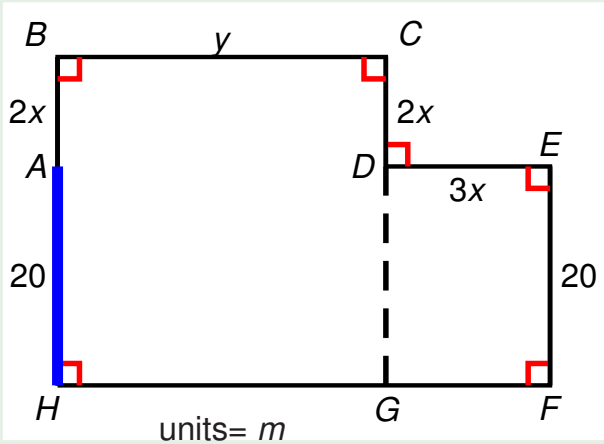
Precalculus
§ Geometric-text problems leading to polynomial systems, part 1

Todor Milev

2019

Example



A field is enclosed by a wall AH and fencing at the rest of the boundary, as depicted. Given: $|EF| = |AH| = 20\ m$, $|BC| = y\ m$, $|AB| = |DC| = 2x\ m$, $|DE| = 3x\ m$; fencing length, excluding wall, is 130 m; area of $HBCG$ is 3 times that of $DEFG$. Find the length $|HF|$.

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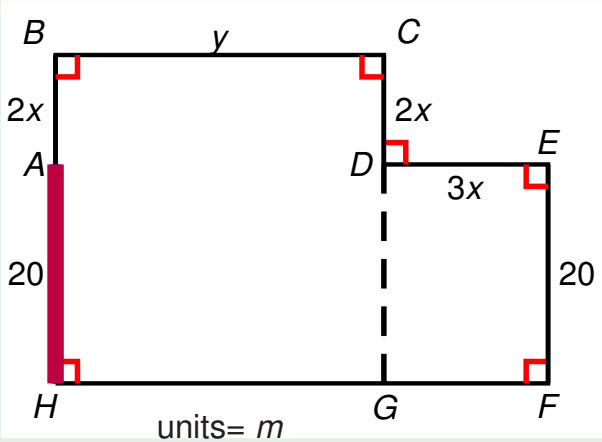

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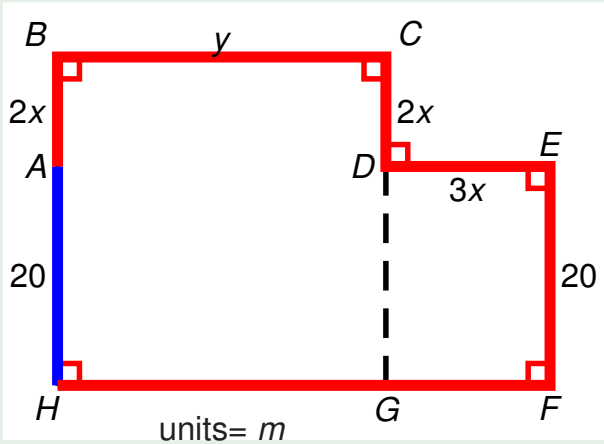

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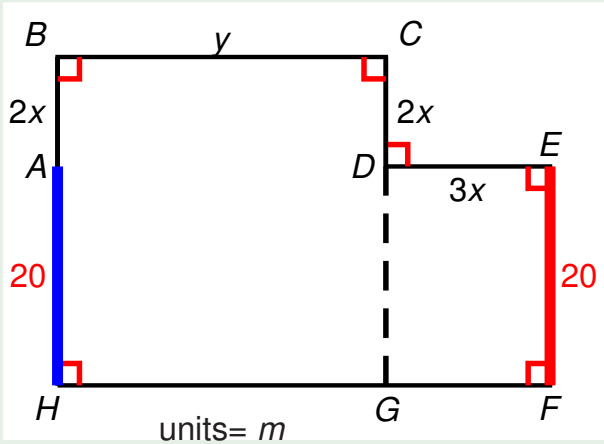

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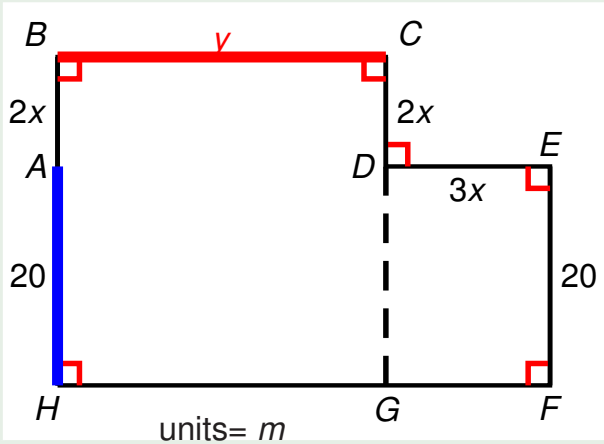

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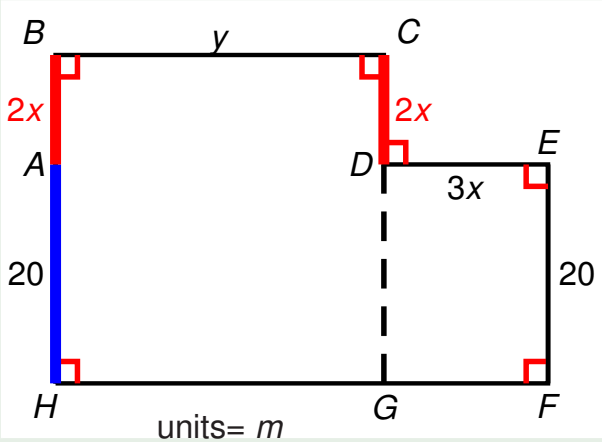

