# THETA INDIVIDUAL 1999

1. E $19 + 1 + 99 = 119$

2. D $-19x + 19 < 99$
$-19x < 80$
$x > \frac{-80}{19}$ or $-4\frac{4}{19}$
LEAST INTEGER $\boxed{-4}$

3. A $3717_8 = 3\cdot8^3 + 7\cdot8^2 + 1\cdot8^1 + 7\cdot8^0$
$= 3(512) + 7(64) + 8 + 7$
$= 1536 + 448 + 15$
$= 1999$ SUM OF DIGITS: $\boxed{28}$

4. B 19, 23, 29, 31, 37, 41, 43, 47, 53, 59, 61, 67, 71, 73, 79, 83, 89, 97
18 primes, $99 - 19 + 1 = 81$ #5
$\frac{18}{81} = \boxed{\frac{2}{9}}$

5. B $\frac{1}{2^{30}\cdot 2^6} = \frac{1}{2^{36}} = 2^{-36}$ $\boxed{X = -36}$

6. C
A(-5, 2) → A'(5, 2) 5
B(-2, 3) → B'(2, 3) 2
C(-4, 7) → C'(4, 7) +4
$\boxed{11}$

7. A $3^6\cdot 3^6\cdot 2^6 = (2\cdot 3^2)^x$
$(3\cdot 3\cdot 2)^6 \Rightarrow \boxed{x = 6}$

8. D $ax^3 + (b-3)x^2 - cx + d = 4x^3 + 7x - 3$
$a = 4$ $b - 3 = 0$ $-cx = 7x$ $d = -3$
$b = 3$ $-c = 7$
$c = -7$
$4 + 3 - 7 - 3 = \boxed{-3}$

9. E $\frac{t(t-1)}{(t-3)(t+1)} \cdot \frac{(t+1)(t+1)}{t(t+4)} \cdot \frac{2(t-4)(t+4)}{2(P)} = \frac{t-1}{t-3}$
By cancellation $P = 2(t-4)(t+1)$
$P = 2(t^2 - 3t - 4)$
$P = 2t^2 - 6t - 8$
$a = 2,\ b = -6,\ c = -8$
$2 - 6 - 8$ $\boxed{-12}$

10. D 

$4 \cdot 13 = 52$

11. B $M\left(\frac{4+1}{2}, \frac{1-1}{2}\right) = M(5, -4)$
$m = \frac{1-(-9)}{6-4} = \frac{10}{2} = 5$ $\perp m = -\frac{1}{5}$
$y - y_1 = m(x - x_1)$
$y + 4 = -\frac{1}{5}(x - 5)$
$x + 5y = -15$ $1 + 5 - 15 = \boxed{-9}$

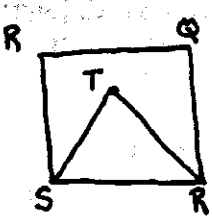
12. A $(6-4)(4-6) \div (6+4)(4+6)$
$(2)(-2) \div (10)(10)$
$-4 \div 100$
$\frac{-4}{100}(m)$ $\boxed{-4}$

13. E $x + 2y = -3$ $ax + 3y = -2$
$m = -\frac{1}{2}$ $m = -\frac{a}{3}$
$\perp m = 2$ $2 = -\frac{a}{3}$
$6 = -a$
$\boxed{-6 = a}$

14. B $5^1 = 64$ $5^2 = 64$ $5^3 = 64$ $5^6 = 64$
$5 = 8$ $5 = 4$ $5 = 2$
$64 + 8 + 4 + 2 = \boxed{78}$

15. D $6.\overline{3} - 2.1\overline{6}$ $\frac{16}{15}$, $1\frac{1}{15}$
$6\frac{3}{9} - 2\frac{15}{90}$
$6\frac{1}{3} - 2\frac{1}{6}$ $\boxed{4\frac{1}{6}}$
$6\frac{2}{6} - 2\frac{1}{6}$

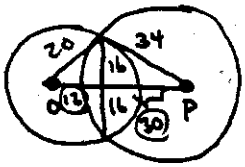
16. D $(2x-1)^2 - 4 - 2(x^2 - 4) - 1 = 12$
$4x^2 - 4x + 1 - 4 - (2x^2 - 8 - 1) = 12$
$4x^2 - 4x - 3 - 2x^2 + 9 = 12$
$2x^2 - 4x - 6 = 0$
$x^2 - 2x - 3 = 0$ $X = 3$ or $x = -$
$(x-3)(x+1) = 0$ $3(-1) = \boxed{-}$

17. C 

$\angle TRS$ and $\angle TSR = 60°$
$\angle SRQ = 90°$
$\angle TRQ = 30°$
$\overline{TR} = \overline{RQ}$
$\angle RTQ = \angle RQT$
$\frac{180° - 30°}{2} = \frac{150°}{2} = \boxed{75°}$

