I/O Ports

The functionality of input/output pins is described in the I/O Ports chapter in the datasheet for the controller, but in an alternative form here. On AVR a port consists of 8 physical i/o pins, e.g. Port B consists of pins PB0, PB1, .. , PB7. See Pin Configurations in the datasheet for a drawing of the device. A complete list of alternative functions of the pins is in the I/O Ports chapter.
A pin is referred to having a low level if the voltage is close to 0V / ground (GND), and high if the voltage is close to the supply voltage (VCC) typically 3V or 5V.

Here is a summary of the 3 registers that control each port, e.g. Port B. DDRB is data direction register and decides if a pin is input or output. An input pin expects a low or high input from external circuitry e.g. a switch. An output pin can be used to drive external circuitry, e.g. a light emitting diode (led). DDRB-register:

Bit name	DDB7	DDB6	DDB5	DDB4	DDB3	DDB2	DDB1	DDB0
Initial value	0	0	0	0	0	0	0	0

Default value is zero and all pins are inputs. A one in a bit position will make the corresponding pin an output., e.g. 1 in bit DDB2 will make PB2 output.

PORTB register decides output level when a pin is output. (As input it can enable an internal pull-up resistor). PORTB-register:

Bit name	PORTB7	PORTB6	PORTB5	PORTB4	PORTB3	PORTB2	PORTB1	PORTB0
Initial value	0	0	0	0	0	0	0	0

PINB is the physical value on the pins, i.e. if PB0 pin has a low level; the bit value of PINB0 will be 0, and correspondingly 1 if the pin is high. Initial value in the register is of course unknown as external circuitry is not known when starting up. I can also be used to toggle PORTB bits when written to. PINB register:

Bit name	PINB7	PINB6	PINB5	PINB4	PINB3	PINB2	PINB1	PINB0
Initial value	x	x	x	x	x	x	x	x

A summary of bit DDB0 and bit PORTB0 functionality for PB0:

DDB0	PORTB0	Function of PB0
0	0	Input, internal pull-up disabled
0	1	Input, internal pull-up enabled
1	0	Output, low level (sink)
1	1	Output, high level (source)