12.1 Answer Key

① $\frac{y-4}{y^2-16} = \frac{(y-4)}{(y-4)(y+4)} = \boxed{\frac{1}{y+4}}$

② $\frac{x+3}{x^2-9} = \frac{(x+3)}{(x+3)(x-3)} = \boxed{\frac{1}{x-3}}$

③ $\frac{a^2-a}{a-1} = \frac{a(a-1)}{(a-1)} = \boxed{a}$

④ $\frac{m^2-2m}{m-2} = \frac{m(m-2)}{(m-2)} = \boxed{m}$

⑤ $\frac{2x^2+6}{2x+6} = \frac{2(x^2+3)}{2(x+3)} = \boxed{\frac{x^2+3}{x+3}}$

⑥ $\frac{3n^2-9}{3n-9} = \frac{3(n^2-3)}{3(n-3)} = \boxed{\frac{n^2-3}{n-3}}$

⑦ $\frac{-4y^2}{2y^2-4y^3} = \frac{-4y^2}{2y^2(1-2y)} = \boxed{\frac{-2}{1-2y}}$

⑧ $\frac{3a^2}{3a^3+6a^2b} = \frac{3a^2}{3a^2(a+2b)} = \boxed{\frac{1}{a+2b}}$

⑨ $\frac{x+6}{x^2+7x+6} = \frac{(x+6)}{(x+6)(x+1)} = \boxed{\frac{1}{x+1}}$

⑩ $\frac{x-3}{x^2+x-12} = \frac{(x-3)}{(x-3)(x+4)} = \boxed{\frac{1}{x+4}}$

⑪ $\frac{9-a^2}{a^2-a-6} = \frac{(3-a)(3+a)}{(a-3)(a+2)}$

$\frac{-(a-3)(3+a)}{(a-3)(a+2)} = \boxed{\frac{-(3+a)}{a+2}}$

⑫ $\frac{25-4x^2}{2x^2+x-15} = \frac{(5-2x)(5+2x)}{2x^2+6x-5x-15}$

$\frac{(5-2x)(5+2x)}{2x(x+3)-5(x+3)} = \frac{(5-2x)(5+2x)}{(x+3)(2x-5)}$

$\frac{-(2x-5)(5+2x)}{(x+3)(2x-5)} = \boxed{\frac{-(5+2x)}{x+3}}$

⑬ $\frac{x^2-3x+2}{2x-2x^2} = \frac{(x-2)(x-1)}{2x(1-x)}$

$\frac{-(x-2)(1-x)}{2x(1-x)} = \boxed{\frac{-(x-2)}{2x}}$

⑭ $\frac{9a-3a^2}{3a^2-3a-18} = \frac{3a(3-a)}{3(a^2-a-6)} = \frac{3a(3-a)}{3(a-3)(a+2)}$

$\frac{-3a(a-3)}{3(a-3)(a+2)} = \boxed{\frac{-a}{a+2}}$

⑮ $\frac{m^2-2m-8}{m^2-m-6} = \frac{(m-4)(m+2)}{(m-3)(m+2)} = \boxed{\frac{m-4}{m-3}}$

⑯ $\frac{x^2+x-12}{x^2+2x-15} = \frac{(x+4)(x-3)}{(x+5)(x-3)} = \boxed{\frac{x+4}{x+5}}$

⑰ $\frac{2a^2-ab-b^2}{b^2+ab-2a^2} = \frac{2a^2-2ab+ab-b^2}{(b+2a)(b-a)}$

$\frac{2a(a-b)+b(a-b)}{(b+2a)(b-a)} = \frac{(a-b)(2a+b)}{(b+2a)(b-a)}$

$\frac{-(b-a)}{(b-a)} = \boxed{-1}$

⑱ $\frac{3x^2-3y^2}{y^2-x^2} = \frac{3(x^2-y^2)}{y^2-x^2} = \frac{-3(y^2-x^2)}{(y^2-x^2)} = \boxed{-3}$

⑲ $\frac{a^4-5a^2+4}{a^2-a-2} = \frac{(a^2-4)(a^2-1)}{(a-2)(a+1)}$

$\frac{(a+2)(a-2)(a+1)(a-1)}{(a-2)(a+1)} = \boxed{(a+2)(a-1)}$

⑳ $\frac{y^4-13y^2+36}{y^2+5y+6} = \frac{(y^2-9)(y^2-4)}{(y+3)(y+2)}$

$\frac{(y+3)(y-3)(y+2)(y-2)}{(y+3)(y+2)}$

$\boxed{(y-3)(y-2)}$

12.2 Answer Key

① $\frac{6a^2n}{8n^2} \cdot \frac{12n}{9a} = \frac{72a^2n^2}{72an^2} = \boxed{a}$

② $\frac{10n^3}{6x^3} \cdot \frac{12n^2x^4}{25n^3x^2} = \frac{120n^5x^4}{150n^3x^5} = \boxed{\frac{4n^3}{5x}}$

③ $\frac{3a-3b}{a} \cdot \frac{a^2}{a-b} = \frac{3a^2(a-b)}{a(a-b)} = \boxed{3a}$

④ $\frac{a^2-b^2}{a-b} \cdot \frac{7}{a+b} = \frac{7(a-b)(a+b)}{(a-b)(a+b)} = \boxed{7}$

⑤ $\frac{x-5}{x^2-7x+10} \cdot \frac{x-2}{3} = \frac{(x-5)(x-2)}{3(x-5)(x-2)} = \boxed{\frac{1}{3}}$

⑥ $\frac{x+1}{x^2-2x-3} \cdot \frac{x-3}{x+2} = \frac{(x+1)(x-3)}{(x-3)(x+1)(x+2)} = \boxed{\frac{1}{x+2}}$

⑦ $\frac{a^2-b^2}{2a^2+3ab+b^2} \cdot \frac{2a+b}{b-a} = \frac{(a-b)(a+b)(2a+b)}{(2a^2+2ab+ab+b^2)(b-a)}$

$\frac{(a-b)(a+b)(2a+b)}{(a+b)(2a+b)(b-a)} = \frac{-(b-a)(a+b)(2a+b)}{(a+b)(2a+b)(b-a)} = \boxed{-1}$

⑧ $\frac{2x-y}{x^2-y^2} \cdot \frac{(x+y)^2}{y^2-xy-2x^2} = \frac{(2x-y)(x+y)(x+y)}{(x+y)(x-y)(y-2x)(y+x)}$

$\frac{-(y-2x)}{(x-y)(y-2x)} = \boxed{\frac{-1}{x-y}}$

⑨ $\frac{y^2}{x+2} \div \frac{y}{x+2}$

$\frac{y^2}{(x+2)} \cdot \frac{(x+2)}{y}$

$\frac{y^2}{y} = \boxed{y}$

⑩ $\frac{2a^3}{a+1} \div \frac{a^2}{a+1}$

$\frac{2a^3}{a+1} \cdot \frac{a+1}{a^2}$

$\frac{2a^3}{a^2} = \boxed{2a}$

⑪ $\frac{m^2+2m+1}{2} \div \frac{m+1}{m-1} = \frac{(m+1)(m+1)}{2}$

$\frac{m-1}{m+1} = \boxed{\frac{m^2-1}{2}}$

⑫ $\frac{y^2-16}{y^2-64} \div \frac{y+4}{y-8} = \frac{(y-4)(y+4)}{(y-8)(y+8)} \cdot \frac{(y-8)}{(y+4)}$

$\boxed{\frac{y-4}{y+8}}$

⑬ $\frac{x}{x+2} \div \frac{x^2}{x^2+5x+6} = \frac{x}{(x+2)} \cdot \frac{(x+3)(x+2)}{x^2} = \boxed{\frac{x+3}{x}}$

⑭ $\frac{x^2+x-2}{x^2+5x+6} \div \frac{x^2+2x-3}{x^2+7x+12}$

$\frac{(x+2)(x-1)}{(x+3)(x+2)} \cdot \frac{(x+4)(x+3)}{(x+3)(x-1)} = \boxed{\frac{x+4}{x+3}}$

⑮ $\frac{a^2+3a-10}{a^2+8a+15} \div \frac{a^2-6a+8}{8-2a}$

$\frac{(a+5)(a-2)}{(a+5)(a+3)} \cdot \frac{2(4-a)}{(a-4)(a-2)} = \frac{-2(a-4)}{(a+3)(a-4)} = \boxed{\frac{-2}{a+3}}$

⑯ $\frac{2x^2-x-15}{x^2-2x-3} \div \frac{2x^2+3x-5}{1-x^2}$

$\frac{(x-3)(2x+5)}{(x-3)(x+1)} \cdot \frac{(1-x)(1+x)}{(2x+5)(x-1)} = \frac{-(x-1)}{(x+1)} = \boxed{-1}$

12.3 Answer Key

① $\frac{7}{3a} - \frac{4}{6a^2} = \left(\frac{2a}{2a}\right)\frac{7}{3a} - \frac{4}{6a^2}$

$\frac{14a-4}{6a^2} = \frac{2(7a-2)}{6a^2} = \boxed{\frac{7a-2}{3a^2}}$

② $\frac{5b}{7x} + \frac{3a}{21x^2} = \left(\frac{3x}{3x}\right)\frac{5b}{7x} + \frac{3a}{21x^2}$

$\frac{15xb+3a}{21x^2}$

$\frac{3(5xb+a)}{21x^2} = \boxed{\frac{5xb+a}{7x^2}}$

③ $\frac{2}{t} - \frac{t+3}{5} = \left(\frac{5}{5}\right)\frac{2}{t} - \left(\frac{t}{t}\right)\frac{t+3}{5}$

$\frac{2s-(t^2+3t)}{5t} = \boxed{\frac{2s-t^2-3t}{5t}}$

④ $\frac{7}{a} - \frac{x-1}{b} = \left(\frac{b}{b}\right)\frac{7}{a} - \left(\frac{a}{a}\right)\frac{x-1}{b}$

$\frac{7b-(ax-a)}{ab} = \boxed{\frac{7b-ax+a}{ab}}$

⑤ $\frac{a}{a+b} + \frac{8}{b} = \left(\frac{b}{b}\right)\frac{a}{a+b} + \left(\frac{a+b}{a+b}\right)\frac{8}{b}$

$\boxed{\frac{ab+8a+8b}{ab+b^2}}$

⑥ $\frac{m}{m-n} - \frac{5}{m} = \left(\frac{m}{m}\right)\frac{m}{m-n} - \left(\frac{m-n}{m-n}\right)\frac{5}{m}$

$\frac{m^2-(5m-5n)}{m^2-mn} = \boxed{\frac{m^2-5m+5n}{m^2-mn}}$

⑦ $\frac{x+y}{y-2} + \frac{x-y}{2-y}$ multiply by (-1) twice

$\frac{x+y}{y-2} - \frac{x-y}{y-2} = \frac{(x+y)-(x-y)}{y-2}$

$\frac{x+y-x+y}{y-2} = \boxed{\frac{2y}{y-2}}$

⑧ $\frac{a+b}{x-3} + \frac{a+b}{3-x}$ multiply by (-1) twice

$\frac{a+b}{x-3} - \frac{a+b}{x-3} = \frac{(a+b)-(a+b)}{x-3}$

$\frac{a+b-a-b}{x-3} = \frac{0}{x-3} = \boxed{0}$

⑨ $\frac{2y}{y^2-25} + \frac{y+5}{y-5} = \frac{2y}{(y+5)(y-5)} + \left(\frac{y+5}{y+5}\right)\frac{y+5}{y-5} = \frac{2y+(y+5)(y+5)}{(y+5)(y-5)} = \boxed{\frac{y^2+12y+25}{y^2-25}}$

⑩ $\frac{m-n}{m+n} - \frac{1}{m^2-n^2} = \left(\frac{m-n}{m-n}\right)\frac{m-n}{m+n} - \frac{1}{(m-n)(m+n)} = \frac{(m-n)^2-1}{(m-n)(m+n)} = \boxed{\frac{m^2-2mn+n^2+1}{m^2-n^2}}$

⑪ $\frac{x^2-1}{x+1} + \frac{x^2+1}{x-1} = \frac{(x+1)(x-1)}{(x+1)} + \frac{x^2+1}{x-1}$

$\left(\frac{x-1}{x-1}\right)\frac{x-1}{1} + \frac{x^2+1}{x-1} = \frac{(x^2-2x+1)+(x^2+1)}{x-1}$

$\boxed{\frac{2x^2-2x+2}{x-1}}$ or $\boxed{\frac{2(x^2-x+1)}{x-1}}$

⑫ $\frac{k}{2k+1} - \frac{2}{k+2} = \left(\frac{k+2}{k+2}\right)\frac{k}{2k+1} - \left(\frac{2k+1}{2k+1}\right)\frac{2}{k+2}$

$\frac{(k^2+2k)-(4k+2)}{(k+2)(2k+1)} = \boxed{\frac{k^2-2k-2}{2k^2+5k+2}}$

⑬ $\frac{-18}{y^2-9} + \frac{7}{3-y} = \frac{-18}{(y+3)(y-3)} + \frac{7}{(3-y)}\left(\frac{-1}{-1}\right)$

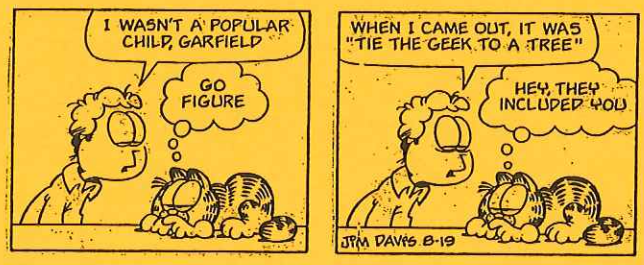
$\frac{-18}{(y+3)(y-3)} - \frac{7}{(y-3)}\left(\frac{y+3}{y+3}\right)$

$\frac{-18-(7y+21)}{y^2-9} = \boxed{\frac{-7y-39}{y^2-9}}$

⑭ $\frac{-3}{5-a} + \frac{5}{a^2-25} = \left(\frac{-1}{-1}\right)\frac{-3}{(5-a)} + \frac{5}{(a+5)(a-5)}$

$\frac{3}{a-5}\left(\frac{a+5}{a+5}\right) + \frac{5}{(a+5)(a-5)}$

$\frac{(3a+15)+5}{(a+5)(a-5)} = \boxed{\frac{3a+20}{a^2-25}}$

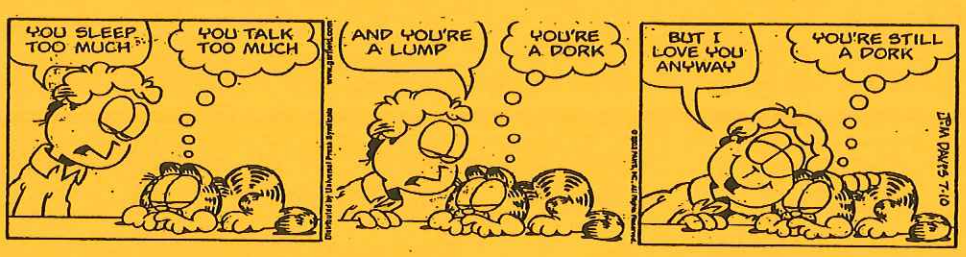


(15) $\frac{a}{a-b} + \frac{b}{2b+3a} = \left(\frac{2b+3a}{2b+3a}\right)\frac{a}{a-b} + \left(\frac{a-b}{a-b}\right)\frac{b}{2b+3a} = \frac{(2ab+3a^2)+(ab-b^2)}{(2b+3a)(a-b)} = \boxed{\frac{3a^2+3ab-b^2}{3a^2-ab-2b^2}}$

(16) $\frac{m-1}{m+1} + \frac{4}{2m+5} = \left(\frac{2m+5}{2m+5}\right)\frac{m-1}{m+1} + \left(\frac{m+1}{m+1}\right)\frac{4}{2m+5} = \frac{(2m^2+3m-5)+(4m+4)}{2m^2+7m+5} = \boxed{\frac{2m^2+7m-1}{2m^2+7m+5}}$

(17) $\frac{4a}{6a^2-a-2} - \frac{5a+1}{2-3a} = \frac{4a}{(2a+1)(3a-2)} + \frac{5a+1}{3a-2} = \frac{4a}{(2a+1)(3a-2)} + \left(\frac{2a+1}{2a+1}\right)\frac{5a+1}{3a-2} = \frac{4a+(10a^2+7a+1)}{(2a+1)(3a-2)}$

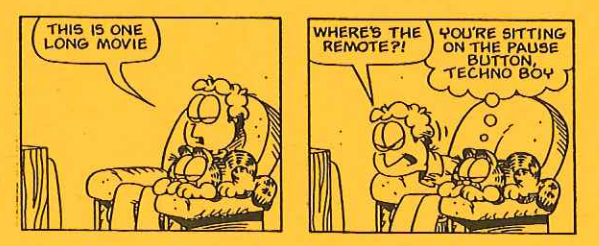
$\boxed{\frac{10a^2+11a+1}{6a^2-a-2}}$



(18) $\frac{2x+1}{(x-1)^2} + \frac{x-2}{(1-x)(x+4)}$

$\frac{2x+1}{(x-1)^2} - \frac{x-2}{(x-1)(x+4)} = \left(\frac{x+4}{x+4}\right)\frac{2x+1}{(x-1)^2} - \left(\frac{x-1}{x-1}\right)\frac{x-2}{(x-1)(x+4)} = \frac{(2x^2+9x+4)-(x^2-3x+2)}{(x+4)(x-1)^2} = \boxed{\frac{x^2+12x+2}{(x+4)(x-1)^2}}$

(19) $\frac{2t^2-t-21}{2t^2-15t+28} = \frac{(t+3)(2t-7)}{(t-4)(2t-7)} = \boxed{\frac{t+3}{t-4}}$



(20) $\frac{x^2-4x+4}{x^2+4x-12} = \frac{(x-2)(x-2)}{(x+6)(x-2)} = \boxed{\frac{x-2}{x+6}}$

(21) $\frac{x^2-15x+50}{x^2-9x+20} \cdot \frac{x^2-11x+24}{x^2-18x+80} = \frac{(x-5)(x-10)}{(x-5)(x-4)} \cdot \frac{(x-8)(x-3)}{(x-8)(x-10)} = \boxed{\frac{x-3}{x-4}}$

(22) $\frac{y}{5} \div \frac{y^2-25}{5-y} = \frac{y}{5} \cdot \frac{5-y}{(y-5)(y+5)} = \frac{y}{5} \cdot \frac{-(y-5)}{(y-5)(y+5)} = \boxed{\frac{-y}{5y+25}}$

(23) $\frac{x^2-16}{16-x^2} \div \frac{7}{x}$

$\frac{-(16-x^2)}{(16-x^2)} \cdot \frac{x}{7} = \boxed{\frac{-x}{7}}$

(24) $\frac{x^4-37x^2+36}{x^2-7x+6} = \frac{(x^2-36)(x^2-1)}{(x-6)(x-1)}$

$\frac{(x-6)(x+6)(x-1)(x+1)}{(x-6)(x-1)}$

$\boxed{(x+6)(x+1)}$ or $\boxed{(x^2+7x+6)}$

12.4
Answer Key

(1) $\frac{\frac{x^2}{y}}{\frac{y}{x^3}} = \frac{x^2}{y} \cdot \frac{x^3}{y} = \boxed{\frac{x^5}{y^2}}$

