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2013 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. $13 + 24 + 31 + 36 + 47 + 29 = (13 + 47) + (24 + 36) + (31 + 29) = 60 + 60 + 60 = 180$

2. $483 \times 2 + 483 \times 999 = 483 \times (2 + 999) = 483 \times 1001 = 483483$

3. $375 \times 8 + 125 \times 6 = 125 \times 2 \times (3 \times 4 + 3) = 125 \times 30 = 3750$

4. $12 \times 3 + 120 \times 3 + 1200 \times 3 + 12000 \times 3 = 12 \times 3 \times (1 + 10 + 100 + 1000) = 36 \times 1111 = 39996$

5. $2013 \div 495 \times 45 = 2013 \div (495 \div 45) = 2013 \div 11 = 183$

6. $1 + 32 + 543 + 7654 + 98765 + 759876 + 7864987 + 88975398 + 999686429 = (1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9) + (20 + 30 + 40 + 50 + 60 + 70 + 80 + 90) + (300 + 400 + 500 + 600 + 700 + 800 + 900) + (4000 + 5000 + 6000 + 7000 + 8000 + 9000) + (50000 + 60000 + 70000 + 80000 + 90000) + (600000 + 700000 + 800000 + 900000) + (7000000 + 8000000 + 9000000) + (80000000 + 90000000) + 900000000 = 45 + 440 + 4200 + 39000 + 350000 + 3000000 + 24000000 + 170000000 + 900000000 = 1097393685$

7. $13 + 213 + 413 + 613 + \dots + 1813 + 2013 =$

【解 1】 $= 13 + (200 + 13) + (400 + 13) + (600 + 13) + \dots + (1800 + 13) + (2000 + 13) = 13 \times 11 + 200 \times (1 + 2 + 3 + \dots + 10) = 143 + 11000 = 11143$

【解 2】 $= \frac{11 \times (13 + 2013)}{2} = 11 \times 1013 = 11143$

8. $13 + 26 + 52 + 104 + 208 + 416 + 832 + 1664 + 3328 + 6656 = 13 \times (1 + 2 + 4 + 8 + 16 + 32 + 64 + 128 + 256 + 512) = 13 \times 1023 = 13299$

9. $6102 + 6104 + 6106 + \dots + 6198 + 6200 - 6199 - 6197 - 6195 - \dots - 6103 - 6101 = 6102 - 6101 + 6104 - 6103 + 6106 - 6105 + \dots + 6198 - 6197 + 6200 - 6199 = 50$

10. $\frac{169 + 400 + 520}{9 \times 121} = \frac{13 \times 13 + 20 \times 20 + 2 \times 13 \times 20}{3 \times 3 \times 11 \times 11} = \frac{(13 + 20)^2}{33^2} = 1$

$$11. \frac{13^2 - 5^2}{48 \times 36 - 12 \times 75} = \frac{(13+5)(13-5)}{12 \times 3 \times (4 \times 12 - 25)} = \frac{18 \times 8}{12 \times 3 \times 23} = \frac{4}{23}$$

$$12. 183 \times \frac{183}{91} - \frac{1}{91} = \frac{1}{91} \times (183 \times 183 - 1) = \frac{1}{91} \times (183+1) \times (183-1) = \frac{1}{91} \times 184 \times 182 = 184 \times 2 = 368$$

$$13. 2013000 \div 125 \div 4 + 40260 \times 125 \times 4 = 2013000 \div 1000 \times 8 \div 4 + 40260 \times 1000 \div 8 \times 4 = 2013 \times 2 + 40260000 \div 2 = 20134026$$

$$14. \frac{198 \times 176 \times 154 \times 132 \times 110 \times 88 \times 66 \times 44 \times 22}{11 \times 22 \times 33 \times 44 \times 55 \times 66 \times 77 \times 88 \times 99} = \frac{22}{11} \times \frac{44}{22} \times \frac{66}{33} \times \frac{88}{44} \times \frac{110}{55} \times \frac{132}{66} \times \frac{154}{77} \times \frac{176}{88} \times \frac{198}{99} = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 512$$

