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2017 小學數學競賽選拔賽初賽試題

第一試：計算題（考試時間 1 小時）

◎ 請將答案填入答案卷對應題號的空格內，不須計算過程。答案若為分數請化為最簡分數。本題目卷正反面空白處可為作演算草稿紙。每題 5 分，共 100 分

1. $2017 + 2017 + 2017 + 2017 + 2017 = ?$

$$= 2017 \times 5 = (2000 + 17) \times 5 = 2000 \times 5 + 17 \times 5 = 10000 + 85 = 10085$$

2. $1000000 \div 2 \div 2 \div 2 \div 2 \div 2 \div 5 \div 5 \div 5 \div 5 = ?$

【參考解法 1】

$$= 2 \times 2 \times 2 \times 2 \times 2 \times 5 \times 5 \times 5 \times 5 \times 5 \div 2 \div 2 \div 2 \div 2 \div 2 \div 5 \div 5 \div 5 \div 5$$

$$= 2 \times 5 \times 5 = 50$$

【參考解法 2】

$$= 1000000 \div 10000 \div 2 = 100 \div 2 = 50$$

3. $222222222 + 222222222 + 22222222 + 2222222 - 111111 - 11111 - 1111 - 111 - 11 - 1 = ?$

$$= (222222222 + 222222222 + 22222222 + 2222222) - (111111 + 11111 + 1111 + 111 + 11 + 1)$$

$$= 246888888 - 12345 = 246876543$$

4. $240 \div 70 \div 80 \times 350 \div 60 \times 420 = ?$

$$= 240 \div 80 \times 350 \div 70 \times 420 \div 60 = 3 \times 5 \times 7 = 105$$

5. $24 \times 60 \times 60 = ?$

【參考解法 1】

$$= 24 \times 36 \times 100$$

$$= (30 - 6) \times (30 + 6) \times 100 = (30 \times 30 - 6 \times 6) \times 100$$

$$= (900 - 36) \times 100 = 86400$$

【參考解法 2】

$$= 24 \times 6 \times 6 \times 100$$

$$= 144 \times 6 \times 100 = 86400$$

6. $20.27 - (60.71 - 40.73) + 80.16 - (179.79 - 100.84) = ?$

【參考解法 1】

$$= 20.27 - 60.71 + 40.73 + 80.16 - 179.79 + 100.84$$

$$= (20.27 + 40.73) - 60.71 + (80.16 + 100.84) - 179.79$$

$$= 61 - 60.71 + 181 - 179.79$$

$$= 0.29 + 1.21 = 1.5$$

【參考解法 2】

$$= 20.27 - 60.71 + 40.73 + 80.16 - 179.79 + 100.84$$

$$= (20 - 60 + 40 + 80 - 179 + 100) + (0.27 - 0.71 + 0.73 + 0.16 - 0.79 + 0.84)$$

$$= 1 + (2 - 1.5) = 1.5$$

$$\begin{aligned}
 7. \quad & 71.02 + 10.27 + 2.71 + 27.1 = ? \\
 & = (71 + 10 + 2 + 27) + (0.2 + 0.27 + 0.71 + 0.1) \\
 & = 110 + 1.1 = 111.1
 \end{aligned}$$

$$\begin{aligned}
 8. \quad & \left(\frac{4.3}{12.9} + \frac{6.18}{12.36} - \frac{2.02}{12.12} \right) \times 99 = ? \\
 & = \left(\frac{1}{3} + \frac{1}{2} - \frac{1}{6} \right) \times 99 = \left(\frac{5}{6} - \frac{1}{6} \right) \times 99 = \frac{4}{6} \times 99 = \frac{2}{3} \times 99 = 66
 \end{aligned}$$

$$\begin{aligned}
 9. \quad & 7 + 13 + 19 + 25 + \cdots + 1999 + 2005 + 2011 + 2017 = ? \\
 & = (7 + 2017) + (13 + 2011) + (19 + 2005) + (25 + 1999) + \cdots + (1009 + 1015) \\
 & = \underbrace{2024 + 2024 + 2024 + \cdots + 2024}_{168 \text{項}} = 2024 \times 168 = 340032
 \end{aligned}$$

$$10. \quad 20 - 17 + 40 - 34 + 60 - 51 + 80 - 68 + 100 - 85 + 120 - 102 + 140 - 119 + 160 - 136 = ?$$

【參考解法 1】

$$\begin{aligned}
 & = (20 - 17) + (40 - 34) + (60 - 51) + (80 - 68) + (100 - 85) + (120 - 102) \\
 & \quad + (140 - 119) + (160 - 136) \\
 & = 3 + 6 + 9 + 12 + 15 + 18 + 21 + 24 = \frac{(3 + 24) \times 8}{2} = 108
 \end{aligned}$$