② $\dfrac{\frac{a^3}{b^2}}{\frac{b}{a^2}}$

$\frac{a^3}{b^2} \cdot \frac{a^2}{b}$

$\boxed{\frac{a^5}{b^3}}$

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

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

$\boxed{\frac{1}{xy^2}}$

④ $\dfrac{\frac{a^2}{b}}{\frac{a}{b^2}}$

$\frac{a^2}{b} \cdot \frac{b^2}{a}$

$\boxed{ab}$

⑤ $\dfrac{\frac{a^2b^3}{c^2}}{\frac{ac^2}{b}}$

$\frac{a^2b^3}{c^2} \cdot \frac{b}{ac^2}$

$\boxed{\frac{ab^4}{c^4}}$

⑥ $\dfrac{\frac{x^3y}{z^2}}{\frac{z^2x}{y^2}}$

$\frac{x^3y}{z^2} \cdot \frac{y^2}{z^2x}$

$\boxed{\frac{x^2y^3}{z^4}}$

⑦ $\dfrac{\frac{x+y}{a+b}}{\frac{x^2-y^2}{a^2-b^2}}$

$\frac{(x+y)}{(a+b)} \cdot \frac{(a+b)(a-b)}{(x+y)(x-y)}$

$\boxed{\frac{a-b}{x-y}}$

⑧ $\dfrac{\frac{4n^2-m^2}{n^2}}{\frac{2n+m}{n}}$

$\frac{(2n+m)(2n-m)}{n^2} \cdot \frac{n}{(2n+m)}$

$\boxed{\frac{2n-m}{n}}$

⑨ $\dfrac{\frac{1}{x}+\frac{1}{y}}{\frac{1}{x}-\frac{1}{y}}$

$\frac{\frac{y+x}{xy}}{\frac{y-x}{xy}} = \frac{y+x}{xy} \cdot \frac{xy}{y-x} = \boxed{\frac{y+x}{y-x}}$

⑩ $\dfrac{\frac{a}{b}+\frac{a}{c}}{\frac{a}{b^2-bc}} = \dfrac{\frac{ac+ab}{bc}}{\frac{a}{b(b-c)}} = \frac{a(c+b)}{bc} \cdot \frac{b(b-c)}{a}$

$\frac{(b+c)(b-c)}{c} = \boxed{\frac{b^2-c^2}{c}}$

⑪ $\dfrac{\frac{x^2+8x+15}{x^2+x-6}}{\frac{x^2+2x-15}{x^2-2x-3}} = \frac{(x+5)(x+3)}{(x+3)(x-2)} \cdot \frac{(x-3)(x+1)}{(x+5)(x-3)}$

$\boxed{\frac{x+1}{x-2}}$

⑫ $\dfrac{\frac{a^2-6a+5}{a^2+13a+42}}{\frac{a^2-4a+3}{a^2+3a-18}}$

$\frac{(a-5)(a-1)}{(a+6)(a+7)} \cdot \frac{(a+6)(a-3)}{(a-3)(a-1)} = \boxed{\frac{a-5}{a+7}}$

⑬ $\dfrac{\frac{y^2-1}{y^2+3y-4}}{\frac{y+1}{}} = \frac{\frac{(y+1)(y-1)}{(y+4)(y-1)}}{(y+1)}$

$\frac{(y+1)}{(y+4)} \cdot \frac{1}{(y+1)} = \boxed{\frac{1}{y+4}}$

⑭ $\dfrac{\frac{a^2-2a-3}{a^2-1}}{a-3} = \frac{(a-3)(a+1)}{(a+1)(a-1)}$

$\frac{(a-3)}{(a-1)} \cdot \frac{1}{(a-3)} = \boxed{\frac{1}{a-1}}$

(15) $\dfrac{x+5+\frac{3}{x+1}}{x-1-\frac{3}{x+1}} = \dfrac{\frac{(x+5)(x+1)}{(x+1)}+\frac{3}{(x+1)}}{\frac{(x-1)(x+1)}{(x+1)}-\frac{3}{(x+1)}}$

$\dfrac{\frac{(x+5)(x+1)+3}{(x+1)}}{\frac{(x-1)(x+1)-3}{(x+1)}} = \dfrac{\frac{x^2+6x+8}{x+1}}{\frac{x^2-4}{x+1}}$

$\dfrac{\frac{(x+4)(x+2)}{(x+1)}}{\frac{(x+2)(x-2)}{(x+1)}} = \dfrac{(x+4)(x+2)}{(x+1)} \cdot \dfrac{(x+1)}{(x+2)(x-2)}$

$\boxed{\dfrac{x+4}{x-2}}$

(16) $\dfrac{x+2+\frac{2}{x+5}}{x+6+\frac{6}{x+1}} = \dfrac{\frac{(x+2)(x+5)+2}{(x+5)}}{\frac{(x+6)(x+1)+6}{(x+1)}}$

$\dfrac{\frac{x^2+7x+12}{x+5}}{\frac{x^2+7x+12}{x+1}} = \dfrac{(x^2+7x+12)}{x+5} \cdot \dfrac{x+1}{(x^2+7x+12)}$

$\boxed{\dfrac{x+1}{x+5}}$

(17) $\dfrac{x-1-\frac{15}{x+1}}{x-4} = \dfrac{\frac{(x-1)(x+1)-15}{(x+1)}}{(x-4)}$

$\dfrac{\frac{x^2-16}{x+1}}{x-4} = \dfrac{(x-4)(x+4)}{(x+1)} \cdot \dfrac{1}{(x-4)}$

$\boxed{\dfrac{x+4}{x+1}}$

(18) $\dfrac{\frac{a^2-a-1}{a-1}}{a-\frac{1}{a-1}} = \dfrac{\frac{a^2-a-1}{a-1}}{\frac{a(a-1)-1}{a-1}} = \dfrac{\frac{a^2-a-1}{a-1}}{\frac{a^2-a-1}{a-1}} = \boxed{1}$

(19) $\dfrac{x+5+\frac{4}{x+1}}{x+3} = \dfrac{\frac{(x+5)(x+1)+4}{(x+1)}}{(x+3)}$

$\dfrac{\frac{x^2+6x+9}{x+1}}{x+3} = \dfrac{(x+3)(x+3)}{(x+1)} \cdot \dfrac{1}{(x+3)} = \boxed{\dfrac{x+3}{x+1}}$

(20) $\dfrac{a^2+a-6}{a^2+8a+15} = \dfrac{(a+3)(a-2)}{(a+5)(a+3)} = \boxed{\dfrac{a-2}{a+5}}$

(21) $\dfrac{x^2-y^2}{x^2+2xy+y^2} = \dfrac{(x+y)(x-y)}{(x+y)(x+y)} = \boxed{\dfrac{x-y}{x+y}}$

(22) $\dfrac{x^2-4}{x^2-3x-10} \cdot \dfrac{x^2+x-30}{x^2+3x-18}$

$\dfrac{(x+2)(x-2)}{(x-5)(x+2)} \cdot \dfrac{(x+6)(x-5)}{(x+6)(x-3)} = \boxed{\dfrac{x-2}{x-3}}$

(23) $\dfrac{a+b}{a^2-a-6} \div \dfrac{a+b}{(a+2)^2}$

$\dfrac{(a+b)}{(a-3)(a+2)} \cdot \dfrac{(a+2)(a+2)}{(a+b)} = \boxed{\dfrac{a+2}{a-3}}$

(24) $\dfrac{3}{x^2-3x-10} - \dfrac{3}{x-5}$

$\dfrac{3}{(x-5)(x+2)} - \dfrac{3}{x-5}\left(\dfrac{x+2}{x+2}\right)$

$\dfrac{3-3(x+2)}{(x-5)(x+2)} = \dfrac{3-3x-6}{x^2-3x-10}$

$\boxed{\dfrac{-3x-3}{x^2-3x-10}}$ or $\boxed{\dfrac{-3(x+1)}{(x-5)(x+2)}}$

(25) $\frac{2}{x^2-10x+21} + \frac{4}{7-x}$

$\frac{2}{(x-7)(x-3)} - \frac{4}{(x-7)}$

$\frac{2}{(x-7)(x-3)} - \frac{4}{(x-7)}\left(\frac{x-3}{x-3}\right)$

$\frac{2-4(x-3)}{(x-7)(x-3)} = \frac{2-4x+12}{x^2-10x+21}$

$\boxed{\frac{-4x+14}{x^2-10x+21}}$ or $\boxed{\frac{-2(2x-7)}{(x-7)(x-3)}}$

12.5 Answer Key

(1) $\left[\frac{x+1}{x} + \frac{x+4}{x} = 6\right]$ mult. by x

$(x+1)+(x+4) = 6x$

$2x+5 = 6x$

$5 = 4x$ $\boxed{x = 5/4}$

(2) $\left[\frac{18}{b} = \frac{3}{b} + 5\right]$ mult. by b

$18 = 3+5b$

$15 = 5b$ $\boxed{b = 3}$

(3) $\left[\frac{11}{2x} - \frac{2}{3x} = \frac{1}{6}\right]$ mult. by $6x$

$33 - 4 = x$ $\boxed{x = 29}$

(4) $\left[\frac{2}{3x} - \frac{5}{2x} = \frac{11}{6}\right]$ mult. by $6x$

$4 - 15 = 11x$

$-11 = 11x$ $\boxed{x = -1}$

(5) $\left[\frac{m}{m+1} + \frac{5}{m-1} = 1\right] (m+1)(m-1)$

$m(m-1)+5(m+1) = 1(m+1)(m-1)$

$m^2-m+5m+5 = m^2-1$

$4m = -6$ $\boxed{m = -3/2}$

(6) $\left[\frac{r-1}{r+1} - \frac{2r}{r-1} = -1\right] (r+1)(r-1)$

$(r-1)(r-1) - 2r(r+1) = -1(r+1)(r-1)$

$(r^2-2r+1) - (2r^2+2r) = -r^2+1$

$r^2-2r+1-2r^2-2r = -r^2+1$

$-4r = 0$ $\boxed{r = 0}$

(7) $\frac{5}{5-p} + \frac{p^2}{p-5} = -2$

$\left[\frac{5}{5-p} - \frac{p^2}{5-p} = -2\right] (5-p)$

$5-p^2 = -2(5-p)$

$5-p^2 = -10+2p$

$0 = p^2+2p-15$

$(p+5)(p-3) = 0$ $\boxed{p = -5, 3}$

(8) $\frac{r^2}{r-7} + \frac{50}{7-r} = 14$

$\left[\frac{r^2}{r-7} - \frac{50}{r-7} = 14\right] (r-7)$

$r^2-50 = 14(r-7)$

$r^2-50 = 14r-98$

$r^2-14r+48 = 0$

$(r-6)(r-8) = 0$ $\boxed{r = 6, 8}$

(9) $\left[\frac{2b-5}{b-2} - 2 = \frac{3}{b+2}\right] (b-2)(b+2)$

$(2b-5)(b+2) - 2(b-2)(b+2) = 3(b-2)$

$(2b^2-b-10) - (2b^2-8) = 3b-6$

continued

$2b^2-b-10-2b^2+8=3b-6$

$-4b=-4$ $\boxed{b=1}$

⑩ $\left[\frac{z+3}{z-1}+\frac{z+1}{z-3}=2\right](z-1)(z-3)$

$(z+3)(z-3)+(z+1)(z-1)=2(z-1)(z-3)$

$(z^2-9)+(z^2-1)=2z^2-8z+6$

$2z^2-10=2z^2-8z+6$

$-16=-8z$ $\boxed{z=2}$

⑪ $\left[\frac{7}{k-3}-\frac{1}{2}=\frac{3}{k-4}\right](2)(k-3)(k-4)$

$7(2)(k-4)-1(k-3)(k-4)=3(2)(k-3)$

$(14k-56)-(k^2-7k+12)=6k-18$

$0=k^2-15k+50$

$0=(k-5)(k-10)$ $\boxed{k=5,10}$

⑫ $\left[\frac{x+2}{x-2}-\frac{2}{x+2}=\frac{-7}{3}\right](3)(x-2)(x+2)$

$(x+2)(3)(x+2)-2(3)(x-2)=-7(x-2)(x+2)$

$(3x^2+12x+12)-(6x-12)=-7(x^2-4)$

$3x^2+12x+12-6x+12=-7x^2+28$

$10x^2+6x-4=0$

$2(5x^2+3x-2)=0$

$2(5x^2+5x-2x-2)=0$

$2[5x(x+1)-2(x+1)]=0$

$2(5x-2)(x+1)=0$ $\boxed{x=2/5,-1}$

⑬ $\left[\frac{x-2}{x}-\frac{x-3}{x-6}=\frac{1}{x}\right](x)(x-6)$

$(x-2)(x-6)-(x-3)(x)=1(x-6)$

$(x^2-8x+12)-(x^2-3x)=x-6$

$x^2-8x+12-x^2+3x=x-6$

$-5x+12=x-6$

$-6x=-18$

$\boxed{x=3}$

⑭ $\left[\frac{14}{n-6}=\frac{1}{2}+\frac{6}{n-8}\right](2)(n-6)(n-8)$

$14(2)(n-8)=1(n-6)(n-8)+6(2)(n-6)$

$28n-224=(n^2-14n+48)+(12n-72)$

$28n-224=n^2-14n+48+12n-72$

$0=n^2-30n+200$

$0=(n-10)(n-20)$ $\boxed{n=10,20}$

⑮ $\frac{5}{x-3}+\frac{-x}{3-x}=x$

$\left[\frac{5}{x-3}+\frac{x}{x-3}=x\right](x-3)$

$5+x=x(x-3)$

$5+x=x^2-3x$

$0=x^2-4x-5$

$0=(x-5)(x+1)$ $\boxed{x=5,-1}$

⑯ $\frac{c}{c-4}-\frac{6}{4-c}=c$

$\left[\frac{c}{c-4}+\frac{6}{c-4}=c\right](c-4)$

$c+6=c(c-4)$

$c+6=c^2-4c$

$0=c^2-5c-6$

$0=(c-6)(c+1)$ $\boxed{c=6,-1}$

⑰ $\frac{2n^2-5n+2}{2n^2-7n+3}=\frac{2n^2-4n-n+2}{2n^2-6n-n+3}$

$\frac{2n(n-2)-1(n-2)}{2n(n-3)-1(n-3)}=\frac{(2n-1)(n-2)}{(2n-1)(n-3)}=\boxed{\frac{n-2}{n-3}}$

⑱ $\frac{x+3}{x-4}\div\frac{2x^2+11x+15}{2x^2-8x}$

$\frac{x+3}{x-4}\div\frac{(2x+5)(x+3)}{2x(x-4)}$

$\frac{(x+3)}{(x-4)}\cdot\frac{2x(x-4)}{(2x+5)(x+3)}=\boxed{\frac{2x}{2x+5}}$

(19) $\frac{a}{a+1} - \frac{1}{a^2+a} = \frac{a}{a+1} - \frac{1}{a(a+1)}$

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

$\frac{(a+1)(a-1)}{a(a+1)} = \boxed{\frac{a-1}{a}}$

(20) $\dfrac{n+2-\frac{30}{n+1}}{n-\frac{2(n+6)}{n+1}} = \dfrac{n+2\left(\frac{n+1}{n+1}\right)-\frac{30}{n+1}}{n\left(\frac{n+1}{n+1}\right)-\frac{2n+12}{n+1}}$

$\dfrac{\frac{(n^2+3n+2)-30}{n+1}}{\frac{(n^2+n)-2n-12}{n+1}} = \dfrac{\frac{n^2+3n-28}{n+1}}{\frac{n^2-n-12}{n+1}}$

$\dfrac{\frac{(n+7)(n-4)}{(n+1)}}{\frac{(n+3)(n-4)}{(n+1)}}$

$\frac{(n+7)\cancel{(n-4)}}{\cancel{(n+1)}} \cdot \frac{\cancel{(n+1)}}{\cancel{(n+3)}\cancel{(n-4)}} = \boxed{\frac{n+7}{n+3}}$

12.6
Answer Key

(1)

	r	$\cdot$	t	$=$	w
Jane	$1/4$	$\cdot$	t	$=$	$t/4$
Jim	$1/6$	$\cdot$	t	$=$	$t/6$

$\frac{t}{4} + \frac{t}{6} = 1$

(24) $\left[\frac{t}{4} + \frac{t}{6} = 1\right]$

$6t + 4t = 24$
$10t = 24$
$t = 12/5$

$\boxed{2\frac{2}{5}\text{ hrs} \text{ or } 2:24}$

(2)

	r	$\cdot$	t	$=$	w
Mark	$1/6$	$\cdot$	t	$=$	$t/6$
Rosetta	$1/8$	$\cdot$	t	$=$	$t/8$

(24) $\left[\frac{t}{6} + \frac{t}{8} = 1\right]$

$4t + 3t = 24$
$7t = 24$
$t = 24/7$

$\boxed{3\frac{3}{7}\text{ hrs} \text{ or } \approx 3:26}$

(3)

	r	$\cdot$	t	$=$	w
Helena	$1/5$	$\cdot$	t	$=$	$t/5$
Jeff	$1/8$	$\cdot$	t	$=$	$t/8$

(40) $\left[\frac{t}{5} + \frac{t}{8} = 1\right]$

$8t + 5t = 40$
$13t = 40$
$t = 40/13$

$\boxed{3\frac{1}{13}\text{ days}}$

(4)

	r	$\cdot$	t	$=$	w
Frank	$1/10$	$\cdot$	t	$=$	$t/10$
Keith	$1/15$	$\cdot$	t	$=$	$t/15$

(30) $\left[\frac{t}{10} + \frac{t}{15} = 1\right]$

$3t + 2t = 30$
$5t = 30$
$t = 6$

$\boxed{6\text{ hours}}$

(5)

	r	$\cdot$	t	$=$	w
Pipe #1	$1/12$	$\cdot$	t	$=$	$t/12$
Pipe #2	$1/4$	$\cdot$	t	$=$	$t/4$

(12) $\left[\frac{t}{12} + \frac{t}{4} = 1\right]$

$t + 3t = 12$
$4t = 12$
$t = 3$

$\boxed{3\text{ hours}}$

⑥

	r	$\cdot$	t	$=$	w
Pipe #1	$1/3$	$\cdot$	t	$=$	$t/3$
Pipe #2	$1/10$	$\cdot$	t	$=$	$t/10$

(30) $\left[\frac{t}{3}+\frac{t}{10}=1\right]$

$10t+3t=30$
$13t=30$
$t=30/13$

$2\frac{4}{13}$ hours or $\approx 2:18$

⑦

	r	$\cdot$	t	$=$	w
Fill Pipe	$1/10$	$\cdot$	t	$=$	$t/10$
Drain Pipe	$1/15$	$\cdot$	t	$=$	$t/15$