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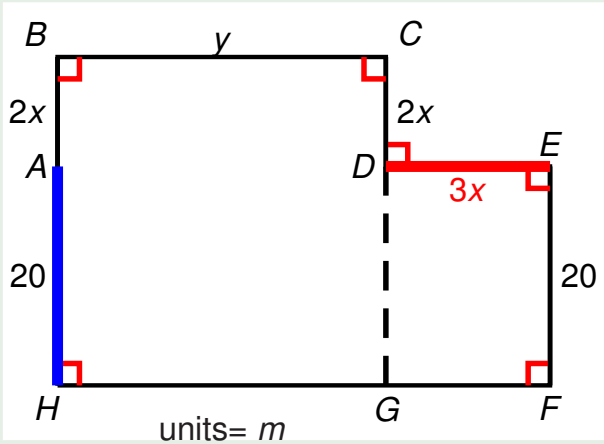

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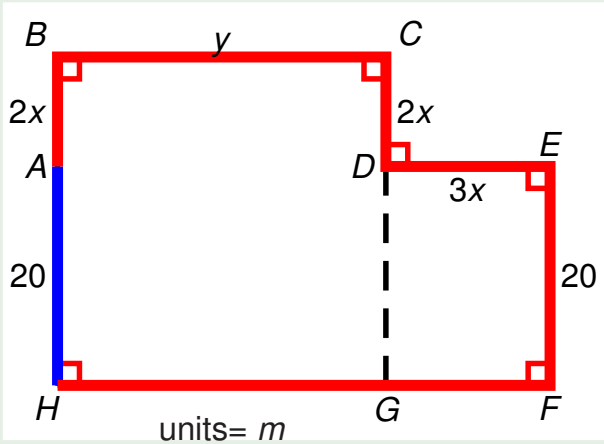

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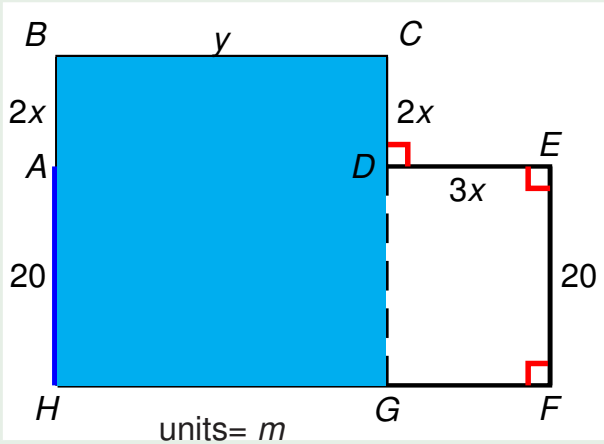

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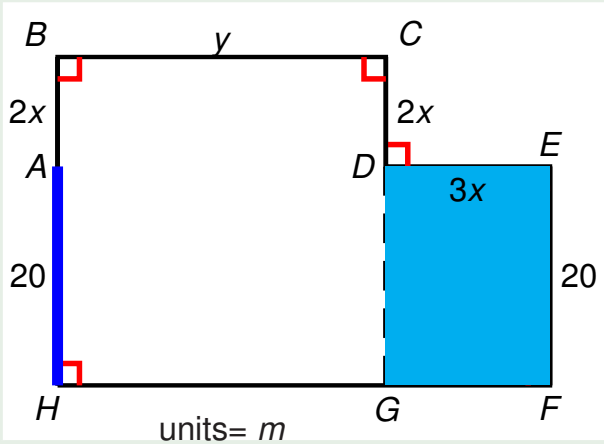

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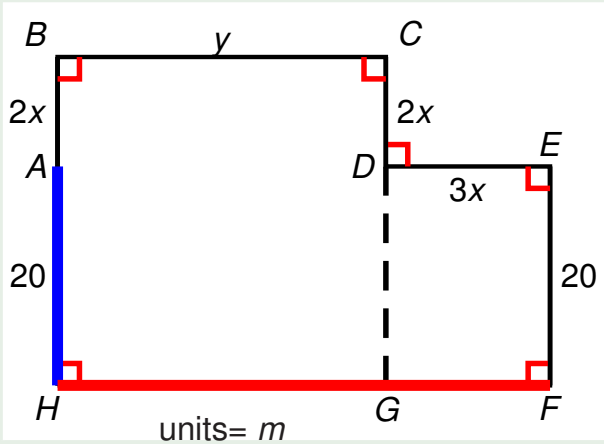

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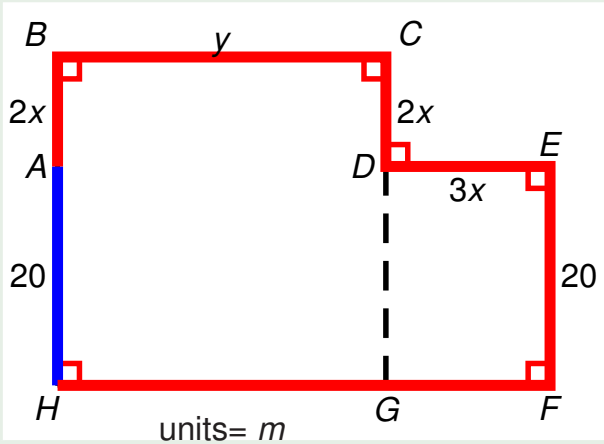

