

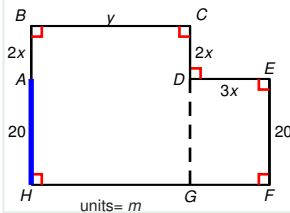
## Precalculus

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

Todor Milev

2019

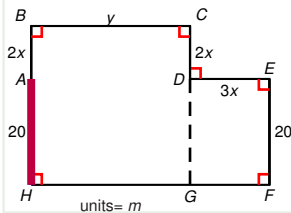
## Example



A field is enclosed by a wall  $AH$  and fencing at the rest of the boundary, as depicted. Given:

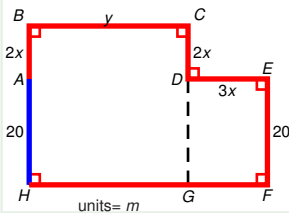
$|EF| = |AH| = 20 \text{ m}$ ,  $|BC| = y \text{ m}$ ,  
 $|AB| = |DC| = 2x \text{ m}$ ,  $|DE| = 3x \text{ m}$ ; fencing length, excluding wall, is 130 m; area of  $HBCG$  is 3 times that of  $DEFG$ . Find the length  $|HF|$ .

## Example



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

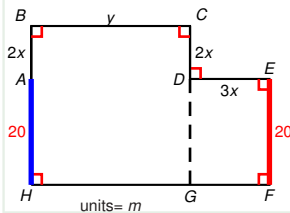
## Example



A field is enclosed by a wall  $AH$  and **fencing at the rest of the boundary**, as depicted. Given:

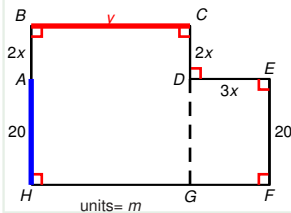
$|EF| = |AH| = 20 \text{ m}$ ,  $|BC| = y \text{ m}$ ,  
 $|AB| = |DC| = 2x \text{ m}$ ,  $|DE| = 3x \text{ m}$ ; fencing length, excluding wall, is 130 m; area of  $HBCG$  is 3 times that of  $DEFG$ . Find the length  $|HF|$ .

## Example



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

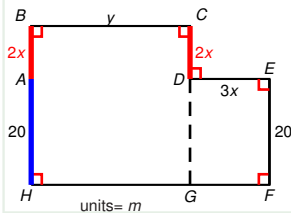
## Example



A field is enclosed by a wall  $AH$  and fencing at the rest of the boundary, as depicted. Given:

$|EF| = |AH| = 20 \text{ m}$ ,  $|BC| = y \text{ m}$ ,  
 $|AB| = |DC| = 2x \text{ m}$ ,  $|DE| = 3x \text{ m}$ ; fencing length, excluding wall, is 130 m; area of  $HBCG$  is 3 times that of  $DEFG$ . Find the length  $|HF|$ .

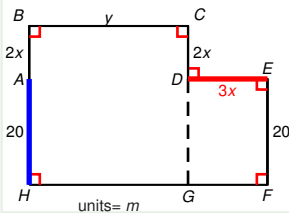
## Example



A field is enclosed by a wall  $AH$  and fencing at the rest of the boundary, as depicted. Given:

$|EF| = |AH| = 20 \text{ m}$ ,  $|BC| = y \text{ m}$ ,  
 $|AB| = |DC| = 2x \text{ m}$ ,  $|DE| = 3x \text{ m}$ ; fencing length, excluding wall, is 130 m; area of  $HBCG$  is 3 times that of  $DEFG$ . Find the length  $|HF|$ .

## Example

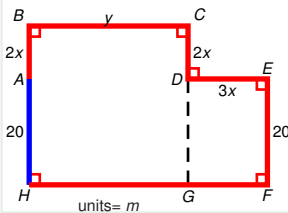


A field is enclosed by a wall  $AH$  and fencing at the rest of the boundary, as depicted. Given:

$|EF| = |AH| = 20 \text{ m}$ ,  $|BC| = y \text{ m}$ ,  
 $|AB| = |DC| = 2x \text{ m}$ ,  $|DE| = 3x \text{ m}$ ; fencing  
length, excluding wall, is 130 m; area of  $HBCG$  is  
3 times that of  $DEFG$ . Find the length  $|HF|$ .