(30) $\left[\frac{t}{10}-\frac{t}{15}=1\right]$

$3t-2t=30$
$t=30$

30 hours

⑧

	r	$\cdot$	t	$=$	w
Fill Pipe #1	$1/6$	$\cdot$	t	$=$	$t/6$
Fill Pipe #2	$1/4$	$\cdot$	t	$=$	$t/4$
Drain Pipe	$1/12$	$\cdot$	t	$=$	$t/12$

(12) $\left[\frac{t}{6}+\frac{t}{4}-\frac{t}{12}=1\right]$

$2t+3t-t=12$
$4t=12$
$t=3$

3 hours

⑨

	r	$\cdot$	t	$=$	w
Cindy	$1/6$	$\cdot$	$18/5$	$=$	$3/5$
Erica	r	$\cdot$	$18/5$	$=$	$2/5$

once it is determined that Cindy did 3/5 of the work, Erica must have done the remaining 2/5

$\frac{18r}{5}=\frac{2}{5}$
$18r=2 \quad r=1/9$

9 hours

⑩

	r	$\cdot$	t	$=$	w
Ben	$1/3$	$\cdot$	$15/8$	$=$	$5/8$
Jason	r	$\cdot$	$15/8$	$=$	$3/8$

$\frac{15r}{8}=\frac{3}{8} \quad 15r=3 \quad r=\frac{1}{5}$ 5 days

⑪

	r	$\cdot$	t	$=$	w
John	3	$\cdot$	$1/5$	$=$	$3/5$
Denise	r	$\cdot$	$1/5$	$=$	$2/5$

$\frac{r}{5}=\frac{2}{5} \quad r=2$ 1/2 hour

⑫

	r	$\cdot$	t	$=$	w
Ann	$3r$	$\cdot$	$3/4$	$=$	$9r/4$
Phil	r	$\cdot$	$3/4$	$=$	$3r/4$

(4) $\left[\frac{9r}{4}+\frac{3r}{4}=1\right]$

$9r+3r=4$
$12r=4$
$r=1/3$
$3r=1$

reciprocal of $1=1$

1 hour

⑬ $\frac{n^4-26n^2+25}{n^2+4n-5}=\frac{(n^2-25)(n^2-1)}{(n+5)(n-1)}$

$\frac{(n+5)(n-5)(n+1)(n-1)}{(n+5)(n-1)}$

$(n-5)(n+1)$ or n^2-4n-5

⑭ $\frac{9}{x^2-7x+12}=\frac{5}{x-3}+\frac{2}{x-4}$

$(x-3)(x-4)\left[\frac{9}{(x-3)(x-4)}=\frac{5}{x-3}+\frac{2}{x-4}\right]$

$9=5(x-4)+2(x-3)$
$9=5x-20+2x-6$
$35=7x$

$x=5$

Unit 12
REVIEW
Answer Key

① $\frac{x+y}{x^2-y^2} = \frac{(x+y)}{(x+y)(x-y)} = \boxed{\frac{1}{x-y}}$

② $\frac{x+y}{x^2+2xy+y^2} = \frac{(x+y)}{(x+y)(x+y)} = \boxed{\frac{1}{x+y}}$

③ $\frac{2b-2a}{a^2-b^2} = \frac{2(b-a)}{(a-b)(a+b)}$

$\frac{-2(a-b)}{(a-b)(a+b)} = \boxed{\frac{-2}{a+b}}$

④ $\frac{12-3x}{x^2-x-12} = \frac{3(4-x)}{(x-4)(x+3)}$

$\frac{-3(x-4)}{(x-4)(x+3)} = \boxed{\frac{-3}{x+3}}$

⑤ $\frac{6x^2+17x-14}{3x^2-20x+12}$

$\frac{(3x-2)(2x+7)}{(3x-2)(x-6)} = \boxed{\frac{2x+7}{x-6}}$

⑥ $\frac{3m^2+8m-3}{6m^2+17m-3}$

$\frac{(3m-1)(m+3)}{(6m-1)(m+3)} = \boxed{\frac{3m-1}{6m-1}}$

⑦ $\frac{n^4-13n^2+36}{n^2-5n+6} = \frac{(n^2-4)(n^2-9)}{(n-3)(n-2)}$

$\frac{(n+2)(n-2)(n+3)(n-3)}{(n-3)(n-2)}$

$\boxed{n^2+5n+6}$

⑧ $\frac{x^4-25x^2+144}{x^2-x-12} = \frac{(x^2-9)(x^2-16)}{(x-4)(x+3)}$

$\frac{(x+3)(x-3)(x+4)(x-4)}{(x-4)(x+3)}$

$\boxed{x^2+x-12}$

⑨ $\frac{6m^3n}{16a^2} \cdot \frac{4a^2m}{9n^3} = \boxed{\frac{m^4}{6n^2}}$

⑩ $\frac{7xy^3}{11z^2} \cdot \frac{44z^3}{21x^2y} = \boxed{\frac{4y^2z}{3x}}$

⑪ $\frac{n^2+20n+99}{n+9} \cdot \frac{n+7}{n^2+12n+11}$

$\frac{(n+11)(n+9)(n+7)}{(n+9)(n+11)(n+1)} = \boxed{\frac{n+7}{n+1}}$

⑫ $\frac{x^2+19x+84}{x-3} \cdot \frac{x^2-9}{x^2+15x+36}$

$\frac{(x+12)(x+7)(x+3)(x-3)}{(x-3)(x+3)(x+12)} = \boxed{x+7}$

⑬ $\frac{t^2+8t+16}{w^2-6w+9} \div \frac{2t+8}{3w-9}$

$\frac{(t+4)(t+4)}{(w-3)(w-3)} \cdot \frac{3(w-3)}{2(t+4)} = \boxed{\frac{3t+12}{2w-6}}$

⑭ $\frac{k^2-81}{2k^2-72} \div \frac{k-9}{2k+12}$

$\frac{(k+9)(k-9)}{2(k+6)(k-6)} \cdot \frac{2(k+6)}{(k-9)} = \boxed{\frac{k+9}{k-6}}$

⑮ $\frac{a^2+a-6}{3a^2+13a+12} \div \frac{a^2+3a-10}{3a^2+7a+4}$

$\frac{(a-2)(a+3)}{(3a+4)(a+3)} \cdot \frac{(a+1)(3a+4)}{(a+5)(a-2)} = \boxed{\frac{a+1}{a+5}}$

(16) $\frac{2n^3+6n^2}{n^2-1} \div \frac{n^2+6n+9}{n^2-n}$

$\frac{2n^2(n+3)}{(n+1)(n-1)} \cdot \frac{n(n-1)}{(n+3)(n+3)} = \boxed{\frac{2n^3}{n^2+4n+3}}$

(17) $\frac{x+8}{x^2-64} + \frac{1}{8-x} = \frac{x+8}{(x-8)(x+8)} - \frac{1}{(x-8)}\left(\frac{x+8}{x+8}\right)$

$\frac{(x+8)-(x+8)}{x^2-64} = \frac{0}{x^2-64} = \boxed{0}$

(18) $\frac{3}{a+b} + \frac{1}{b^2-a^2} = \frac{3}{a+b} - \frac{1}{a^2-b^2}$

$\left(\frac{a-b}{a-b}\right)\frac{3}{a+b} - \frac{1}{(a-b)(a+b)} = \boxed{\frac{3a-3b-1}{a^2-b^2}}$

(19) $\frac{2x+3}{x^2-4} + \frac{6}{x+2} = \frac{2x+3}{(x+2)(x-2)} + \frac{6}{x+2}\left(\frac{x-2}{x-2}\right)$

$\frac{2x+3+6x-12}{(x+2)(x-2)} = \boxed{\frac{8x-9}{x^2-4}}$

(20) $\frac{-3}{a-5} + \frac{-6}{a^2-5a}$

$\frac{-3}{a-5}\left(\frac{a}{a}\right) + \frac{-6}{a(a-5)} = \boxed{\frac{-3a-6}{a^2-5a}}$

(21) $\frac{3a+2}{3a-6} - \frac{a+2}{a^2-4} = \frac{3a+2}{3(a-2)} - \frac{a+2}{(a-2)(a+2)}$

$\frac{3a+2}{3(a-2)}\left(\frac{a+2}{a+2}\right) - \frac{a+2}{(a-2)(a+2)}\left(\frac{3}{3}\right)$

$\frac{(3a^2+8a+4)-(3a+6)}{3(a-2)(a+2)} = \frac{3a^2+5a-2}{3(a-2)(a+2)}$

$\frac{(3a-1)(a+2)}{3(a-2)(a+2)} = \boxed{\frac{3a-1}{3a-6}}$

(22) $\frac{n-2}{n+2} - \frac{16}{n^2-4} = \frac{n-2}{n+2} - \frac{16}{(n+2)(n-2)}$

continued

$\frac{n-2}{n+2}\left(\frac{n-2}{n-2}\right) - \frac{16}{(n+2)(n-2)}$

$\frac{(n^2-4n+4)-16}{(n+2)(n-2)} = \frac{n^2-4n-12}{(n+2)(n-2)}$

$\frac{(n-6)(n+2)}{(n+2)(n-2)} = \boxed{\frac{n-6}{n-2}}$

(23) $\frac{30-6a}{a^2-9} - \frac{a-5}{3-a} = \frac{30-6a}{(a+3)(a-3)} + \frac{a-5}{a-3}\left(\frac{a+3}{a+3}\right)$

$\frac{(30-6a)+(a^2-2a-15)}{(a-3)(a+3)} = \frac{a^2-8a+15}{(a-3)(a+3)}$

$\frac{(a-5)(a-3)}{(a-3)(a+3)} = \boxed{\frac{a-5}{a+3}}$

(24) $\frac{-n-5}{n^2+2n-15} - \frac{n}{3-n} = \frac{-n-5}{(n+5)(n-3)} + \frac{n}{n-3}\left(\frac{n+5}{n+5}\right)$

$\frac{(-n-5)+(n^2+5n)}{(n+5)(n-3)} = \frac{n^2+4n-5}{(n+5)(n-3)}$

$\frac{(n+5)(n-1)}{(n+5)(n-3)} = \boxed{\frac{n-1}{n-3}}$

(25) $\frac{\frac{a+b}{c}}{\frac{a^2-b^2}{c^2}} = \frac{(a+b)}{c} \cdot \frac{c^2}{(a+b)(a-b)}$

$\boxed{\frac{c}{a-b}}$

(26) $\frac{\frac{n^2-9}{n^2-4}}{\frac{n^2-4n+3}{n+2}}$

$\frac{(n+3)(n-3)}{(n+2)(n-2)} \cdot \frac{(n+2)}{(n-3)(n-1)}$

$\boxed{\frac{n+3}{n^2-3n+2}}$

(27) $$\frac{n-\frac{n-4}{n-3}}{n+1-\frac{2n+17}{n+5}} = \frac{n\left(\frac{n-3}{n-3}\right)-\frac{n-4}{n-3}}{n+1\left(\frac{n+5}{n+5}\right)-\frac{2n+17}{n+5}}$$

$$\frac{\frac{(n^2-3n)-(n-4)}{n-3}}{\frac{(n^2+6n+5)-(2n+17)}{n+5}} = \frac{\frac{n^2-4n+4}{n-3}}{\frac{n^2+4n-12}{n+5}}$$

$$\frac{(n-2)(n-2)}{(n-3)} \cdot \frac{(n+5)}{(n+6)(n-2)}$$

$$\boxed{\frac{n^2+3n-10}{n^2+3n-18}}$$

(28) $$\frac{x+3-\frac{x+18}{x+2}}{x-\frac{8x-6}{x+3}} = \frac{x+3\left(\frac{x+2}{x+2}\right)-\frac{x+18}{x+2}}{x\left(\frac{x+3}{x+3}\right)-\frac{8x-6}{x+3}}$$

$$\frac{\frac{(x^2+5x+6)-(x+18)}{x+2}}{\frac{(x^2+3x)-(8x-6)}{x+3}} = \frac{\frac{x^2+4x-12}{x+2}}{\frac{x^2-5x+6}{x+3}}$$

$$\frac{(x+6)(x-2)}{(x+2)} \cdot \frac{(x+3)}{(x-3)(x-2)}$$

$$\boxed{\frac{x^2+9x+18}{x^2-x-6}}$$

(29) $$\frac{\frac{1}{x}-\frac{1}{y}}{\frac{y}{x}-1} = \frac{\frac{1}{x}\left(\frac{y}{y}\right)-\frac{1}{y}\left(\frac{x}{x}\right)}{\frac{y}{x}-1\left(\frac{x}{x}\right)}$$

$$\frac{\frac{y-x}{xy}}{\frac{y-x}{x}} = \frac{(y-x)}{xy} \cdot \frac{x}{(y-x)} = \boxed{\frac{1}{y}}$$

(30) $$\frac{\frac{a}{b}-\frac{b}{a}}{\frac{a}{b}+1} = \frac{\frac{a}{b}\left(\frac{a}{a}\right)-\frac{b}{a}\left(\frac{b}{b}\right)}{\frac{a}{b}+1\left(\frac{b}{b}\right)}$$

$$\frac{\frac{a^2-b^2}{ab}}{\frac{a+b}{b}} = \frac{(a+b)(a-b)}{ab} \cdot \frac{b}{(a+b)} = \boxed{\frac{a-b}{a}}$$

(31) $(a-3)(a+3)\left[\frac{2a-3}{a-3}-2=\frac{12}{a+3}\right]$

$(2a-3)(a+3)-2(a-3)(a+3)=12(a-3)$
$(2a^2+3a-9)-(2a^2-18)=12a-36$
$3a+9=12a-36$
$-9a=-45$ $\quad \boxed{a=5}$

(32) $(2x)(x-5)\left[\frac{3}{x}+\frac{1}{x-5}=\frac{1}{2x}\right]$

$3(2)(x-5)+1(2x)=1(x-5)$
$6x-30+2x=x-5$
$7x=25$ $\quad \boxed{x=25/7}$

(33) $$\frac{4m}{m-3}+\frac{6}{3-m}=m$$

$(m-3)\left[\frac{4m}{m-3}-\frac{6}{m-3}=m\right]$

$4m-6=m(m-3)$
$4m-6=m^2-3m$
$0=m^2-7m+6$
$0=(m-6)(m-1)$ $\quad \boxed{m=6,1}$

(34) $(3)(m-1)(m-3)\left[\frac{m+3}{m-1}+\frac{m+1}{m-3}=\frac{22}{3}\right]$

$(m+3)(m-3)(3)+(m+1)(m-1)(3)=22(m-1)(m-3)$
$(3m^2-27)+(3m-3)=22m^2-88m+66$
$6m^2-30=22m^2-88m+66$

Continued

$0 = 16m^2 - 88m + 96$
$0 = 2m^2 - 11m + 12$
$0 = 2m^2 - 8m - 3m + 12$
$0 = 2m(m-4) - 3(m-4)$
$0 = (m-4)(2m-3)$

$\boxed{m = 4, 3/2}$

(35)

	r	·	t	=	w
Sharon	1/4	·	t	=	t/4
Mike	1/5	·	t	=	t/5

(20) $\boxed{\frac{t}{4} + \frac{t}{5} = 1}$

$5t + 4t = 20$
$9t = 20$
$t = 20/9$

$\boxed{2\frac{2}{9} \text{ hours} \approx 2:13}$

(36)

	r	·	t	=	w
Andy	2/5	·	t	=	2t/5
Pam	2/3	·	t	=	2t/3

rate	
$\frac{1}{2\frac{1}{2}}$	$\frac{2}{5}$
$\frac{1}{1\frac{1}{2}}$	$\frac{2}{3}$

(15) $\boxed{\frac{2t}{5} + \frac{2t}{3} = 1}$

$6t + 10t = 15$
$16t = 15$
$t = 15/16$

$\boxed{15/16 \text{ hours or } \approx 56 \text{ min.}}$

(37)

	r	·	t	=	w
Faucet	6	·	t	=	6t
Drain	4	·	t	=	4t

$6t - 4t = 1$
$2t = 1 \quad t = 1/2$

$\boxed{1/2 \text{ hr. or } 30 \text{ min.}}$

(38)

	r	·	t	=	w
Hose	3	·	t	=	3t
Hose	3	·	t	=	3t
Drain	2	·	t	=	2t

$2(3t) - 2t = 1$
$4t = 1$
$t = 1/4$

$\boxed{1/4 \text{ hr. or } 15 \text{ min.}}$

(39)

	r	·	t	=	w
Phil	r	·	3/2	=	5/8
Evan	1/4	·	3/2	=	3/8

$\frac{3r}{2} = \frac{5}{8}$ $\quad r = 5/12$ reciprocal 12/5

$24r = 10$ $\quad \boxed{2\frac{3}{5} \text{ hrs. or } 2:24}$

(40)

	r	·	t	=	w
Ben	1/5	·	3	=	3/5
Jerry	r	·	3	=	2/5

$3r = \frac{2}{5}$ $\quad$ reciprocal 15/2

$15r = 2$
$r = 2/15$

$\boxed{7\frac{1}{2} \text{ hrs. or } 7:30}$

Unit 12
SKILL CHECK

① $\frac{2x+6y}{x^2+2xy-3y^2} = \frac{2(x+3y)}{(x+3y)(x-y)} = \boxed{\frac{2}{x-y}}$

② $\frac{2x^2+13x+20}{2x^2+5x} = \frac{(2x+5)(x+4)}{x(2x+5)} = \boxed{\frac{x+4}{x}}$

③ $\frac{14a^2b}{6ac} \cdot \frac{2ac^3}{7b^3} = \boxed{\frac{2a^2c^2}{3b^2}}$

④ $\frac{x^2+3x+2}{3x^2-14x+8} \div \frac{x^3+2x^2}{x^2-4x}$

$\frac{(x+2)(x+1)}{(3x-2)(x-4)} \cdot \frac{x(x-4)}{x^2(x+2)} = \boxed{\frac{x+1}{3x^2-2x}}$

⑤ $\frac{4-2a}{a^2-5a+6} + \frac{a}{a-3} = \frac{4-2a}{(a-3)(a-2)} + \frac{a}{a-3}\left(\frac{a-2}{a-2}\right)$

$\frac{(4-2a)+(a^2-2a)}{(a-3)(a-2)} = \frac{a^2-4a+4}{(a-3)(a-2)}$

$\frac{(a-2)(a-2)}{(a-3)(a-2)} = \boxed{\frac{a-2}{a-3}}$

⑥ $\frac{y^2+xy}{x^2-y^2} - \frac{x+y}{y-x}$

$\frac{y^2+xy}{(x+y)(x-y)} + \frac{x+y}{x-y}\left(\frac{x+y}{x+y}\right)$

$\frac{(y^2+xy)+(x^2+2xy+y^2)}{(x+y)(x-y)}$

$\frac{x^2+3xy+2y^2}{(x+y)(x-y)}$

$\frac{(x+2y)\cancel{(x+y)}}{\cancel{(x+y)}(x-y)} = \boxed{\frac{x+2y}{x-y}}$

⑦ $\frac{\frac{a}{b^2}-\frac{2}{b}}{\frac{a^2-ab-2b^2}{b}} = \frac{\frac{a}{b^2}-\frac{2}{b}\left(\frac{b}{b}\right)}{\frac{(a-2b)(a+b)}{b}}$