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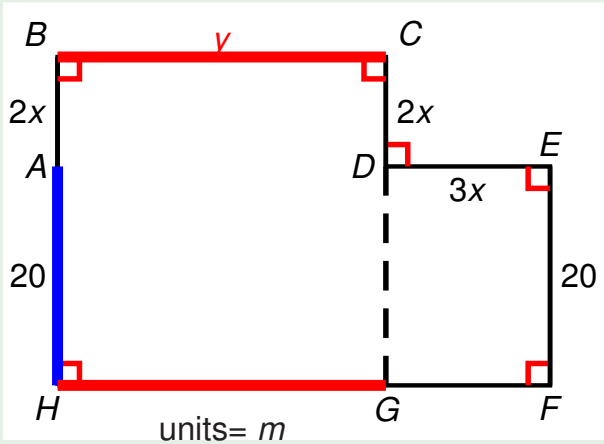

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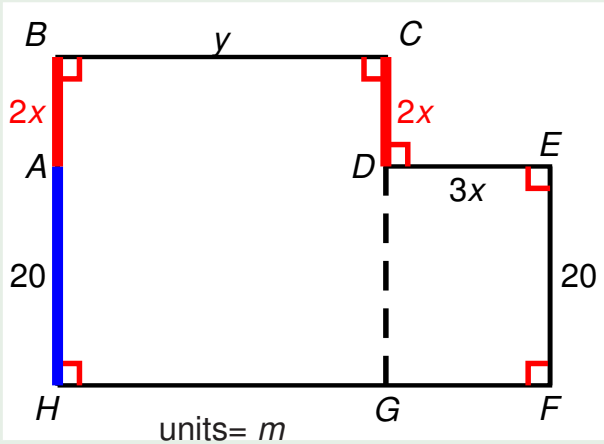

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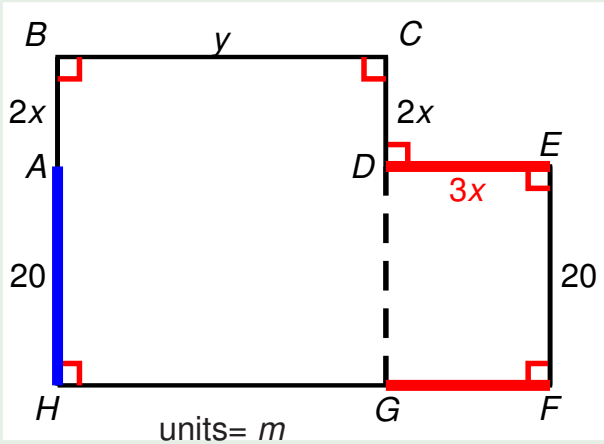

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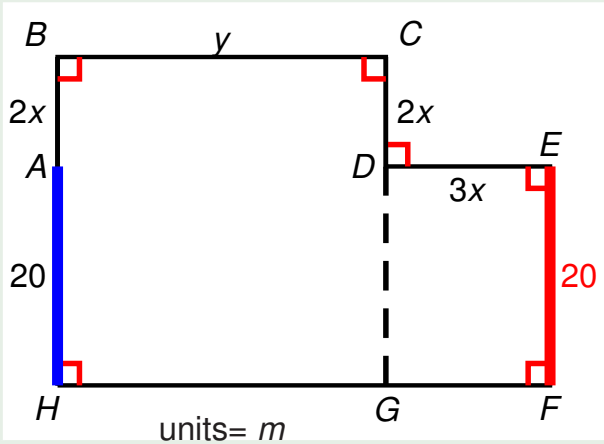

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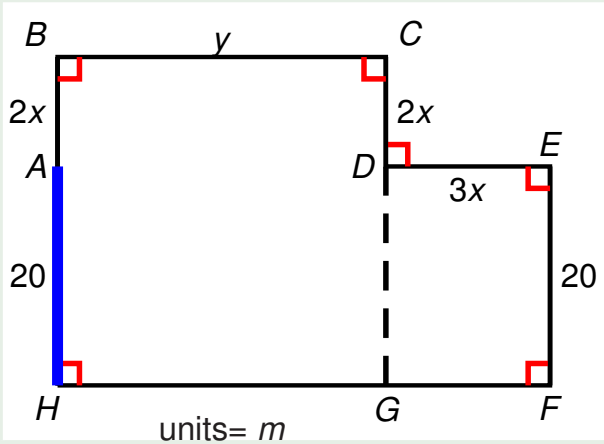

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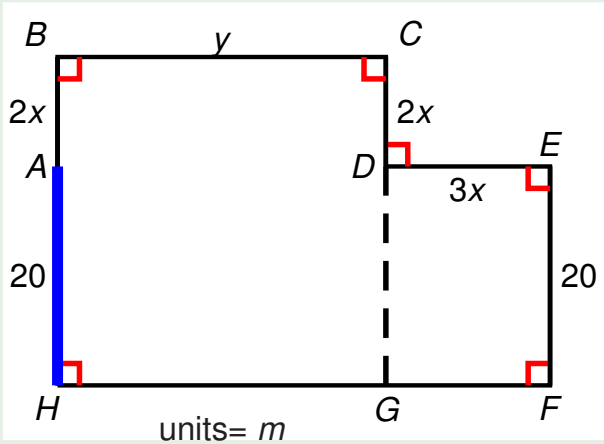

