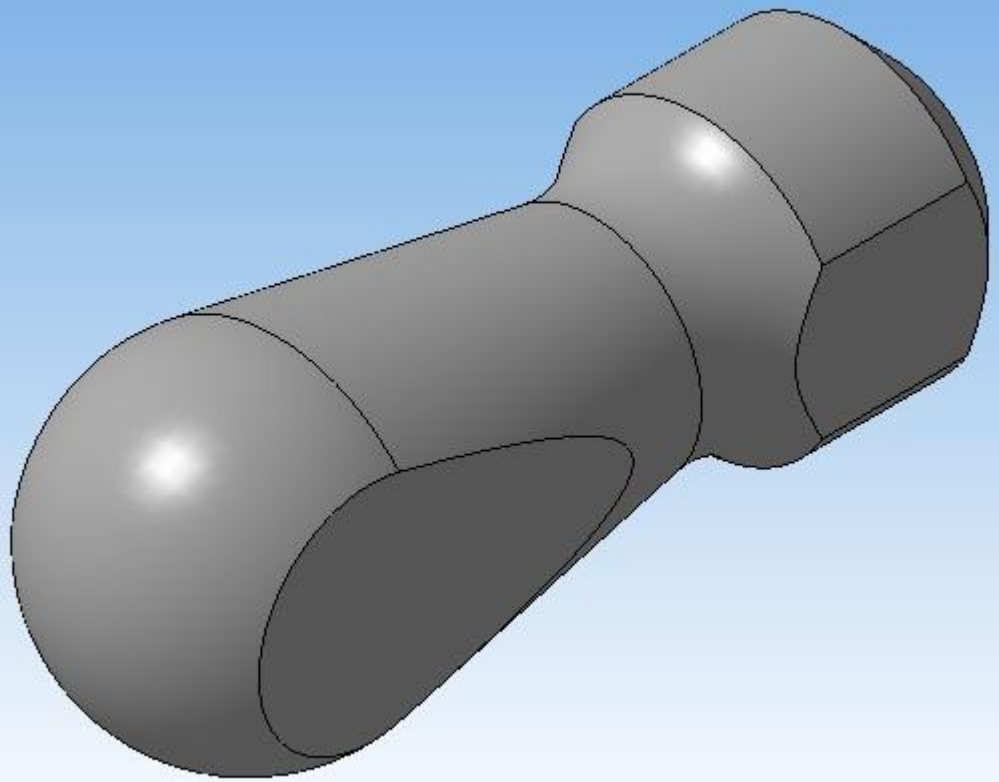
Определение натуральных размеров и площади сечения многогранника наклонной плоскостью

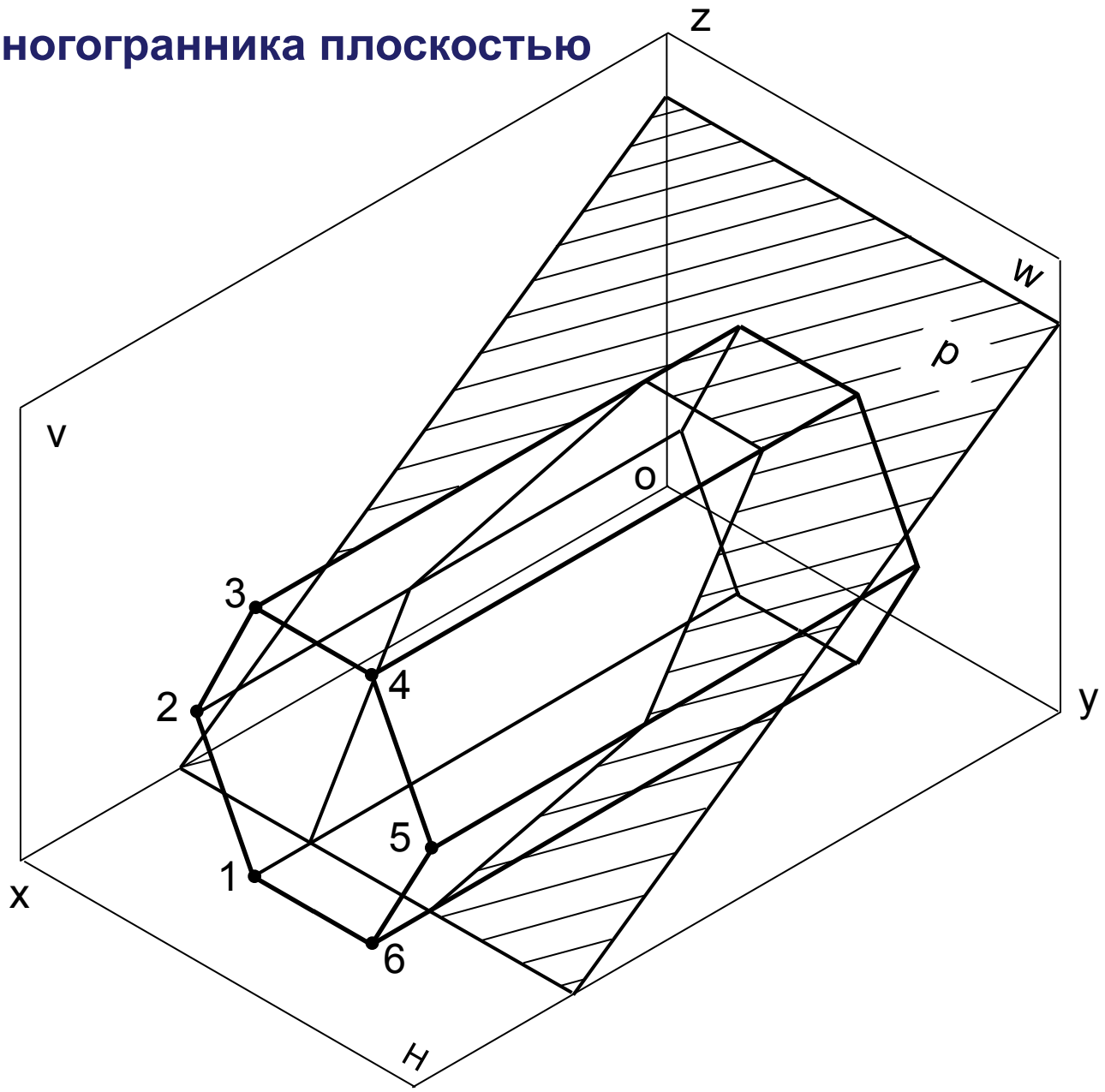
ПЛАН РАБОТЫ

- Построение проекций точки на поверхности геометрических тел.
- Построение трех проекций сечения (среза) на геометрических телах.
- Определение натурального размера сечения одним из способов преобразования проекций.
- Вычисление площади сечения.