18. C $(1-3y)^2 - 3y^2 = 13$
$1 - 6y + 9y^2 - 3y^2 = 13$
$6y^2 - 6y - 12 = 0$ $y = 2$ $y =$
$y^2 - y - 2 = 0$ $x = -5$ or $x = 4$
$(y-2)(y+1) = 0$ $-5 + 4 = \boxed{-1}$

19. **B**




$12+30 = \boxed{42}$

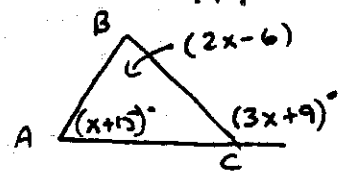
20. **D** LET P = 1999 1998 1994

THUS, $(p+3)^2 - 2p^2 + (p-3)^2$

$p^2+6p+9 - 2p^2 + p^2-6p+9$

$9+9$ (18)

21 **B**




$m\angle A < 90°$

$m\angle B < 90°$

$m\angle D = 180° - \angle C$

$90° < m\angle D < 180°$

$x+15 < 90°$ $\quad 2x-6 < 90°$ $\quad 90° < 3x+9 < 180°$

$x < 75°$ $\quad 2x < 96$ $\quad 81° < 3x < 171°$

$x < 48$ $\quad (27 < x < 57)$

$47 < x < 48$

$\hookrightarrow 47-28+1 = \boxed{20}$

22. **C**

$(A+B)-(B+C) = A-C = 1-2 = -1$

$(A-C)+(C+D) = A+D = -1+3 = 2$

$(A+D)-(D+E) = A+E = 2-5 = -3$

$(A-E)+(E+F) = A+F = -3+8 = 5$

$(A+F)-(F+G) = A-G = 5-13 = -8$

$(A-G)+(G+H) = A+H = -8+21 = 13$

$(A+H)-(H+I) = A-I = 13-34 = -21$

$(A-I)+(I+J) = A+J = -21+55 = \boxed{34}$

23 **A** $f(-1) = x^{16}+5 = (-1)^{16}+5 = 1+5 = \boxed{6}$

24. **B** $\dfrac{2^{n+4}-2^{n+1}}{2^{n+4}} = \dfrac{2^n2^4-2^n2^1}{2^n2^4} = \dfrac{2^n2(2^3-1)}{2^n\cdot 2^4}$

$\dfrac{8-1}{8} = \boxed{\dfrac{7}{8}}$

25. **B** (ABE)(BILL)(NOT CARL)

$\frac{1}{6}\cdot\frac{1}{5}\cdot\frac{3}{4}\cdot 3!$ $\quad \boxed{\frac{3}{20}}$

26. **C** $\pi r^2 + \pi r L$ $\quad r=18$ $\quad a=12$

$\pi 9^2 + \pi 9\cdot 15$

$21\pi$

27. **A** $\left(5\log_x x - \log_3 27\right) \div \left(\log_5 \frac{1}{5} + \log_4 8\right)$

$(5-3) \div (-1+\frac{3}{2})$

$2 \div \frac{1}{2}$

$4$

$4^x = 8$

$2^{2x} = 2^3$

$2x = 3$

$x = \frac{3}{2}$

28. **D** $(n-2)(180) = \frac{n}{2}(100+140)$

$(n-2)(360) = n(240)$

$360n - 720 = 240n$

$-720 = -120n$

$6 = n$

29. **E** $(5,7)$ $\quad r = \sqrt{13}$

$(x-5)^2 + (y-7)^2 = 13$

$x^2+y^2-10x-14y+61 = 0$

$10+14+61 = 85$

30. **B** $15!$ IS A MULTIPLE OF 9.

$41+A = 45$

$A = 4$

T1 $V_{cone} = \frac{1}{3}\pi r^2 h$ $\quad V_{sphere} = \frac{4}{3}\pi r^3$

$= \frac{1}{3}\pi r^2 r$

$= \frac{1}{3}\pi r^3$

$\dfrac{\frac{1}{3}\pi r^3}{\frac{4}{3}\pi r^3} = \dfrac{\frac{1}{3}}{\frac{4}{3}} = \boxed{\frac{1}{4}}$

T2 $4^x = \sqrt{2^{3y}}$

$2^{2x} = (2^{3y})^{\frac{1}{2}}$

$2^{2x} = 2^{\frac{3y}{2}}$

$2x = \frac{3y}{2}$

$4x = 3y$

$\boxed{x = \frac{3y}{4}}$

T3. $x^3 + px + q = 0$

Sum of the roots is zero - not $x^2$ term.

$3 - 1 + r_3 = 0$

$2 + r_3 = 0$

$\boxed{r_3 = -2}$