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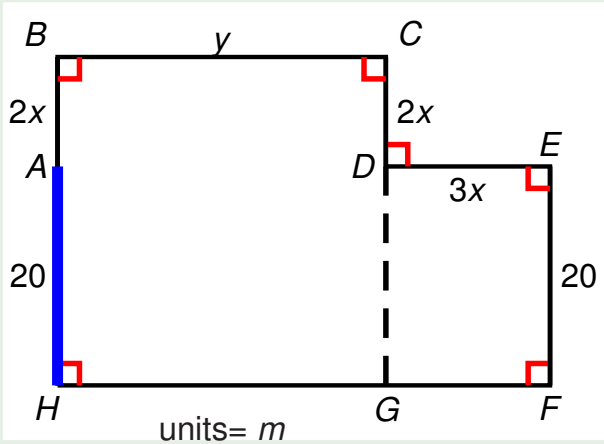

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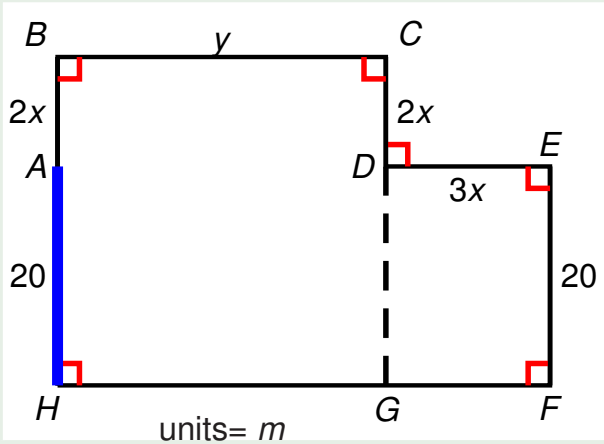

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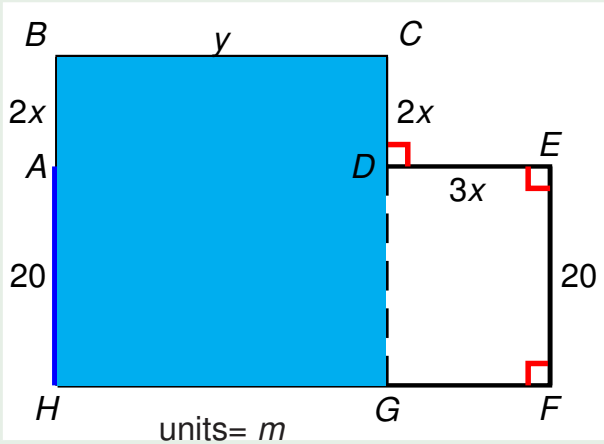

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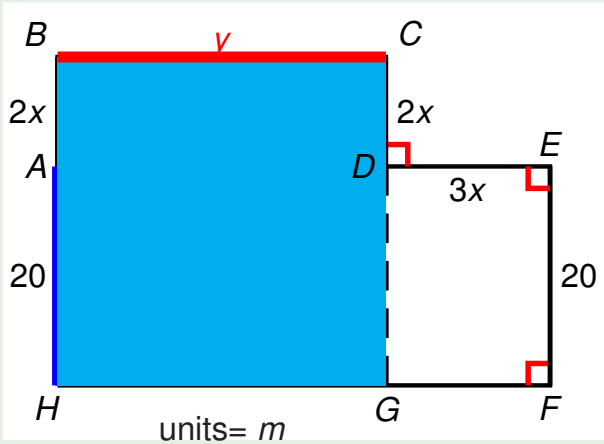

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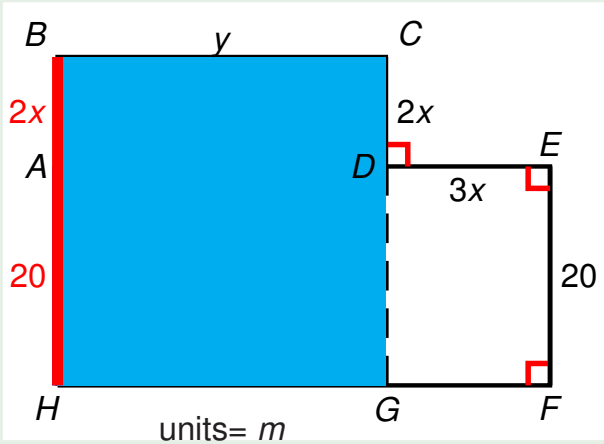

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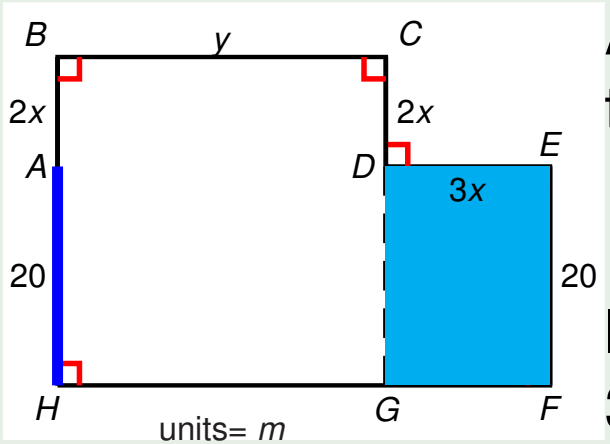