$\frac{\frac{a-2b}{b^2}}{\frac{(a-2b)(a+b)}{b}} = \frac{\cancel{(a-2b)}}{b^2} \cdot \frac{b}{\cancel{(a-2b)}(a+b)}$

$\boxed{\frac{1}{ab+b^2}}$

⑧ $\frac{a+\frac{a+2}{a-4}}{a+3-\frac{4a-8}{a-2}} = \frac{a\left(\frac{a-4}{a-4}\right)+\frac{a+2}{a-4}}{a+3\left(\frac{a-2}{a-2}\right)-\frac{4a-8}{a-2}}$

$\frac{\frac{(a^2-4a)+(a+2)}{a-4}}{\frac{(a^2+a-6)-(4a-8)}{a-2}} = \frac{a^2-3a+2}{a-4} \cdot \frac{a-2}{a^2-3a+2} = \boxed{\frac{a-2}{a-4}}$

⑨ $(n-5)(n+4)\left[\frac{n-1}{n-5} - \frac{9n+1}{n^2-n-20} = \frac{2n+1}{n+4}\right]$

$(n-1)(n+4)-(9n+1) = (2n+1)(n-5)$

$(n^2+3n-4)-(9n+1) = (2n^2-9n-5)$

$n^2+3n-4-9n-1 = 2n^2-9n-5$

$0 = n^2-3n$

$0 = n(n-3)$ $\quad \boxed{n = 0, 3}$

⑩

	r	$\cdot$	t	$=$	w
Pipe #1	$1/6$	$\cdot$	t	$=$	$t/6$
Pipe #2	$1/8$	$\cdot$	t	$=$	$t/8$
Drain	$1/12$	$\cdot$	t	$=$	$t/12$

$24\left[\frac{t}{6}+\frac{t}{8}-\frac{t}{12}=1\right]$

$4t+3t-2t=24$

$5t=24$

$t=24/5$ $\quad \boxed{4\frac{4}{5} \text{ hrs or } 4:48}$

⑪

	r	$\cdot$	t	$=$	w
Jan	$3/2$	$\cdot$	$1/4$	$=$	$3/8$
Dean	r	$\cdot$	$1/4$	$=$	$5/8$

40 min (Jan) = 2/3 hrs

reciprocal 3/2 (Jan's rate)

$r \quad 5$

$4 \quad 8$ $\quad$ reciprocal is 2/5

$8r=20$

$r=5/2$ $\quad \boxed{\frac{2}{5} \text{ hrs or } 24 \text{ min.}}$

Unit 12
REMEDIATION

① $\frac{a^2-b^2}{3a^2-ab-2b^2} = \frac{(a-b)(a+b)}{(3a+2b)(a-b)} = \boxed{\frac{a+b}{3a+2b}}$

② $\frac{3x^2+10x+3}{x^3+3x^2} = \frac{(3x+1)(x+3)}{x^2(x+3)} = \boxed{\frac{3x+1}{x^2}}$

③ $\frac{9xy^2z}{4z^3} \cdot \frac{2x^3z}{15xy^4} = \frac{18x^4y^2z^2}{60xy^4z^3} = \boxed{\frac{3x^3}{10y^2z}}$

④ $\frac{n^2+10n+21}{2n^2+9n+4} \div \frac{n^2+7n}{n^3+4n^2}$

$\frac{(n+3)(n+7)}{(2n+1)(n+4)} \cdot \frac{n^2(n+4)}{n(n+7)} = \boxed{\frac{n^2+3n}{2n+1}}$

⑤ $\frac{-x^2+3x-2}{x^2+5x-6} + \frac{2x+1}{x+6}$

$\frac{-x^2+3x-2}{(x+6)(x-1)} + \frac{2x+1}{x+6}\left(\frac{x-1}{x-1}\right)$

$\frac{(-x^2+3x-2)+(2x^2-x-1)}{(x+6)(x-1)}$

$\frac{x^2+2x-3}{(x+6)(x-1)} = \frac{(x+3)(x-1)}{(x+6)(x-1)} = \boxed{\frac{x+3}{x+6}}$

⑥ $\frac{-a^2+3ab+4b^2}{a^2-b^2} - \frac{2a+b}{b-a}$

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

$\frac{(-a^2+3ab+4b^2)+(2a^2+3ab+b^2)}{(a+b)(a-b)}$

$\frac{a^2+6ab+5b^2}{(a+b)(a-b)} = \frac{(a+5b)(a+b)}{(a+b)(a-b)}$

$\boxed{\frac{a+5b}{a-b}}$

⑦ $\frac{\frac{2}{x}-\frac{5}{y}}{\frac{6x}{x^2}-\frac{15}{y}} = \frac{\frac{2y-5x}{xy}}{\frac{6xy-15x^2}{x^2y}}$

$\frac{(2y-5x)}{xy} \cdot \frac{x^2y}{3x(2y-5x)} = \frac{x^2y}{3x^2y} = \boxed{\frac{1}{3}}$

⑧ $\frac{n+2-\frac{2n+4}{n+3}}{n+4-\frac{2}{n+3}} = \frac{n+2\left(\frac{n+3}{n+3}\right)-\frac{2n+4}{n+3}}{n+4\left(\frac{n+3}{n+3}\right)-\frac{2}{n+3}}$

$\frac{\frac{(n^2+5n+6)-(2n+4)}{n+3}}{\frac{(n^2+7n+12)-(2)}{n+3}} = \frac{\frac{n^2+3n+2}{n+3}}{\frac{n^2+7n+10}{n+3}}$

$\frac{(n+2)(n+1)}{(n+3)} \cdot \frac{(n+3)}{(n+5)(n+2)} = \boxed{\frac{n+1}{n+5}}$

⑨ $(n+3)(n+2)\left[\frac{5}{n+3}+\frac{10n}{n^2+5n+6} = \frac{3n+2}{n+2}\right]$

$5(n+2)+10n = (3n+2)(n+3)$
$5n+10+10n = 3n^2+11n+6$
$0 = 3n^2-4n-4$
$0 = 3n^2-6n+2n-4$
$0 = 3n(n-2)+2(n-2)$
$0 = (n-2)(3n+2)$ $\boxed{n=2, -2/3}$

⑩

Pipe	$\frac{r}{1/4} \cdot \frac{t}{t} = \frac{w}{t/4}$
Hose	$1/8 \cdot t = t/8$
Drain	$1/6 \cdot t = t/6$

$24\left(\frac{t}{4}+\frac{t}{8}-\frac{t}{6}=1\right)$

$6t+3t-4t = 24$
$5t = 24$
$t = 24/5$
$\boxed{4\ 4/5 \text{ hrs or } 4:48}$

Unit 12
EXTRA PRACTICE

⑪

	r	· t	= w
Peter	4/3	· 1/3	= 4/9
Gordon	r	· 1/3	= 5/9

45 min is 3/4 hr (Peter's time)
Reciprocal is 4/3 (Peter's rate)

$\frac{r}{3} = \frac{5}{9}$ reciprocal is 3/5

$9r = 15$

$r = 5/3$

3/5 hr. or 36 minutes

① $\frac{2x-4}{x^2-8x+12} = \frac{2(x-2)}{(x-6)(x-2)} = \boxed{\frac{2}{x-6}}$

② $\frac{-2b+2a}{a^2-b^2} = \frac{-2(b-a)}{(a+b)(a-b)} = \frac{2(a-b)}{(a+b)(a-b)} = \boxed{\frac{2}{a+b}}$

③ $\frac{2n^2-7n-4}{n^2-7n+12} = \frac{(n-4)(2n+1)}{(n-4)(n-3)} = \boxed{\frac{2n+1}{n-3}}$

④ $\frac{2n^2-2n-4}{n+1} = \frac{2(n-2)(n+1)}{(n+1)} = \boxed{2(n-2)}$

⑤ $\frac{3ab^4}{10c^2} \cdot \frac{5c}{12a^3b^2} = \boxed{\frac{b^2}{8a^2c}}$

⑥ $\frac{n^2-2n-15}{n^2+5n+6} \cdot \frac{2n^2+6n+4}{n-5}$

$\frac{(n-5)(n+3)}{(n+2)(n+3)} \cdot \frac{2(n+2)(n+1)}{(n-5)} = \boxed{2(n+1)}$

⑦ $\frac{x^2+7x+12}{8} \div \frac{x+3}{6}$

$\frac{(x+4)(x+3)}{8} \cdot \frac{6}{(x+3)} = \boxed{\frac{3(x+4)}{4}}$

⑧ $\frac{3x+12}{3x^2+x-2} \div \frac{x^3+4x^2}{x^6-x^5}$

$\frac{3(x+4)}{(x+1)(3x-2)} \cdot \frac{x^5(x+1)}{x^2(x+4)} = \boxed{\frac{3x^3}{3x-2}}$

⑨ $\frac{a-4}{a+3} + \frac{-7}{a^2+5a+6}$

$\frac{(a-4)}{(a+3)}\left[\frac{(a+2)}{(a+2)}\right] + \frac{-7}{(a+3)(a+2)}$

$\frac{(a^2-2a-8)-7}{(a+3)(a+2)}$

$\frac{(a+3)(a-5)}{(a+3)(a+2)} = \boxed{\frac{a-5}{a+2}}$

⑩ $\frac{2x+10}{x^2+x-2} + \frac{x+4}{x+2}$

$\frac{2(x+5)}{(x+2)(x-1)} + \frac{(x+4)}{(x+2)}\left[\frac{(x-1)}{(x-1)}\right]$

$\frac{(2x+10)+(x^2+3x-4)}{(x+2)(x-1)}$

$\frac{x^2+5x+6}{(x+2)(x-1)}$

$\frac{(x+3)(x+2)}{(x+2)(x-1)} = \boxed{\frac{x+3}{x-1}}$

⑪ $\frac{9n+4}{n^2+4n} - \frac{-2n}{n+4}$

$\frac{9n+4}{n(n+4)} - \frac{-2n}{(n+4)}\left[\frac{n}{n}\right]$

$\frac{(9n+4)+2n^2}{n(n+4)}$

$\frac{2n^2+9n+4}{n(n+4)}$

$\frac{(n+4)(2n+1)}{n(n+4)} = \boxed{\frac{2n+1}{n}}$

⑫ $\frac{-16}{x^2-16} - \frac{x+2}{4-x}$

$\frac{-16}{(x+4)(x-4)} + \frac{x+2}{(x-4)}\left[\frac{x+4}{x+4}\right]$

$\frac{(-16)+(x^2+2x-8)}{(x+4)(x-4)}$

$\frac{x^2+2x-24}{(x+4)(x-4)} = \frac{(x-4)(x+6)}{(x+4)(x-4)} = \boxed{\frac{x+6}{x+4}}$

⑬ $\frac{\frac{n+3}{n^3}}{\frac{n^2+5n+6}{n^2}}$

$\frac{(n+3)}{n^3} \cdot \frac{n^2}{(n+3)(n+2)}$

$\boxed{\frac{1}{n(n+2)}}$

⑭ $\frac{\frac{3}{a^2} - \frac{2}{a^3}}{\frac{3a^2+10a-8}{a}}$

$\frac{\frac{3a-2}{a^3}}{\frac{(a+4)(3a-2)}{a}}$

$\frac{(3a-2)}{a^3} \cdot \frac{a}{(3a-2)(a+4)}$

$\boxed{\frac{1}{a^2(a+4)}}$

⑮ $\frac{2x}{x^2+4x+3} = \frac{2}{x+1} + \frac{6}{x+3}$

$\left[\frac{2x}{(x+3)(x+1)} = \frac{2}{x+1} + \frac{6}{x+3}\right](x+1)(x+3)$

$2x = 2(x+3)+6(x+1)$

$2x = 2x+6+6x+6$

$-6x = 12$ $\boxed{x=-2}$

⑯ $\left[\frac{2}{n+3} + \frac{4}{n^2-9} = \frac{3n+1}{n-3}\right](n^2-9)$

$2(n-3)+4 = (3n+1)(n+3)$

$2n-6+4 = 3n^2+10n+3$

$3n^2+8n+5 = 0$

$3n^2+3n+5n+5 = 0$

$3n(n+1)+5(n+1) = 0$

$(n+1)(3n+5) = 0$

$\boxed{n = -1, -5/3}$

Algebra Skills Review

Part I (Units 1-8)

"A"

⑰ Francis $\frac{R}{1/6} \cdot \frac{T}{t} = \frac{W}{t/6}$
Scott $1/4 \cdot t = t/4$

$\left[\frac{t}{6} + \frac{t}{4} = 1\right] 12$

$2t + 3t = 12$
$5t = 12$
$t = 12/5$

$2\frac{2}{5}$ hrs or 2:24

⑱ $\frac{R}{1/4} \cdot \frac{T}{t} = \frac{W}{t/4}$
Fill Pipe $1/4 \cdot t = t/4$
Drain $1/6 \cdot t = t/6$

$\left[\frac{t}{4} - \frac{t}{6} = 1\right] 12$

$3t - 2t = 12$
$t = 12$

12 hours

⑲ $\dfrac{n+1 - \frac{n+5}{n-1}}{n - \frac{4-n}{n-1}}$

$\dfrac{\frac{(n-1)(n+1)-(n+5)}{n-1}}{\frac{(n-1)(n)-(4-n)}{n-1}}$

$\frac{n^2-1-n+5}{n^2-n-4+n} = \frac{n^2+n+6}{n^2-4}$

$\frac{(n-3)(n+2)}{(n-2)(n+2)} = \frac{n-3}{n-2}$

⑳ Pablo $\frac{R}{2/3} \cdot \frac{T}{1/2} = \frac{W}{1/3}$
Chris $r \cdot 1/2 = r/2$

Pablo's time is 3/2, rate is reciprocal of time (2/3)

$\left[\frac{1}{3} + \frac{r}{2} = 1\right] 6$

$2 + 3r = 6$
$3r = 4$
$r = 4/3$
reciprocal $= 3/4$

3/4 hrs or 0:45

① Additive Inverse

② $2a^2 - 3ab + a^3$
$2(-2)^2 - 3(-2)(-3) + (-2)^3$
$2(4) - 3(6) + (-8)$
$8 + (-18) + (-8) =$ **-18**

③ $3ab - 2a(a-3b) - 4a^2$
$3ab - 2a^2 + 6ab - 4a^2$
$9ab - 6a^2$

④ $\frac{2n}{3} - 3(n-1) = -4(n+4) - 1$
$\frac{2n}{3} - 3n + 3 = -4n - 16 - 1$
$2n - 9n + 9 = -12n - 51$
$5n = -60$
$n = -12$

⑤ $\frac{2x+9}{5} > \frac{x+4}{3}$

$3(2x+9) > 5(x+4)$
$6x + 27 > 5x + 20$
$x > -7$

⑥ $3nc - 2 = 5n$
$3nc - 5n = 2$
$n(3c-5) = 2$

$n = \frac{2}{3c-5}$ for $c \neq 5/3$

⑦ $|a+2|-4 \geq 2$

$|a+2| \geq 6$

$a+2 \geq 6$ or $a+2 \leq -6$

$\boxed{a \geq 4 \text{ or } a \leq -8}$

⑧ $|3a-9|<6$ and $|a| \neq 2$

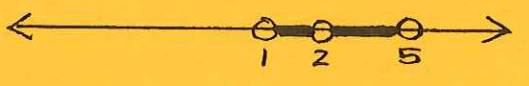
$3a-9<6$ and $3a-9>-6$

$3a<15$ and $3a>3$

$(a<5$ and $a>1)$ and $(a \neq \pm 2)$

$\boxed{(1<a<5) \text{ and } (a \neq 2)}$

"a" cannot equal (-2) and still be between +1 and +5



⑨ $\left(\frac{1}{2}x^2y^3z\right)^2(-2xy^{-1}z^2)^3$

$\left(\frac{1}{4}x^4y^6z^2\right)(-8x^3y^{-3}z^6)$

$\boxed{-2x^7y^3z^8}$

⑩ $\frac{-18a^2b^3c^{-3}}{8a^{-3}b^2c^{-1}} = \boxed{\frac{-9a^5b}{4c^2}}$

⑪ $(.03 \times 10^{-3})(.14 \times 10^{-2})$

$.0042 \times 10^{-5} = \boxed{4.2 \times 10^{-8}}$

⑫ $(4x+7)(2x-5)$

$\boxed{8x^2-6x-35}$

⑬

$$\begin{array}{r} 2a^2+3a+2 \\ a-1 \overline{)\,2a^3+a^2-a-5} \\ \underline{2a^3-2a^2} \\ 3a^2-a \\ \underline{3a^2-3a} \\ 2a-5 \\ \underline{2a-2} \\ -3 \end{array}$$

⑭ $(2ab^{x+2}-3c^{4x})^2$

$\boxed{4a^2b^{2x+4}-12ab^{x+2}c^{4x}+9c^{8x}}$

⑮ $(4x^n+y^{n-3})(4x^n-y^{n-3})$

$\boxed{16x^{2n}-y^{2n-6}}$

⑯ $12a^2b,\ 30ab^3c,\ 56abc^2$

$12 = 2^2 \cdot 3$

$30 = 2 \cdot 3 \cdot 5$

$56 = 2^3 \cdot 7$

GCF = 2

LCM = $2^3 \cdot 3 \cdot 5 \cdot 7$

$\boxed{\text{GCF} = 2ab \quad \text{LCM} = 840a^2b^3c^2}$

⑰ $n^8-1 = (n^4+1)(n^4-1) = (n^4+1)(n^2+1)(n^2-1)$

$\boxed{(n^4+1)(n^2+1)(n+1)(n-1)}$

⑱ $6n^2+14n-12$

$2(3n^2+7n-6) = 2(3n^2+9n-2n-6)$

$2[3n(n+3)-2(n+3)] = \boxed{2(n+3)(3n-2)}$

⑲ $(3n-2x)^2-(n+5x)^2$

$[(3n-2x)+(n+5x)][(3n-2x)-(n+5x)]$

$\boxed{(4n+3x)(2n-7x)}$

⑳ $a^2b^2-a^4+a^2b^2-b^4$

$a^2(b^2-a^2)+b^2(a^2-b^2)$

$a^2(b^2-a^2)-b^2(b^2-a^2)$

$(b^2-a^2)(a^2-b^2)$

$\boxed{(b+a)(b-a)(a+b)(a-b)}$

㉑ $2n^3+6n = -8n^2$

$2n^3+8n^2+6n = 0$

$2n(n^2+4n+3) = 0$

$2n(n+3)(n+1) = 0$

$\boxed{n = 0, -3, -1}$

㉒ $(-2,-10)\ (4,-15)$

$\frac{(-10)-(-15)}{(-2)-(4)} = \frac{5}{-6}$

$\frac{5}{-6} = \frac{A}{-B}$ $A=5$ $B=6$

$\boxed{5x+6y=-70}$

$5x+6y=C$

$5(-2)+6(-10) = -70$

(23) $2x-y=12$ slope $=2$

$\perp$ slope $=-\frac{1}{2}$

$y=-\frac{1}{2}x+b \quad (-3,9)$

$(9)=-\frac{1}{2}(-3)+b$

$9=\frac{3}{2}+b$

$b=\frac{15}{2}$ $\boxed{y=-\frac{1}{2}x+\frac{15}{2}}$

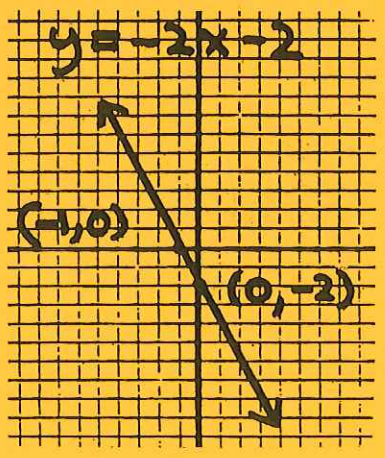
(24) $y=\frac{2}{5}x-4 \quad m=\frac{2}{5} \quad (-2,-5)$

