Mat 1033c Lial
Chapter 7
Practice for the test
solutions
10/09/2009
KINCADE

① $\frac{-2x^3+7x^2+15x}{x^2-8x+15}$

$= \frac{-x(2x^2-7x-15)}{x^2-8x+15}$

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

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

which is NOT equivalent to $\frac{-x(2x+3)}{x+3}$ (NOTA)

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

which is NOT equivalent to $\frac{+1}{x-4}$ (NOTA)

③ $f(x) = \frac{x^2-64}{x^2-2x-48}$

$(x-8)(x+6)$ (B)

$x \neq 8, -6$

④ $f(x) = \frac{x-6}{a}$ (D)

There are no restrictions since there is no variable in the denominator.

⑤ $f(x) = \frac{x^2-49}{x^2+2x-15}$

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

$x \neq -5, 3$

$x+5 \neq 0$, $x \neq -5$

$x-3 \neq 0$, $x \neq +3$

⑥ $g(a) = \frac{2a+22}{a^2-9}$

$(a+3)(a-3)$ (C)

$a \neq -3, 3$

Domain: $\{a \mid a \neq -3, 3\}$

⑦ $h(x) = \frac{5}{x^2+12x+35}$

$(x+5)(x+7)$ (D)

Domain: $\{x \mid x \neq -7, -5\}$

⑧ $\frac{6p-6}{p} \cdot \frac{5p^2}{8p-8}$

$\frac{6(p-1)}{p} \cdot \frac{5p^2}{8(p-1)}$

$\frac{3\cancel{6}(p-1)}{\cancel{p}} \cdot \frac{(5)p^{\cancel{2}(p)}}{\cancel{8}(p-1)}$ (4)

$\frac{3 \cdot 5 \cdot p}{4} = \frac{15p}{4}$ (C)

(9) $$\frac{k^2+10k+16}{k^2+13k+40} \cdot \frac{k^2+5k}{k^2-2k-8}$$

$$= \frac{(k+8)(k+2)}{(k+5)(k+8)} \cdot \frac{k(k+5)}{(k-4)(k+2)}$$

$$= \frac{\cancel{(k+8)}\cancel{(k+2)}}{\cancel{(k+5)}\cancel{(k+8)}} \cdot \frac{k\cancel{(k+5)}}{(k-4)\cancel{(k+2)}}$$

$$= \boxed{\frac{k}{k-4}} \quad (D)$$

(10) $$\frac{7p-7}{p} \div \frac{8p-8}{2p^2}$$

$$\frac{7(p-1)}{p} \cdot \frac{2p^2}{8(p-1)}$$

$$\frac{7\cancel{(p-1)}}{p} \cdot \frac{2p^2}{\cancel{8(p-1)}}$$

$$= \frac{7 \cdot 1 \cdot p^2}{4 \cdot p} = \boxed{\frac{7p}{4}} \quad (D)$$

(11) $$\frac{(2x-7)(x+2)}{(x+8)(x-3)} \div \frac{(x+2)(3x+7)}{(x+8)(x-3)}$$

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

(B)

$$= \frac{(2x-7)\cancel{(x+2)}}{\cancel{(x+8)}\cancel{(x-3)}} \cdot \frac{\cancel{(x+8)}\cancel{(x-3)}}{\cancel{(x+2)}(3x+7)} = \boxed{\frac{2x-7}{3x+7}}$$

(12)

$$\frac{5x^2-14xy-3y^2}{y^2+4xy-5x^2}\cdot\frac{y^2+3xy-4x^2}{15x^2+8xy+y^2}\div\frac{4x^2-11xy-3y^2}{15x^2+2xy-y^2}$$

$$=\frac{5x^2-14xy-3y^2}{y^2+4xy-5x^2}\cdot\frac{y^2+3xy-4x^2}{15x^2+8xy+y^2}\cdot\frac{15x^2+2xy-y^2}{4x^2-11xy-3y^2}$$

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

$$=\frac{\cancel{(5x+y)}\cancel{(x-3y)}}{(y+5x)\cancel{(y-x)}}\cdot\frac{\cancel{(y+4x)}\cancel{(y-x)}}{\cancel{(5x+y)}\cancel{(3x+y)}}\cdot\frac{(5x-y)\cancel{(3x+y)}}{\cancel{(4x+y)}\cancel{(x-3y)}}$$