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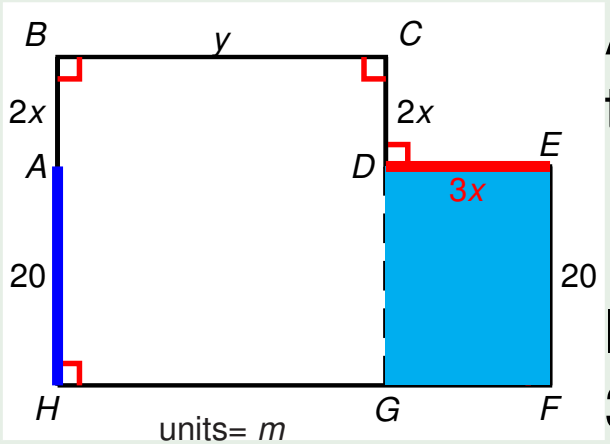

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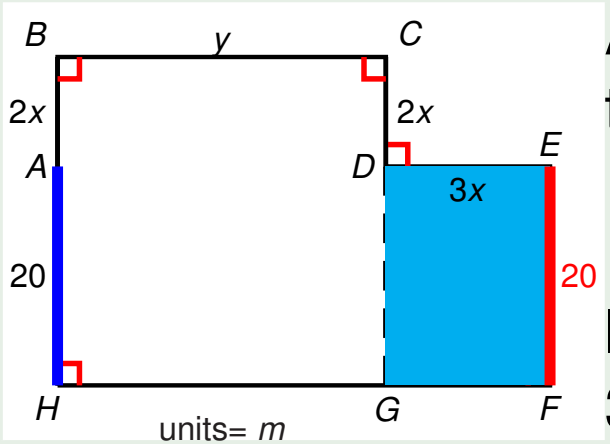

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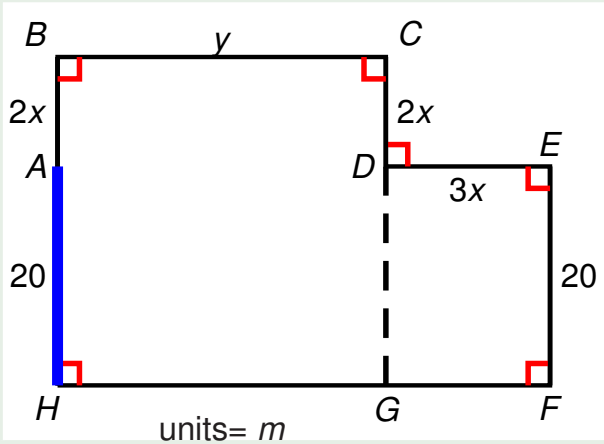

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$$\begin{aligned}
\text{Fence length} &= 130m \\
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10x + 2y &= 110 \qquad \big| \text{ Div. by 2} \\
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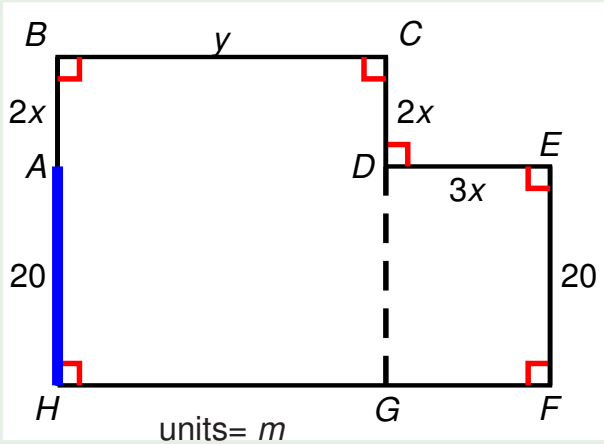

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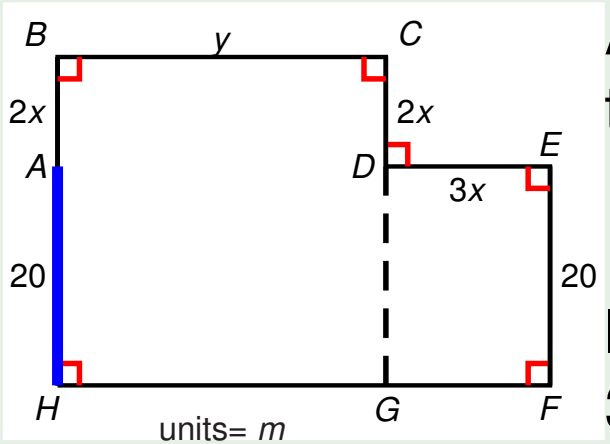

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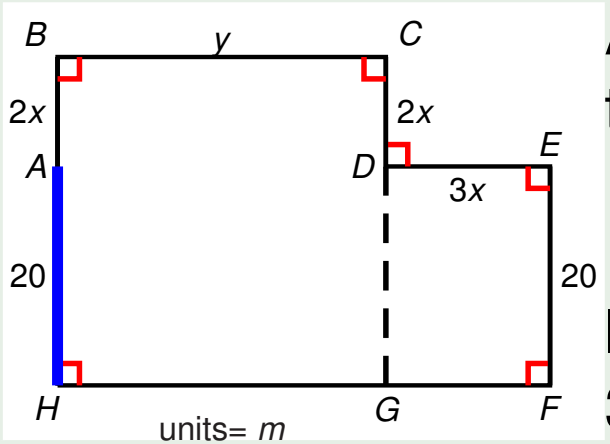

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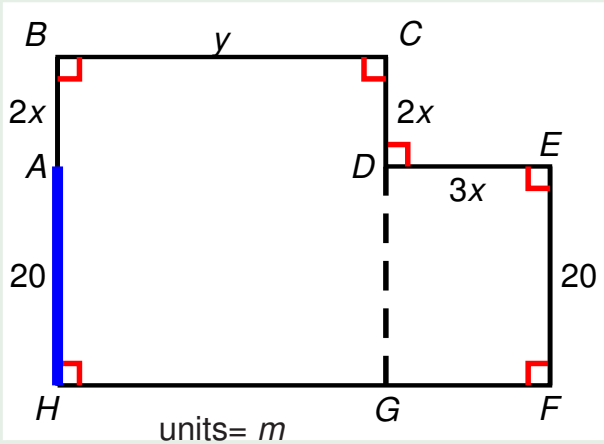

