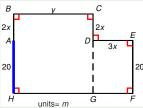
Precalculus

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

Todor Miley

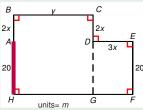
2019



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

$$|EF| = |AH| = 20 m, |BC| = y m,$$

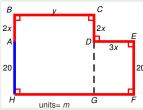
$$_{20}|AB|=|DC|=2x\ m,\ |DE|=3x\ m;$$
 fencing length, excluding wall, is 130 m; area of *HBCG* is



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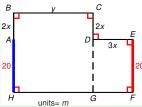


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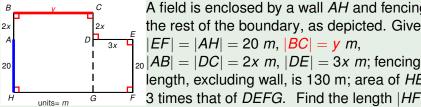
length, excluding wall, is 130 m; area of *HBCG* is 3 times that of *DEFG*. Find the length |*HF*|.



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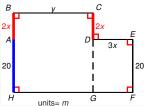
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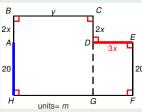
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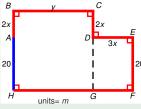
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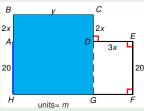


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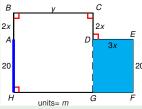
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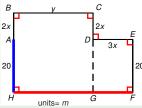
$$Area(HBCG) = 3 \cdot Area(DEFH)$$



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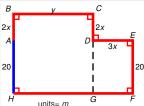
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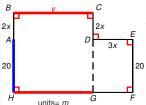
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Fence length =
$$130m$$

2y + 2 · 2x + 2 · 3x + 20 = 130

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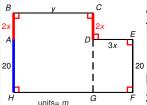
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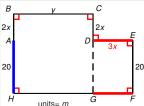
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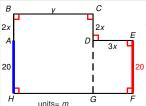
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Fence length =
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2y + 2 · 2x + $\frac{2}{3}$ · $\frac{3x}{4}$ + 20 = 130

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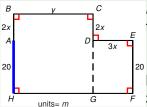
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Fence length =
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2y + 2 · 2x + 2 · 3x + $\frac{20}{20}$ = 130

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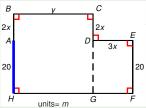
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Fence length =
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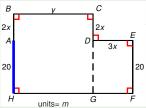
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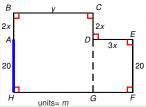
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$$|ER = |BR = |B$$

Fence length =
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 $2y + 2 \cdot 2x + 2 \cdot 3x + 20 = 130$
 $10x + 2y = 110$ | Div. by 2
 $5x + y = 55$

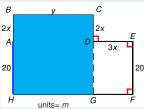
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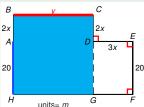
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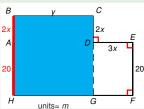


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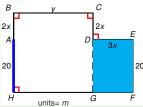
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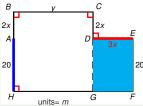
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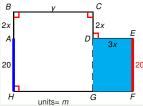
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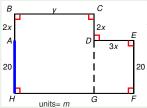
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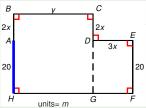
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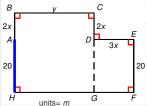
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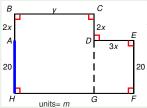
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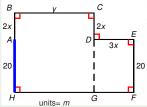
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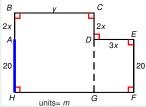
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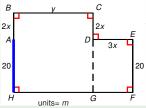
$$|BF| = |BF| = 3x \text{ m}; \text{ fencing}$$

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$$|BF| = |BF| = 3x \text{ m}; \text{ fencing}$$

Fence length =
$$130m$$

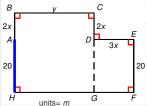
 $2y + 2 \cdot 2x + 2 \cdot 3x + 20 = 130$
 $10x + 2y = 110$ | Div. by 2
 $5x + y = 55$
 $y = 55 - 5x$
 $Area(HBCG) = 3 \cdot Area(DEFH)$
 $y \cdot (2x + 20) = 3 \cdot 3x \cdot 20$
 $(55 - 5x)(2x + 20) - 180x = 0$
 $110x + 1100 - 10x^2 - 100x - 180x = 0$



the rest of the boundary, as depicted. Given:
$$|EF| = |AH| = 20 \, m$$
, $|BC| = y \, m$, $|BC| = |BC| = 2x \, m$, $|BC| = 3x \, m$; fencing length, excluding wall, is 130 m; area of $|BCG|$ is 3 times that of $|BEG|$. Find the length $|BE|$.