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

(13) $\frac{m^2-7m}{m-2}+\frac{10}{m-2}$

* With addition & subtraction, you must keep the lcd. Sometimes it will cancel out in the last step.

$$=\frac{m^2-7m+10}{m-2}$$

$$=\frac{(m-5)(m-2)}{(m-2)}=\frac{(m-5)\cancel{(m-2)}}{\cancel{(m-2)}}=\boxed{m-5}$$ (C)

(14) $\frac{7}{4x^2}+\frac{3}{4x^2}=\frac{7+3}{4x^2}=\frac{10}{4x^2}=\boxed{\frac{5}{2x^2}}$ (A)

(15) $7a+21 \mid a^2+3a$

$7(a+3) \mid a(a+3)$

lcd $= \boxed{7a(a+3)}$ (D)

$= \boxed{7a^2+21a}$

(16) $m^2+5m \mid m^2+2m-15$

$m(m+5) \mid (m+5)(m-3)$

lcd $= \boxed{m(m+5)(m-3)}$ (C)

(17) $7y+42 \mid y^2-36 \mid y$

$7(y+6) \mid (y+6)(y-6) \mid y$

lcd $= 7(y+6)(y-6)\cdot y$ (D)

$= \boxed{7y(y+6)(y-6)}$

(18) lcd $(x+4)(x-4)(x+1)$

$\frac{x}{x^2-16} - \frac{4}{x^2+5x+4}$

$(x+4)(x-4) \quad (x+4)(x+1)$

so $\boxed{x \neq -4, 4 \text{ or } 1}$

often, I don't write this step

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

$= \frac{x(x+1) - 4(x-4)}{\text{lcd}}$

$= \frac{x^2+x-4x+16}{\text{lcd}}$

$= \frac{x^2-3x+16}{\text{lcd}} = \boxed{\frac{x^2-3x+16}{(x+4)(x-4)(x+1)}}$ (A)

(19) $\frac{3}{10x} + \frac{9}{14x^2}$ $\quad 10 = 2 \cdot 5$, $14 = 2 \cdot 7$

$lcd = 2 \cdot 5 \cdot 7 \cdot x^2$

$= 70x^2$

$= \frac{3(7x) + 9(5)}{lcd} = \boxed{\frac{21x + 45}{70x^2}}$ (D)

(20) $\frac{1}{6x^5y^2} - \frac{11}{2xy} = \frac{1(1) - 11(3x^4y)}{lcd}$

$lcd = 6x^5y^2$ $= \boxed{\frac{1 - 33x^4y}{6x^5y^2}}$ (C)

(21) $\frac{2ab}{a^2 - b^2} - \frac{b}{a-b} + \frac{4}{1}$ $\quad lcd = (a+b)(a-b)$

$(a+b)(a-b)$

$= \frac{2ab - b(a+b) + 4(a+b)(a-b)}{lcd}$ (C)

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

$= \frac{4a^2 + ab - 5b^2}{(a+b)(a-b)} = \frac{(4a+5b)(a-b)}{(a+b)(a-b)} = \boxed{\frac{4a+5b}{a+b}}$

(22) $\frac{1}{x-3} - \frac{5}{3-x} = \frac{1}{x-3} + \frac{5}{x-3} = \boxed{\frac{6}{x-3}}$

Recall $3 - x$

$= -x + 3$

$= -(x-3)$

then move the negative sign

(A)

(23) $\left(\frac{7.1x}{50-x} + \frac{7.6x}{59-x}\right)\frac{1}{2}$

lcd $= (50-x)(59-x)$

$= \frac{7.1x(59-x) + 7.6x(50-x)}{2(50-x)(59-x)}$

$= \frac{418.9x - 7.1x^2 + 380x - 7.6x^2}{2(50-x)(59-x)}$ (C)

