Multiplication and Division instructions

Table 2.1 Summary of HCS12 multiply and divide instructions

Mnemonic	Function	Operation
emul	unsigned 16 by 16 multiply	$(D) \times (Y) \to Y:D$
emuls	signed 16 by 16 multiply	$(D) \times (Y) \to Y:D$
mul	unsigned 8 by 8 multiply	$(A) \times (B) \to A:B$
ediv	unsigned 32 by 16 divide	$(Y:D) \div (X)$ quotient $\to$ Y remainder $\to$ D
edivs	signed 32 by 16 divide	$(Y:D) \div (X)$ quotient $\to$ Y remainder $\to$ D
fdiv	16 by 16 fractional divide	$(D) \div (X) \to X$ remainder $\to$ D
idiv	unsigned 16 by 16 integer divide	$(D) \div (X) \to X$ remainder $\to$ D
idivs	signed 16 by 16 integer divide	$(D) \div (X) \to X$ remainder $\to$ D

→ The upper 16 bits in Y and the lower ones in D

- fdiv: D should be less than X. The radix point of the quotient is to the left of bit 15.

- fdiv assumes the operands are unsigned binary fractions $0.2^{-1}2^{-2}2^{-3}\ldots$

Example : Write an instruction sequence to multiply the 16-bit numbers stored at $1000-$1001 and $1002-$1003 and store the product at $1100-$1103.

```
ldd     $1000        ;load first word
ldy     $1002        ;load second word
emul          ;[D] x [Y] → Y:D use emuls if the numbers are signed
sty     $1100        ; store most significant 16 bits
std     $1102        ; store least significant 16 bits
```

Example : Write an instruction sequence to divide the signed 16-bit number stored at $1020-$1021 by the signed 16-bit number stored at $1005-$1006 and store the quotient and remainder at $1100 and $1102, respectively.

```
ldd     $1005
ldx     $1020
idivs             ; D/X   X = qutient, D = remainder, use idiv if numbers are
                                                                unsigned
stx     $1100     ; store the quotient (16 bits) at $1100 and $1101
std     $1102     ; store the remainder (16 bits)
```