8051 Assembly Language Programs (EdSim51)

Each task below is implemented using efficient and minimal 8051 Assembly Language instructions for EdSim51 simulator.

## 1. Sum and average of 5 bytes

MOV R0, #30H ; Start address of data  
MOV R2, #05 ; Counter  
CLR A ; Clear accumulator for sum  
  
SUM\_LOOP:  
ADD A, @R0  
INC R0  
DJNZ R2, SUM\_LOOP  
  
MOV B, #5  
DIV AB ; A = average, B = remainder

## 2. Square of a number

MOV A, #num  
MOV B, A  
MUL AB ; A = LSB, B = MSB of square

## 3. Cube of a number

MOV A, #num  
MOV B, A  
MUL AB ; A = num^2 LSB  
MOV R2, A ; Store square in R2  
MOV A, #num  
MOV B, R2  
MUL AB ; A = cube LSB

## 4. (a + b)^2

MOV A, #a  
ADD A, #b  
MOV B, A  
MUL AB

## 5. (a - b)^2

MOV A, #a  
CLR C  
SUBB A, #b  
MOV B, A  
MUL AB

## 6. a^2 - b^2

MOV A, #a  
MOV B, A  
MUL AB  
MOV R0, A ; a² in R0  
  
MOV A, #b  
MOV B, A  
MUL AB  
MOV R1, A ; b² in R1  
  
MOV A, R0  
CLR C  
SUBB A, R1 ; A = a² - b²

## 7. Area of triangle

MOV A, #base  
MOV B, #height  
MUL AB  
CLR C  
RRC A ; Divide by 2

## 8. Area of square

MOV A, #side  
MOV B, A  
MUL AB

## 9. Sum of first 5 natural numbers

MOV A, #5  
MOV B, #6  
MUL AB  
CLR C  
RRC A ; Divide by 2

## 10. Area of rectangle

MOV A, #length  
MOV B, #breadth  
MUL AB

## 11. Sum of first 5 odd numbers

MOV R0, #1  
MOV R2, #5  
CLR A  
  
ODD\_LOOP:  
ADD A, R0  
ADD R0, #2  
DJNZ R2, ODD\_LOOP

## 12. Sum of first 5 even numbers

MOV R0, #2  
MOV R2, #5  
CLR A  
  
EVEN\_LOOP:  
ADD A, R0  
ADD R0, #2  
DJNZ R2, EVEN\_LOOP

## 13. Multiply and divide without MUL/DIV

; Multiply a \* b using addition  
MOV R0, #a  
MOV R1, #b  
CLR A  
  
MULT\_LOOP:  
ADD A, R0  
DJNZ R1, MULT\_LOOP  
  
; Divide a / b using subtraction  
MOV R0, #a  
MOV R1, #b  
CLR R2 ; Quotient  
  
DIV\_LOOP:  
CLR C  
MOV A, R0  
SUBB A, R1  
JC DONE\_DIV ; If result negative, stop  
MOV R0, A  
INC R2  
SJMP DIV\_LOOP  
  
DONE\_DIV:  
; R2 = Quotient

## 14. Sum of first 5 multiples of 3

MOV R0, #3  
MOV R2, #5  
CLR A  
  
M3\_LOOP:  
ADD A, R0  
ADD R0, #3  
DJNZ R2, M3\_LOOP

## 15. Sum of first 5 multiples of 5

MOV R0, #5  
MOV R2, #5  
CLR A  
  
M5\_LOOP:  
ADD A, R0  
ADD R0, #5  
DJNZ R2, M5\_LOOP