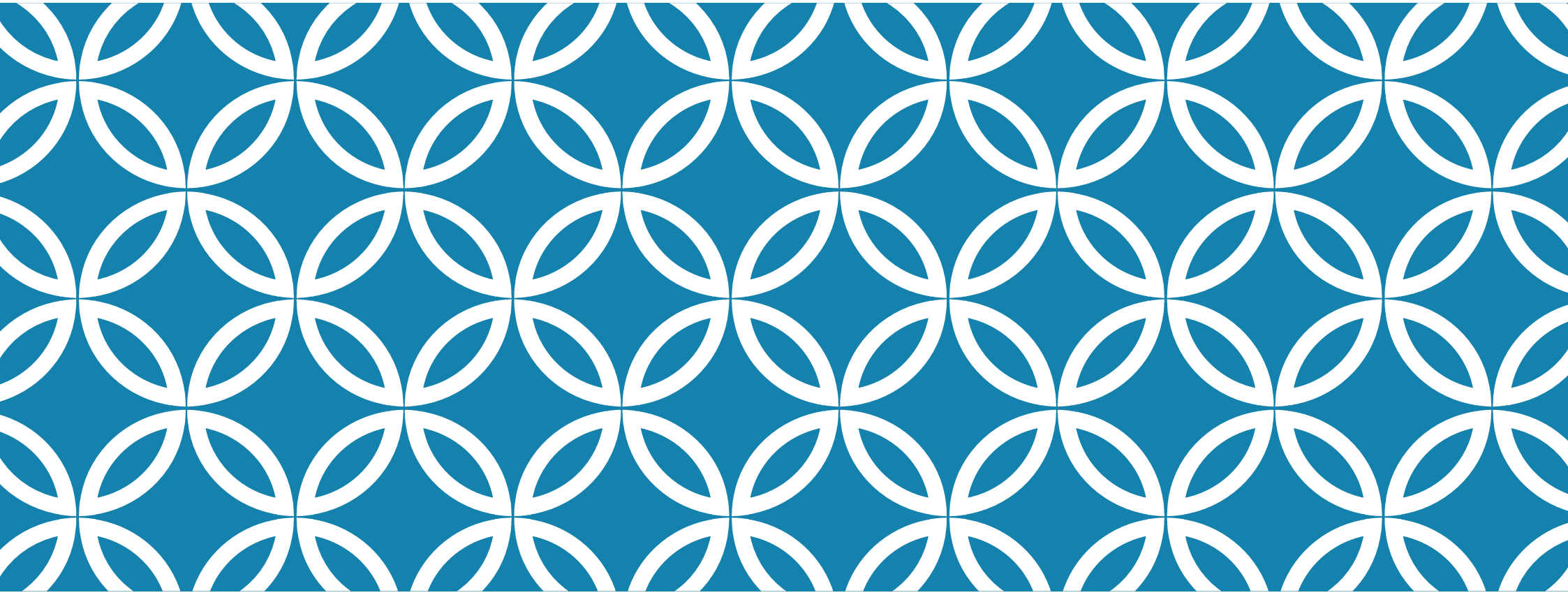


DATA REPRESENTATION

Chapter 1

BINARY, DECIMAL AND HEXADECIMAL

- Decimal : everyday number, human number
- Binary : computer number, machine language
- Hexadecimal : programing number

Binary	0	1														
Decimal	0	1	2	3	4	5	6	7	8	9						
Hexadecimal	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F

BINARY

- Binary = 0,1
  - True/False, Yes/No
- Why computers use only 1/0?
  - Because data is processed by logic gates and store in registers
- Representing a letter
  - ASCII
- Equipment status
  - 0 = OFF example TV is off
  - 1 = ON example TV is on

D	B	C
32	00100000	space
33	00100001	!
34	00100010	"
35	00100011	#
36	00100100	$
37	00100101	%
38	00100110	&
39	00100111	'
40	00101000	(
41	00101001	)
42	00101010	*
43	00101011	+
44	00101100	,
45	00101101	-
46	00101110	.
47	00101111	/
48	00110000	0
49	00110001	1
50	00110010	2
51	00110011	3
52	00110100	4
53	00110101	5
54	00110110	6
55	00110111	7
56	00111000	8