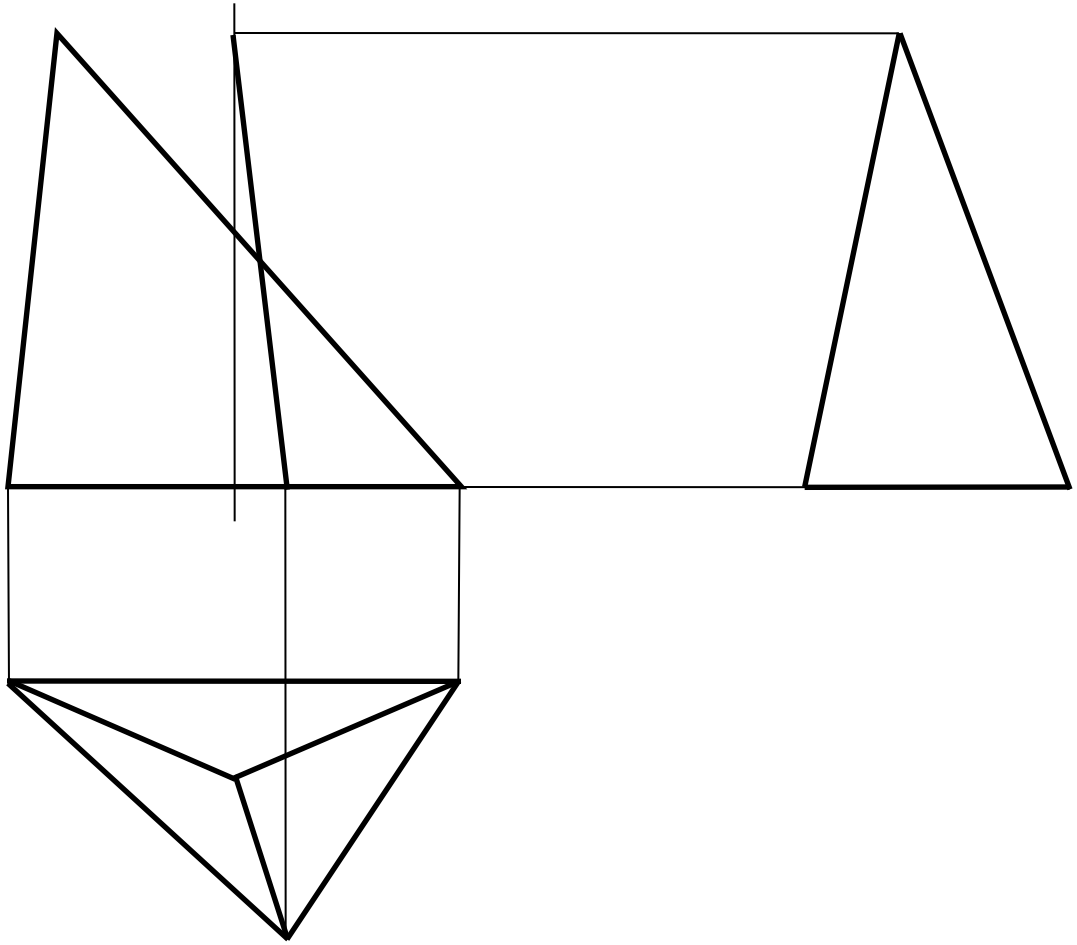
Линия среза (сечение)- это плоская фигура, полученная в результате пересечения тела плоскостью и содержащая