$$15. \frac{650}{13 \times 63} + \frac{650}{63 \times 113} + \frac{650}{113 \times 163} + \frac{650}{163 \times 213} + \dots + \frac{650}{1913 \times 1963} + \frac{650}{1963 \times 2013} = 650 \times \left(\frac{1}{13 \times 63} + \frac{1}{63 \times 113} + \frac{1}{113 \times 163} + \frac{1}{163 \times 213} + \dots + \frac{1}{1913 \times 1963} + \frac{1}{1963 \times 2013} \right) = 650 \times \frac{1}{50} \left(\left(\frac{1}{13} - \frac{1}{63} \right) + \left(\frac{1}{63} - \frac{1}{113} \right) + \left(\frac{1}{113} - \frac{1}{163} \right) + \dots + \left(\frac{1}{1963} - \frac{1}{2013} \right) \right) = 13 \times \left(\frac{1}{13} - \frac{1}{2013} \right) = 1 - \frac{13}{2013} = \frac{2000}{2013}$$

$$16. \frac{183.4 \times 4 \frac{2}{7} - (3 \frac{3}{4} \times 4800) \times (\frac{0.1}{10} + \frac{0.2}{10})}{3 \frac{9}{11} \times 7 \frac{6}{7}} = \frac{\frac{917}{5} \times \frac{30}{7} - (15 \times 1200) \times \frac{3}{100}}{\frac{42}{11} \times \frac{55}{7}} = \frac{131 \times 6 - 180 \times 3}{6 \times 5} = \frac{262 - 180}{2 \times 5} = 8.2$$

$$17. 5 \times 5 - 4 \times 4 + 50 \times 50 - 40 \times 40 + 500 \times 500 - 400 \times 400 + 5000 \times 5000 - 4000 \times 4000 + 50000 \times 50000 - 40000 \times 40000 = 9 \times 1 + 90 \times 10 + 900 \times 100 + 9000 \times 1000 + 90000 \times 10000 = 909090909$$

$$18. 2013 \times \left(1 - \frac{1}{2}\right) \times \left(1 - \frac{1}{4}\right) \times \left(1 - \frac{1}{6}\right) \times \dots \times \left(1 - \frac{1}{2012}\right) \times \left(1 + \frac{1}{3}\right) \times \left(1 + \frac{1}{5}\right) \times \dots \times \left(1 + \frac{1}{2013}\right) = 2013 \times \frac{1}{2} \times \frac{4}{3} \times \frac{3}{4} \times \frac{6}{5} \times \frac{5}{6} \times \dots \times \frac{2011}{2012} \times \frac{2014}{2013} = 2013 \times \frac{1}{2} \times \frac{2014}{2013} = 1007$$

$$\begin{aligned}
 \mathbf{19.} \quad & \frac{2013^2 - 2011^2}{2012} + \frac{2009^2 - 2007^2}{2008} + \frac{2005^2 - 2003^2}{2004} + \frac{2001^2 - 1999^2}{2000} = \\
 & \frac{2 \times (2013 + 2011)}{2012} + \frac{2 \times (2009 + 2007)}{2008} + \frac{2 \times (2005 + 2003)}{2004} + \frac{2 \times (2001 + 1999)}{2000} = \\
 & 2 \times 2 + 2 \times 2 + 2 \times 2 + 2 \times 2 = \mathbf{16}
 \end{aligned}$$

$$\begin{aligned}
 \mathbf{20.} \quad & \left(2 + \frac{1}{2}\right) \times \left(2 + \frac{1}{3}\right) \times \left(2 + \frac{1}{4}\right) \times \cdots \times \left(2 + \frac{1}{2013}\right) \times \frac{2013}{5} \times \frac{2012}{7} \times \frac{2011}{9} \times \cdots \times \frac{2}{4027} \times \frac{1}{4029} \\
 & = \frac{5}{2} \times \frac{7}{3} \times \frac{9}{4} \times \cdots \times \frac{4027}{2013} \times \frac{2013}{5} \times \frac{2012}{7} \times \frac{2011}{9} \times \cdots \times \frac{2}{4027} \times \frac{1}{4029} = \frac{\mathbf{1}}{\mathbf{4029}}
 \end{aligned}$$