$\boxed{y+5=\frac{2}{5}(x+2)}$

(25) $4x+4=-2y$ divide by -2

$-2x-2=y$

$\boxed{\begin{array}{l} y=-2x-2 \\ \text{slope } -2 \\ y\text{-int } (0,-2) \\ x\text{-int } (-1,0) \end{array}}$



(26) $(-9,7) \quad (-3,5)$

$x \qquad\qquad y$

$\frac{(-9)+(-3)}{2} \qquad \frac{(7)+(5)}{2}$

$\boxed{(-6,6)}$

(27) $f[g(n+3)]$

$g(x)=x-5$

$g(n+3)=(n+3)-5=n-2$

$f(x)=x-x^2$

$f(x-5)=(n-2)-(n-2)^2$

$\boxed{-n^2+5n-6}$

"B"

Alg. Skills Review Part I (Units 1-8)

① Commutative Property of Addition

② a^3-3b^2+3ab

$(-1)^3-3(-4)^2+3(-1)(-4)$

$(-1)-3(16)+3(4)$

$(-1)+(-48)+(12) = \boxed{-37}$

③ $4x(2x-y)-3x(y+2x)$

$8x^2-4xy-3xy-6x^2 = \boxed{2x^2-7xy}$

④ $12+\frac{3x}{5}=-3(x+8)$

$\left[12+\frac{3x}{5}=-3x-24\right](5)$

$60+3x=-15x-120$

$18x=-180$ $\boxed{x=-10}$

⑤ $\frac{3(2n+1)}{7} \geq \frac{12-n}{-2}$

Denominator must be positive before cross multiplying an inequality

$\frac{6n+3}{7} \geq \frac{n-12}{2}$

$2(6n+3) \geq 7(n-12)$

$12n+6 \geq 7n-84$

$5n \geq -90$ $\boxed{n \geq -18}$

⑥ $2(3x+y)=3y(x-1)$

$6x+2y=3xy-3y$

$6x-3xy=-5y$

$x(6-3y)=-5y$

$\boxed{x=\frac{-5y}{6-3y} \text{ for } y \neq 2}$

⑦ $|n-1|+3<9$

$|n-1|<6$

$n-1<6$ and $n-1>-6$

$n<7$ and $n>-5$

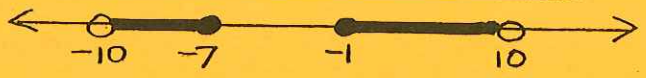
$\boxed{-5<n<7}$

⑧ $|n+4|-1 \geq 2$ and $|n|<10$

$|n+4| \geq 3$

$[n+4 \geq 3$ or $n+4 \leq -3]$ and $[n<10$ and $n>-10]$

$\boxed{(n \geq -1 \text{ or } n \leq -7) \text{ and } (-10<n<10)}$



⑨ $(-\frac{1}{3}a^2b^3c)^2(-3ab^{-1}c)^3$

$(\frac{1}{9}a^4b^6c^2)(-27a^3b^{-3}c^3)$

$\boxed{-3a^7b^3c^5}$

⑩ $\frac{-30a^{-3}bc^{-2}}{-6ab^4c^{-5}} = \boxed{\frac{5c^3}{a^4b^3}}$

⑪ $\frac{.0063 \times 10^4}{9 \times 10^7} = .0007 \times 10^{-3} = \boxed{7 \times 10^{-7}}$

⑫ $(3a+5b)(a-6b) = \boxed{3a^2-13ab-30b^2}$

⑬ $a+2b \overline{)\,5a^3 - 2b^3}$

$5a^2-10ab+20b^2-\frac{42b^3}{a+2b}$

$5a^3+10a^2b$

$-10a^2b$

$-10a^2b-20ab^2$

$20ab^2-2b^3$

$20ab^2+40b^3$

$-42b^3$

⑭ $(3c^{x+3}+d^{3x})^2$

$\boxed{9c^{2x+6}+6c^{x+3}d^{3x}+d^{6x}}$

⑮ $(2a^{n-1}+3b^{n+4})(2a^{n-1}-3b^{n+4})$

$\boxed{4a^{2n-2}-9b^{2n+8}}$

⑯ $75xyz,\ 40x^2y,\ 12y^2$

$75 = 3 \cdot 5^2$ GCF: 1

$40 = 2^3 \cdot 5$ LCM:

$12 = 2^2 \cdot 3$ $2^3 \cdot 3 \cdot 5^2$

$\boxed{GCF = y \quad LCM = 600x^2y^2z}$

⑰ $3x^3+6x^2+15x$

$\boxed{3x(x^2+2x+5)}$

⑱ $4a^2+18ab+8b^2$

$2(2a^2+9ab+4b^2)$

$2(2a^2+8ab+ab+4b^2)$

$2[2a(a+4b)+b(a+4b)]$

$\boxed{2(a+4b)(2a+b)}$

⑲ $(a+4)^2+3(a+4)-10$

$[(a+4)+5][(a+4)-2]$

$\boxed{(a+9)(a+2)}$

⑳ $x^6-x^4y^2+16y^2-16x^2$

$x^4(x^2-y^2)+16(y^2-x^2)$

$x^4(x^2-y^2)-16(x^2-y^2)$

$(x^2-y^2)(x^4-16)$

$\boxed{(x+y)(x-y)(x^2+4)(x+2)(x-2)}$

㉑ $4a^3+6a = 14a^2$

$4a^3-14a^2+6a = 0$

$2a(2a^2-7a+3) = 0$

$2a(2a^2-6a-a+3) = 0$

$2a[2a(a-3)-1(a-3)] = 0$

$2a(a-3)(2a-1) = 0$

$\boxed{a = 0, 3, \frac{1}{2}}$

㉒ $(-2,5)\ (-4,9)$

$\frac{5-9}{(-2)-(-4)} = \frac{-4}{2}$ $m = -2$

$y = -2x+b$

$(5) = -2(-2)+b$

$5 = 4+b$

$b = 1$

$\boxed{y = -2x+1}$

㉓ $y = \frac{-1}{2}x+3$ $m = -\frac{1}{2}$ $(8,-6)$

$\frac{1}{-2} = \frac{A}{-B}$ $A=1$ $B=2$

$x+2y = C$

$(8)+2(-6) = -4$

$\boxed{x+2y = -4}$

(24) $2x-3y=8$ $m=2/3$ $(-2,-6)$
$\perp m = -3/2$

$\boxed{y+6=\frac{-3}{2}(x+2)}$

(25) $y=\frac{1}{4}x-2$

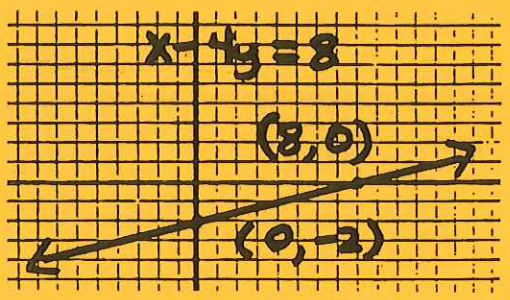
$4y=x-8$

$-x+4y=-8$

$\boxed{x-4y=8}$

$x-4y=8$

slope $1/4$
y-int $(0,-2)$
x-int $(8,0)$



(26) $A(-2,9)$ $P(5,-1)$

x: -2 to 5 (up 7)
y: 9 to -1 (down 10)

$5+7, -1-10$ $\boxed{(12,-11)}$

(27) $f[g(a+b)]$ $f(x)=-2x$
$g(x)=x^2$

$g(a+b)=(a+b)^2$
$(a^2+2ab+b^2)$

$f(a^2+2ab+b^2)=-2(a^2+2ab+b^2)$

$\boxed{-2a^2-4ab-2b^2}$

"C"

Alg. Skills Review Part I (Units 1-8)

① multiplicative Inverse

② $4x^2y-2(x+2y)$
$4(-1)^2(-5)-2[(-1)+2(-5)]$
$4(1)(-5)-2(-11)$
$(-20)-(-22)=$ $\boxed{2}$

③ $3n^2-2n(n+m)+2mn-n^2$
$3n^2-2n^2-2mn+2mn-n^2=$ $\boxed{0}$

④ $5(n-2)=\frac{n}{2}+3n-1$

$2[5n-10=\frac{n}{2}+3n-1]$

$10n-20=n+6n-2$
$10n-20=7n-2$
$3n=18$

$\boxed{n=6}$

⑤ $3(n+4) > \frac{4n+6}{3}$

$3n+12 > \frac{4n+6}{3}$

$3(3n+12) > 4n+6$
$9n+36 > 4n+6$
$5n > -30$

$\boxed{n>-6}$

⑥ $xy-3ab=2a(x+b)$
$xy-3ab=2ax+2ab$
$xy-2ax=5ab$
$x(y-2a)=5ab$

$\boxed{x=\frac{5ab}{y-2a} \text{ for } y-2a\neq 0}$

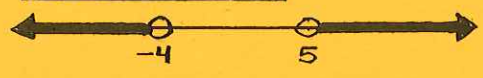
⑦ $|2a-1|-2>7$

$|2a-1|>9$

$2a-1>9$ or $2a-1<-9$

$2a>10$ or $2a<-8$

$\boxed{a>5 \text{ or } a<-4}$



⑧ $|a+4|\leq 7$ and $|a|\neq 2$

$(a+4\leq 7$ and $a+4\geq -7)$ and $(a\neq \pm 2)$

$(a\leq 3$ and $a\geq -11)$ and $(a\neq \pm 2)$

$\boxed{(-11\leq a\leq 3) \text{ and } (a\neq \pm 2)}$

⑨ $(2x^{-2}y^3)^5\left(\frac{-1}{2}x^4y^{-2}\right)^3$

$(32x^{-10}y^{15})\left(\frac{-1}{8}x^{12}y^{-6}\right)=\boxed{-4x^2y^9}$

⑩ $\dfrac{-12x^3y^{-2}}{-20x^{-2}y^4z^{-2}}=\boxed{\dfrac{3x^5z^2}{5y^6}}$

⑪ $\dfrac{7000\times 10^{-4}}{.5\times 10^{-2}}=14{,}000\times 10^{-2}$

$\boxed{1.4\times 10^2}$

⑫ $(2a-7b)(3a-5b)=\boxed{6a^2-31ab+35b^2}$

⑬

$$x-3y\;\Big|\;4x^4+12x^3y+36x^2y^2+108xy^3+\frac{319y^4}{x-3y}$$

$$-5y^4$$

$$4x^4-12x^3y$$

$$12x^3y$$

$$12x^3y-36x^2y^2$$

$$36x^2y^2$$

$$36x^2y^2-108xy^3$$

$$108xy^3-5y^4$$

$$108xy^3-324y^4$$

$$319y^4$$

⑭ $(x^{3n-2}-4y^{2n+1})^2$

$\boxed{x^{6n-4}-8x^{3n-2}y^{2n+1}+16y^{4n+2}}$

⑮ $(3a^{3x}+b^{x-1})(3a^{3x}-b^{x-1})$

$\boxed{9a^{6x}-b^{2x-2}}$

⑯ $60a^3b^5c^2,\ 100a^4b^2c^3,\ 108a^2b^3c^4$

$60=2^2\cdot 3\cdot 5$ $\quad GCF=2^2$

$100=2^2\cdot 5^2$ $\quad LCM=2^2\cdot 3^3\cdot 5^2$

$108=2^2\cdot 3^3$

$\boxed{GCF=4a^2b^2c^2 \quad LCM=2700a^4b^5c^4}$

⑰ $3a^6b^2-3a^2b^6=3a^2b^2(a^4-b^4)$

$3a^2b^2(a^2+b^2)(a^2-b^2)$

$\boxed{3a^2b^2(a^2+b^2)(a+b)(a-b)}$

⑱ $6a^2-3ab-9b^2$

$3(2a^2-ab-3b^2)$

$3(2a^2-3ab+2ab-3b^2)$

$3[a(2a-3b)+b(2a-3b)]$

$\boxed{3(2a-3b)(a+b)}$

⑲ $(2n+5)^2-(n-4)^2$

$[(2n+5)+(n-4)][(2n+5)-(n-4)]$

$\boxed{(3n+1)(n+9)}$

⑳ $a^6-a^4b^2-a^2b^4+b^6$

$a^4(a^2-b^2)-b^4(a^2-b^2)$

$(a^2-b^2)(a^4-b^4)$

$(a+b)(a-b)(a^2+b^2)(a^2-b^2)$

$\boxed{(a^2+b^2)(a+b)^2(a-b)^2}$

㉑ $9a^3=4a$

$9a^3-4a=0$

$a(9a^2-4)=0$

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

$\boxed{a=0,\ -2/3,\ 2/3}$

㉒ $(-4,5)(-3,9)$

$\dfrac{5-9}{-4-(-3)}=\dfrac{-4}{-1}=4$ $\qquad 4x-y=C$

$4(-4)-(5)=-21$

$\dfrac{4}{1}=\dfrac{A}{-B}$ $\quad A=4$ $\quad B=-1$

$\boxed{4x-y=-21}$

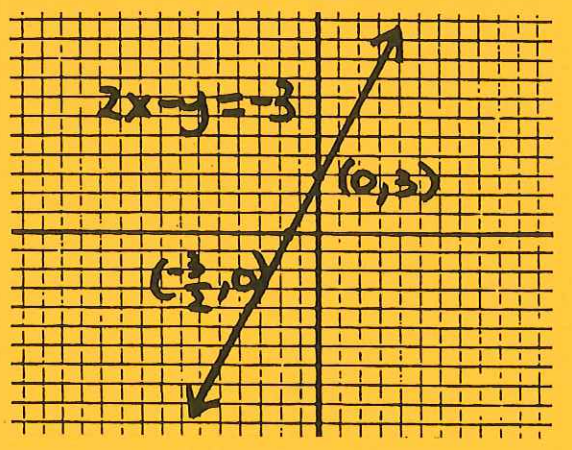
(23) $3x+2y=4$ slope $=-3/2$
$\perp$ slope $=2/3$
$y=\frac{2}{3}x+b \quad (-1,5)$
$(5)=\frac{2}{3}x(-1)+b$
$\frac{15}{3}+\frac{2}{3}=b$ $\boxed{y=\frac{2}{3}x+\frac{17}{3}}$

(24) $y+6=\frac{2}{3}(x-3)$
Change to standard form
$3\left[y+6=\frac{2}{3}(x-3)\right]$
$3y+18=2x-6$
$-2x+3y=-24$
$2x-3y=24$

slope $2/3$
y-int $(0,-8)$
x-int $(12,0)$

(25) $\left[\frac{-4}{3}x+\frac{2}{3}y=2\right](3)$
$-4x+2y=6$
$4x-2y=-6$
$\boxed{2x-y=-3}$

slope 2
y-int $(0,3)$
x-int $(-3/2,0)$



(26) $A(5,-12)$ $B(-1,4)$
$x: \frac{5+(-1)}{2}$ $y: \frac{(-12)+(4)}{2}$
midpoint $\boxed{(2,-4)}$

(27) $f[g(n-3)]$
$f(x)=6-x^2$
$g(x)=x-1$ continued

$g(n-3)=(n-3)-1=n-4$
$f(n-4)=6-(n-4)^2$
$6-(n^2-8n+16)$
$6-n^2+8n-16$
$\boxed{-n^2+8n-10}$

Algebra Skills Review

Part II (Units 9-12)

"A"

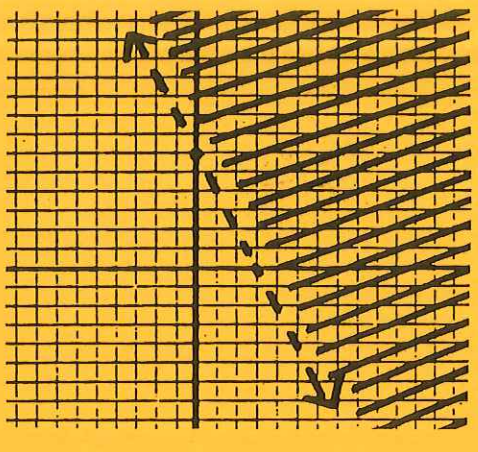
① $4x-y=6$ slope 4 y-int $(0,-6)$
$12x-3y=18$ slope 4 y-int $(0,-6)$

consistent, dependent
infinite solutions

② $5x-2y=17$
$x+3y=0 \quad \times(-5)$

$5x-2y=17$
$-5x-15y=0$
$-17y=17$
$y=-1$
$x=3$
$\boxed{(3,-1)}$ ↵

③ $2x+y>6$ $\boxed{y>-2x+6}$

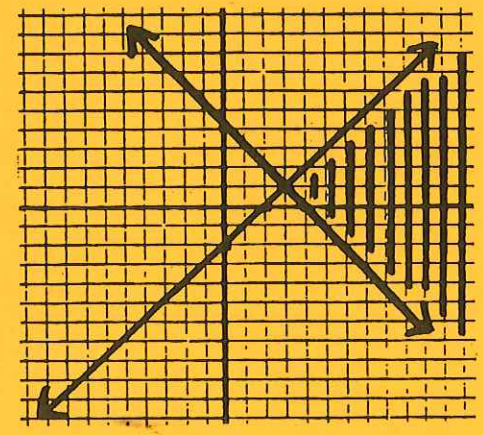


④ $|y-1|+3 \le x$

$|y-1| \le x-3$

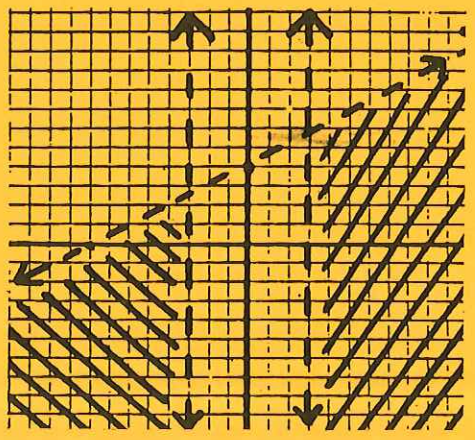
$y-1 \le x-3$ and $y-1 \ge -x+3$

$\boxed{y \le x-2 \text{ and } y \ge -x+4}$



⑤ $y < \frac{1}{2}x+4$ and $|x|>3$

$\boxed{(y<\frac{1}{2}x+4) \text{ and } (x>3 \text{ or } x<-3)}$



⑥ $\sqrt{54x^2y^3z^8} = \boxed{3|x|yz^4\sqrt{6y}}$

⑦
$$\begin{array}{r} 14.28 \\ \sqrt{204.0000} \end{array} \approx \boxed{14.3}$$

$$\begin{array}{r|l} 24 & 104 \\ & 96 \\ \hline 282 & 800 \\ & 564 \\ \hline 2848 & 23600 \end{array}$$