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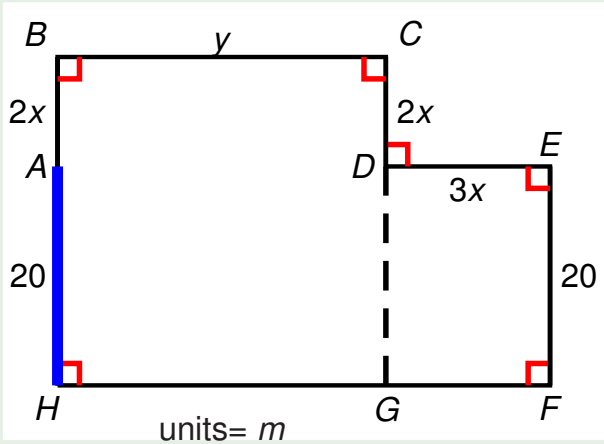

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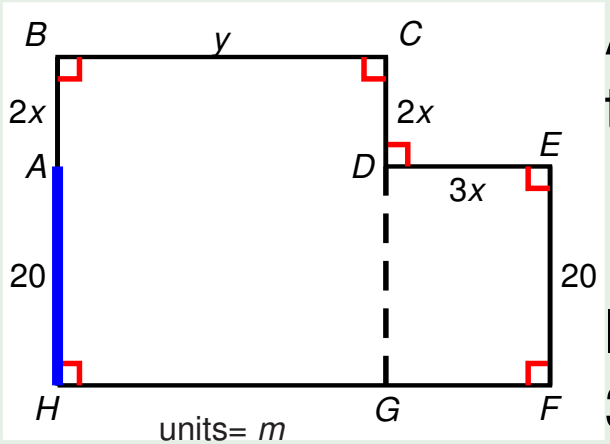

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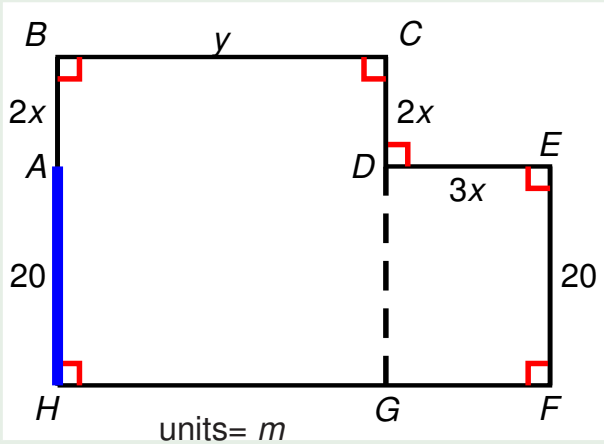

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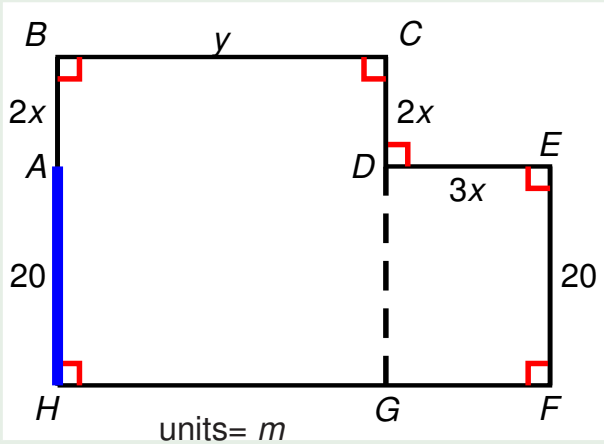

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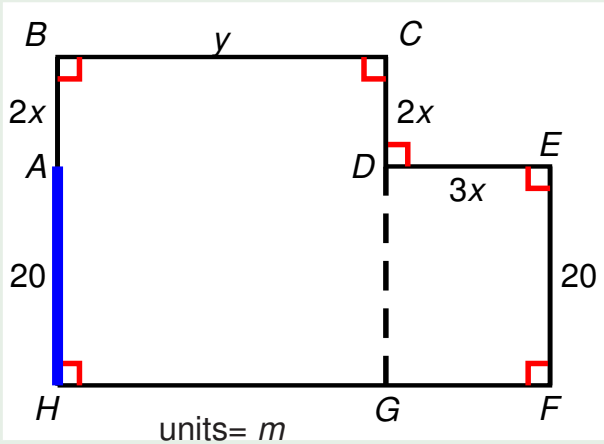

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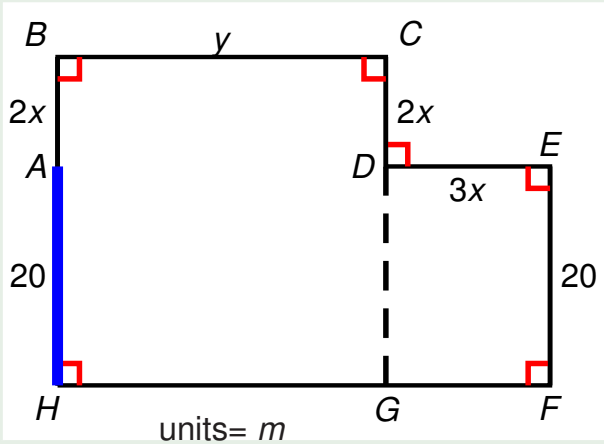

