

UNIT 1 *Base Arithmetic***Extra Exercises 1.1**

1. Convert each of the following binary numbers to base 10:
 - (a) 11
 - (b) 1011
 - (c) 11101
 - (d) 100011
 - (e) 101101
 - (f) 1001001
 - (g) 110010
 - (h) 111101
 - (i) 110111

2. Write each of the following base 10 numbers as binary numbers:
 - (a) 12
 - (b) 38
 - (c) 15
 - (d) 61
 - (e) 102
 - (f) 90
 - (g) 82
 - (h) 44
 - (i) 56

3.
 - (a) What is the *largest* possible binary number with 5 digits?
 - (b) What is the *smallest* possible binary number with 5 digits?
 - (c) Convert your answers to (a) and (b) to base 10.

UNIT 1 *Base Arithmetic***Extra Exercises 1.2**

1. Calculate the following, in binary arithmetic:

(a) $1 + 1$

(b) $1 + 101$

(c) $11 + 101$

(d) $111 + 101$

(e) $110 + 101$

(f) $111 + 111$

(g) $11011 + 1101$

(h) $1110 + 1011$

(i) $11011 + 11101$

2. Calculate the following, in binary arithmetic:

(a) $11 - 1$

(b) $10 - 1$

(c) $111 - 100$

(d) $1011 - 110$

(e) $1111 - 101$

(f) $1000 - 11$

(g) $10000 - 1110$

(h) $11010 - 1101$

(i) $110111 - 1101$

3. Solve these equations, where all the numbers are binary numbers.

(a) $x - 111 = 1010$

(b) $x - 101 = 1101$

(c) $x + 11 = 110$

(d) $x + 111 = 1101$

(e) $x - 1011 = 1101$

(f) $x + 10111 = 11100$

UNIT 1 *Base Arithmetic***Extra Exercises 1.3**

1. Calculate the following, in binary arithmetic:
 - (a) 1101×10
 - (b) 10110×100
 - (c) 11101×1000
 - (d) $1010100 \div 100$

2. Carry out these multiplications, in binary arithmetic:
 - (a) 101×11
 - (b) 1111×101
 - (c) 1011×110
 - (d) 1101×111
 - (e) 10001×111
 - (f) 10011×110
 - (g) 1101×110
 - (h) 10111×111

3. Multiply each of the following binary numbers by itself:
 - (a) 1
 - (b) 10
 - (c) 110
 - (d) 1101
 - (e) 1011
 - (f) 10011

UNIT 1 *Base Arithmetic***Extra Exercises 1.4**

1. Convert the following numbers from the base stated to base 10:

- | | |
|----------------|-----------------|
| (a) 122 base 3 | (b) 312 base 4 |
| (c) 142 base 5 | (d) 1125 base 6 |
| (e) 178 base 9 | (f) 243 base 5 |
| (g) 615 base 7 | (h) 342 base 6 |

2. Convert these base 10 numbers to the base stated:

- | | |
|-------------------|-------------------|
| (a) 47 to base 3 | (b) 17 to base 4 |
| (c) 108 to base 5 | (d) 99 to base 6 |
| (e) 142 to base 7 | (f) 362 to base 8 |
| (g) 142 to base 9 | (h) 97 to base 4 |

3. Carry out the following calculations in the base stated:

- | | |
|---------------------------|---------------------------|
| (a) $142 + 233$ base 5 | (b) $463 + 354$ base 8 |
| (c) $121 + 122$ base 3 | (d) $683 + 478$ base 9 |
| (e) $412 - 332$ base 5 | (f) 12×32 base 4 |
| (g) 36×25 base 7 | (h) 64×16 base 8 |

Extra Exercises 1.1 Answers

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|----|-------------|-------------|---------------|
| 1. | (a) 3 | (b) 11 | (c) 29 |
| | (d) 35 | (e) 45 | (f) 73 |
| | (g) 50 | (h) 61 | (i) 55 |
| 2. | (a) 1100 | (b) 100110 | (c) 1111 |
| | (d) 111101 | (e) 1100110 | (f) 1011010 |
| | (g) 1010010 | (h) 101100 | (i) 111000 |
| 3. | (a) 11111 | (b) 10000 | (c) 31 and 16 |

Extra Exercises 1.2 Answers

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|----|------------|-----------|------------|
| 1. | (a) 10 | (b) 110 | (c) 1000 |
| | (d) 1100 | (e) 1011 | (f) 1110 |
| | (g) 101000 | (h) 11001 | (i) 111000 |
| 2. | (a) 10 | (b) 1 | (c) 11 |
| | (d) 101 | (e) 1010 | (f) 101 |
| | (g) 10 | (h) 1101 | (i) 101010 |
| 3. | (a) 10001 | (b) 10010 | (c) 11 |
| | (d) 110 | (e) 11000 | (f) 101 |

Extra Exercises 1.3 Answers

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|----|--------------|-------------|---------------|--------------|
| 1. | (a) 11010 | (b) 1011000 | (c) 11101000 | (d) 10101 |
| 2. | (a) 1111 | (b) 1001011 | (c) 1000010 | (d) 1011011 |
| | (e) 1110111 | (f) 1110010 | (g) 1001110 | (h) 10100001 |
| 3. | (a) 1 | (b) 100 | (c) 100100 | |
| | (d) 10101001 | (e) 1111001 | (f) 101101001 | |

Extra Exercises 1.4 Answers

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|----|----------|----------|----------|----------|
| 1. | (a) 17 | (b) 54 | (c) 47 | (d) 269 |
| | (e) 152 | (f) 73 | (g) 306 | (h) 134 |
| 2. | (a) 1202 | (b) 101 | (c) 413 | (d) 243 |
| | (e) 262 | (f) 552 | (g) 167 | (h) 1201 |
| 3. | (a) 430 | (b) 1037 | (c) 1020 | (d) 1272 |
| | (e) 30 | (f) 1110 | (g) 1332 | (h) 1330 |