Worksheet: Hexadecimal Expansion (Example 5)

Part A — Worked Example

Problem. Find the hexadecimal expansion of $(177130)_{10}$.

Step 1: Recall. To convert from decimal to base 16, divide repeatedly by 16 and record the remainders. The remainders (read bottom-to-top) give the digits.

Step 2: Divide 177130 **by** 16**.**

$$177130 = 16 \cdot 11070 + 10.$$

Remainder = 10 (which corresponds to A in hexadecimal).

Step 3: Divide 11070 **by** 16**.**

$$11070 = 16 \cdot 691 + 14.$$

Remainder = 14 (which corresponds to E).

Step 4: Divide 691 **by** 16**.**

$$691 = 16 \cdot 43 + 3.$$

Remainder = 3.

Step 5: Divide 43 **by** 16**.**

$$43 = 16 \cdot 2 + 11.$$

Remainder = 11 (which corresponds to B).

Step 6: Divide 2 **by** 16**.**

$$2 = 16 \cdot 0 + 2.$$

Remainder = 2, quotient = 0. Stop here.

Step 7: Collect remainders. Reading bottom-to-top: $2, B, 3, E, A$.

$$(177130)_{10} = (2B3EA)_{16}.$$

$\boxed{(177130)_{10} = (2B3EA)_{16}}$

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Part B — Easier Practice Problems

1. Convert $(255)_{10}$ into hexadecimal. 2. Convert $(4095)_{10}$ into hexadecimal.

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Part C — Harder Challenge

Convert $(1048575)_{10}$ into hexadecimal. (Hint: $1048575 = 2^{20} - 1$.)