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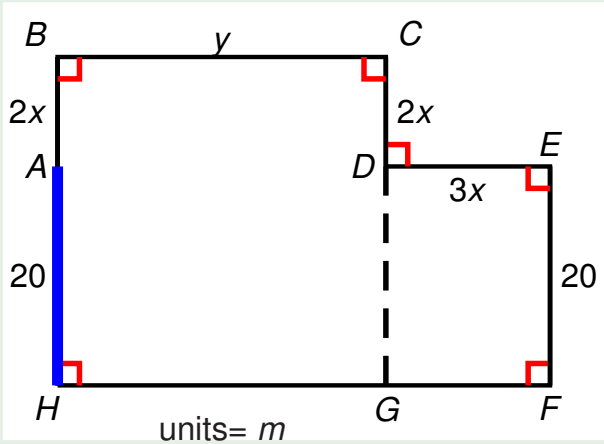
Example



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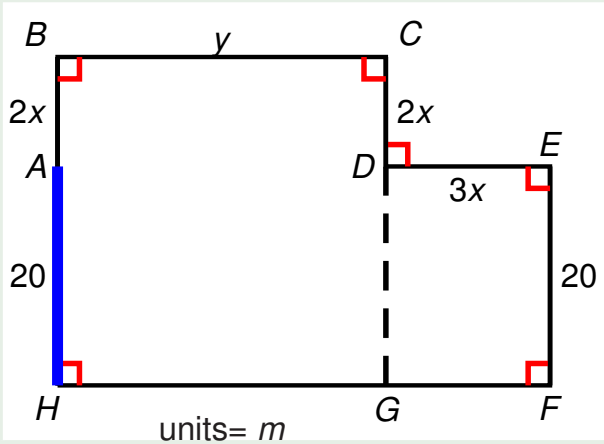
Example



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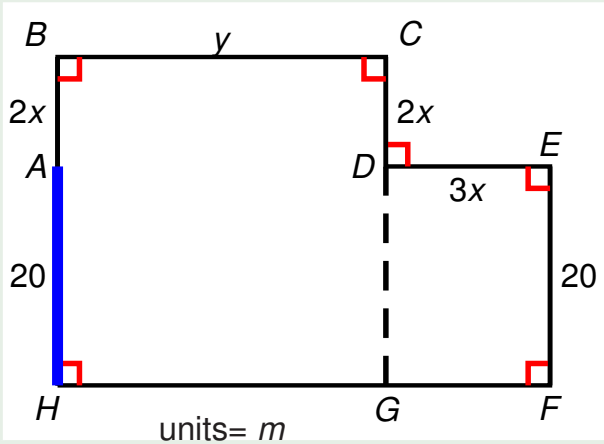

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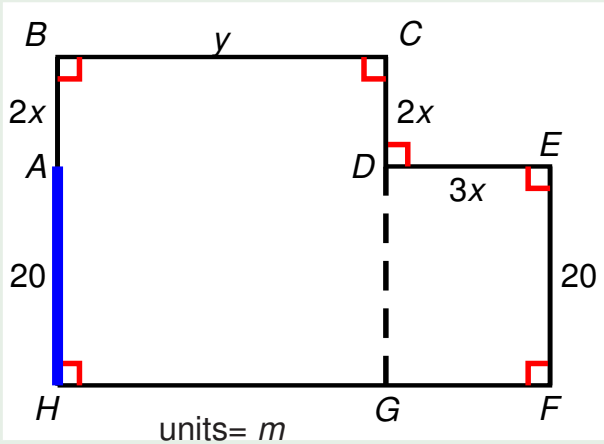

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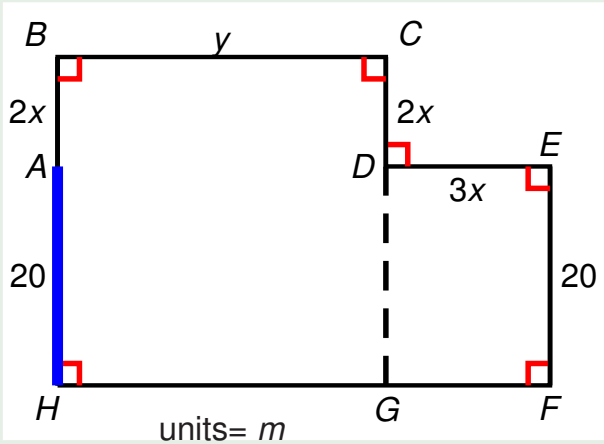
Example



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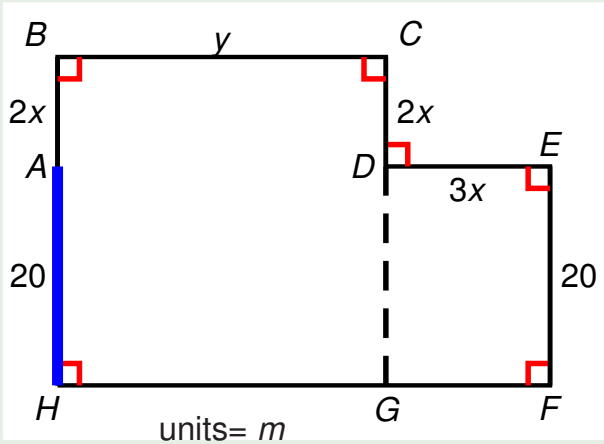

