

## Individual Answers

- |                    |                           |                                    |
|--------------------|---------------------------|------------------------------------|
| 1) C $\sqrt{2}\pi$ | 2) C 7.5                  | 3) D $-2 + 15i$                    |
| 4) A 43033         | 5) E No Solution          | 6) C 13                            |
| 7) A 1350          | 8) D 473,186              | 9) B $\frac{6}{7}$ hr              |
| 10) D $(-6, 2)$    | 11) A 1441 <sub>six</sub> | 12) C 14                           |
| 13) E 8            | 14) A -7                  | 15) C 568.27                       |
| 16) C 48           | 17) C 2                   | 18) E 3                            |
| 19) A Down         | 20) D 262,144             | 21) B $\sqrt{86}$                  |
| 22) C 8.24         | 23) E 2                   | 24) C $\frac{38}{3}$               |
| 25) A 32           | 26) B 13,234              | 27) C $3x^3y^5\sqrt[6]{27xy^2z^2}$ |
| 28) B 1            | 29) E 343                 | 30) D 2                            |

## Team Answers

- |                                                                                                     |                   |                                         |
|-----------------------------------------------------------------------------------------------------|-------------------|-----------------------------------------|
| 1) $\frac{9 + 3\sqrt{41}}{2}$                                                                       | 2) $(x + 7)$      | 3) 0                                    |
| 4) 5,184                                                                                            | 5) -1             | 6) $-20\sqrt{3}$                        |
| 7) -67,584                                                                                          | 8) $\frac{35}{3}$ | 9) $\frac{2,187z^{15}}{2,000x^{16}y^3}$ |
|                                                                                                     |                   | 10) $16\sqrt{30}$                       |
| 11) $\left(-\infty, \frac{-4 - \sqrt{66}}{5}\right) \cup \left(-2, \frac{-4 + \sqrt{66}}{5}\right)$ | 12) 8.82          |                                         |
| 13) 2                                                                                               | 14) 17            | 15) $\frac{2163}{16}$                   |

①  $\frac{9 + 3\sqrt{41}}{2}$   $x = \sqrt{12-x}$   $y = 3\sqrt{8+y}$   $\therefore y = \Rightarrow \frac{9 \pm 3\sqrt{41}}{2}$   
 $x = 3$   $y^2 - 9y - 72 = 0$

②  $\frac{(x+2)(x+1)}{(x-2)(x+1)} \cdot \frac{x(x-5)(x+5)}{(x-7)(x+5)} \cdot \frac{(2x+1)(x-2)}{x(x-5)} \cdot \frac{(x-1)(x+1)}{(2x+1)(x+2)}$  ALL CANCELS EXCEPT.  $\boxed{x+7}$

③ Sum of ASYMPTOTES.  $\frac{b}{a} - \frac{b}{a} = \boxed{0}$

④  $\log_3(x+5)(x-2) = \log_3 18$   $x^2 + 3x - 10 = 18$   $x = 4$   
 $2^{16y} = 4^{10y-12}$   $16y = 20y - 24$   $6 = y$   
 $\therefore w = 4(6)^4 = \boxed{5184}$

⑤  $D_x = \begin{vmatrix} 3 & -4 & 3 \\ 4 & 2 & -1 \\ 5 & -3 & 2 \end{vmatrix}$ ,  $D_y = \begin{vmatrix} 2 & 3 & 3 \\ 5 & 4 & -1 \\ 4 & 5 & 2 \end{vmatrix}$   $\frac{D_x}{D_y} = \frac{-11}{11} = \boxed{-1}$

⑥  $\frac{(x+7)^2}{9} + \frac{(y-2)^2}{12} = 1$   $\frac{a}{a} = \frac{1}{2}$ ,  $a = 2c$   $a^2 = b^2 + c^2$   $2c = 2\sqrt{3}$   
 $(-7+2)(2\sqrt{3} + 2\sqrt{3})$   $(2c)^2 = 9 + c^2$   $c^2 = 3$ ,  $c = \sqrt{3}$   
 $-5(4\sqrt{3}) = \boxed{-20\sqrt{3}}$

⑦  $\binom{12}{5}(2x)^7(-y)^5 + \binom{12}{6}(2x)^6(-y)^6 + \binom{12}{7}(2x)^5(-y)^7$   
 $-101376 + 59136 - 25344 = \boxed{-67584}$