【參考解法 2】

$$\begin{aligned}
 & = (20 + 40 + 60 + 80 + 100 + 120 + 140 + 160) - (17 + 34 + 51 + 68 + 85 + 102 + 119 + 136) \\
 & = \frac{(20 + 160) \times 8}{2} - \frac{(17 + 136) \times 8}{2} = (180 - 153) \times 4 = 27 \times 4 = 108
 \end{aligned}$$

$$\begin{aligned}
 11. \quad & (22001177 + 22110077 + 112277 + 221177 + 11002277 + 11220077) \div 6 = ? \\
 & = ((22001100 + 22110000 + 112200 + 221100 + 11002200 + 11220000) + 77 \times 6) \div 6 \\
 & = 66666600 \div 6 + 77 = 11111100 + 77 = 11111177
 \end{aligned}$$

$$\begin{aligned}
 12. \quad & 5000 - 2048 - 1024 - 512 - 256 - 128 - 64 - 32 - 16 - 8 - 4 - 2 - 1 = ? \\
 & = 5000 - (1 + 2 + 4 + 8 + 16 + 32 + 64 + 128 + 256 + 512 + 1024 + 2048) \\
 & = 5000 - \left(\frac{2048 \times 2 - 1}{2 - 1} \right) = 5000 - 4095 = 905
 \end{aligned}$$

$$\begin{aligned}
 13. \quad & 2017 \times \frac{128}{63} - \frac{2}{63} = ? \\
 & = 2017 \times \left(2 + \frac{2}{63} \right) - \frac{2}{63} = 4034 + 2017 \times \frac{2}{63} - \frac{2}{63} = 4034 + 2016 \times \frac{2}{63} = 4034 + 64 = 4098
 \end{aligned}$$

$$\begin{aligned}
 14. \quad & 41\frac{3}{20} \times 0.25 + 41.15 \times \frac{1}{3} + 18\frac{17}{20} + \frac{1}{6} \times 41\frac{3}{20} + 41.15 \times \frac{1}{4} = ? \\
 & = 41\frac{3}{20} \times \frac{1}{4} + 41\frac{3}{20} \times \frac{1}{3} + 18\frac{17}{20} + \frac{1}{6} \times 41\frac{3}{20} + 41\frac{3}{20} \times \frac{1}{4} \\
 & = 41\frac{3}{20} \times \left(\frac{1}{4} + \frac{1}{3} + \frac{1}{6} + \frac{1}{4} \right) + 18\frac{17}{20} = 41\frac{3}{20} \times 1 + 18\frac{17}{20} = 60
 \end{aligned}$$

15. $999 + 999 \times 999 + 999 \times 999 \times 999 = ?$

【参考解法 1】

$$\begin{aligned} &= 999 \times (1 + 999) + 999 \times 999 \times 999 = 999 \times 1000 + 999 \times 999 \times 999 \\ &= 999 \times (1000 + 999 \times 999) = (1000 - 1) \times (1000 + (1000 - 1) \times (1000 - 1)) \\ &= (1000 - 1) \times (1000 + 1000000 - 2000 + 1) = (1000 - 1) \times 999001 \\ &= 999001000 - 999001 = 998001999 \end{aligned}$$

【参考解法 2】

$$\begin{aligned} &= 999 + 999 \times 999 \times (1 + 999) = 999 + 999 \times 999 \times 1000 \\ &= 999 \times (1 + 999000) = 999 + 999 \times 999000 \\ &= 999 + (1000 - 1) \times (1000000 - 1000) = 999 + 1000000000 - 1000000 - 1000000 + 1000 \\ &= 1000001999 - 2000000 = 998001999 \end{aligned}$$

16. $\frac{\frac{460}{37} \div \frac{297}{91}}{77 \div (\frac{1}{2} - \frac{1}{6} + \frac{9}{10})} \div \frac{598}{243} = ?$

$$\begin{aligned} &= \frac{\frac{460}{37} \div \frac{297}{91}}{77 \div \frac{37}{30}} \div \frac{598}{243} = \frac{460}{37} \times \frac{91}{297} \times \frac{1}{77} \times \frac{37}{30} \times \frac{243}{598} \\ &= \frac{46 \times 10}{37} \times \frac{7 \times 13}{11 \times 27} \times \frac{1}{7 \times 11} \times \frac{37}{3 \times 10} \times \frac{9 \times 27}{46 \times 13} = \frac{1}{11} \times \frac{1}{11} \times 3 = \frac{3}{121} \end{aligned}$$