## Example



A field is enclosed by a wall  $AH$  and fencing at the rest of the boundary, as depicted. Given:

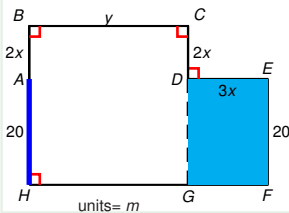
$$|EF| = |AH| = 20 \text{ m}, |BC| = y \text{ m},$$

$|AB| = |DC| = 2x \text{ m}, |DE| = 3x \text{ m}$ ; **fencing length, excluding wall, is 130 m**; area of  $HBCG$  is 3 times that of  $DEFG$ . Find the length  $|HF|$ .

$$\text{Fence length} = 130 \text{ m}$$



## Example

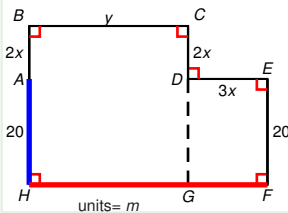


A field is enclosed by a wall  $AH$  and fencing at the rest of the boundary, as depicted. Given:  
 $|EF| = |AH| = 20\text{ m}$ ,  $|BC| = y\text{ m}$ ,  
 $|AB| = |DC| = 2x\text{ m}$ ,  $|DE| = 3x\text{ m}$ ; fencing  
 length, excluding wall, is  $130\text{ m}$ ; area of  $HBCG$  is  
 3 times that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

Fence length =  $130\text{ m}$

$$\text{Area}(HBCG) = 3 \cdot \text{Area}(DEFG)$$

## Example

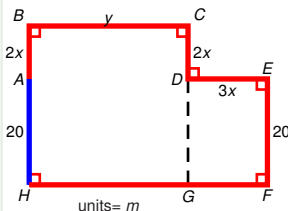


A field is enclosed by a wall  $AH$  and fencing at the rest of the boundary, as depicted. Given:  
 $|EF| = |AH| = 20\text{ m}$ ,  $|BC| = y\text{ m}$ ,  
 $|AB| = |DC| = 2x\text{ m}$ ,  $|DE| = 3x\text{ m}$ ; fencing  
 length, excluding wall, is  $130\text{ m}$ ; area of  $HBCG$  is  
 3 times that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

Fence length =  $130\text{ m}$

$$\text{Area}(HBCG) = 3 \cdot \text{Area}(DEFG)$$

## Example



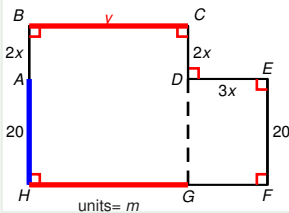
A field is enclosed by a wall  $AH$  and fencing at the rest of the boundary, as depicted. Given:  
 $|EF| = |AH| = 20 \text{ m}$ ,  $|BC| = y \text{ m}$ ,  
 $|AB| = |DC| = 2x \text{ m}$ ,  $|DE| = 3x \text{ m}$ ; fencing length, excluding wall, is 130 m; area of  $HBCG$  is 3 times that of  $DEFG$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

$$\text{Fence length} = 130 \text{ m}$$

$$2y + 2 \cdot 2x + 2 \cdot 3x + 20 = 130$$

$$\text{Area}(HBCG) = 3 \cdot \text{Area}(DEFG)$$

## Example



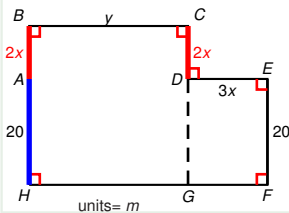
A field is enclosed by a wall  $AH$  and fencing at the rest of the boundary, as depicted. Given:  
 $|EF| = |AH| = 20 \text{ m}$ ,  $|BC| = y \text{ m}$ ,  
 $|AB| = |DC| = 2x \text{ m}$ ,  $|DE| = 3x \text{ m}$ ; fencing  
length, excluding wall, is 130 m; area of  $HBCG$  is  
3 times that of  $DEFG$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

