Ex 1.3

8/ (d)
$$2x + 5 = 3x - 4$$
$$2x + 5 + 4 = 3x - 4 + 4$$
$$2x + 9 = 3x$$
$$2x + 9 - 2x = 3x - 2x$$
$$9 = x$$

sol^{n} set = $\{9\}$

9/ Let x be the original number and y be the answer after the calculation then

$$\frac{\frac{3x+49}{7} - 7}{3} = y$$

Solving this equation for x we get

$$\frac{3x+49}{7} - 7 = 3y$$
$$\frac{3x+49}{7} = 7 + 3y$$
$$3x + 49 = 49 + 21y$$
$$3x = 21y$$
$$x = 7y$$

Which means to get the original number, the teach must multiply the answer by 7.

13/ Let x be the no. of student tickets sold. then

	student	non-student	total
no. of tickets	x	$812-x$	812
revenue	$2x$	$3(812-x)$	\$1912

We must have "Total revenue is \$1912"

$$\therefore \quad 2x + 3(812-x) = 1912$$
$$2x + 2436 - 3x = 1912$$
$$2436 - x = 1912$$
$$-x = -524$$
$$x = 524$$

Ans: 524 student tickets were sold.

14/ Let x be the amount received by the youngest then

oldest	middle	youngest	total
$3x$	$x+14000$	x	64000

Since "The total is \$64000", it translates to

$$3x + x + 14000 + x = 64000$$
$$5x + 14000 = 64000$$
$$5x = 50000$$
$$x = 10,000$$

Ans: The oldest child received \$30,000
The middle child received \$24,000
The youngest received \$10,000

Ex 2.1

1/ (a) $\{x \mid x$ is a letter in the word MATHEMATICS$\}$
$= \{M, A, T, H, E, I, C, S\}$

(b) $\{x \mid x$ is a state in the continental U.S.$\}$
$= \{$ Alabama, Arizona, Arkansas, $\cdots \}$

(c) $\{x \mid x$ is a natural number greater than 20$\}$
$= \{21, 22, 23, \cdots\}$

(d) $\{x \mid x$ is a state in the U.S. bordering Pacific Ocean$\}$
$= \{$ Alaska, California, Hawaii, Oregon, Washington $\}$

2/(a) $P = \{a, b, c, d\}$

(b) $\{1, 2\} \subset \{1, 2, 3, 4\}$

(c) $\{0, 1\} \not\subseteq \{1, 2, 3, 4\}$

(d) $0 \notin \emptyset$

(e) $\{0\} \neq \emptyset$

Ex 2.1

3/ (a) $\{1,2,3,4,5\}$ and $\{m,n,o,p,q\}$ can be put into a one-to-one correspondence.

(b) $\{m,a,t,h\}$ and $\{f,u,n\}$ cannot be put into a one-to-one correspondence

(c) $\{a,b,c,d,\cdots,m\}$ and $\{1,2,3,4,\ldots,13\}$ can be put into a one-to-one correspondence.

(d) $\{x \mid x$ is a letter in the word mathematics$\}$ and $\{1,2,3,\ldots,11\}$ cannot be put into a one-to-one correspondence because the first set only has 8 elements in it.

(e) $\{\bigcirc, \triangle\}$ and $\{2\}$ cannot be put into a one-to-one correspondence

5/ (a) No. of one-to-one correspondence between $\{x,y,z,u,v\}$ and $\{1,2,3,4,5\}$ if x must correspond to 5 $= 1 \times 4 \times 3 \times 2 \times 1$

$= \underline{24}$

(b) No. of one-to one correspondence with x corresponds to 5 and y to 1 $= 1 \times 1 \times 3 \times 2 \times 1$

$= \underline{6}$

(c) No. of one-to-one correspondence if x, y, z must correspond to odd numbers

$= 3 \times 2 \times 1 \times 2 \times 1$

$= \underline{12}$

Ex 2.1

7/ (a) $n(\{101, 102, 103, \cdots, 1100\}) = 1100 - 100 = \underline{\underline{1000}}$

(b) $n(\{1, 3, 5, \cdots, 1001\}) = \frac{1002}{2} = \underline{\underline{501}}$

(c) $n(\{1, 2, 4, 8, 16, \cdots, 1024\})$
$= n(\{2^0, 2^1, 2^2, 2^3, \cdots, 2^{10}\})$
$= \underline{\underline{11}}$

(d) $n(\{x \mid x = k^2, k = 1, 2, 3, \cdots, 100\})$
$= \underline{\underline{100}}$

(e) $n(\{\{1,2\}, \{3,4\}, \{5,6\}\})$
$= \underline{\underline{3}}$

(f) $n(\{i+j \mid i \in \{1,2,3\} \text{ and } j \in \{1,2,3\}\})$
$= n(\{1+1, 1+2, 1+3, 2+1, 2+2, 2+3, 3+1, 3+2, 3+3\})$
$= n(\{2, 3, 4, 5, 6\})$
$= \underline{\underline{5}}$

11/ (a) $0 \notin \phi$ (b) $\{1\} \notin \{1, 2\}$
(c) $\phi \notin \phi$ (d) $\{1,2\} \notin \{1,2\}$
(e) $1024 \in \{x \mid x = 2^n \text{ and } n \in N\}$ because $1024 = 2^{10}$
(f) $3002 \in \{X \mid x = 3n-1 \text{ and } n \in N\}$ because $3002 = 3(1001) - 1$

12/ (a) $0 \notin \phi$ (b) $\{1\} \subseteq \{1, 2\}$
(c) $\phi \subseteq \phi$ (d) $\{1,2\} \subseteq \{1,2\}$
(e) $1024 \notin \{x \mid x = 2^n \text{ and } n \in N\}$
(f) $3002 \notin \{x \mid x = 3n-1 \text{ and } n \in N\}$

Ex 2.1

13/ (a) Yes, if $A = B$ then $A \subseteq B$

(b) No, if $A \subseteq B$, it is not necessary that $A \subset B$
for example $A = \{1, 2\}$, $B = \{1, 2\}$

(c) Yes, if $A \subset B$ then $A \subseteq B$.

(d) No, if $A \subseteq B$, it is not necessary that $A = B$
for example, $A = \{1\}$, $B = \{1, 2\}$.

16/ (no. of ways to pick the first digit) × (no. of ways to pick the second digit)

$= 9 \times 9$

$= \underline{81}$