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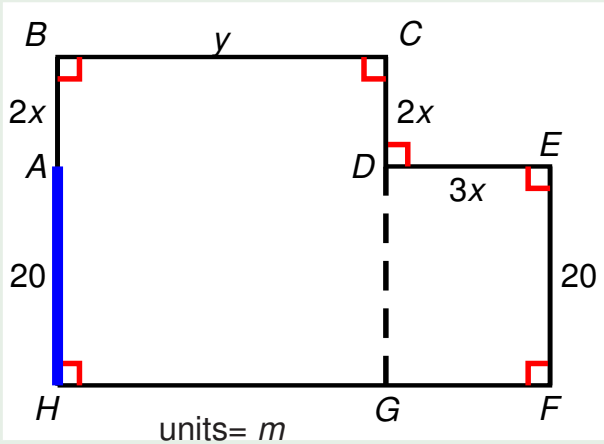

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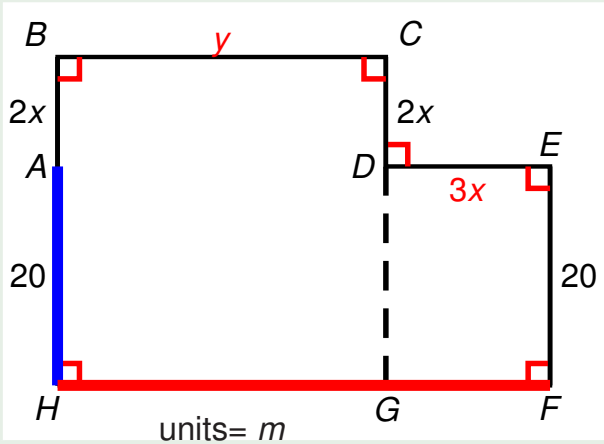

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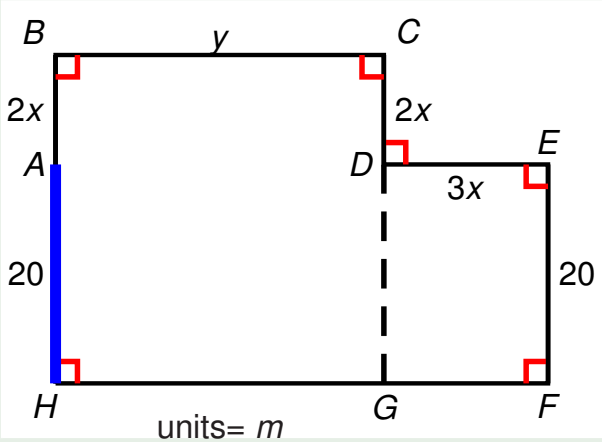

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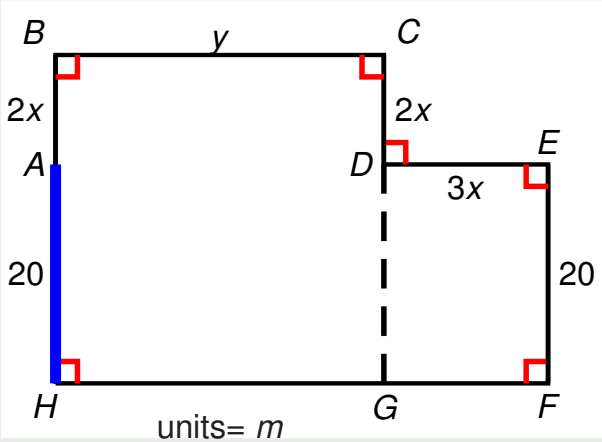

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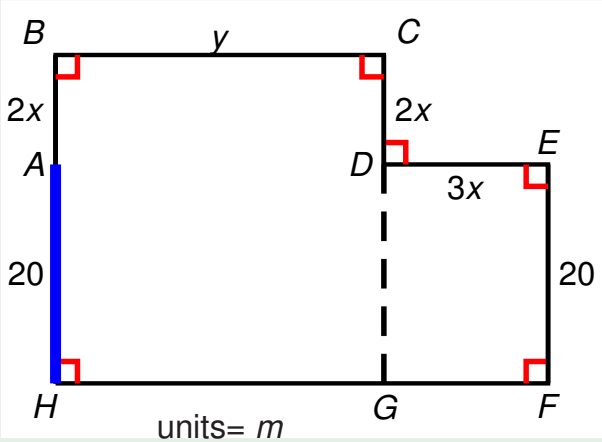
&= 55 - 5 \cdot 5 = 30 \\
|HF| &= (y + 3x)m \\
&= (30 + 3 \cdot 5)m \\
&= 45m
\end{aligned}
$$

Example



A field is enclosed by a wall AH and fencing at the rest of the boundary, as depicted. Given: $|EF| = |AH| = 20\ m$, $|BC| = y\ m$, $|AB| = |DC| = 2x\ m$, $|DE| = 3x\ m$; fencing length, excluding wall, is 130 m; area of $HBCG$ is 3 times that of $DEFG$. Find the length $|HF|$.

$$
\begin{aligned}
y &= 55 - 5x \\
-10x^2 - 170x + 1100 &= 0 \qquad \big| \text{ Div. by } -10 \\
x^2 + 17x - 110 &= 0 \\
(x \quad -5)(x + 22) &= 0 \\
x = 5 \text{ or } \cancel{x = -22} &\qquad \big| \ x > 0 \\
y &= 55 - 5x \\
&= 55 - 5 \cdot 5 = 30 \\
|HF| &= (y + 3x)m \\
&= (30 + 3 \cdot 5)m \\
&= 45m
\end{aligned}
$$