$$\text{Fence length} = 130 \text{ m}$$

$$2y + 2 \cdot 2x + 2 \cdot 3x + 20 = 130$$

$$\text{Area}(HBCG) = 3 \cdot \text{Area}(DEFG)$$

## Example



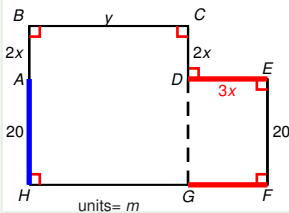
A field is enclosed by a wall  $AH$  and fencing at the rest of the boundary, as depicted. Given:  
 $|EF| = |AH| = 20\text{ m}$ ,  $|BC| = y\text{ m}$ ,  
 $|AB| = |DC| = 2x\text{ m}$ ,  $|DE| = 3x\text{ m}$ ; fencing  
 length, excluding wall, is  $130\text{ m}$ ; area of  $HBCG$  is  
 3 times that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

$$\text{Fence length} = 130\text{ m}$$

$$2y + 2 \cdot 2x + 2 \cdot 3x + 20 = 130$$

$$\text{Area}(HBCG) = 3 \cdot \text{Area}(DEFG)$$

## Example



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

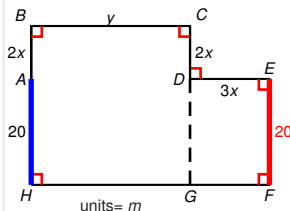
$$\text{Fence length} = 130 \text{ m}$$

$$2y + 2 \cdot 2x + 2 \cdot 3x + 20 = 130$$

$$\text{Area}(HBCG) = 3 \cdot \text{Area}(DEFG)$$



## Example



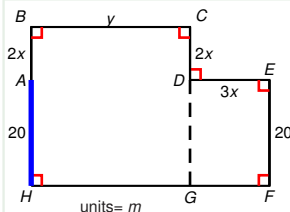
A field is enclosed by a wall  $AH$  and fencing at the rest of the boundary, as depicted. Given:  
 $|EF| = |AH| = 20 \text{ m}$ ,  $|BC| = y \text{ m}$ ,  
 $|AB| = |DC| = 2x \text{ m}$ ,  $|DE| = 3x \text{ m}$ ; fencing  
 length, excluding wall, is  $130 \text{ m}$ ; area of  $HBCG$  is  
 3 times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

$$\text{Fence length} = 130 \text{ m}$$

$$2y + 2 \cdot 2x + 2 \cdot 3x + 20 = 130$$

$$\text{Area}(HBCG) = 3 \cdot \text{Area}(DEFG)$$

## Example



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

$$\text{Fence length} = 130 \text{ m}$$

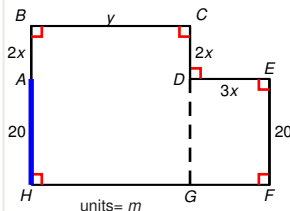
$$2y + 2 \cdot 2x + 2 \cdot 3x + 20 = 130$$

