Solutions: Decimal Expansion from Hexadecimal (Example 3)

Part A — Worked Example

$$(FACE)_{16} = 15 \cdot 16^3 + 10 \cdot 16^2 + 12 \cdot 16^1 + 14 \cdot 16^0$$
$$= 61{,}440 + 2{,}560 + 192 + 14 = \boxed{64{,}206}.$$

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Part B — Easier Practice

Problem: $(2B)_{16}$.

$$2 \cdot 16^1 + 11 \cdot 16^0 = 32 + 11 = \boxed{43}.$$

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Part C — Easier Practice

Problem: $(7F)_{16}$.

$$7 \cdot 16^1 + 15 \cdot 16^0 = 112 + 15 = \boxed{127}.$$

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Part D — Harder Practice

Problem: $(BEEF)_{16}$. Digits: $B = 11$, $E = 14$, $F = 15$.

$$(BEEF)_{16} = 11 \cdot 16^3 + 14 \cdot 16^2 + 14 \cdot 16^1 + 15 \cdot 16^0.$$

$$= 11 \cdot 4096 + 14 \cdot 256 + 14 \cdot 16 + 15 \cdot 1.$$

$$= 45{,}056 + 3{,}584 + 224 + 15 = \boxed{48{,}879}.$$

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Teaching Notes

- Emphasize hex digits A–F map to 10–15.

- Point out binary shortcut: each hex digit corresponds to a 4-bit binary block.

- Common pitfalls: forgetting to expand digits above 9, or miscomputing $16^2 = 256$.