точки, принадлежащие как поверхности тела, так и секущей плоскости.

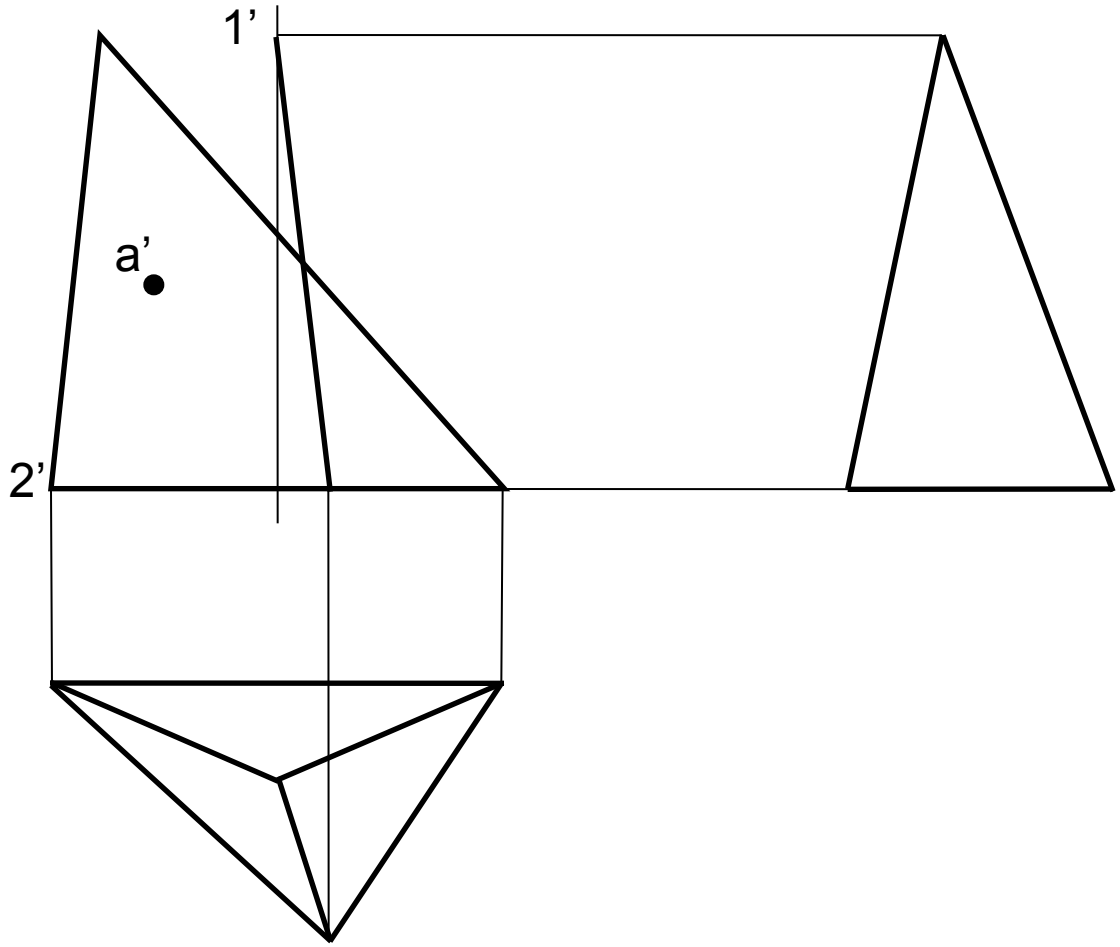
Сечение многогранника плоскостью



Построение проекций точки