TEST 1A

1/ $(x^2y)\left(\frac{x^2y^{-3}z^{-6}}{y^5x^4z^{-8}}\right)^{-2}$

$= x^2y(x^{-2}y^{-8}z^2)^{-2}$

$= x^2y\,x^4y^{16}z^{-4}$

$= \frac{x^6y^{17}}{z^4}$

2/
$$3x+2\overline{)\,9x^3+0x^2+5x+0}\;\;3x^2-2x+3$$
$$-(9x^3+6x^2)$$
$$-6x^2$$
$$-(-6x^2-4x)$$
$$9x$$
$$-(9x+6)$$
$$-6$$

$\therefore \frac{9x^3+5x}{2+3x} = 3x^2-2x+3-\frac{6}{2+3x}$

3/ $\dfrac{\frac{1}{x+3}-\frac{1}{2x-6}}{\frac{1}{x-3}+\frac{2}{x^2-9}}$

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

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

$= \dfrac{2(x-3)-(x+3)}{2(x+3)+4}$

$= \dfrac{x-9}{2(x+5)}$

4/ $\dfrac{2a^3-a^2b-ab^2}{2a^2+5ab+2b^2} \div \dfrac{2a^2-3ab+b^2}{a^2+2ab}$

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

$= \dfrac{a^2}{2a-b}$

5/ $\dfrac{4x+1}{x^2+5x+4} - \dfrac{x+3}{x^2+4x+3}$

$= \dfrac{4x+1}{(x+1)(x+4)} - \dfrac{x+3}{(x+1)(x+3)}$

$= \dfrac{(4x+1)(x+3)-(x+3)(x+4)}{(x+1)(x+3)(x+4)}$

$= \dfrac{3x-3}{(x+1)(x+4)}$

$= \dfrac{3(x-1)}{(x+1)(x+4)}$

6/ $-5 = \frac{6}{x} - x \quad (LCD = x)$

$\Rightarrow -5x = 6 - x^2$

$\Rightarrow x^2 - 5x - 6 = 0$

$\Rightarrow (x-6)(x+1) = 0$

$\Rightarrow x = 6, \; x = -1$

7/ Let x be the smallest integer
then $x+2$ is the middle integer
and $x+4$ is the largest integer

$\Rightarrow x + (x+2) + (x+4) = 2x + 9$

$\Rightarrow 3x + 6 = 2x + 9$

$\Rightarrow x = 3$

$\therefore$ The integers are 3, 5, and 7.

TEST 1A cont'd

8/ Let x be the smaller integer, then $x+2$ is the larger

$$\Rightarrow \frac{1}{x} + \frac{1}{x+2} = \frac{5}{12}$$

$\{LCD = 12x(x+2)\}$

$$\Rightarrow 12(x+2) + 12x = 5x(x+2)$$
$$\Rightarrow 24x + 24 = 5x^2 + 10x$$
$$\Rightarrow 5x^2 - 14x - 24 = 0$$
$$\Rightarrow (5x+6)(x-4) = 0$$
$$x = \cancel{-\frac{6}{5}} \text{ or } \boxed{x = 4}$$

$\therefore$ The integers are 4 and 6.

9/ Let x be the speed of the boat

	D	R	T
Up	4	$x-3$	$\frac{4}{x-3}$
Down	4	$x+3$	$\frac{4}{x+3}$

$$\Rightarrow \frac{4}{x-3} + \frac{4}{x+3} = 1$$

$\{LCD = (x-3)(x+3)\}$

$$\Rightarrow 4(x+3) + 4(x-3) = x^2 - 9$$
$$\Rightarrow 8x = x^2 - 9$$
$$\Rightarrow x^2 - 8x - 9 = 0$$
$$\Rightarrow (x-9)(x+1) = 0$$
$$\boxed{x = 9}, \cancel{x = -1}$$

$\therefore$ The speed of the boat is 9 mph.

10/ Let the speed of the car be x then the train's speed is $x+10$

	D	R	T
Train	130	$x+10$	$\frac{130}{x+10}$
Car	110	x	$\frac{110}{x}$

$$\Rightarrow \frac{130}{x+10} = \frac{110}{x}$$

$\{LCD = x(x+10)\}$

$$\Rightarrow 130x = 110x + 1100$$
$$\Rightarrow 2x = 110$$
$$\Rightarrow x = 55$$

$\therefore$ the car's speed = 55 mph
the train's speed = 65 mph