

Q.P.1

$$\begin{array}{l} 293 / 16 = 18 \dots 5 \\ 18 / 16 = 1 \dots 2 \\ 1 / 16 = 0 \dots 1 \end{array}$$

Decimal : 293
Hex : 0x125

Q.P.2

Because each number in the array is stored in a 16-bit integer, but many of the initial prime numbers are small enough to fit within 8 bits.

Q.2.1

Q.2.2

Based on the formula : Band Rate = $\frac{f_{osc}}{16 \times (UBRR_0 + 1)}$

$$UBRR_0 = \frac{\frac{f_{osc}}{(Band\ Rate) \times 16} - 1}{\frac{2 \times 10^6}{9600 \times 16}} = 12.02083$$

0.02083 does not matter for this project, so I took 12

Decimal \rightarrow Binary

12 1100

Therefore UBRR should be: $\underbrace{0000}_{UBRR_0[11:8]} \underbrace{00001100}_{UBRRL[7:0]}$

Q.3.3

binary decimal 8 bit can represent up to 255
8 bits \rightarrow 255

Q 3, 4

H: 72, E: 69, L: 76, O: 74

Q 3, 5

$$63 \% / 10 = 3$$

$$\begin{array}{ccc} \text{Decimal} & & \text{ASCII} \\ 3 + 48 & \rightarrow & 51 \end{array}$$

$$63 / 10 = 6$$

$$6 + 48 \rightarrow 54$$

Q 4.1

Given that the baud rate is 9600 bit per second

Total bit in one frame = 1 (start) + 8 (data) + 1 (finish) = 10 bits

$$T_{\text{bit}} = \frac{10}{9600} = 1.0416 \text{ ms}$$

One character takes 1.0416 ms so 3 digits take $1.0416 \times 3 = 3.0438 \text{ ms}$

Q 4.2

Total Characters = 2 (comma) + 2 (space) + 3 (digits) $\times 3 = 13$

$$T_{(3 \text{ 3-digit})} = 13 \times 1.0416 = \underline{\underline{13.5408 \text{ ms}}}$$

1.0416 is calculated at Q 4.1

Total Characters = 62 (numbers) $\times 3$ (digits) + 61 (comma) + 61 (space) = 308

$$\text{Total Time} = 308 \times 1.0416 = 320.8128 \text{ ms}$$

Q 4, 3,

	Initial	Required	
UCSRAA	0x20	0x00	changed
UCSRB	0x00	0x08	✓
UCSRC	0x06	0x06	✗
UBRR0H	0x00	0x00	✓ (as part of UBRR0)
UBRR0L	0x00	0x06	✓