$= \boxed{\frac{-14.7x^2 + 798.9x}{2(50-x)(59-x)}} = \boxed{\frac{-7.35x^2 + 399.45x}{(50-x)(59-x)}}$

divide -14.7 & 7989 by 2

(24) $\frac{5}{r} + \frac{8}{r-5} = \frac{5(r-5) + 8(r)}{lcd} = \frac{5r-25+8r}{lcd}$

lcd $= r(r-5)$

(B) $= \boxed{\frac{13r-25}{r(r-5)}}$

(25) $\frac{\frac{y}{8}}{\frac{9}{y-3}} = \frac{y}{8} \cdot \frac{y-3}{9} = \boxed{\frac{y(y-3)}{72}}$ (C)

(27) $\frac{9s^2 - 25t^2}{st}$

lcd st (multiply by it) $\frac{3}{t} - \frac{5}{s}$

$= \frac{9s^2-25t^2}{3(s)-5(t)} = \frac{9s^2-25t^2}{3s-5t}$

$= \frac{(3s+5t)(3s-5t)}{(3s-5t)}$ (A)

(26) on next page

$= \boxed{3s+5t}$

(26) $\dfrac{\frac{4}{1}+\frac{2}{x}}{\frac{x}{3}+\frac{1}{6}}$ ·6x ·6x

lcd 6x

$= \dfrac{4(6x)+2(6)}{x(2x)+1(x)} = \dfrac{24x+12}{2x^2+x}$

$= \dfrac{12(2x+1)}{x(2x+1)} = \boxed{\dfrac{12}{x}}$ (D)

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

lcd $x^2y^2$

(B)

(29) $\dfrac{20}{x+12} - \dfrac{5}{x+10} = 0$

lcd $(x+12)(x+10)$

$x \neq -12, -10$

$20(x+10) - 5(x+12) = 0(x+10)(x+12)$

0

$20x + 20 - 5x - 60 = 0$

$15x - 40 = 0$

$15x = 40$

$x = 40/15 = \boxed{8/3}$

answer to the question!

(D)

(30) $\dfrac{13}{5x} + \dfrac{11}{13x} = \dfrac{x}{4}$ (B)

lcd $= 5 \cdot 4 \cdot 13 \cdot x = 103,857x$ so $\boxed{x \neq 0}$

(31) $1 + \dfrac{1}{x} = \dfrac{90}{x^2} \Longrightarrow x^2 + x = 90$

lcd $= x^2$

$\boxed{x \neq 0}$

$x^2 + x - 90 = 0$

$(x+10)(x-9) = 0$

$\boxed{x = -10}$ $\boxed{x = 9}$

(C)

(32) $\frac{7}{x-4} = 1 + \frac{9}{x+4}$

lcd $= (x+4)(x-4)$

$x \neq -4, 4$

$7(x+4) = 1(x+4)(x-4) + 9(x-4)$

$7x + 28 = x^2 - 16 + 9x - 36$

$7x + 28 = x^2 + 9x - 52$

$0 = x^2 + 2x - 80$

$0 = (x+10)(x-8)$

$x = -10$ $x = 8$

(D)

(33) $\frac{2}{x-2} + \frac{10}{x} = \frac{-20}{x^2-2x}$

$x^2 - 2x$
$x(x-2)$

lcd $= x(x-2)$

$x \neq 0, 2$

$2(x) + 10(x-2) = -20$

(A)

$2x + 10x - 20 = -20$

$12x = 0$

$x \neq 0$

so no soln

(34) $\frac{4x-5}{2x+1} = \frac{2x-1}{x+2}$

lcd $= (2x+1)(x+2)$

$2x+1 \neq 0$ $x+2 \neq 0$

$2x \neq -1$ $x \neq -2$

$x \neq -1/2$

$(4x-5)(x+2) = (2x+1)(2x-$

$4x^2 + 8x - 5x - 10 = 4x^2 - 1$

$3x - 10 = -1$

$3x = 9$

$x = 3$

(A)

(35) $\frac{1}{w+6} + \frac{1}{3w-8} = \frac{-26}{3w^2+10w-48}$

$(w+6)(3w-8)$

lcd

$w \neq -6, 8/3$

$1(3w-8) + 1(w+6) = -26$

$3w - 8 + w + 6 = -26$

$4w - 2 = -26$

$4w = -24$

$w \neq -6$

no soln

(B)

