ALG 2 TEAM SOLUTIONS
March 199·

[illegible]

①

Jim:	$\frac{2}{3}x$	$\frac{2}{3}x+20$
Sister	x	$x+20$

$$\frac{2}{3}x+20 = \frac{7}{8}(x+20)$$

$$\frac{2}{3}x+20 = \frac{7}{8}x+\frac{140}{8}$$

$$16x+480 = 21x+420$$

$$60 = 5x$$

$$12 = x$$

$$\boxed{12}$$

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②

$$\left(\frac{1}{a}-a^2\right)\left(a+\frac{a^2}{1-a}\right) \div \left[(a+1)^2-a\right]$$

$$\left(\frac{1-a^3}{a}\right)\left(\frac{a-a^2+a^2}{1-a}\right) \div \left[a^2+2a+1-a\right]$$

$$\frac{\cancel{(1-a)}\cancel{(1+a+a^2)}}{\cancel{a}} \left(\frac{\cancel{a}}{(\cancel{1-a})}\right) \cdot \frac{1}{(\cancel{a^2+a+1})} = 1$$

$$\boxed{1}$$

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③ $x = 2^k \qquad y = 2^{k+3} \qquad \frac{x}{y} = \frac{2^k}{2^{k+3}} = 2^{-3} = \boxed{\frac{1}{8}}$

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④

$$\frac{1}{x}+\frac{2}{y}=5$$

$$\frac{3}{x}-\frac{4}{y}=0$$

$$\begin{array}{r} \frac{2}{x}+\frac{4}{y}=10 \\ +\ \frac{3}{x}-\frac{4}{y}=0 \\ \hline \frac{5}{x} \qquad = 10 \end{array}$$

$$5 = 10x$$

$$\frac{1}{2} = x$$

$$\frac{1}{1/2}+\frac{2}{y}=5$$

$$2+\frac{2}{y}=5$$

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

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

$$\boxed{\left(\frac{1}{2}, \frac{2}{3}\right)}$$

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⑤

$$\left(2a-\frac{a^2-b^2}{a}\right)\left(3b+\frac{a^2+b^2}{b}\right) \div \left(\frac{a^2}{b^2}+5+\frac{4b^2}{a^2}\right)$$

$$\left(\frac{2a^2-a^2+b^2}{a}\right)\left(\frac{3b^2+a^2+b^2}{b}\right) \div \left(\frac{a^4+5a^2b^2+4b^4}{a^2b^2}\right)$$

$$\left(\frac{\cancel{a^2+b^2}}{\cancel{a}}\right)\left(\frac{\cancel{a^2+4b^2}}{\cancel{b}}\right) \cdot \frac{\overset{ab}{\cancel{a^2b^2}}}{\cancel{(a^2+4b^2)}\cancel{(a^2+b^2)}} = \boxed{ab}$$

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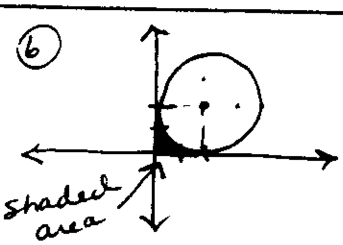
⑥



$(x-2)^2+(y-2)^2=4$ ⊙ Center $(2,2)$ radius 2

Square $2\times 2 = 4$

$\frac{1}{4}\odot = \frac{1}{4}\pi(4) = \pi$

$$\boxed{4-\pi}$$

(7) $\begin{vmatrix} 1 & 2 & 3 & -6 \\ 0 & 1 & 2 & 0 \\ 0 & 1 & 1 & 3 \\ -1 & 5 & 2 & 10 \end{vmatrix} \Rightarrow \begin{vmatrix} 1 & 2 & 3 & -6 \\ 0 & 1 & 2 & 0 \\ 0 & 1 & 1 & 3 \\ 0 & 7 & 5 & 4 \end{vmatrix} \Rightarrow \begin{vmatrix} 1 & 2 & 0 \\ 1 & 1 & 3 \\ 7 & 5 & 4 \end{vmatrix} = 4+42+0-0-15-8 = \boxed{23}$

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(8)

Two letters $\underline{26}\ \underline{26}\ \underline{10} = 6760$

$\underline{26}\ \underline{26}\ \underline{10}\ \underline{10} = 67600$

$\underline{26}\ \underline{26}\ \underline{10}\ \underline{10}\ \underline{10} = 676000$

order does not matter

${}_5C_2$

$\therefore\ {}_5C_2 \cdot 26 \cdot 26 \cdot 10 \cdot 10 \cdot 10 =$ TOTAL TAGS: $\boxed{6{,}760{,}000}$