$$10x + 2y = 110$$

$$\text{Area}(HBCG) = 3 \cdot \text{Area}(DEFG)$$



## Example



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

$$\text{Fence length} = 130\text{ m}$$

$$2y + 2 \cdot 2x + 2 \cdot 3x + 20 = 130$$

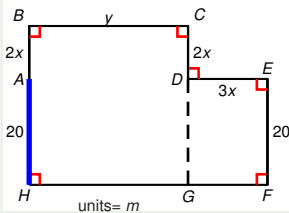
$$10x + 2y = 110$$

| Div. by 2

$$5x + y = 55$$

$$\text{Area}(HBCG) = 3 \cdot \text{Area}(DEFG)$$

## Example



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

$$\text{Fence length} = 130\text{ m}$$

$$2y + 2 \cdot 2x + 2 \cdot 3x + 20 = 130$$

$$10x + 2y = 110$$

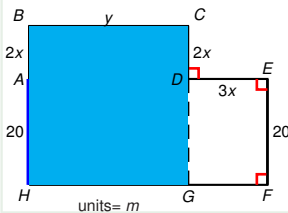
| Div. by 2

$$5x + y = 55$$

$$y = 55 - 5x$$

$$\text{Area}(HBCG) = 3 \cdot \text{Area}(DEFG)$$

## Example



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

$$\text{Fence length} = 130\text{ m}$$

$$2y + 2 \cdot 2x + 2 \cdot 3x + 20 = 130$$

$$10x + 2y = 110$$

| Div. by 2

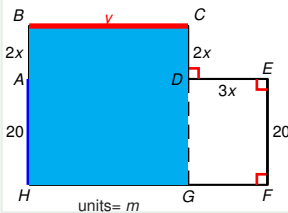
$$5x + y = 55$$

$$y = 55 - 5x$$

$$\text{Area}(HBCG) = 3 \cdot \text{Area}(DEFG)$$

$$y \cdot (2x + 20) = 3 \cdot 3x \cdot 20$$

## Example



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

$$\text{Fence length} = 130\text{ m}$$

$$2y + 2 \cdot 2x + 2 \cdot 3x + 20 = 130$$

$$10x + 2y = 110$$

| Div. by 2

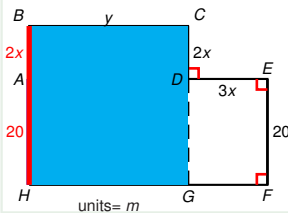
$$5x + y = 55$$

$$y = 55 - 5x$$

$$\text{Area}(HBCG) = 3 \cdot \text{Area}(DEFG)$$

$$y \cdot (2x + 20) = 3 \cdot 3x \cdot 20$$

## Example



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

$$\text{Fence length} = 130\text{ m}$$

$$2y + 2 \cdot 2x + 2 \cdot 3x + 20 = 130$$

$$10x + 2y = 110$$

| Div. by 2

$$5x + y = 55$$

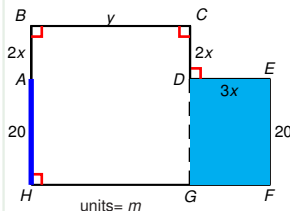
$$y = 55 - 5x$$

$$\text{Area}(HBCG) = 3 \cdot \text{Area}(DEFG)$$

$$y \cdot (2x + 20) = 3 \cdot 3x \cdot 20$$



## Example



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

$$\text{Fence length} = 130 \text{ m}$$

$$2y + 2 \cdot 2x + 2 \cdot 3x + 20 = 130$$

$$10x + 2y = 110$$

| Div. by 2

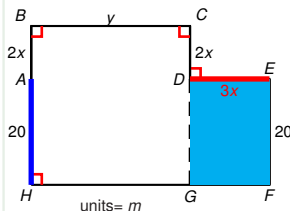
$$5x + y = 55$$

$$y = 55 - 5x$$

$$\text{Area}(HBCG) = 3 \cdot \text{Area}(DEFG)$$

$$y \cdot (2x + 20) = 3 \cdot 3x \cdot 20$$

## Example



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

$$\text{Fence length} = 130 \text{ m}$$

$$2y + 2 \cdot 2x + 2 \cdot 3x + 20 = 130$$

$$10x + 2y = 110$$

| Div. by 2

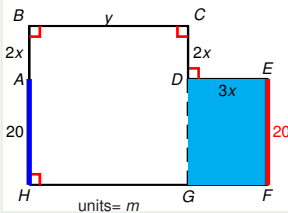
$$5x + y = 55$$

$$y = 55 - 5x$$

$$\text{Area}(HBCG) = 3 \cdot \text{Area}(DEFG)$$

