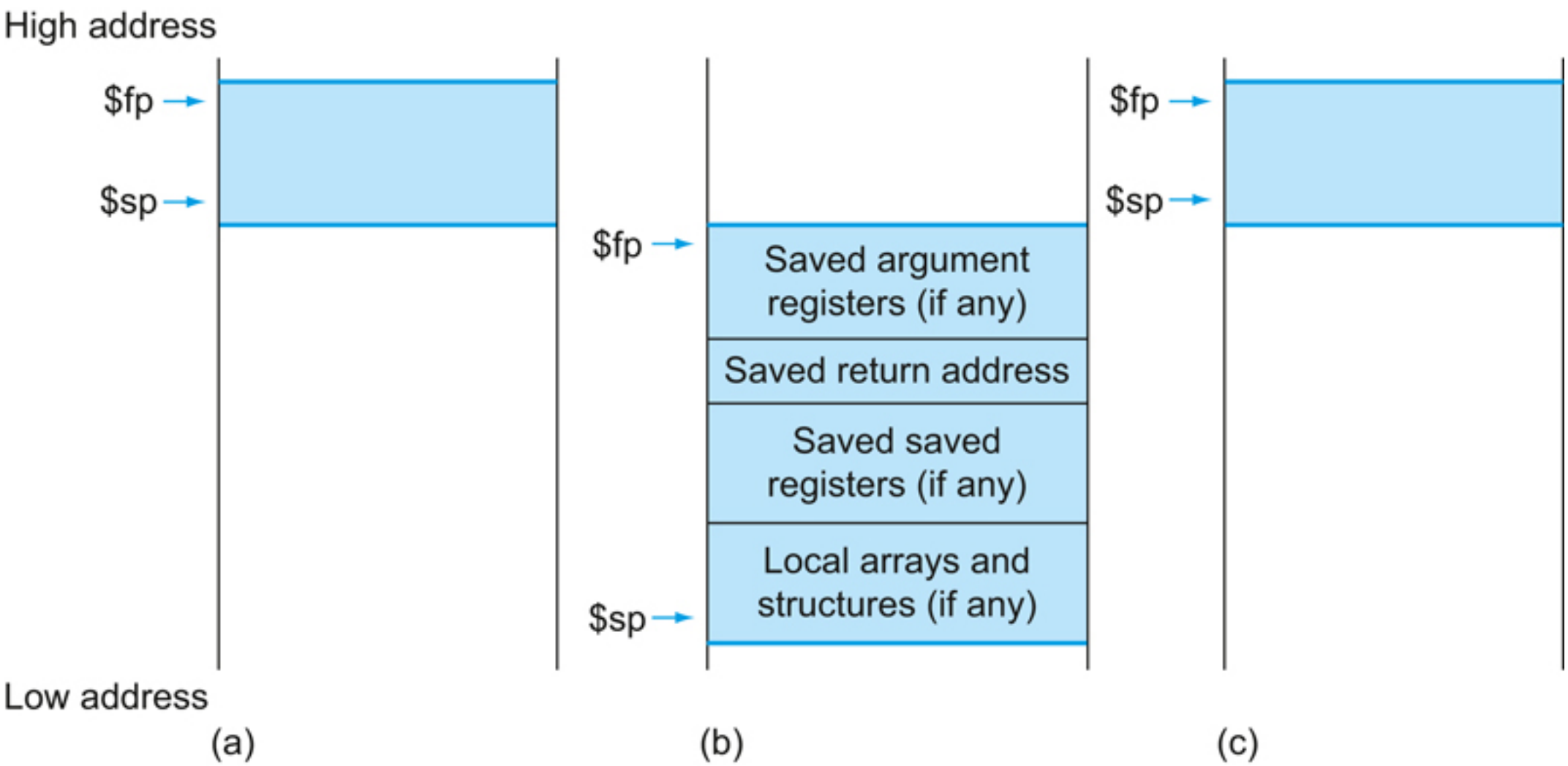

FIGURE 2.12 Illustration of the stack allocation (a) before, (b) during, and (c) after the procedure call. The frame pointer ($fp) points to the first word of the frame, often a saved argument register, and the stack pointer ($sp) points to the top of the stack. The stack is adjusted to make room for all the saved registers and any memory-resident local variables. Since the stack pointer may change during program execution, it's easier for programmers to reference variables via the stable frame pointer, although it could be done just with the stack pointer and a little address arithmetic. If there are no local variables on the stack within a procedure, the compiler will save time by *not* setting and restoring the frame pointer. When a frame pointer is used, it is initialized using the address in $sp on a call, and $sp is restored using $fp. This information is also found in Column 4 of the MIPS Reference Data Card at the front of this book.