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(9) (A) $\sqrt{8} \cdot \sqrt[6]{8} = 2^{3/2} \cdot 2^{3/6} = 2^{2} = 4$

(C) $\sqrt[4]{27} \cdot \sqrt[8]{9}$

$3^{3/4} \cdot 3^{2/8} = 3^{1}$

(B) $(8-y)^{1/3} = 4$

$8-y = 64$

$-y = 56$

$y = -56$

(D) $8^{1.2} \cdot 2^{-3.6} =$

$2^{3(1.2)} \cdot 2^{-3.6} = 2^{3.6} \cdot 2^{-3.6} = 2^{0} = 1$

$3A + B - 4C + D = 12 - 56 - 12 + 1 = \boxed{-55}$

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(10) $\begin{bmatrix} 1 & 3 \\ 2 & 7 \end{bmatrix} X = \begin{bmatrix} 4 & 1 \\ -2 & 3 \end{bmatrix}$

$X = \begin{bmatrix} 1 & 3 \\ 2 & 7 \end{bmatrix}^{-1} \begin{bmatrix} 4 & 1 \\ -2 & 3 \end{bmatrix} \Rightarrow \frac{1}{7-6} \begin{bmatrix} 7 & -3 \\ -2 & 1 \end{bmatrix} \begin{bmatrix} 4 & 1 \\ -2 & 3 \end{bmatrix} = \boxed{\begin{bmatrix} 34 & -2 \\ -10 & 1 \end{bmatrix}}$

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(11) $x = .254\overline{54}$

$100x = 25.454\overline{54}$

$99x = 25.2$

$x = \frac{25.2}{99} = \frac{252}{990} = \frac{2 \cdot \cancel{2} \cdot 7 \cdot \cancel{3 \cdot 3}}{5 \cdot \cancel{2} \cdot \cancel{9} \cdot 11} = \boxed{\frac{14}{55}}$

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(12) $xy + x + y = 71$

$x^2y + xy^2 = 880 \Rightarrow xy(x+y) = 880$

Let $a = xy \quad b = x+y$

$a + b = 71 \quad a = 71 - b$

$ab = 880 \quad (71-b)b = 880$

$71b - b^2 = 880$

$b^2 - 71b + 880 = 0$

$(b-16)(b-55) = 0$

$b = 16 \quad b = 55$

$a = 55 \quad a = 16$

I. So $x+y = 55$ and $xy = 16$

II. or $x+y = 16$ and $xy = 55$

FIRST Case isn't possible no solution with integers $xy = 16$

Case 2 $5, 11 \quad 5+11 = 16$

$5(11) = 55$

Thus $x^2 + y^2 = 5^2 + 11^2 = \boxed{146}$

(13) If the product is -96 the factor[illegible] and [illegible]

Possibilities $\quad 1, -3\cdot 2^5$ — *Sum is negative* — one is odd

$3, -2^5 \rightarrow$ 3 is odd

$\boxed{6, -2^4}$

$-12, 2^3 \rightarrow 2^3$ is a cube

$-24, 2^2 \rightarrow 2^2$ is a square

$-48, 2 \rightarrow$ 2 is a factor of 48

$\boxed{6, -16}$

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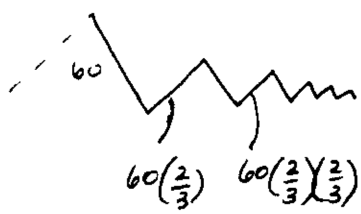
(14)



downs $60 + 60\left(\frac{3}{5}\right) + 60\left(\frac{3}{5}\right)^2 + \cdots$

$S = \dfrac{60}{1-3/5} = 150$

ups = downs $\quad 150 + 150 = 300$

-60 (1 missing up!)

$\boxed{240}$

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(15) x: rowing in still water

y: rate of current

$d = rT$

$\dfrac{d}{r} = t$

$\dfrac{10}{x+y} = 2\frac{1}{2}$

$\dfrac{10}{x-y} = 5$

$5x + 5y = 20$

$5x - 5y = 10$

$10.\ x = 30$

$x = 3$

$y = 1$

$\boxed{1}$