$$y \cdot (2x + 20) = 3 \cdot 3x \cdot 20$$

## Example



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

$$\text{Fence length} = 130 \text{ m}$$

$$2y + 2 \cdot 2x + 2 \cdot 3x + 20 = 130$$

$$10x + 2y = 110$$

| Div. by 2

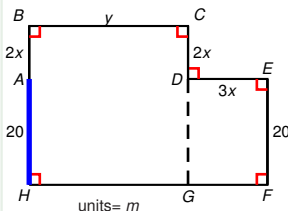
$$5x + y = 55$$

$$y = 55 - 5x$$

$$\text{Area}(HBCG) = 3 \cdot \text{Area}(DEFG)$$

$$y \cdot (2x + 20) = 3 \cdot 3x \cdot 20$$

## Example



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

$$\text{Fence length} = 130 \text{ m}$$

$$2y + 2 \cdot 2x + 2 \cdot 3x + 20 = 130$$

$$10x + 2y = 110$$

| Div. by 2

$$5x + y = 55$$

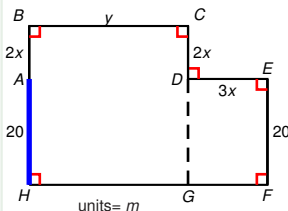
$$y = 55 - 5x$$

$$\text{Area}(HBCG) = 3 \cdot \text{Area}(DEFG)$$

$$y \cdot (2x + 20) = 3 \cdot 3x \cdot 20$$

$$(55 - 5x)(2x + 20) - 180x = 0$$

## Example



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

$$\text{Fence length} = 130 \text{ m}$$

$$2y + 2 \cdot 2x + 2 \cdot 3x + 20 = 130$$

$$10x + 2y = 110$$

| Div. by 2

$$5x + y = 55$$

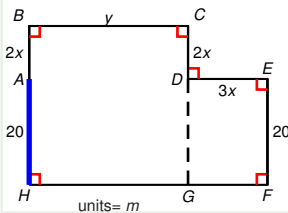
$$y = 55 - 5x$$

$$\text{Area}(HBCG) = 3 \cdot \text{Area}(DEFG)$$

$$y \cdot (2x + 20) = 3 \cdot 3x \cdot 20$$

$$(55 - 5x)(2x + 20) - 180x = 0$$

## Example



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

$$\text{Fence length} = 130 \text{ m}$$

$$2y + 2 \cdot 2x + 2 \cdot 3x + 20 = 130$$

$$10x + 2y = 110$$

| Div. by 2

$$5x + y = 55$$

$$y = 55 - 5x$$

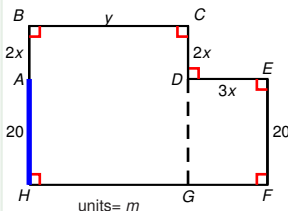
$$\text{Area}(HBCG) = 3 \cdot \text{Area}(DEFG)$$

$$y \cdot (2x + 20) = 3 \cdot 3x \cdot 20$$

$$(55 - 5x)(2x + 20) - 180x = 0$$

$$110x + 1100 - 10x^2 - 100x - 180x = 0$$

## Example



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

$$\text{Fence length} = 130 \text{ m}$$

$$2y + 2 \cdot 2x + 2 \cdot 3x + 20 = 130$$

$$10x + 2y = 110$$

| Div. by 2

$$5x + y = 55$$

$$y = 55 - 5x$$

$$\text{Area}(HBCG) = 3 \cdot \text{Area}(DEFG)$$

$$y \cdot (2x + 20) = 3 \cdot 3x \cdot 20$$

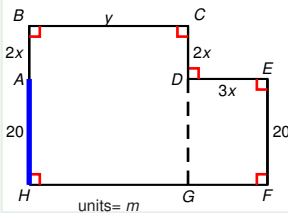
$$(55 - 5x)(2x + 20) - 180x = 0$$

$$110x + 1100 - 10x^2 - 100x - 180x = 0$$





## Example



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

$$\text{Fence length} = 130\text{ m}$$

$$2y + 2 \cdot 2x + 2 \cdot 3x + 20 = 130$$

$$10x + 2y = 110$$

| Div. by 2

$$5x + y = 55$$

$$y = 55 - 5x$$

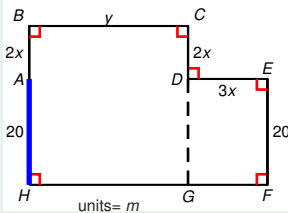
$$\text{Area}(HBCG) = 3 \cdot \text{Area}(DEFG)$$