на поверхности геометрического тела

Треугольная пирамида

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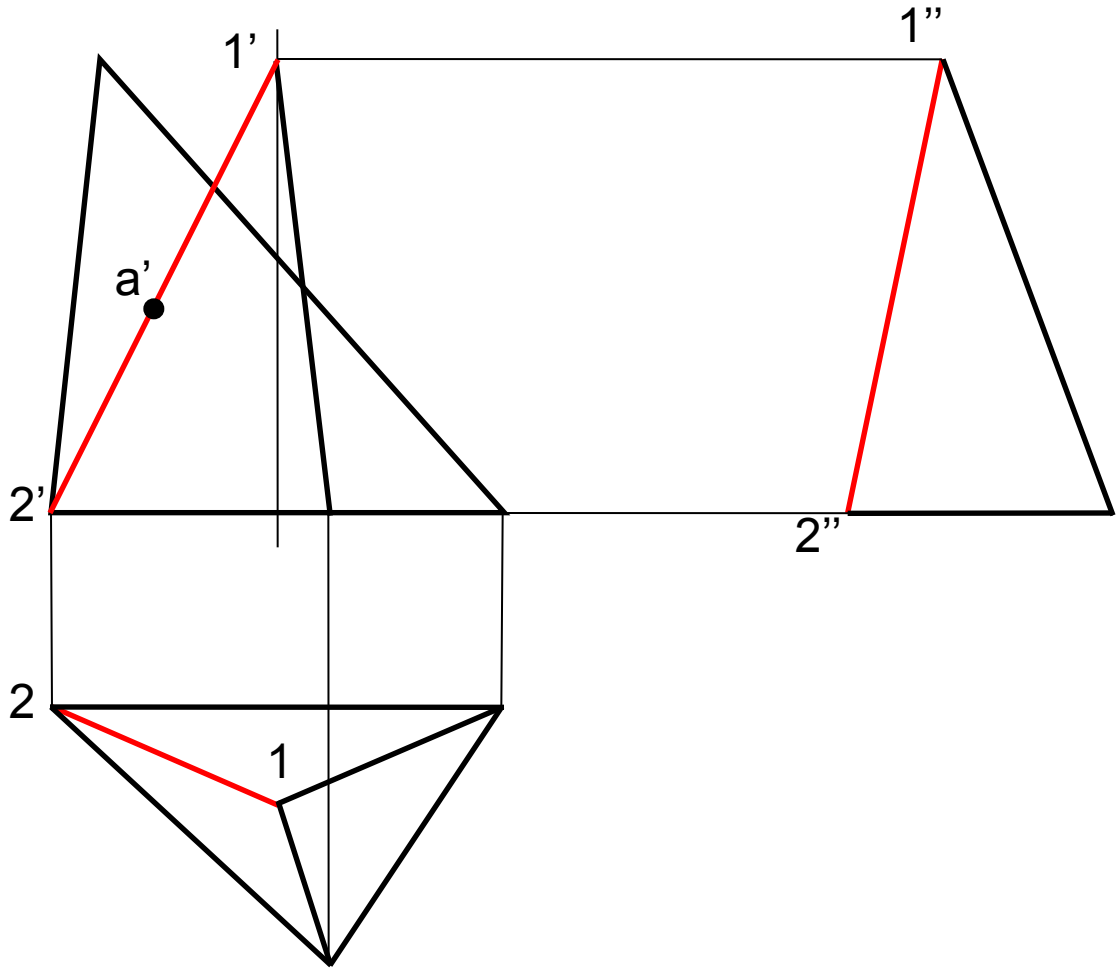