⑧ $\sqrt{2}(3\sqrt{6}-\sqrt{10})-2\sqrt{3}$

$3\sqrt{12}-\sqrt{20}-2\sqrt{3}$

$6\sqrt{3}-2\sqrt{5}-2\sqrt{3}$

$\boxed{4\sqrt{3}-2\sqrt{5}}$

⑨ $\frac{2\sqrt{3}}{3\sqrt{2}-\sqrt{3}} \cdot \frac{3\sqrt{2}+\sqrt{3}}{3\sqrt{2}+\sqrt{3}}$

$\frac{6\sqrt{6}+6}{18-3} = \frac{6\sqrt{6}+6}{15}$

$\boxed{\frac{2\sqrt{6}+2}{5}}$

⑩ $\sqrt{1156}=34$, $\sqrt{1179}$, $\sqrt{1225}=35$ } 69 } 23

$34\frac{23}{69} = \boxed{34\frac{1}{3}}$

⑪ $\sqrt{2x+5}-1=2$

$\sqrt{2x+5}=3$

$2x+5=9$

$2x=4$ $\boxed{x=2}$

⑫ $a^2+b^2=c^2$

$4^2+b^2=8^2$

$16+b^2=64$

$b^2=48$

$b=\sqrt{48}$

$\boxed{4\sqrt{3}\text{ m}}$

⑬ $(3,5)$ to $(5,9)$

$d=\sqrt{(x_1-x_2)^2+(y_1-y_2)^2}$

$d=\sqrt{(3-5)^2+(5-9)^2}$

$d=\sqrt{4+16}=\sqrt{20}$

$\boxed{2\sqrt{5}}$

⑭ $y=x^2-10x+21$

axis $x=-b/2a$

$\boxed{x=5}$

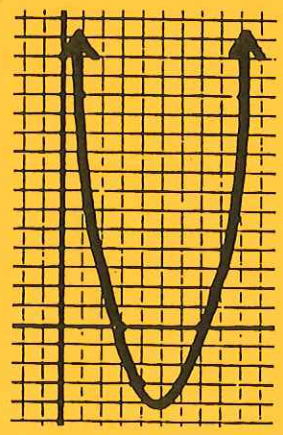
vertex

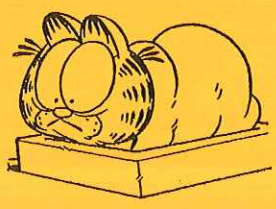
$y=(5)^2-10(5)+21$

$25-50+21=-4$

$\boxed{(5,-4)}$

x	y	
4	-3	$4^2-10(4)+21$
3	0	$3^2-10(3)+21$
1	12	$1^2-10(1)+21$





(15) $2x^2-11x+15=0$
$2x^2-6x-5x+15=0$
$2x(x-3)-5(x-3)=0$
$(x-3)(2x-5)=0$
$\boxed{x=3, 5/2}$

(16) $2n^2-12n+14=0$
$n^2-6n=-7$
-3 $n^2-6n+9=-7+9$
$(n-3)^2=2$
$n-3=\pm\sqrt{2}=\boxed{3\pm\sqrt{2}}$

(17) $-4n^2+8n=-3$
$-4n^2+8n+3=0$
$a=-4\ \ b=8\ \ c=3$
$n=\dfrac{-b\pm\sqrt{b^2-4ac}}{2a}$
$\dfrac{-8\pm\sqrt{(8)^2-4(-4)(3)}}{2(-4)}$
$\dfrac{-8\pm\sqrt{112}}{-8}=\dfrac{-8\pm4\sqrt{7}}{-8}$
$\boxed{\dfrac{2\pm\sqrt{7}}{2}}$

(18) $x^2+5x+3=0$
$b^2-4ac>0$
$(5)^2-4(1)(3)=13$
$\boxed{\text{2 real roots}}$
Irrational

(19) $\dfrac{2x^2+x-1}{x^2+5x+6}\cdot\dfrac{x+3}{x+1}$
$\dfrac{(2x-1)(x+1)}{(x+3)(x+2)}\cdot\dfrac{(x+3)}{(x+1)}$
$\boxed{\dfrac{2x-1}{x+2}}$

(20) $\dfrac{n^2-16}{n^2-64}\div\dfrac{n+4}{n-8}$
$\dfrac{(n+4)(n-4)}{(n+8)(n-8)}\cdot\dfrac{(n-8)}{(n+4)}=\boxed{\dfrac{n-4}{n+8}}$

(21) $\dfrac{4}{5-n}-\dfrac{3}{n^2-5n}=\dfrac{4}{5-n}-\dfrac{3}{n(n-5)}=\dfrac{4}{5-n}+\dfrac{3}{n(5-n)}$
$\dfrac{4n}{n(5-n)}+\dfrac{3}{n(5-n)}=\boxed{\dfrac{4n+3}{n(5-n)}}$

(22) $\dfrac{\dfrac{x+y}{a+b}}{\dfrac{x^2-y^2}{a^2-b^2}}=\dfrac{\dfrac{x+y}{a+b}}{\dfrac{(x+y)(x-y)}{(a+b)(a-b)}}=\dfrac{(x+y)}{(a+b)}\cdot\dfrac{(a+b)(a-b)}{(x+y)(x-y)}=\boxed{\dfrac{a-b}{x-y}}$

(23) $(y)(y+3)\left[\dfrac{-2}{y+3}-\dfrac{2}{y}=-1\right]$
$-2y-2(y+3)=-(y+3)(y)$
$-2y-2y-6=-y^2-3y$
$y^2-y-6=0$
$(y-3)(y+2)=0$
$\boxed{y=3,-2}$

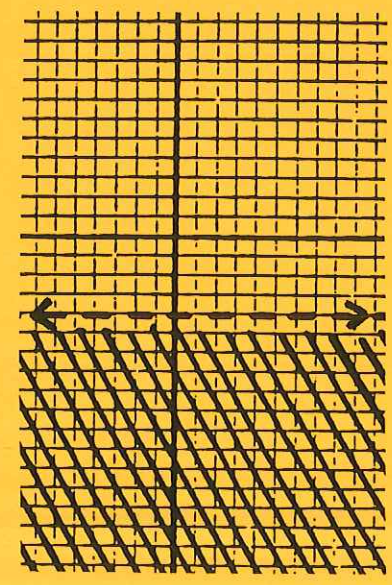
"B"

Alg. Skills Review Part II (Units 9-12)

① $y=6x-8$ $\quad m=6$
$12x-3y=16$ $\quad m=4$
$\boxed{\begin{array}{l}\text{independent}\\ \text{consistent}\\ \text{one solution}\end{array}}$

② $2x+3y=6\ \cdot(-3)$
$3x+4y=7\ \cdot(2)$
$-6x-9y=-18$
$6x+8y=14$
$-y=-4$
$y=4\ \ x=-3$
$\boxed{(-3,4)}$

③ $y<-4$

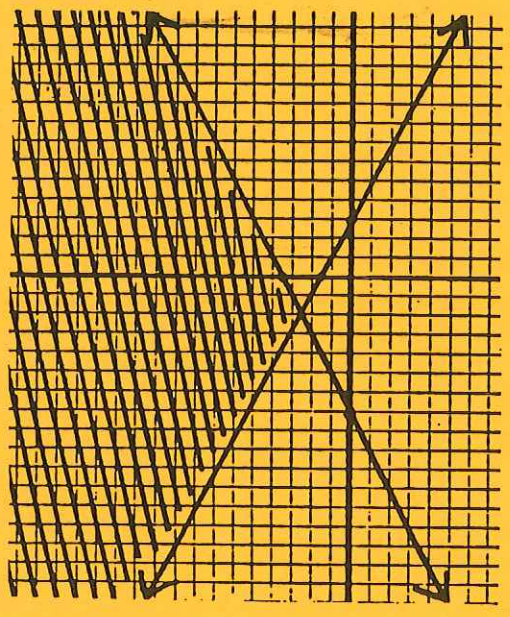


④ $|y+2|+5 \le -2x$

$|y+2| \le -2x-5$

$y+2 \le -2x-5$ and $y+2 \ge 2x+5$

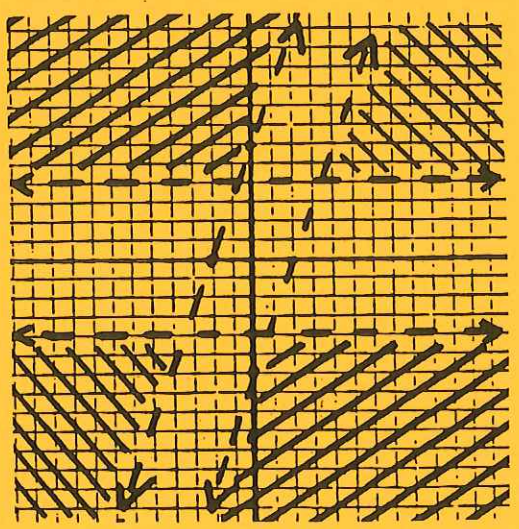
$\boxed{y \le -2x-7 \text{ and } y \ge 2x+3}$



⑤ $|y-3x|>6$ and $|y|>4$

$(y-3x>6$ or $y-3x<-6)$

$\boxed{(y>3x+6 \text{ or } y<3x-6) \text{ and } (y>4 \text{ or } y<-4)}$



⑥ $\sqrt{72a^3b^4c^2} = \boxed{6ab^2|c|\sqrt{2a}}$

⑦ $\begin{array}{r} 21.35 \\ \sqrt{456.00\,00} \end{array} \approx \boxed{21.4}$

$\begin{array}{r} 4 \\ 41\overline{)56} \\ 41 \\ 423\overline{)1500} \\ 1269 \\ 4265\overline{)23100} \end{array}$

⑧ $\sqrt{5}(3\sqrt{10}+2\sqrt{15})-\sqrt{27}$

$3\sqrt{50}+2\sqrt{75}-\sqrt{27}$

$15\sqrt{2}+10\sqrt{3}-3\sqrt{3} = \boxed{15\sqrt{2}+7\sqrt{3}}$

⑨ $\frac{3\sqrt{5}}{\sqrt{5}+2\sqrt{2}} \cdot \frac{\sqrt{5}-2\sqrt{2}}{\sqrt{5}-2\sqrt{2}} = \frac{15-6\sqrt{10}}{5-8}$

$\frac{15-6\sqrt{10}}{-3} = \boxed{-5+2\sqrt{10}}$

⑩ $38 = \sqrt{1444}$, $\sqrt{1488}$ (77) 44, $39 = \sqrt{1521}$

$38\frac{44}{77}$

$\boxed{38\frac{4}{7}}$

⑪ $\sqrt{4a+13}-3=2$

$\sqrt{4a+13}=5$

$4a+13=25$

$4a=12$

$\boxed{a=3}$

⑫ $a^2+b^2=c^2$

$2^2+8^2=c^2$

$c^2=68$

$c=\sqrt{68}$

$\boxed{2\sqrt{17}\text{ m}}$

⑬ $(6,-2)$ to $(-2,-4)$

$d=\sqrt{[(6)-(-2)]^2+[(-2)-(-4)]^2}$

$d=\sqrt{(8)^2+(2)^2} = \sqrt{68} = \boxed{2\sqrt{17}}$

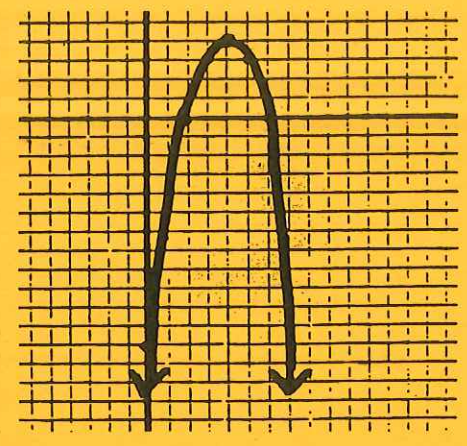
⑭ $y=-x^2+8x-12$

axis $x=-b/2a$ $\boxed{x=4}$ $\boxed{(4,4)}$

vertex $y=-(4)^2+8(4)-12=4$

x	y	
3	3	$-(3)^2+8(3)-12$
2	0	$-(2)^2+8(2)-12$
0	-12	$-(0)^2+8(0)-12$

graph on next page



(15) $3x^2+16x+16=0$
$3x^2+12x+4x+16=0$
$3x(x+4)+4(x+4)=0$
$(x+4)(3x+4)=0$
$\boxed{x=-4,\ -4/3}$

(16) $3n^2-24n=36$
$n^2-8n=12$
$+4\quad n^2-8n+16=12+16$
$(n-4)=28$
$n-4=\pm 2\sqrt{7}$ $\boxed{n=4\pm 2\sqrt{7}}$

(17) $4n^2+8n-1=0$
$a=4\ \ b=8\ \ c=-1$
$\frac{-8\pm\sqrt{(8)^2-4(4)(-1)}}{2(4)}$
$\frac{-8\pm\sqrt{80}}{8}=\frac{-8\pm 4\sqrt{5}}{8}$
$\boxed{\frac{-2\pm\sqrt{5}}{2}}$

(18) $3x^2+6x+3=0$
b^2-4ac
$(6)^2-4(3)(3)=0$
$\boxed{\text{1 real root}}$ Rational

(19) $\frac{n^2-16}{n^2-8n+16}\cdot\frac{n-4}{n^2+6n+8}$
$\frac{(n-4)(n+4)}{(n-4)(n-4)}\cdot\frac{(n-4)}{(n+4)(n+2)}=\boxed{\frac{1}{n+2}}$

(20) $\frac{n^2+2n+1}{n-1}\div\frac{n+1}{2n^2-8n+6}$
$\frac{(n+1)(n+1)}{(n-1)}\cdot\frac{2(n-1)(n-3)}{(n+1)}=\boxed{\begin{array}{c}2(n+1)(n-3)\text{ or}\\ 2n^2-4n-6\end{array}}$

(21) $\frac{3}{2n-4}+\frac{2}{2n-n^2}=\frac{3}{2(n-2)}+\frac{2}{n(2-n)}$
$\frac{3}{2(n-2)}-\frac{2}{n(n-2)}=\frac{3}{2(n-2)}\left(\frac{n}{n}\right)-\frac{2}{n(n-2)}\left(\frac{2}{2}\right)=\boxed{\frac{3n-4}{2n(n-2)}}$

(22) $\frac{\frac{x+y}{x^2-y^2}}{\frac{x-y}{y^2-x^2}}=\frac{\frac{(x+y)}{(x-y)(x+y)}}{\frac{(x-y)}{(y-x)(y+x)}}=\frac{\frac{(x+y)}{(x-y)(x+y)}}{\frac{-1(x-y)}{(x-y)(y+x)}}$
$\frac{1}{x-y}\cdot\frac{y+x}{-1}=\boxed{\frac{-(x+y)}{x-y}}$

(23) $(x-1)(x+1)\left[1-\frac{1}{x-1}=\frac{2}{x+1}\right]$
$(x-1)(x+1)-(x+1)=2(x-1)$
$(x^2-1)-(x+1)=2x-2$
$x^2-1-x-1-2x+2=0$
$x^2-3x=0\quad x(x-3)=0$ $\boxed{x=0,3}$

"C"

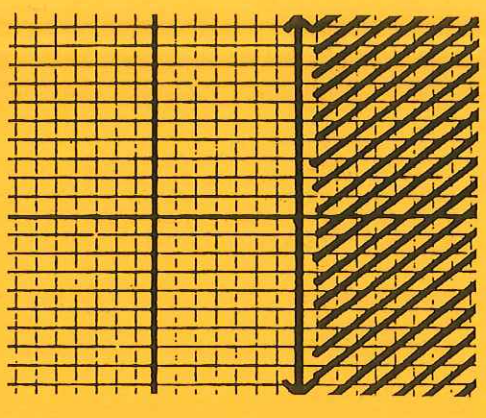
Alg. Skills Review Part II (Units 9-12)

① $y=2x+6$ $m=2$ y-int $(0,6)$
$8x-4y=10$ $m=2$ y-int $(0,-5/2)$
$\boxed{\text{independent, inconsistent, 0 solutions}}$

② $3x-2y=7\ \times(3)$
$4x-3y=11\ \times(-2)$
$9x-6y=21$
$-8x+6y=-22$
$x\quad\ =-1$

$3(-1)-2y=7$
$-2y=10$
$y=-5$
$\boxed{(-1,-5)}$

③ $x \geq 7$

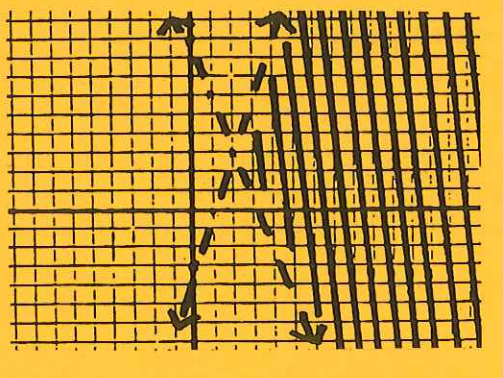


④ $|y-3|+6 < 3x$

$|y-3| < 3x-6$

$y-3 < 3x-6$ and $y-3 > -3x+6$

$\boxed{y < 3x-3 \text{ and } y > -3x+9}$

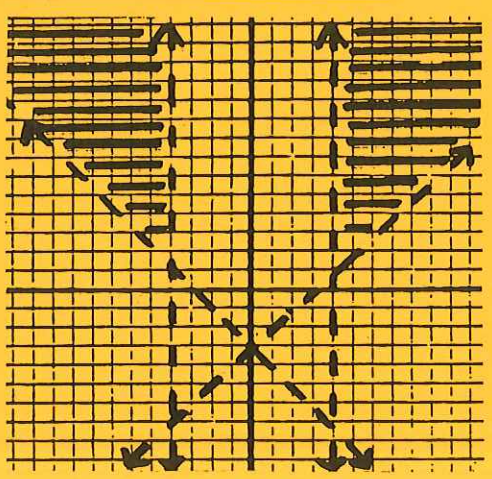


⑤ $|x| < y+3$ and $|x| > 4$

$(x < y+3$ and $x > -y-3)$

and $(x > 4$ or $x < -4)$

$\boxed{(y > x-3 \text{ and } y > -x-3) \text{ and } (x > 4 \text{ or } x < -4)}$