Fence length =
$$130m$$

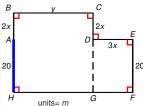
 $2y + 2 \cdot 2x + 2 \cdot 3x + 20 = 130$
 $10x + 2y = 110$ | Div. by 2
 $5x + y = 55$
 $y = 55 - 5x$
 $Area(HBCG) = 3 \cdot Area(DEFH)$
 $y \cdot (2x + 20) = 3 \cdot 3x \cdot 20$
 $(55 - 5x)(2x + 20) - 180x = 0$
 $110x + 1100 - 10x^2 - 100x - 180x = 0$
 $-10x^2 - 170x + 1100 = 0$



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

Fence length =
$$130m$$

 $2y + 2 \cdot 2x + 2 \cdot 3x + 20 = 130$
 $10x + 2y = 110$ | Div. by 2
 $5x + y = 55$
 $y = 55 - 5x$
 $Area(HBCG) = 3 \cdot Area(DEFH)$
 $y \cdot (2x + 20) = 3 \cdot 3x \cdot 20$
 $(55 - 5x)(2x + 20) - 180x = 0$
 $110x + 1100 - 10x^2 - 100x - 180x = 0$
 $-10x^2 - 170x + 1100 = 0$

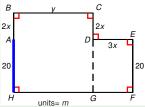


A field is enclosed by a wall AH and fencing at the rest of the boundary, as depicted. Given:

the rest of the boundary, as depicted. Given:
$$|EF| = |AH| = 20 \text{ m}, |BC| = y \text{ m},$$

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

$$y = 55 - 5x$$
$$-10x^2 - 170x + 1100 = 0$$



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

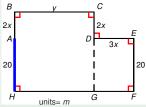
the rest of the boundary, as depicted. Given:
$$|EF| = |AH| = 20 \text{ m}, |BC| = y \text{ m},$$

$$|AB| = |DC| = 2x \text{ m}, |DE| = 3x \text{ m}; \text{ fencing}$$

$$|ERROR = |BRR = |B$$

$$y = 55 - 5x$$

 $-10x^2 - 170x + 1100 = 0$ | Div. by -10
 $x^2 + 17x - 110 = 0$



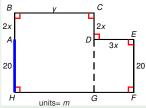
A field is enclosed by a wall AH and fencing at the rest of the boundary, as depicted. Given:

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

 $|BC| = |BC| = 2x \text{ m}, |BC| = 3x \text{ m}; \text{ fencing}$
 $|BC| = 3x \text{ m}; \text{ fencing}$

$$y = 55 - 5x$$

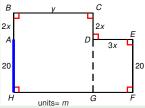
 $-10x^2 - 170x + 1100 = 0$ | Div. by -10
 $x^2 + 17x - 110 = 0$
 $(x + ?)(x + ?) = 0$



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 $|AB| = 3$ times that of $|AB| = 3$ find the length $|AB| = 3$ times that of $|AB| = 3$ find the length $|AB| = 3$ times that of $|AB| = 3$ times that $|AB| = 3$ times $|AB| = 3$ times that $|AB| = 3$ times th$

$$y = 55 - 5x$$

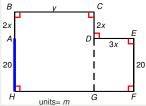
 $-10x^2 - 170x + 1100 = 0$ | Div. by -10
 $x^2 + 17x - 110 = 0$
 $(x - 5)(x + 22) = 0$



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

the rest of the boundary, as depicted. Given:
$$|EF| = |AH| = 20 \text{ m}, |BC| = y \text{ m},$$
 $|BC| = |BC| = 2x \text{ m}, |BC| = 3x \text{ m};$ fencing length, excluding wall, is 130 m; area of $|BCG|$ is 3 times that of $|BEFG|$. Find the length $|BF|$.

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



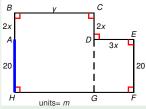
the rest of the boundary, as depicted. Given:
$$|EF| = |AH| = 20 \text{ m}, |BC| = y \text{ m},$$

$$|B| = |BC| = 2x \text{ m}, |BE| = 3x \text{ m}; \text{ fencing}$$

$$|B| = |B| = |B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}; \text{ area of } B| = 3x \text{ m}$$

$$y = 55 - 5x$$

 $-10x^2 - 170x + 1100 = 0$ | Div. by -10
 $x^2 + 17x - 110 = 0$
 $(x -5)(x + 22) = 0$
 $x = 5 \text{ or } x = -22$



the rest of the boundary, as depicted. Given:
$$|EF| = |AH| = 20 \text{ m}, |BC| = y \text{ m},$$

$$|BC| = |BC| = 2x \text{ m}, |DE| = 3x \text{ m}; \text{ fencing}$$

$$|BC| = |BC| = 2x \text{ m}, |BC| = 3x \text{ m}; \text{ area of } BCG \text{ is}$$

$$|BC| = 3x \text{ m}; \text{ area of } BCG \text{ is}$$

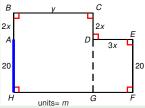
$$|BC| = 3x \text{ m}; \text{ area of } BCG \text{ is}$$

$$|BC| = 3x \text{ m}; \text{ area of } BCG \text{ is}$$

$$|BC| = 3x \text{ m}; \text{ area of } BCG \text{ is}$$

$$y = 55 - 5x$$

 $-10x^2 - 170x + 1100 = 0$ | Div. by -10
 $x^2 + 17x - 110 = 0$
 $(x -5)(x + 22) = 0$
 $x = 5 \text{ or } x = 22$ | $x > 0$



the rest of the boundary, as depicted. Given:
$$|EF| = |AH| = 20 \text{ m}, |BC| = y \text{ m},$$

