ALGEBRA 2 REGIONAL JANUARY

1-C SIDE OF SQUARE $= \frac{2}{\sqrt{2}} = \sqrt{2}$ $\therefore$ $\frac{\sqrt{2}}{2}$ IS RADIUS OF SMALL CIRCLE

$\therefore$ $2\pi r$ OR $2\pi\left(\frac{\sqrt{2}}{2}\right) = \boxed{\sqrt{2}\,\pi}$

2-C AREA OF FIELD − AREA OF HOUSE

$4 \times 2 = 8 - .5 = \boxed{7.5}$

3-D $i^{45} = i$, $i^{35} = -i$, $\sqrt{-121} = 11i$, $(4+3i)^2 = 7+24i$, $(2-i)(4+i) = 9-2i$

$i - i - 11i + 7 + 24i - 9 + 2i = \boxed{-2+15i}$

4-A $50^2 = \frac{50(51)(101)}{6} = 42925 - (1)^2 - (2)^2 - (3)^2 - (4)^2 = 42895$

$(50)(3) - (4)(3) = (138 + 42895) = \boxed{43033}$

5-E $4x^2 + 9 = 0$ $\quad 4x^2 = -9$, $\boxed{\emptyset}$, NO REAL SOLUTIONS

6-C 2002 → 2, 1001; 1001 → 11, 91; 91 → 7, 13

$2^1 \cdot 11^1 \cdot 7^1 \cdot 13^1$

$(2)(2)(2)(2) = 16$ → $\boxed{13}$ IS LARGEST PRIME LESS THAN 16

7-A $(x+4)^2 + (x+19)^2 = (x+34)^2$

$x^2 + 8x + 16 + x^2 + 38x + 361 = x^2 + 68x + 1156$

$x^2 - 22x - 779 = 0$

$x = \frac{22 \pm 60}{2}$, 41 or $\cancel{-19}$

$A = \frac{1}{2}(x+4)(x+19) = \frac{1}{2}(45)(60)$

$= \boxed{1350}$

8-D $2005(3)^5 - 2004(3)^2 + 2003(3) - 2002 = \boxed{473186}$

9-B $\frac{\frac{1}{2}hr}{2} + \frac{\frac{1}{2}hr}{3} + \frac{\frac{1}{2}hr}{x} = 1$ $\therefore$ $12x\left(\frac{1}{4} + \frac{1}{6} + \frac{1}{2x} = 1\right)$

$\therefore$ $3x + 2x + 6 = 12x$, $7x = 6$, $x = \boxed{\frac{6}{7}\,hr}$

10-D MDPT. $\left(\frac{-4-8}{2}, \frac{7-3}{2}\right) = (-6, 2)$

11-A $2 \cdot 4^3 + 3 = 131$ $\quad 2 \cdot 5^3 + 4 = 254$

$\boxed{1441_{six}}$

216 | 385 → 1, $385 - 216 = 169$; 36 | 169 → 4, -144 = 25; 6 | 25 → 4, -24 = $\boxed{1}$ → $\boxed{1441}$

INDIVIDUAL SOLUTIONS

ALGEBRA 2 REGIONAL JANUARY

12-C

(1+3) $(7x+z=25)^{-5}$

(2+3) $6x+5z=38$

$-29x=-87$

$x=3$

$6(3)+5z=38$

$z=4$

$3(3)+y-4=12$

$y=7$

$x+y+z=3+7+4=\boxed{14}$

13-E

Sum Roots $=\frac{-b}{a}=\frac{-4}{1} \to \frac{-8}{2}$, Product Roots $=\frac{c}{a}=\frac{-1}{2}$

$a=2,\ b=8,\ c=-1$

Sum of Rec. $=\frac{-b}{c}$

$\frac{-8}{-1}=\boxed{8}$

14-A

$3^1=3,\ 3^2=9,\ \underline{3^3=7},\ 3^4=1$

$4\overline{)227}$ = 56 R 3

Now = 7

$10^1=1\underline{0},\ 10^2=1\underline{00},\ 10^3=1\underline{000}$ etc. ∴ Then = 0, $0-7=\boxed{-7}$

15-C

$365\left(1+\frac{\frac{\pi}{100}}{4}\right)^{4(30)}=933.27-365=\boxed{568.27}$

16-C

5544 → 11 · 504 → 2 · 252 → 2 · 126

126 → 2 · 63 → 7 · 9 → 3 · 3

$3^{(2)}\cdot 2^{(3)}\cdot 11^{(1)}\cdot 7^{(1)}$

$(3)(4)(2)(2)=\boxed{48}$

17-C

Use Rational Roots Theorem.