D	B	C
57	00111001	9
58	00111010	:
59	00111011	;
60	00111100	<
61	00111101	=
62	00111110	>
63	00111111	?
64	01000000	@
65	01000001	A
66	01000010	B
67	01000011	C
68	01000100	D
69	01000101	E
70	01000110	F
71	01000111	G
72	01001000	H
73	01001001	I
74	01001010	J
75	01001011	K
76	01001100	L
77	01001101	M
78	01001110	N
79	01001111	O
80	01010000	P
81	01010001	Q

D	B	C
82	01010010	R
83	01010011	S
84	01010100	T
85	01010101	U
86	01010110	V
87	01010111	W
88	01011000	X
89	01011001	Y
90	01011010	Z
91	01011011	[
92	01011100	\
93	01011101	]
94	01011110	^
95	01011111	_
96	01100000	`
97	01100001	a
98	01100010	b
99	01100011	c
100	01100100	d
101	01100101	e
102	01100110	f
103	01100111	g
104	01101000	h
105	01101001	i
106	01101010	j

D	B	C
107	01101011	k
108	01101100	l
109	01101101	m
110	01101110	n
111	01101111	o
112	01110000	p
113	01110001	q
114	01110010	r
115	01110011	s
116	01110100	t
117	01110101	u
118	01110110	v
119	01110111	w
120	01111000	x
121	01111001	y
122	01111010	z
123	01111011	{
124	01111100	|
125	01111101	}
126	01111110	~
127	01111111	DEL

KEY: D = denary
B = binary
C = character

Figure 3.3 The printable characters of the 7-bit ASCII code

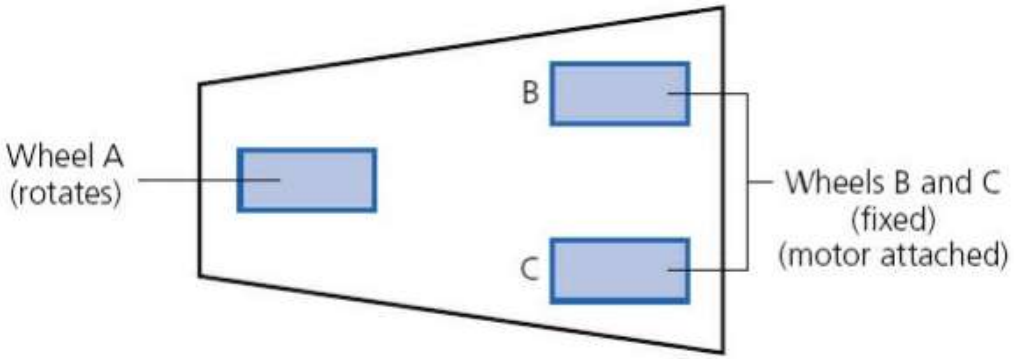
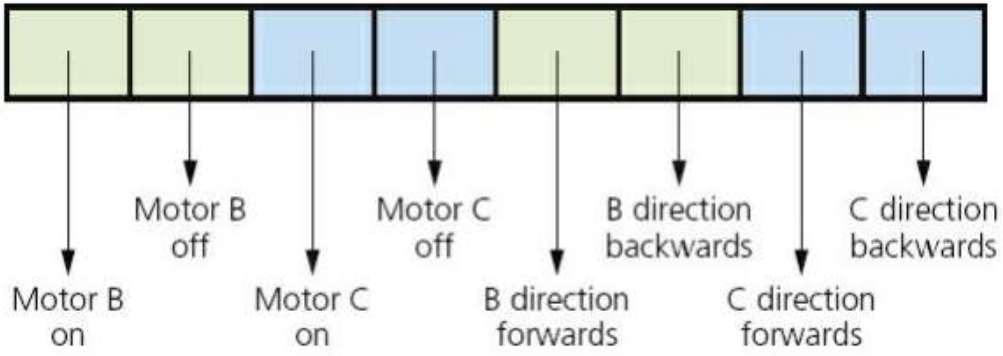


Figure 1.3

An 8-bit register is used to control the movement of the robot vacuum cleaner:



Activity 1.3

a What would be the effect if the register contained the following values?

i 1 0 0 1 1 0 0 0

ii 1 0 1 0 0 1 0 1

iii 1 0 1 0 0 1 1 0

b What would the register contain if only motor C was ON and the motors were turning in a BACKWARDS direction?

c What would the register contain if motor B and motor C were both ON but B was turning in a backward direction and C was turning in a forward direction?

d What would be the effect if the register contained the following?

1 1 1 1 1 1 1 1