17. $154154 \div 49 \div 1573 + 462462 \div 121 \div 637 = ?$

【参考解法 1】

$$\begin{aligned} &= 154154 \times \frac{1}{49} \times \frac{1}{1573} + 154154 \times 3 \times \frac{1}{121} \times \frac{1}{637} \\ &= 154154 \times \frac{1}{49} \times \frac{1}{121} \times (\frac{1}{13} + 3 \times \frac{1}{13}) \\ &= 154 \times 1001 \times \frac{1}{7 \times 7} \times \frac{1}{11 \times 11} \times \frac{4}{13} \\ &= 154 \times \frac{1}{7} \times \frac{1}{11} \times 4 = 11 \times 14 \times \frac{1}{7} \times \frac{1}{11} \times 4 = 8 \end{aligned}$$

【参考解法 2】

$$\begin{aligned} &= 154154 \times \frac{1}{49} \times \frac{1}{1573} + 154154 \times 3 \times \frac{1}{121} \times \frac{1}{637} \\ &= 154154 \times \frac{1}{77077} + 154154 \times 3 \times \frac{1}{77077} \\ &= 154154 \times 4 \times \frac{1}{77077} = 2 \times 4 = 8 \end{aligned}$$

$$\begin{aligned}
18. & (41590 \times 8193 - 20170) \div (4158 \times 819.4 + 201.8) = ? \\
& = 10 \times (4159 \times 8193 - 2017) \div (0.1 \times (4158 \times 8194 + 2018)) \\
& = 100 \times (4159 \times 8193 - 2017) \div ((4159 - 1) \times (8193 + 1) + 2018) \\
& = 100 \times (4159 \times 8193 - 2017) \div (4159 \times 8193 - 1 \times 8193 + 4159 \times 1 - 1 \times 1 + 2018) \\
& = 100 \times (4159 \times 8193 - 2017) \div (4159 \times 8193 - 8193 + 4159 - 1 + 2018) \\
& = 100 \times (4159 \times 8193 - 2017) \div (4159 \times 8193 - 2017) = 100
\end{aligned}$$

$$\begin{aligned}
19. & \frac{7}{10} + \frac{37}{40} + \frac{85}{88} + \frac{148}{151} + \frac{235}{238} + \frac{337}{340} = ? \\
& = (1 - \frac{3}{10}) + (1 - \frac{3}{40}) + (1 - \frac{3}{88}) + (1 - \frac{3}{151}) + (1 - \frac{3}{238}) + (1 - \frac{3}{340}) \\
& = 6 - (\frac{3}{10} + \frac{3}{40} + \frac{3}{88} + \frac{3}{151} + \frac{3}{238} + \frac{3}{340}) \\
& = 6 - (\frac{3}{2 \times 5} + \frac{3}{5 \times 8} + \frac{3}{8 \times 11} + \frac{3}{11 \times 14} + \frac{3}{14 \times 17} + \frac{3}{17 \times 20}) \\
& = 6 - (\frac{1}{2} - \frac{1}{5} + \frac{1}{5} - \frac{1}{8} + \frac{1}{8} - \frac{1}{11} + \frac{1}{11} - \frac{1}{14} + \frac{1}{14} - \frac{1}{17} + \frac{1}{17} - \frac{1}{20}) \\
& = 6 - (\frac{1}{2} - \frac{1}{20}) = 6 - \frac{9}{20} = 5\frac{11}{20} = 5.55 = \frac{111}{20}
\end{aligned}$$

$$\begin{aligned}
20. & \frac{\frac{1}{512}}{1 + \frac{1}{512}} + \frac{\frac{1}{511}}{(1 + \frac{1}{512})(1 + \frac{1}{511})} + \frac{\frac{1}{510}}{(1 + \frac{1}{512})(1 + \frac{1}{511})(1 + \frac{1}{510})} + \dots \\
& + \frac{\frac{1}{456}}{(1 + \frac{1}{512})(1 + \frac{1}{511})(1 + \frac{1}{510}) \dots (1 + \frac{1}{456})} = ? \\
& = \frac{\frac{1}{512}}{\frac{513}{512}} + \frac{\frac{1}{511}}{\frac{513}{512} \times \frac{512}{511}} + \frac{\frac{1}{510}}{\frac{513}{512} \times \frac{512}{511} \times \frac{511}{510}} + \dots + \frac{\frac{1}{456}}{\frac{513}{512} \times \frac{512}{511} \times \frac{511}{510} \times \dots \times \frac{457}{456}} \\
& = \frac{1}{513} + \frac{1}{513} + \frac{1}{513} + \dots + \frac{1}{513} \\
& \quad \underbrace{\hspace{10em}}_{57 \text{項}} \\
& = \frac{1}{513} \times 57 = \frac{1}{9}
\end{aligned}$$