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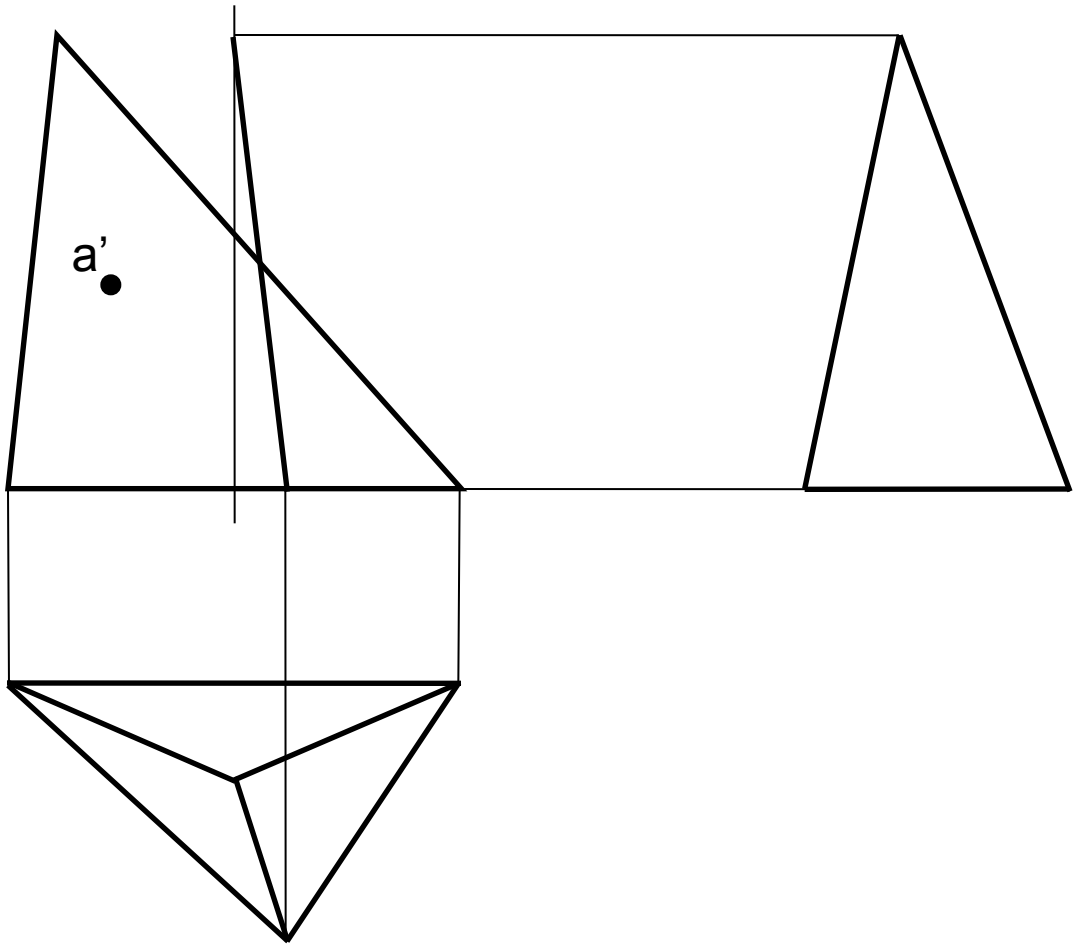
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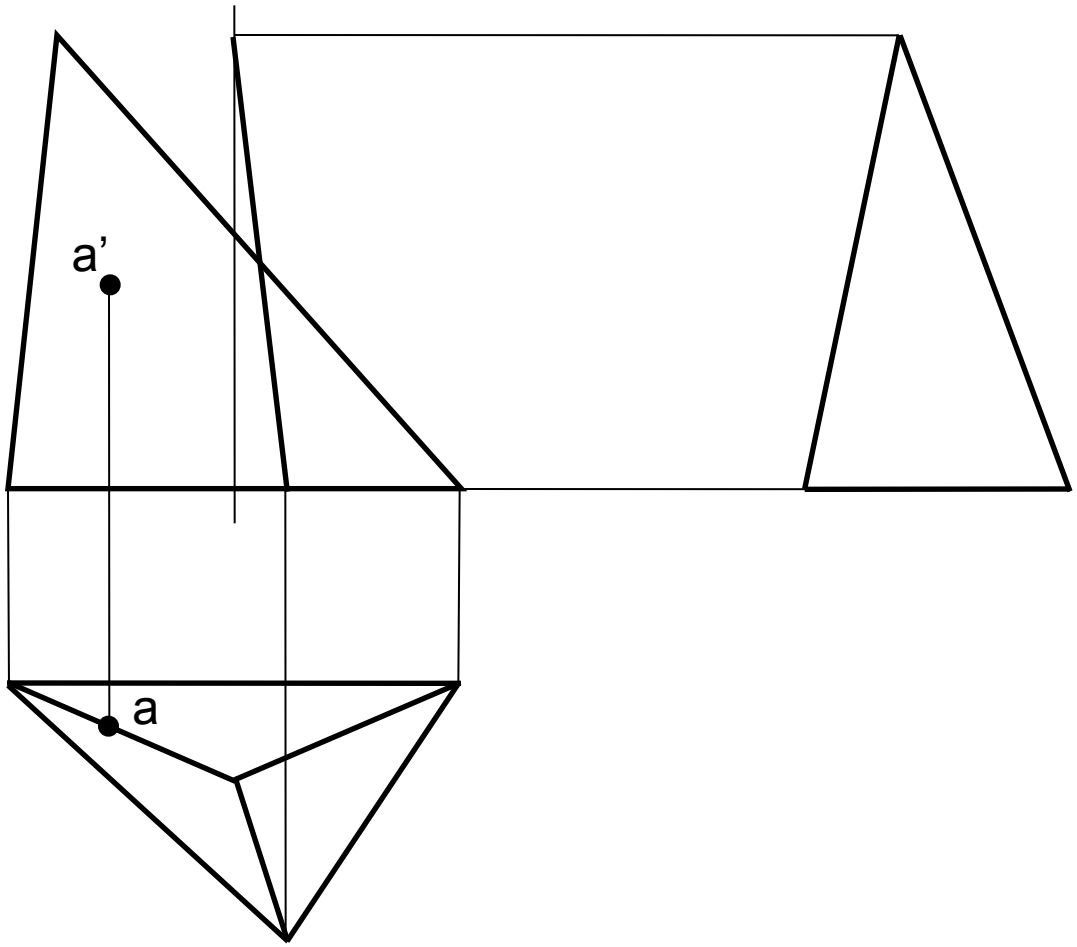