$$y \cdot (2x + 20) = 3 \cdot 3x \cdot 20$$

$$(55 - 5x)(2x + 20) - 180x = 0$$

$$110x + 1100 - 10x^2 - 100x - 180x = 0$$

## Example



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

$$\text{Fence length} = 130\text{ m}$$

$$2y + 2 \cdot 2x + 2 \cdot 3x + 20 = 130$$

$$10x + 2y = 110$$

| Div. by 2

$$5x + y = 55$$

$$y = 55 - 5x$$

$$\text{Area}(HBCG) = 3 \cdot \text{Area}(DEFG)$$

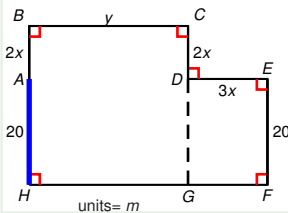
$$y \cdot (2x + 20) = 3 \cdot 3x \cdot 20$$

$$(55 - 5x)(2x + 20) - 180x = 0$$

$$110x + 1100 - 10x^2 - 100x - 180x = 0$$

$$-10x^2 - 170x + 1100 = 0$$

## Example



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

$$\text{Fence length} = 130\text{ m}$$

$$2y + 2 \cdot 2x + 2 \cdot 3x + 20 = 130$$

$$10x + 2y = 110$$

| Div. by 2

$$5x + y = 55$$

$$y = 55 - 5x$$

$$\text{Area}(HBCG) = 3 \cdot \text{Area}(DEFG)$$

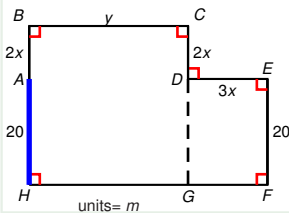
$$y \cdot (2x + 20) = 3 \cdot 3x \cdot 20$$

$$(55 - 5x)(2x + 20) - 180x = 0$$

$$110x + 1100 - 10x^2 - 100x - 180x = 0$$

$$-10x^2 - 170x + 1100 = 0$$

## Example

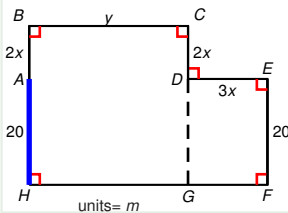


A field is enclosed by a wall  $AH$  and fencing at the rest of the boundary, as depicted. Given:  
 $|EF| = |AH| = 20 \text{ m}$ ,  $|BC| = y \text{ m}$ ,  
 $|AB| = |DC| = 2x \text{ m}$ ,  $|DE| = 3x \text{ m}$ ; fencing  
 length, excluding wall, is  $130 \text{ m}$ ; area of  $HBCG$  is  
 3 times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