$$\begin{array}{r|rrrrr} -1 & 1 & -1 & -5 & 3 & 6 \\ & & -1 & 2 & 3 & -6 \\ \hline & 1 & -2 & -3 & 6 & \boxed{0} \end{array} \qquad \begin{array}{r|rrrr} 2 & 1 & -2 & -3 & 6 \\ & & 2 & 0 & -6 \\ \hline & 1 & 0 & -3 & \boxed{0} \end{array}$$

$x^2-3=0$

Yield 2 irrational roots

∴ $\boxed{2}$ for -1 and 2

18-E

$x=\sqrt{6+x}$

$x^2=6+x$

x^2-x-6

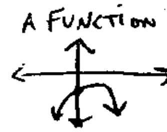
$(x-3)(x+2)=0$

$x=\boxed{3}$ or $\cancel{-2}$

19-A

Since D<0 the graph does not have x intercepts. A function opens up or down

Log($\frac{1}{3}$) is negative so Y int is negative. ∴ Ex.



Down

20-D

$\log_2(\log_3(\log_4 x))=e^0=1$

$\log_3(\log_4 x)=2^1=2$

$\log_4 x=3^2=9$

$x=4^9$

$x=\boxed{262144}$

INDIVIDUAL SOLUTIONS

ALGEBRA 2 REGIONAL JANUARY

21 - B	$d = \sqrt{(3-(-2))^2 + (1-7)^2 + (-8-(-3))^2} = \boxed{\sqrt{86}}$
22 - C	$A = ab\pi \quad , \quad a = \frac{3}{2}b \qquad a^2 = b^2 + c^2$ $64 = b\left(\frac{3}{2}b\right)\pi \qquad 64 = a\left(\frac{2}{3}a\right)\pi \qquad c^2 = \frac{96}{\pi} - \frac{128}{3\pi} = \frac{160}{3\pi}$ $b^2 = \frac{128}{3\pi} \qquad a^2 = \frac{96}{\pi} \qquad c = \frac{4\sqrt{30\pi}}{3\pi} \to 2c = \frac{8\sqrt{30\pi}}{3\pi} \approx \boxed{8.24}$
23 - E	$2 + Z\log_x A + 4Z\log_x B - Z\log_x B = Z\log_x A + Z + 3Z\log_x B$ $Z = \boxed{2}$ ALL CANCELS EXCEPT $2 = Z$
24 - C	$x + 5 = 2x - 7 \qquad 12 = x$ AND $-x - 5 = 2x - 7 \qquad \frac{2}{3} = x$ So. $12 + \frac{2}{3} = \boxed{\frac{38}{3}}$
25 - A	$e = \frac{3}{5} = \frac{12}{a}, a = 20 \ , \ 20^2 = b^2 + 12^2 \ , \ b^2 = 256 \ , \ b = 16 \ \therefore \ 2b = \boxed{32}$
26 - B	$2003 \log 2002 + 2005 \log 2004 = \boxed{13234}$
27 - C	$3^{\frac{3}{2}} x^{\frac{3}{2}} y^{\frac{4}{2}} \cdot x^{\frac{5}{3}} y^{\frac{13}{3}} z^{\frac{1}{3}} \to 3^{\frac{9}{6}} x^{\frac{9}{6}} y^{\frac{12}{6}} \cdot x^{\frac{10}{6}} y^{\frac{26}{6}} z^{\frac{2}{6}} \to \boxed{3x^3y^5\sqrt[6]{27xy^2z^2}}$
28 - B	$4y + 30 - 3x = 41$ AND $-5x + 4y + 12 = 25$ $\therefore \ -3x + 4y = 11 \qquad 5x - 4y = -13 \qquad 2x = -2 \qquad x = -1 \qquad -3(-1) + 4y = 11 \qquad 4y = 8 \qquad y = 2$ $2 + (-1) = \boxed{1}$
29 - E	CHANGE IN SIGNS $f(x) = 4 \ \therefore$ 4 POSSIBLE POSITIVE REAL ROOTS $f(-x) = 3$ SIGN CHANGES $\therefore$ 3 POSSIBLE NEGATIVE REAL ROOTS. $(4+3)^3 = 7^3 = \boxed{343}$
30 - D	$b^2 - 4ac = 16 \ \therefore$ $\boxed{\text{2 REAL RATIONAL ROOTS}}$

INDIVIDUAL SOLUTIONS