IGCSE Computer Science 0478 cheat sheet

The facts, formulas and pseudocode both papers test. No calculators are allowed, so practise every conversion by hand.

Number systems (Topic 1)

Binary place values	128 · 64 · 32 · 16 · 8 · 4 · 2 · 1 (8 bits = 1 byte; 4 bits = 1 nibble)
Denary → binary	Subtract the largest place value that fits, write 1, and carry on: 45 = 32 + 8 + 4 + 1 = 0010 1101
Binary ↔ hexadecimal	Split into nibbles: 1010 1100 = A C. Hex digits: 0–9 then A = 10 … F = 15
Hex → denary	2F = 2 × 16 + 15 = 47
Overflow	An 8-bit result greater than 255 cannot be stored: an overflow error
Logical shift	Left shift 1 place = × 2; right shift 1 place = ÷ 2 (bits shifted out are lost)
Two's complement (8-bit)	Leftmost bit = -128. For -20: +20 = 0001 0100 → flip bits 1110 1011 → add 1 = 1110 1100. Range -128 to +127

Text, images, sound and file sizes

Character sets	ASCII: 7 bits, 128 characters (extended ASCII 8 bits). Unicode: more bits per character, many languages and emojis
Image file size	width × height × colour depth (bits). 800 × 600 × 8 = 3 840 000 bits = 480 000 bytes = 468.75 KiB
Sound file size	sample rate (Hz) × sample resolution (bits) × length (s)
Units (use 1024)	8 bits = 1 byte · 1024 bytes = 1 KiB · 1024 KiB = 1 MiB · then GiB, TiB, PiB, EiB
Compression	Lossy: data is permanently removed (lower resolution or colour depth, sample rate). Lossless: no data lost, e.g. run length encoding (RLE)

Data transmission and error checks (Topic 2)

Packet header	Destination address, packet number, originator's address. Packets can take different routes and are reordered at the end
Methods	Serial (one bit at a time, one wire) · parallel (several bits at once) · simplex · half-duplex · full-duplex
Error checks	Parity check (odd/even, parity byte, parity block) · checksum · echo check · check digit (ISBN, barcodes) · ARQ (acknowledgement + timeout)
Encryption	Symmetric: one key to encrypt and decrypt. Asymmetric: public key encrypts, private key decrypts

Logic gates (Topic 10)

AND · A.B		
A	B	Q
0	0	**0**
0	1	**0**
1	0	**0**
1	1	**1**

OR · A+B		
A	B	Q
0	0	**0**
0	1	**1**
1	0	**1**
1	1	**1**

XOR		
A	B	Q
0	0	**0**
0	1	**1**
1	0	**1**
1	1	**0**

NAND		
A	B	Q
0	0	**1**
0	1	**1**
1	0	**1**
1	1	**0**

NOR		
A	B	Q
0	0	**1**
0	1	**0**
1	0	**0**
1	1	**0**

NOT (one input)	
A	Q
0	**1**
1	**0**

Pseudocode (Topic 8)

Declare	`DECLARE Total : INTEGER` · `CONSTANT Rate ← 6.50` · `DECLARE Names : ARRAY[1:30] OF STRING`
Selection	`IF … THEN … ELSE … ENDIF` · `CASE OF Choice … OTHERWISE … ENDCASE`
Loops	`FOR Index ← 1 TO 10 … NEXT Index` · `WHILE … DO … ENDWHILE` · `REPEAT … UNTIL` (runs at least once)
Routines	`MOD(10, 3)` = 1 · `DIV(10, 3)` = 3 · `ROUND(x, 2)` · `RANDOM()` · `LENGTH` · `UCASE` · `LCASE` · `SUBSTRING("Happy Days", 1, 5)` = "Happy"
Standard algorithms	Linear search · bubble sort · totalling · counting · finding the maximum, minimum and average

Validation, verification and test data (Topic 7)

Validation checks	Range · length · type · presence · format · check digit
Verification	Double entry check · visual check
Test data (range 11–18)	Normal: 15 · Abnormal: 25 or "ten" · Extreme: 11 and 18 · Boundary: 18 and 19 (or 11 and 10)

SQL on one table (Topic 9)

```
SELECT Name, Score FROM Students WHERE Score > 60 AND Year = 10 ORDER BY Score DESCENDING;
SELECT COUNT(*) FROM Students WHERE House = 'Red';
```

· **Keywords:** SELECT, FROM, WHERE, ORDER BY (ASCENDING / DESCENDING), SUM, COUNT, AND, OR

Self-test (answers at the bottom)

1. Convert 1011 0110 to hexadecimal.
2. Write -45 as an 8-bit two's complement integer.
3. A 30-second sound is sampled at 44 100 Hz with 16-bit resolution. Give its size in KiB.
4. Give the output of NOR when A = 0 and B = 0.
5. A program accepts 1 to 50. Give one pair of boundary data.
6. What does DIV(23, 4) return?

Answers: 1. B6. 2. +45 = 0010 1101 → 1101 0010 + 1 = 1101 0011. 3. 44 100 × 16 × 30 = 21 168 000 bits = 2 646 000 bytes ≈ 2583.98 KiB. 4. 1. 5. 50 and 51 (or 1 and 0). 6. 5.