.2} - \frac{5}{2.3} + \frac{7}{3.4} - \dots - \frac{201}{100.101}$

HD:

$$B = \frac{3}{1.2} - \frac{5}{2.3} + \frac{7}{3.4} - \dots - \frac{201}{100.101}$$

$$B = \frac{2+1}{1.2} - \frac{3+2}{2.3} + \frac{4+3}{3.4} - \dots - \frac{101+100}{100.101}$$

$$B = \left( 1 + \frac{1}{2} \right) - \left( \frac{1}{2} + \frac{1}{3} \right) + \left( \frac{1}{3} + \frac{1}{4} \right) - \dots - \left( \frac{1}{100} + \frac{1}{101} \right) = 1 - \frac{1}{101} = \frac{100}{101}$$

Câu 3. Tính  $A = 3 \cdot \frac{1}{1.2} - 5 \cdot \frac{1}{2.3} + 7 \cdot \frac{1}{3.4} - \dots + 15 \cdot \frac{1}{7.8} - 17 \cdot \frac{1}{8.9}$

HD:

$$A = 3 \cdot \frac{1}{1.2} - 5 \cdot \frac{1}{2.3} + 7 \cdot \frac{1}{3.4} - \dots + 15 \cdot \frac{1}{7.8} - 17 \cdot \frac{1}{8.9}$$

$$A = \frac{3}{1.2} - \frac{5}{2.3} + \frac{7}{3.4} - \dots + \frac{15}{7.8} - \frac{17}{8.9}$$

$$A = \frac{2+1}{1.2} - \frac{3+2}{2.3} + \frac{4+3}{3.4} - \dots + \frac{8+7}{7.8} - \frac{9+8}{8.9}$$

$$A = \left(1 + \frac{1}{2}\right) - \left(\frac{1}{2} + \frac{1}{3}\right) + \left(\frac{1}{3} + \frac{1}{4}\right) - \dots + \left(\frac{1}{7} + \frac{1}{8}\right) - \left(\frac{1}{8} + \frac{1}{9}\right) \Rightarrow A = 1 - \frac{1}{9} \Rightarrow A = \frac{8}{9}$$

**Câu 4.** Chứng minh rằng:  $M = \frac{1}{4^2} + \frac{1}{6^2} + \frac{1}{8^2} + \dots + \frac{1}{(2n)^2} < \frac{1}{4}$

HD:

Ta có:  $M = \frac{1}{4^2} + \frac{1}{6^2} + \frac{1}{8^2} + \dots + \frac{1}{(2n)^2}$

$$= \frac{1}{(2.2)^2} + \frac{1}{(2.3)^2} + \frac{1}{(2.4)^2} + \dots + \frac{1}{(2.n)^2}$$

$$= \frac{1}{4.2^2} + \frac{1}{4.3^2} + \frac{1}{4.4^2} + \dots + \frac{1}{4.n^2}$$

$$= \frac{1}{4} \cdot \left( \frac{1}{2^2} + \frac{1}{3^2} + \frac{1}{4^2} + \dots + \frac{1}{n^2} \right)$$

Mà  $\frac{1}{2^2} < \frac{1}{1.2}$ ;  $\frac{1}{3^2} < \frac{1}{2.3}$ ;  $\frac{1}{4^2} < \frac{1}{3.4}$ ;  $\frac{1}{n^2} < \frac{1}{(n-1).n}$

Suy ra  $M < \frac{1}{4} \left( \frac{1}{1.2} + \frac{1}{2.3} + \frac{1}{3.4} + \dots + \frac{1}{(n-1).n} \right)$

$$\Rightarrow M < \frac{1}{4} \left( \frac{1}{1} - \frac{1}{2} + \frac{1}{2} - \frac{1}{3} + \frac{1}{3} - \frac{1}{4} + \dots + \frac{1}{(n-1)} - \frac{1}{n} \right)$$

$$\Rightarrow M < \frac{1}{4} \left( 1 - \frac{1}{n} \right) < \frac{1}{4}$$

Vậy  $M < \frac{1}{4}$