(36) $\frac{1}{a} = \frac{1}{b} + \frac{1}{c}$ Find c

lcd abc

$abc \cdot \frac{1}{a} = \frac{1}{b} \cdot abc + \frac{1}{c} \cdot abc$

$bc = ac + ab$

$bc - ac = ab$

$c(b-a) = ab$

$\frac{c(b-a)}{(b-a)} = \frac{ab}{(b-a)} = c$

Now $a = 13$, $b = 14$ (A)

$\frac{(13)(14)}{(14-13)} = c$

$\frac{182}{1} = 182 = c$

(37) $\frac{PV}{T} = \frac{pv}{t}$ find p

lcd Tt

$PVt = pvT$

$\frac{PVt}{vT} = \frac{pvT}{vT}$

$\frac{PVt}{vT} = p$

so $p = \frac{PVt}{vT} = \frac{(30)(9)(330)}{(6)(250)} =$

$p = 59.4$ (B)

(38) $\frac{PV}{T} = \frac{pv}{t}$ for P

$PVt = pvT$ (A)

$\frac{PVt}{Vt} = \frac{pvT}{Vt} = P$

(39) $P = \frac{A}{1+rt}$ for r

$P(1+rt) = A$

$P + Prt = A$ (13)

$Prt = A - P$

$\frac{Prt}{Pt} = \frac{A-P}{Pt} = r$

(40) $\frac{1}{a}+\frac{1}{b}=\frac{1}{c}$ for c

lcd $abc$

$\frac{1}{a}\cdot abc+\frac{1}{b}\cdot abc=\frac{1}{c}\cdot abc$

$bc+ac=ab$

$c(b+a)=ab$

$\frac{c(b+a)}{(b+a)}=\frac{ab}{(b+a)}$

(C) $c=\frac{ab}{b+a}$

note: Do not cancel!

(41) (D) Basic proportion problem

$\frac{40}{4}=\frac{44}{x}$

$40x=176$

$x=\frac{176}{40}=4.4$ hrs

(42) (D) $\frac{8172 \text{ boxes}}{0.9 \text{ hrs}}=$ 9080 boxes/hr

(43)

| | |
|---|---|
| maid 1 | x |
| maid 2 | 3x |
| together | 3 |

lcd $3x$

$\frac{1}{x}+\frac{1}{3x}=\frac{1}{3}$

$3+1=x$

$4=x$

faster one

maid 1 = 4 hrs

maid 2 = 12 hrs

(B)

(44)

| | |
|---|---|
| new acct | 2x |
| * other acct | x |
| together | 12 |

(D)

lcd $=12x$

$\frac{1}{2x}+\frac{1}{x}=\frac{1}{12}$

$6+12=x$

$18=x$

experienced acct = 18 hrs

(45)

| | |
|---|---|
| Martha | 5 |
| Brother | 6 |
| together | x |

(A)

lcd $=30x$

$\frac{1}{5}+\frac{1}{6}=\frac{1}{x}$

$5x+6x=30$

$11x=30$

$x=\frac{30}{11}$ hrs together

(46) Find value of x

key = $\frac{\text{smaller}}{\text{larger}}$ $\quad \frac{20}{2x-7} = \frac{40}{2x+4}$

(D)

$20(2x+4) = 40(2x-7)$

$40x + 80 = 80x - 280$

$80 + 280 = 80x - 40x$

$360 = 40x$

$9 = x$

(47) key = $\frac{\text{smaller}}{\text{larger}}$ $\quad \frac{5}{2x+4} = \frac{7.5}{4x-5}$

$5(4x-5) = 7.5(2x+4)$

$20x - 25 = 15x + 30$

$20x - 15x = 30 + 25$

$5x = 55$

$x = 11$

(C)

side $EF = 4x - 5$

$= 4(11) - 5$

$= 44 - 5$

$= 39$

(48)

| | R | T | = | D |
|---|---|---|---|---|
| | | same * | | miles |
| Chuck | x+6 | $\frac{164}{x+6}$ | | 164 |
| Dana | x | $\frac{140}{x}$ | | 140 |

$R \cdot T = D$

so $T = \frac{D}{R}$

(D)

Dana's time = Chuck's time

$\frac{140}{x} = \frac{164}{x+6}$

$140(x+6) = x(164)$

$140x + 840 = 164x$

$840 = 24x$

$35 = x$ = Dana's speed

chuck's speed $= x + 6$

$= 35 + 6 =$ 41 mph