⑥ $\sqrt{125a^3b^3c^2} = \boxed{5ab|c|\sqrt{5ab}}$

⑦ $\begin{array}{r} 25.33 \\ \sqrt{642.00\,00} \end{array} \approx 25.3$

$\begin{array}{r} 4 \\ 45\overline{)242} \\ 225 \\ \hline 503\overline{)1700} \\ 1509 \\ \hline 5063\overline{)19100} \end{array}$

⑧ $4\sqrt{3}(\sqrt{6}-2\sqrt{15})-2\sqrt{5}$

$4\sqrt{18}-8\sqrt{45}-2\sqrt{5}$

$12\sqrt{2}-24\sqrt{5}-2\sqrt{5} = \boxed{12\sqrt{2}-26\sqrt{5}}$

⑨ $\frac{4\sqrt{3}}{2\sqrt{2}-\sqrt{3}} \cdot \frac{2\sqrt{2}+\sqrt{3}}{2\sqrt{2}+\sqrt{3}} = \frac{8\sqrt{6}+12}{8-3} = \boxed{\frac{8\sqrt{6}+12}{5}}$

⑩ $47 = \sqrt{2209}$, $\sqrt{2264}$ (95), $48 = \sqrt{2304}$ (55)

$47\frac{55}{95}$ $\boxed{47\frac{11}{19}}$

⑪ $\sqrt{4x+13}+3=4$

$\sqrt{4x+13}=1$

$4x+13=1$

$4x=12$

$\boxed{x=-3}$

⑫ $a^2+b^2=c^2$

$4^2+10^2=c^2$

$16+100=c^2$

$c^2=116$

$c=\boxed{2\sqrt{29}\text{ m}}$

⑬ $(4,5)$ to $(8,-1)$

$d=\sqrt{[(4)-(8)]^2+[(5)-(-1)]^2}$

$d=\sqrt{(-4)^2+(6)^2} = \sqrt{52}$

$d=\boxed{2\sqrt{13}}$

⑭ $y=x^2-6x-16$

axis

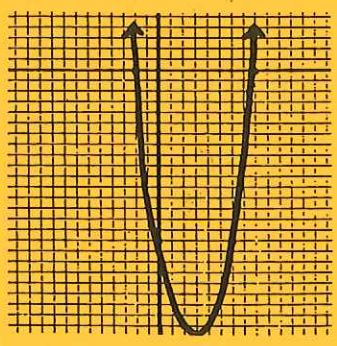
$x=-b/2a$ $\boxed{x=3}$

vertex

$y=(3)^2-6(3)-16=-25$

$\boxed{(3,-25)}$

x	y	
2	-24	$(2)^2-6(2)-16$
0	-16	$(0)^2-6(0)-16$
-2	0	$(-2)^2-6(-2)-16$



(15) $4x^2+15x-4=0$

$4x^2+16x-x-4=0$

$4x(x+4)-1(x+4)=0$

$(x+4)(4x-1)=0$

$\boxed{x=-4, \frac{1}{4}}$

(16) $3n^2+12=18n$

$3n^2-18n=-12$

$\rightarrow n^2-6n=-4$

$n^2-6n+9=-4+9$

$(n-3)^2=5$

$n-3=\pm\sqrt{5}$

$\boxed{n=3\pm\sqrt{5}}$

(17) $n^2-6n+1=0$

$a=1 \quad b=-6 \quad c=1$

$\frac{6\pm\sqrt{(-6)^2-4(1)(1)}}{2(1)}$

$\frac{6\pm\sqrt{32}}{2}=\frac{6\pm4\sqrt{2}}{2}$

$\boxed{3\pm2\sqrt{2}}$

(18) $2x^2+4x+3=0$

$b^2-4ac<0$

$(4)^2-4(2)(3)=-8$

$\boxed{\text{no real roots}}$

(19) $\frac{2n^2-13n+15}{2n-3}\cdot\frac{n+1}{n^2-4n-5}$

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

$\boxed{1}$

(20) $\frac{n^2-81}{n^2-36}\div\frac{n-9}{n+6}$

$\frac{(n+9)(n-9)}{(n+6)(n-6)}\cdot\frac{(n+6)}{(n-9)}=\boxed{\frac{n+9}{n-6}}$

(21) $\frac{-3}{5-a}-\frac{5}{a^2-25}=\frac{-3}{(5-a)}-\frac{5}{(a-5)(a+5)}$

$\frac{3}{a-5}\left(\frac{a+5}{a+5}\right)-\frac{5}{(a-5)(a+5)}$

$\frac{3(a+5)-5}{(a-5)(a+5)}=\frac{3a+15-5}{(a-5)(a+5)}=\boxed{\frac{3a+10}{(a-5)(a+5)}}$

(22) $\frac{n+2+\frac{2}{n+5}}{n+6+\frac{6}{n+1}}=\frac{\frac{(n+2)(n+5)+2}{(n+5)}}{\frac{(n+6)(n+1)+6}{(n+1)}}$

$n^2+7n+10+2=\frac{(n^2+7n+12)}{(n+5)}$

$n^2+7n+6+6=\frac{(n^2+7n+12)}{(n+1)}$

$\frac{(n^2+7n+12)}{(n+5)}\cdot\frac{(n+1)}{(n^2+7n+12)}=\boxed{\frac{n+1}{n+5}}$

(23) $(x-4)(x-1)\left[\frac{3x}{x^2-5x+4}=\frac{2}{x-4}+\frac{3}{x-1}\right]$

$3x=2(x-1)+3(x-4)$

$3x=2x-2+3x-12$

$3x=5x-14$

$-2x=-14$

$\boxed{x=7}$

Problem Solving Review

"A"

Prob. Solving Review
Answer Key

① n -1
$n+2$ $\boxed{1}$
$n+4$ 3

$3(n+4)-(2n+5)=6$
$3n+12-2n-5=6$
$n=-1$

② $-10<3n-4<17$
$-10<3n-4$ and $3n-4<17$
$-6<3n$ and $3n<21$
$-2<n$ and $n<7$
$-2<n<7$
positive, even
$\boxed{n=2,4,6}$

③

	now	In 5	In 4
Ryan	$5n$	$5n+5$	
Sam	$8n$		$8n+4$

$4(5n+5)=3(8n+4)$
$20n+20=24n+12$
$-4n=-8$
$n=2$

Ryan now $5n=10$
Last year $\boxed{\text{9 yrs. old}}$

④ n $\boxed{5}$ $\boxed{-6}$
$n+1$ $\boxed{6}$ $\boxed{-5}$

$n^2+(n+1)^2=61$
$n^2+(n^2+2n+1)=61$
$2n^2+2n-60=0$
$n^2+n-30=0$
$(n-5)(n+6)=0$
$n=5,-6$

⑤ tu
$t+u=7$ $\quad u=7-t$
$10u+t=2(10t+u)-25$
$10u+t=20t+2u-25$
$8u-19t=-25$
$8(7-t)-19t=-25$
$56-8t-19t=-25$
$-27t=-81$
$t=3$ $\quad u=4$ $\quad \boxed{34}$

⑥ $.085n+3(210)=1004$
$.085n+630=1004$
$.085n=374$
$n=4400$ $\quad \boxed{\$4400}$

⑦ nickels $28-3n$
dimes n
quarters $2n$

$5(28-3n)+10n+25(2n)=365$
$140-15n+10n+50n=365$
$45n=225$
$n=5$
nickels $28-3n=$ $\boxed{\text{13 nickels}}$

⑧ $\frac{\text{after tax}}{\text{original price}}$ $\quad \frac{15.37}{n}=\frac{106}{100}$

$106n=1537$
$n=14.5$ $\quad \boxed{\$14.50}$

⑨ $.06n=.08(18{,}000-n)+240$
$.06n=1440-.08n+240$
$.14n=1680$
$n=12{,}000$ $\quad \boxed{\$12{,}000 \text{ @ } 6\%}$

⑩ $4.25n+1.75(50-n)=120$
$4.25n+87.5-1.75n=120$
$2.5n=32.5$
$n=13$
$50-n=37$

$\boxed{\text{13 adult \& 37 child tickets}}$

(11) $.40(30)-.6(n)=.60(30-n)$
$12=18-.6n$
$.6n=6$
10ℓ of water

(12)

	$\frac{r}{}$	$\cdot$	$\frac{t}{}$	$=$	$\frac{d}{}$
Amy	6	$\cdot$	t	$=$	$6t$
Rick	8	$\cdot$	$(t-3/4)$	$=$	$8t-6$

$6t=8t-6$ Amy arrives
$-2t=-6$ 1:30 + 3
$t=3$ **4:30 PM**
Distance to beach $6t=$ **18 miles**

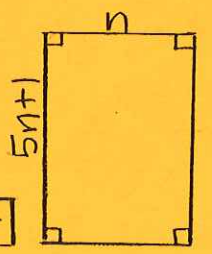
(13)

	$\frac{r}{}$	$\cdot$	$\frac{t}{}$	$=$	$\frac{d}{}$
downstream	$(r+c)$	$\cdot$	3	$=$	42
upstream	$(r-c)$	$\cdot$	7	$=$	42

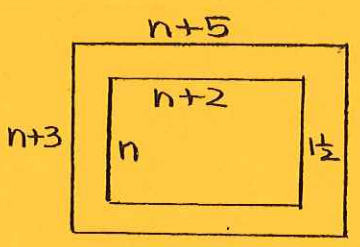
$3r+3c=42 \div 3$ $\quad r+c=14$
$7r-7c=42 \div 7$ $\quad r-c=6$
$2r=20$
$r=10$
$c=4$

current 4 mph

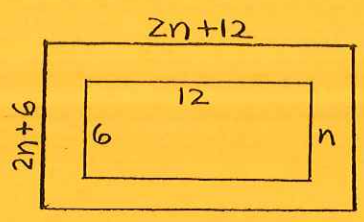
(14) $2n+2(5n+1)=38$
$2n+10n+2=38$
$12n=36$
$n=3$
$5n+1=16$
area $3\cdot16=$ **48 cm²**



(15) $(n+5)(n+3)-n(n+2)=39$
$(n^2+8n+15)-(n^2+2n)=39$
$6n-24=0$
$6(n-4)=0$
$n=4$
$n+2=6$
4 by 6 in



(16) $(2n+12)(2n+6)-(6)(12)=63$
$(4n^2+36n+72)-72=63$
$4n^2+36n-63=0$
$a=4$
$b=36$
$c=-63$
$\frac{-36\pm\sqrt{(36)^2-4(4)(-63)}}{2(4)}$
$\frac{-36\pm48}{8}$
$\frac{-84}{8}, \frac{12}{8}$
$n=$ **1½ ft**



(17) $(n-5)(2n+2)=54$
$2n^2-8n-10=54$
$2n^2-8n-64=0$
$n^2-4n-32=0$
$(n-8)(n+4)=0$
$n=$ **8, −4**

(18)

	$\frac{r}{}$	$\cdot$	$\frac{t}{}$	$=$	$\frac{w}{}$
Jim	1/3	$\cdot$	t	$=$	$t/3$
Russ	1/6	$\cdot$	t	$=$	$t/6$

(6) $\frac{t}{3}+\frac{t}{6}=1$
$2t+t=6$
$3t=6$ $\quad t=$ **2 hours**

(19)

	$\frac{r}{}$	$\cdot$	$\frac{t}{}$	$=$	$\frac{w}{}$
Susan	5	$\cdot$	2/15	$=$	2/3
miwa	r	$\cdot$	2/15	$=$	$2r/15$

(15) $\frac{2}{3}+\frac{2r}{15}=1$
$10+2r=15$
$2r=5$
$r=5/2$
reciprocal $=2/5$
$\frac{2}{5}\times60$ min
24 min

(20)

	$\frac{r}{}$	$\cdot$	$\frac{t}{}$	$=$	$\frac{w}{}$
Fill Pipe 1	1/2	$\cdot$	t	$=$	$t/2$
Fill Pipe 2	1/5	$\cdot$	t	$=$	$t/5$
Drain	1/4	$\cdot$	t	$=$	$t/4$

(20) $\frac{t}{2}+\frac{t}{5}-\frac{t}{4}=1$
$10t+4t-5t=20$
$9t=20$
$t=20/9$
$2\frac{2}{9}$ hours $=$ **2 hrs 13 min**

Quarterly Exam #4 - Skills 1-8

REMEDIATION & EXTRA PRACTICE – Key

① $4ab^2-3(a-2b)$

$4(-2)(-1)^2-3[(-2)-2(-1)]$

$4(-2)(1)-3(0)$

$-8-0=-8$

$2a^2b^2-2(a+3b)-b^3$

$2(-2)^2(-1)^2-2[(-2)+3(-1)]-(-1)^3$

$2(4)(1)-2(-5)-(-1)$

$(8)-(-10)-(-1)$

$(8)+(10)+(1)=19$

② $2xy-3x(y-4)-8x$

$2xy-3xy+12x-8x$

$-xy+4x$

$12x^2-3x(x+2y)-2xy$

$12x^2-3x^2-6xy-2xy$

$9x^2-8xy$

③ $4-\frac{2n}{3}=-2-5(n+4)$

$3[4-\frac{2n}{3}=-2-5n-20]$

$12-2n=-6-15n-60$

$12-2n=-15n-66$

$13n=-78$

$n=-6$

$2(x-3)+\frac{x}{4}=3x-9$

$4[2x-6+\frac{x}{4}=3x-9]$

$8x-24+x=12x-36$

$9x-24=12x-36$

$-3x=-12$

$x=4$

④ $\frac{2a-1}{3}<\frac{2(3a+1)}{8}$

$8(2a-1)<6(3a+1)$

$16a-8<18a+6$

$-2a<14$

$a>-7$

$2x-3(x-1)\geq\frac{x}{2}+6$

$2[2x-3x+3\geq\frac{x}{2}+6]$

$4x-6x+6\geq x+12$

$-3x=\geq 6$

$x\leq -2$

⑤ $(-\frac{1}{2}a^2bc^{-3})^2(-2a^{-1}b^2c^{-2})^3$

$(\frac{1}{4}a^4b^2c^{-6})(-8a^{-3}b^6c^{-6})$

$-2ab^8c^{-12}$

$\frac{-2ab^8}{c^{12}}$

$(-\frac{2}{3}x^{-1}y^{-2}z^2)^2(-3xy^{-3}z^{-1})^2$

$(\frac{4}{9}x^{-2}y^{-4}z^4)(9x^2y^{-6}z^{-2})$

$4x^0y^{-10}z^2=\frac{4z^2}{y^{10}}$

⑥ $\frac{-6xy^{-2}z^{-3}}{4x^2y^3z^{-5}}=\frac{-3z^2}{2xy^5}$

$\frac{12a^{-2}b^{-3}cd^4}{-9a^{-3}b^2c^4d^{-2}}=\frac{-4ad^6}{3b^5c^3}$

⑦ $\frac{.024\times10^{-7}}{2.5\times10^{-2}}=.0096\times10^{-5}$

9.6×10^{-8}

$\frac{484\times10^{-5}}{2.5\times10^{-8}}=193.6\times10^3$

1.936×10^5

⑧ $(3n-5)(4n+3)$

$12n^2-11n-15$

$(2x+3y)(x-4y)$

$2x^2-5xy-12y^2$

⑨ $n-2m\,\overline{)\,3n^3 \qquad -18m^3}$; quotient: $3n^2+6nm+12m^2+\frac{6m^3}{n-2m}$

$3n^3-6n^2m$

$6n^2m$

$6n^2m-12nm^2$

$12nm^2-18m^3$

$12nm^2-24m^3$

$6m^3$

$2x-3y\,\overline{)\,8x^3 \qquad -8y^3}$; quotient: $4x^2+6xy+9y^2+\frac{19y^3}{2x-3y}$

$8x^3-12x^2y$

$12x^2y$

$12x^2y-18xy^2$

$18xy^2-8y^3$

$18xy^2-27y^3$

$19y^3$

⑩ $25x^4y,\ 35xy^3,\ 45x^2y^2$

25	5^2	GCF $=5xy$
35	$5\cdot7$	LCM $=1575x^4y^3$
45	$3^2\cdot5$	

$18a^2b^3,\ 120abc,\ 150a^4bc^2$

18	$2\cdot3^2$	GCF $=6ab$
120	$2^3\cdot3\cdot5$	LCM $=1800a^4b^3c^2$
150	$2\cdot3\cdot5^2$	

⑪ $6x^2+xy-2y^2$ -12 ^ $4\ -3$

$6x^2+4xy-3xy-2y^2$

$2x(3x+2y)-y(3x+2y)$

$(3x+2y)(2x-y)$

$12a^2-13ab+3b^2$ 36 ^ $-9\ -4$

$12a^2-9ab-4ab+3b^2$

$3a(4a-3b)-b(4a-3b)$

$(4a-3b)(3a-b)$

(12) $4a^2x^2 - x^2b^2 + y^2b^2 - 4a^2y^2$

$x^2(4a^2-b^2) + y^2(y^2-4a^2)$

$x^2(4a^2-b^2) - y^2(4a^2-y^2)$

$(4a^2-b^2)(x^2-y^2)$

$(2a+b)(2a-b)(x+y)(x-y)$

$6a^2x - 3a^2y - 6b^2x + 3b^2y$

$3(2a^2x - a^2y - 2b^2x + b^2y)$

$3[a^2(2x-y) - b^2(2x-y)]$

$3(2x-y)(a^2-b^2)$

$3(2x-y)(a+b)(a-b)$

(13) $x^3 - 10x = 3x^2$

$x^3 - 3x^2 - 10x = 0$

$x(x^2-3x-10) = 0$

$x(x-5)(x+2) = 0$

$x = 0, 5, -2$

$5n^2 + 10 = 15n$

$5n^2 - 15n + 10 = 0$

$5(n^2-3n+2) = 0$

$5(n-2)(n-1) = 0$

$n = 2, 1$

(14) $(-2,3)$ $(5,1)$ $\frac{3-1}{-2-5} = \frac{2}{-7} = \frac{A}{-B}$ $A=2$ $B=7$

$2x + 7y = C$

$2(-2) + 7(3) = 17$

$2x + 7y = 17$

I FINALLY GOT THE TOILET UNCLOGGED

$(-4,3)$ $(-6,7)$ $\frac{3-7}{-4-(-6)} = \frac{-4}{2} = -2$

$y = -2x + b$

$(3) = -2(-4) + b$

$3 = 8 + b$

$b = -5$ $y = -2x - 5$

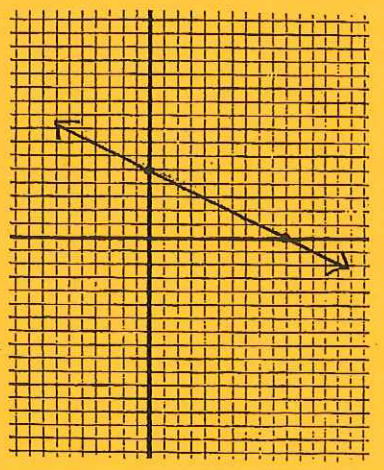
(15) Stan $\parallel$ $y = \frac{-1}{2}x + 2$ $(2,4)$