$$y = 55 - 5x$$

$$-10x^2 - 170x + 1100 = 0$$

## Example



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

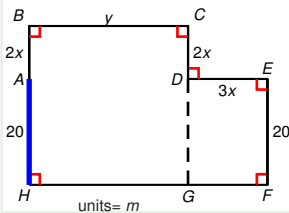
$$y = 55 - 5x$$

$$-10x^2 - 170x + 1100 = 0$$

| Div. by  $-10$

$$x^2 + 17x - 110 = 0$$

## Example



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

$$y = 55 - 5x$$

$$-10x^2 - 170x + 1100 = 0$$

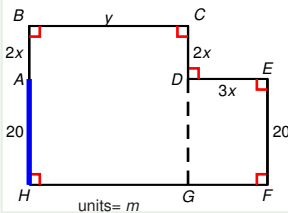
| Div. by  $-10$

$$x^2 + 17x - 110 = 0$$

$$(x + ?)(x + ?) = 0$$



## Example



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

$$y = 55 - 5x$$

$$-10x^2 - 170x + 1100 = 0$$

| Div. by  $-10$

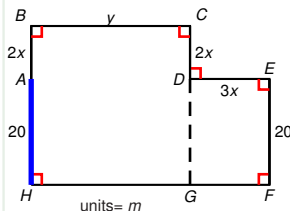
$$x^2 + 17x - 110 = 0$$

$$(x - 5)(x + 22) = 0$$

$$x = 5 \text{ or } x = -22$$



## Example



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

$$y = 55 - 5x$$

$$-10x^2 - 170x + 1100 = 0$$

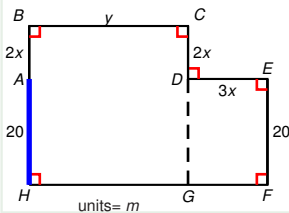
| Div. by  $-10$

$$x^2 + 17x - 110 = 0$$

$$(x - 5)(x + 22) = 0$$

$$x = 5 \text{ or } x = -22$$

## Example



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

$$y = 55 - 5x$$

$$-10x^2 - 170x + 1100 = 0$$

| Div. by  $-10$

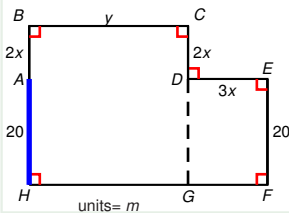
$$x^2 + 17x - 110 = 0$$

$$(x - 5)(x + 22) = 0$$

$$x = 5 \text{ or } \cancel{x = -22}$$

|  $x > 0$

## Example



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

$$y = 55 - 5x$$

$$-10x^2 - 170x + 1100 = 0$$

| Div. by  $-10$

$$x^2 + 17x - 110 = 0$$

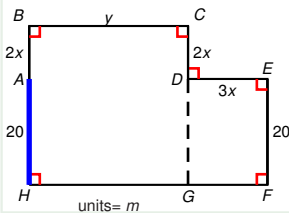
$$(x - 5)(x + 22) = 0$$

$$x = 5 \text{ or } x = -22$$

|  $x > 0$

$$y = 55 - 5x$$

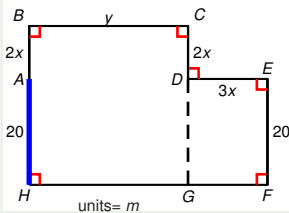
# Example



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

$$\begin{aligned}
 y &= 55 - 5x \\
 -10x^2 - 170x + 1100 &= 0 & | \text{ Div. by } -10 \\
 x^2 + 17x - 110 &= 0 \\
 (x - 5)(x + 22) &= 0 \\
 x = 5 \text{ or } x = -22 & & | x > 0 \\
 y &= 55 - 5x \\
 &= 55 - 5 \cdot 5
 \end{aligned}$$

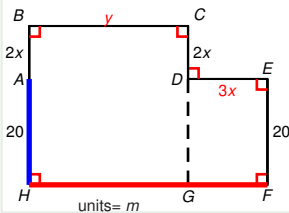
# Example



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

$$\begin{aligned}
 y &= 55 - 5x \\
 -10x^2 - 170x + 1100 &= 0 & \mid \text{Div. by } -10 \\
 x^2 + 17x - 110 &= 0 \\
 (x - 5)(x + 22) &= 0 \\
 x = 5 \text{ or } x = -22 & \mid x > 0 \\
 y &= 55 - 5x \\
 &= 55 - 5 \cdot 5 = 30
 \end{aligned}$$

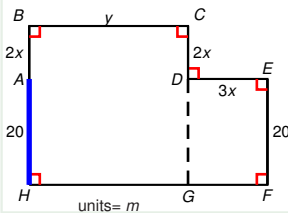
## Example



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

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

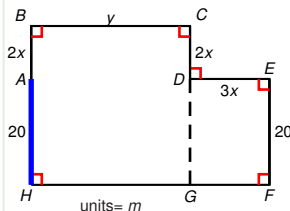
## Example



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

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

# Example

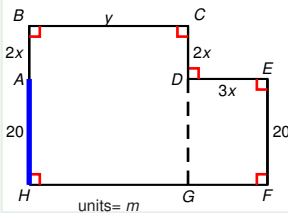


A field is enclosed by a wall  $AH$  and fencing at the rest of the boundary, as depicted. Given:  
 $|EF| = |AH| = 20 \text{ m}$ ,  $|BC| = y \text{ m}$ ,  
 $|AB| = |DC| = 2x \text{ m}$ ,  $|DE| = 3x \text{ m}$ ; fencing  
length, excluding wall, is 130 m; area of  $HBCG$  is  
3 times that of  $DEFG$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

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



## Example



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

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