$$|AB| = |DC| = 2x \text{ m}, |DE| = 3x \text{ m}; \text{ fencing}$$

$$|ERC| = |BRC| = |BRC|$$

$$y = 55 - 5x$$

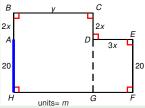
$$-10x^{2} - 170x + 1100 = 0$$

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

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

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

$$y = 55 - 5x$$
| Div. by - 10



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

the rest of the boundary, as depicted. Given:
$$|EF| = |AH| = 20 \text{ m}, |BC| = y \text{ m},$$

$$|BC| = |BC| = 2x \text{ m}, |DE| = 3x \text{ m}; \text{ fencing}$$

$$|BC| = |BC| = 2x \text{ m}, |BC| = 3x \text{ m}; \text{ area of } BCG \text{ is}$$

$$|BC| = 3x \text{ m}; \text{ area of } BCG \text{ is}$$

$$|BC| = 3x \text{ m}; \text{ area of } BCG \text{ is}$$

$$|BC| = 3x \text{ m}; \text{ area of } BCG \text{ is}$$

$$y = 55 - 5x$$

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

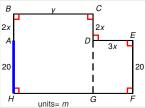
$$x^{2} + 17x - 110 = 0$$

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

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

$$y = 55 - 5x$$

$$= 55 - 5 \cdot 5$$



the rest of the boundary, as depicted. Given:
$$|EF| = |AH| = 20 \text{ m}, |BC| = y \text{ m},$$

$$|BC| = |BC| = 2x \text{ m}, |DE| = 3x \text{ m}; \text{ fencing}$$

$$|BC| = |BC| = 2x \text{ m}, |BC| = 3x \text{ m}; \text{ area of } BCG \text{ is}$$

$$|BC| = 3x \text{ m}; \text{ area of } BCG \text{ is}$$

$$|BC| = 3x \text{ m}; \text{ area of } BCG \text{ is}$$

$$|BC| = 3x \text{ m}; \text{ area of } BCG \text{ is}$$

$$y = 55 - 5x$$

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

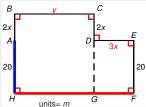
$$x^{2} + 17x - 110 = 0$$

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

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

$$y = 55 - 5x$$

$$= 55 - 5 \cdot 5 = 30$$



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

the rest of the boundary, as depicted. Given:
$$|EF| = |AH| = 20 \text{ m}, |BC| = y \text{ m},$$

$$|BC| = |BC| = 2x \text{ m}, |DE| = 3x \text{ m}; \text{ fencing}$$

$$|BC| = |BC| = 2x \text{ m}, |BC| = 3x \text{ m}; \text{ area of } BCG \text{ is}$$

$$|BC| = |BC| = 3x \text{ m}; \text{ fencing}$$

$$|BC| = |BC| = 3x \text{ m}; \text{ fencing}$$

$$|BC| = |BC| = 3x \text{ m}; \text{ fencing}$$

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$$|BC| = |BC| = 3x \text{ m}; \text{ fencing}$$

$$y = 55 - 5x$$

$$-10x^{2} - 170x + 1100 = 0 | Div. by - 10$$

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

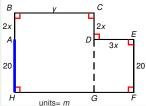
$$(x -5)(x + 22) = 0$$

$$x = 5 \text{ or } x = 22 | x > 0$$

$$y = 55 - 5x$$

$$= 55 - 5 \cdot 5 = 30$$

$$|HF| = (y + 3x)m$$



the rest of the boundary, as depicted. Given:
$$|EF| = |AH| = 20 \text{ m}, |BC| = y \text{ m},$$

$$|BC| = |BC| = 2x \text{ m}, |DE| = 3x \text{ m}; \text{ fencing}$$

$$|BC| = |BC| = 2x \text{ m}, |BC| = 3x \text{ m}; \text{ area of } BCG \text{ is}$$

$$|BC| = |BC| = 3x \text{ m}; \text{ area of } BCG \text{ is}$$

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$$y = 55 - 5x$$

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

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

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

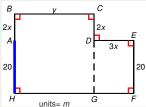
$$x = 5 \text{ or } x = 22$$

$$y = 55 - 5x$$

$$= 55 - 5 \cdot 5 = 30$$

$$|HF| = (y + 3x)m$$

$$= (30 + 3 \cdot 5)m$$



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 $ABCG$ is 3 times that of $ABCG$. Find the length $ABCG$ is$

$$y = 55 - 5x$$

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

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

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

$$x = 5 \text{ or } x = 22 \qquad | x > 0$$

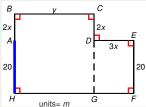
$$y = 55 - 5x$$

$$= 55 - 5 \cdot 5 = 30$$

$$|HF| = (y + 3x)m$$

$$= (30 + 3 \cdot 5)m$$

$$= 45m$$



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 $|AB| = 3$ times that of $|AB| = 3$ find the length $|AB$$

$$y = 55 - 5x$$

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

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

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

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

$$y = 55 - 5x$$

$$= 55 - 5 \cdot 5 = 30$$

$$|HF| = (y + 3x)m$$

$$= (30 + 3 \cdot 5)m$$

$$= 45m$$