⑧  $f(x) = x^{14}(3x-7) + 2(3x-7)$   $3x-7 \rightarrow \frac{7}{3}$   
 $= (x^{14} + 2)(3x-7)$   $(x^{14} + 2) \rightarrow \text{Imag.}$   
 $A = \frac{7}{3}$ ,  $B = \frac{7}{3}$ ,  $C = \frac{14}{3}$ ,  $D = \frac{7}{3}$  Sum  $\boxed{\frac{35}{3}}$

⑨  $\left(\frac{3xy^4}{2x^5y}\right)^4 \left(\frac{4yz^9}{5x^6y^7}\right)^3 \left(\frac{3xyzx^5}{4z^5}\right)^3$   
 $\left(\frac{3^4y^{12}}{2^4x^{16}}\right) \left(\frac{4^3z^{27}}{5^3x^{18}y^{18}}\right) \left(\frac{3^3x^{18}y^3}{4^3z^{12}}\right)$   
 $\downarrow$   
 $\frac{2187z^{15}}{2000x^{16}y^3}$

10

$F(x), c(4,0)$   
 $b = 9 + c^2$   
 $c = \sqrt{7}$   
 $F(4 \pm \sqrt{7}, 0)$   
 $A = 0$

$G(x), b^2 = 20$     $G(x), c^2 = 4 + 20$     $F(x), c(4,0)$   
 $b = 2\sqrt{5}$     $c = 2\sqrt{6}$    c.v.  $(4, \pm 3)$   
 $2b = 4\sqrt{5}$     $2c = 4\sqrt{6}$     $D = 0$   
 $B = 4\sqrt{5}$     $C = 4\sqrt{6}$

$(0 + 4\sqrt{5})(4\sqrt{6} + 0) = (4\sqrt{5})(4\sqrt{6}) = \boxed{16\sqrt{30}}$

11

$(2+x)\left(\frac{4-x}{2+x} = 5x-3\right)$   
 $4-x = 5x^2 + 7x - 6$   
 $5x^2 + 8x - 10$   
 $x = \frac{-8 \pm \sqrt{64 + 200}}{10}$   
 $x = \frac{-4 \pm \sqrt{66}}{5}$

Domain  $x \neq -2$   $\leftarrow \infty \rightarrow$

$\left(-\infty, \frac{-4 - \sqrt{66}}{5}\right) \cup \left(-2, \frac{-4 + \sqrt{66}}{5}\right)$

12

$A = \frac{-4}{-3} = \frac{4}{3}$

$B = 5 - \frac{4}{3} \ln 2$

$C = \frac{-5}{3}$

$D = e + \frac{3\pi}{4}$

$A+B+C+D \approx \boxed{8.82}$

SLOPE =  $-\frac{A}{B}$     $Ax + By = C$

$S = \frac{4}{3}(\ln 2) + b, b = 5 - \frac{4}{3} \ln 2$

$y_{int} = \frac{C}{B}, e = \frac{-3\pi}{4} + b$

13 Using  $x^2 + y^2 + Dx + Ey + F = 0$  SYSTEM OF EQUATIONS  $\rightarrow x^2 + y^2 - 10x + 2y + 9 = 0$

Plug in 3 points to get 3 equations

SLOPE from center  $(5, -1)$  to  $(4, 3) = -4$

$\perp$  SLOPE  $\frac{1}{4}$  AT  $4, 3$

$\therefore x - 4y = -8$     $\frac{C}{B} = \boxed{2}$

14

$\pm \frac{1}{2} \left| \begin{vmatrix} 1 & 2 & 1 \\ -3 & 4 & 1 \\ 6 & 6 & 1 \end{vmatrix} \right| = \pm \frac{1}{2} (-34) = \boxed{17}$

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$A =$

$A = 2004$

$B = 2003 \log 3 + 2004 \log 4 = \underline{2163}$

$C = \frac{-(-14028)}{7} = \underline{2004}$

$D = \frac{120}{2} \cdot \frac{60}{2} \cdot \frac{30}{2} \cdot \frac{10}{2} \cdot \frac{5}{2} = 16$

$\frac{BC}{AD} = \boxed{\frac{2163}{16}}$