$m = \frac{-1}{2} = \frac{-A}{B}$ $A=1$ $B=2$

$x + 2y = C$

$(2) + 2(4) = 10$

$x + 2y = 10$



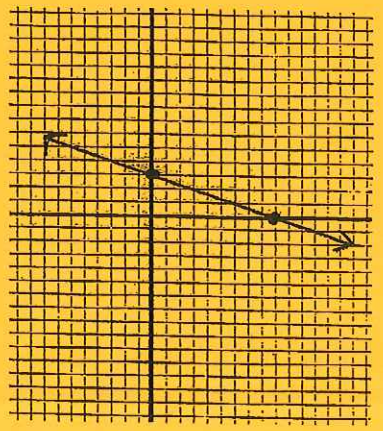
Si $\perp$ $3x - y = -5$ $(-9,6)$

$m = 3$ $\perp m = \frac{-1}{3}$

$y = \frac{-1}{3}x + b$

$(6) = \frac{-1}{3}(-9) + b$

$b = 3$ $y = \frac{-1}{3}x + 3$



(16) $f(n+4)$ for $f(x) = x^2 - 2x$

$f(n+4) = (n+4)^2 - 2(n+4)$

$(n^2+8n+16) - 2n - 8$

$n^2 + 6n + 8$

$f(2a+3)$ for $f(x) = x - x^2$

$f(2a+3) = (2a+3) - (2a+3)^2$

$(2a+3) - (4a^2+12a+9)$

$-4a^2 - 10a - 6$

(17) $A(-5,12)$ $B(-9,-4)$

$P(-7,4)$

$A(8,-9)$ $B(-2,3)$

$P(3,-3)$

(18) $2xy = 3x + 4y$

$2xy - 3x = 4y$

$x(2y-3) = 4y$

$x = \frac{4y}{2y-3}$ for $y \neq 3/2$

$-2y = 4x + xy - 1$

$4x + xy = -2y + 1$

$x(4+y) = -2y + 1$

$x = \frac{-2y+1}{4+y}$ for $y \neq -4$

(20) $(2x^{a+b} - y^{2a+b})^2$

$4x^{2a+2b} - 4x^{a+b}y^{2a+b} + y^{4a+2b}$

$(3x^{n-2} + 2y^{3n+1})^2$

$9x^{2n-4} + 12x^{n-2}y^{3n+1} + 4y^{6n+2}$

(19) $|2x+4|<8$ and $|x| \neq 1$

$(2x+4<8$ and $2x+4>-8)$

$2x<4$ and $2x>-12$

$x<2$ and $x>-6$

$(-6<x<2)$ and $(x \neq 1$ and $x \neq -1)$

$|2n-4| \geq 10$ and $|n| \neq 10$

$(2n-4 \geq 10$ or $2n-4 \leq -10)$

$2n \geq 14$ $\quad 2n \leq -6$

$(n \geq 7$ or $n \leq -3)$ and $(n \neq 10$ and $n \neq -10)$

Quarterly Exam #4 - Skills 9-12

REMEDIATION & EXTRA PRACTICE – Key

(1) slope $-3/2$ $\quad -3/2$

y-int $(0,6)$ $\quad (0,6)$

dependent, consistent, inf

slope $2/5$ $\quad 2/5$

y-int $(0,-2)$ $\quad (0,4)$

independent, inconsistent, 0

(2) $3x-4y=-5$

$(x+5y=-8) \times (-3)$

$3x-4y=-5$

$-3x-15y=24$

$-19y=19$

$y=-1$

$x=-3$ $\quad (-3,-1)$

$4x-2y=-14$

$(6x+y=3) \times (2)$

$4x-2y=-14$

$12x+2y=6$

$16x \quad = -8$

$x=-1/2$

$y=6$ $\quad (-1/2,6)$

(3) $\sqrt{60a^2b^3c^3}$

$2|a|bc\sqrt{15bc}$

$\sqrt{75a^4bc^3d^2}$

$5a^2|cd|\sqrt{3bc}$

(4) $\sqrt{3}(2\sqrt{6}-\sqrt{15})-2\sqrt{2}$

$2\sqrt{18}-\sqrt{45}-2\sqrt{2}$

$6\sqrt{2}-3\sqrt{5}-2\sqrt{2}$

$4\sqrt{2}-3\sqrt{5}$

$4\sqrt{3}-3\sqrt{2}\,(3\sqrt{6}-2\sqrt{10})$

$4\sqrt{3}-9\sqrt{12}+6\sqrt{20}$

$4\sqrt{3}-18\sqrt{3}+12\sqrt{5}=-14\sqrt{3}+12\sqrt{5}$

(5) $\frac{2\sqrt{3}}{3\sqrt{2}-4} \times \frac{3\sqrt{2}+4}{3\sqrt{2}+4} = \frac{6\sqrt{6}+8\sqrt{3}}{18-16}$

$3\sqrt{6}+4\sqrt{3}$

$\frac{3\sqrt{10}}{\sqrt{5}-2} \times \frac{\sqrt{5}+2}{\sqrt{5}+2} = \frac{3\sqrt{50}+6\sqrt{10}}{5-4}$

$\frac{15\sqrt{2}+6\sqrt{10}}{1} = 15\sqrt{2}+6\sqrt{10}$

(6) $\frac{\sqrt{1600}}{\sqrt{1645}} = \frac{40}{41}$ $\Big\}45\Big\}81$

$\sqrt{1681} = 41$

$40\frac{45}{81} = 40\frac{5}{9}$

$\sqrt{4489} = 67$
$\sqrt{4534}$ } 45 } 135
$\sqrt{4624} = 68$

$67\frac{45}{135} = 67\frac{1}{3}$

⑦ $\sqrt{2n+10} - 6 = -4$
$\sqrt{2n+10} = 2$
$2n+10 = 4$
$2n = -6$
$n = -3$

$8 - \sqrt{5x+19} = 5$
$-\sqrt{5x+19} = -3$
$5x+19 = 9$
$5x = -10$
$x = -2$

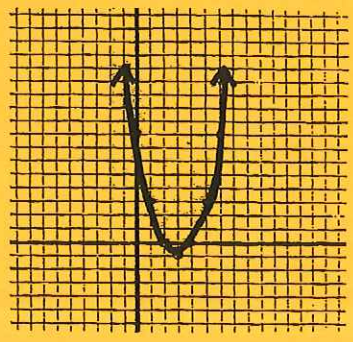
⑧ $(-3,2)$ to $(-8,-3)$
$\sqrt{(-3-(-8))^2+(2-(-3))^2}$
$\sqrt{25+25} = \sqrt{50} = 5\sqrt{2}$

$(5,-9)$ to $(9,-7)$
$\sqrt{(5-9)^2+(-9-(-7))^2}$
$\sqrt{16+4} = \sqrt{20} = 2\sqrt{5}$

⑨ $y = x^2-6x+8$
$x = \frac{-b}{2a}$ axis $x=3$

x	y
2	0
1	3
0	8

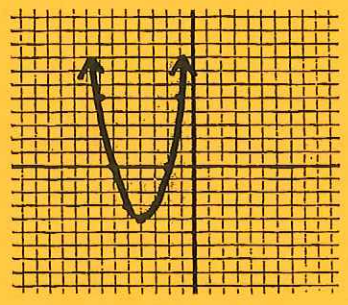
vertex $(3,-1)$



$y = x^2+8x+12$
$x = \frac{-b}{2a}$ axis $x=-4$

x	y
-3	-3
-2	0
-1	5

vertex $(-4,-4)$



⑩ $n^2-6n+6 = 0$
$n^2-6n+9 = -6+9$
$(n-3)^2 = 3$
$n-3 = \sqrt{3}$
$n = 3 \pm \sqrt{3}$

$2x^2+8x-2 = 0$
$x^2+4x-1 = 0$
$x^2+4x+4 = 1+4$
$(x+2)^2 = 5$
$x+2 = \sqrt{5}$
$x = -2 \pm \sqrt{5}$

⑪ $x^2-6x+1 = 0$
$a=1$, $b=-6$, $c=1$
$\frac{6 \pm \sqrt{(-6)^2-4(1)(1)}}{2(1)}$
$\frac{6 \pm \sqrt{32}}{2}$
$\frac{6 \pm 4\sqrt{2}}{2} = 3 \pm 2\sqrt{2}$

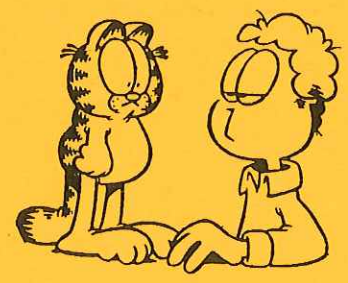
$3x^2+12x-9 = 0$
$3(x^2+4x-3) = 0$
$a=1$, $b=4$, $c=-3$
$\frac{-4 \pm \sqrt{(4)^2-4(1)(-3)}}{2(1)}$
$\frac{-4 \pm \sqrt{28}}{2}$
$\frac{-4 \pm 2\sqrt{7}}{2} = -2 \pm \sqrt{7}$

⑫ $\frac{(x-5)(x+1)}{(x-4)(x-3)} \times \frac{(x-3)}{(x+1)}$
$\frac{x-5}{x-4}$

$\frac{(n-3)(2n+1)}{(n+4)(n+2)} \times \frac{2(n+2)}{(2n+1)}$
$\frac{2(n-3)}{(n+4)}$

⑬ $\frac{2}{n-1} - \frac{3}{n(n-1)} = \frac{2n-3}{n(n-1)}$

$\frac{3x}{x-2} - \frac{5}{x(2-x)}$
$\frac{3x}{x-2} + \frac{5}{x(x-2)} = \frac{3x^2+5}{x(x-2)}$



⑭ $(n+1)(n-2)\left[\frac{n-5}{n+1} + \frac{n+8}{n-2} = 3\right]$
$(n-2)(n-5)+(n+1)(n+8) = 3(n+1)(n-2)$
$(n^2-7n+10)+(n^2+9n+8) = 3n^2-3n-6$
$2n^2+2n+18 = 3n^2-3n-6$
$n^2-5n-24 = 0$
$(n-8)(n+3) = 0$ $n = 8, -3$

$(n)(n+3)\left[\frac{n+3}{n} + \frac{4n}{n+3} = -4\right]$
$(n+3)(n+3)+(n)(4n) = -4(n)(n+3)$
$(n^2+6n+9)+(4n^2) = -4n^2-12n$
$9n^2+18n+9 = 0$
$n^2+2n+1 = 0$
$(n+1)^2 = 0$
$n = -1$

(15) $\frac{(n-3)(n+1)}{(n+2)(n-1)} \times \frac{(n-2)(n+2)}{(n+1)}$

$\frac{(n-3)(n-2)}{(n-1)}$

$\frac{2(x+1)(x-1)}{(x+2)(x-1)} \times \frac{(x+2)}{3(x+1)} = \frac{2}{3}$

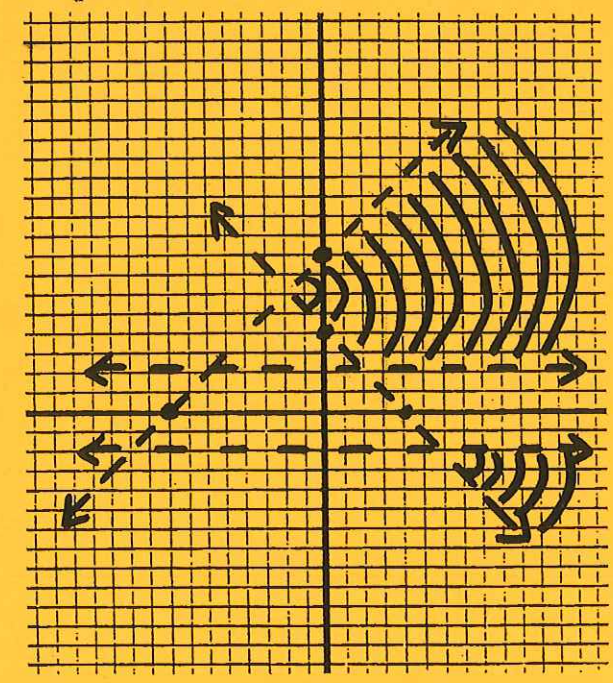
(16) $(y-6 < x+2)$ and $(y-6 > -x-2)$

$[y < x+8$ and $y > -x+4]$ and $[y > 2$ or $y < -2]$

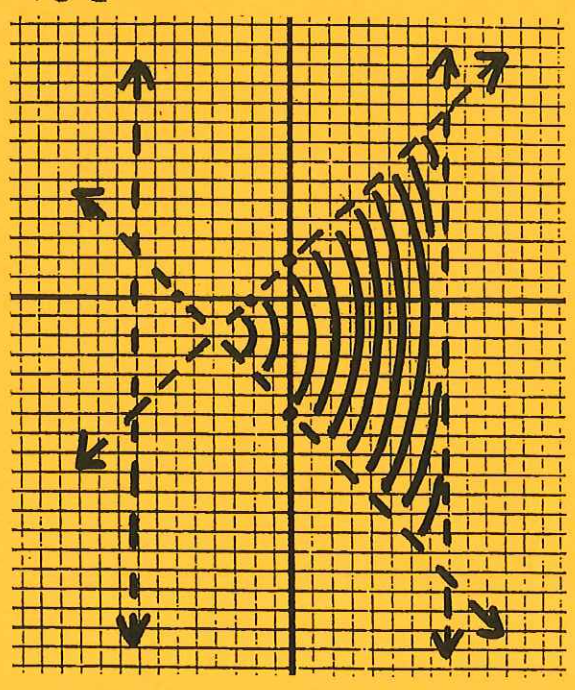
$(y+2 < x+4)$ and $(y+2 > -x-4)$

$[y < x+2$ and $y > -x-6]$ and $[x < 8$ and $x > -8]$

16A



16B



Quarterly Exam #4 - Problem Solving

REMEDIATION & EXTRA PRACTICE – Key

① 8 n $2n-(n+4)=2(n+2)-16$
10 $n+2$ $2n-n-4=2n+4-16$
→ 12 $n+4$ $n-4=2n-12$
$n=8$

-9 n $n-(n+4)=(n+2)+3$
→ -7 $n+2$ $n-n-4=n+2+3$
-5 $n+4$ $-4=n+5$
$n=-9$

② | | now | 6 ago |
|---|---|---|
| Mark | $n+6$ | n |
| Ramon | n | $n-6$ |

$4(n-6)=3(n)$
$4n-24=3n$
$n=24$ $n+6=30$
30 yrs old

	now	14 ago
Ken	$n+10$	$n-4$
Steve	n	$n-14$

$5(n-14)=4(n-4)$
$5n-70=4n-16$
$n=54$ $n+10=64$
next yr = 65
65 yrs old

③ 5 nickels n
10 dimes $2n$
20 quarters $4n$
$5n+10(2n)+25(4n)=625$
$125n=625$ $n=5$
10 dimes

2 nickels $n-2$
8 dimes $2n$
12 quarters $3n$
$5(n-2)+10(2n)+25(3n)=390$
$5n-10+20n+75n=390$
$100n=400$ $n=4$
12 quarters

④ 7 n
9 $n+2$
$n+(n+2)^2=88$
$n+(n^2+4n+4)=88$
$n^2+5n-84=0$
$(n+12)(n-7)=0$
~~-12~~ 7

-7 6 n
-6 7 $n+1$
$n^2+(n+1)^2=85$
$n^2+(n^2+2n+1)=85$
$2n^2+2n-84=0$
$n^2+n-42=0$
$(n+7)(n-6)=0$
-7 6

⑤ 7% $22,800-n$
5% n
$.05n=2[.07(22,800-n)]$
$.05n=2(1596-.07n)$
$.05n=3192-.14n$
$.19n=3192$
$n=16,800$
$(.05)(16,800)=$
$16,800 invested
$840 interest

8% 13,300-n
4% n

$.04n = .08(13,300-n)+100$
$.04n = 1064-.08n+100$
$.12n = 1164$
$n = 9700$
$(.04)(9700) =$

$9700 invested
$388 interest

⑥ $.5(30)-0(n)=.6(30-n)$
$15 = 18-.6n$
$-3 = -.6n$
$n = 5$

5ℓ of water

$.4(20)+1(n)=.75(20+n)$
$8+n = 15+.75n$
$.25n = 7$
$n = 28$

28ℓ of salt

⑦

	R	· T	= D
Denny	6	t	6t
Alan	10	t-1	10t-10

$6t = 10t-10$
$-4t = -10$
$t = 5/2$

2½ hours

	R	· T	= D
michael	40	t	40t
Jermaine	30	$t-\frac{1}{2}$	30t-15

$40t+30t-15 = 125$
$70t = 140$
$t = 2$

4:00

2:00 + 2hrs = 4:00

⑧

	R	· T	= D
with wind	r+w	3	48
against	r-w	6	48

$3r+3w = 48 \quad \div 3$
$6r-6w = 48 \quad \div 6$

$r+w = 16$
$r-w = 8$
$2r = 24$
$r = 12$
$w = 4$

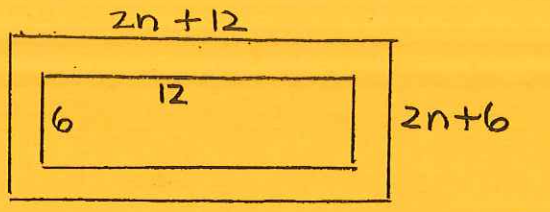
wind: 4 mph

	R	· T	= D
downstream	r+c	3	48
upstream	r−c	4	48

$3r+3c=48 \quad \div 3$
$4r-4c=48 \quad \div 4$

$r+c=16$
$r-c=12$
$2r=28$
$r=14$
$c=2$

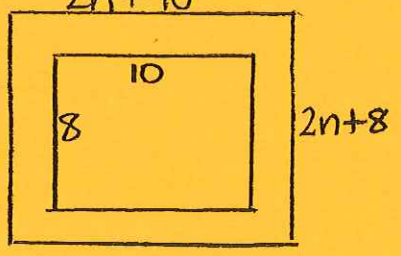
current: 2 mph



$(2n+12)(2n+6)-(6)(12)=88$
$4n^2+36n+72-72=88$
$4n^2+36n-88=0$
$n^2+9n-22=0$
$(n+11)(n-2)=0$
$n=-11 \quad 2$

2 ft.

⑨



$(2n+10)(2n+8)-(8)(10)=63$
$4n^2+36n+80-80=63$
$4n^2+36n-63=0$

$$n=\frac{-36\pm\sqrt{36^2-4(4)(-63)}}{2(4)}$$

$\frac{-36\pm48}{8}=\frac{3}{2},\frac{-21}{2}$

1½ ft

⑩

	R	· T	= W
Joan	3	t	3t
melissa	5	t	5t

$3t+5t=1$
$8t=1$
$t=\frac{1}{8}$ hr
$60\div8=7\frac{1}{2}$

7½ minutes

	R	· T	= W
John	3	1/5	3/5
Sarah	r	1/5	r/5

$\left[\frac{3}{5}+\frac{r}{5}=1\right](5)$
$3+r=5$
$r=2$

½ hr

Sarah's rate is 2 jobs per hour. Rate is reciprocal of time so it takes her ½ hr. to do one job.