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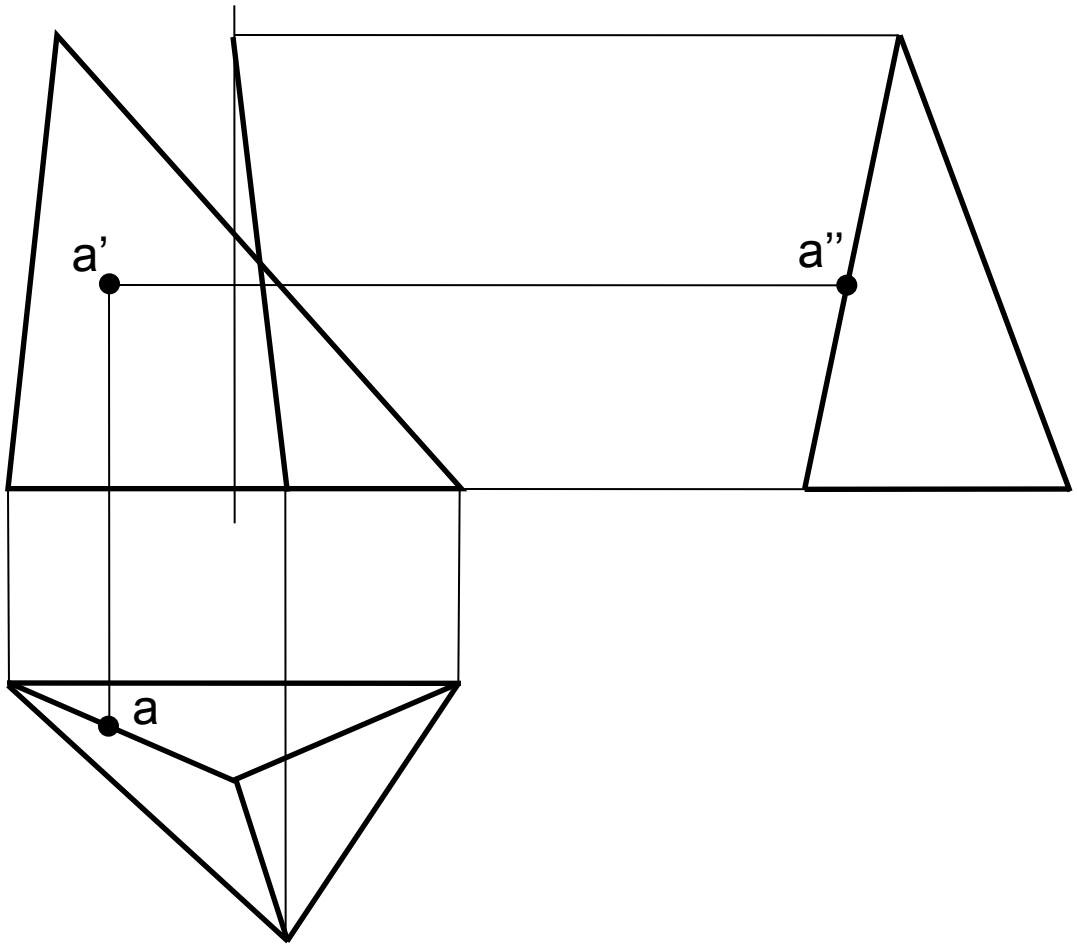
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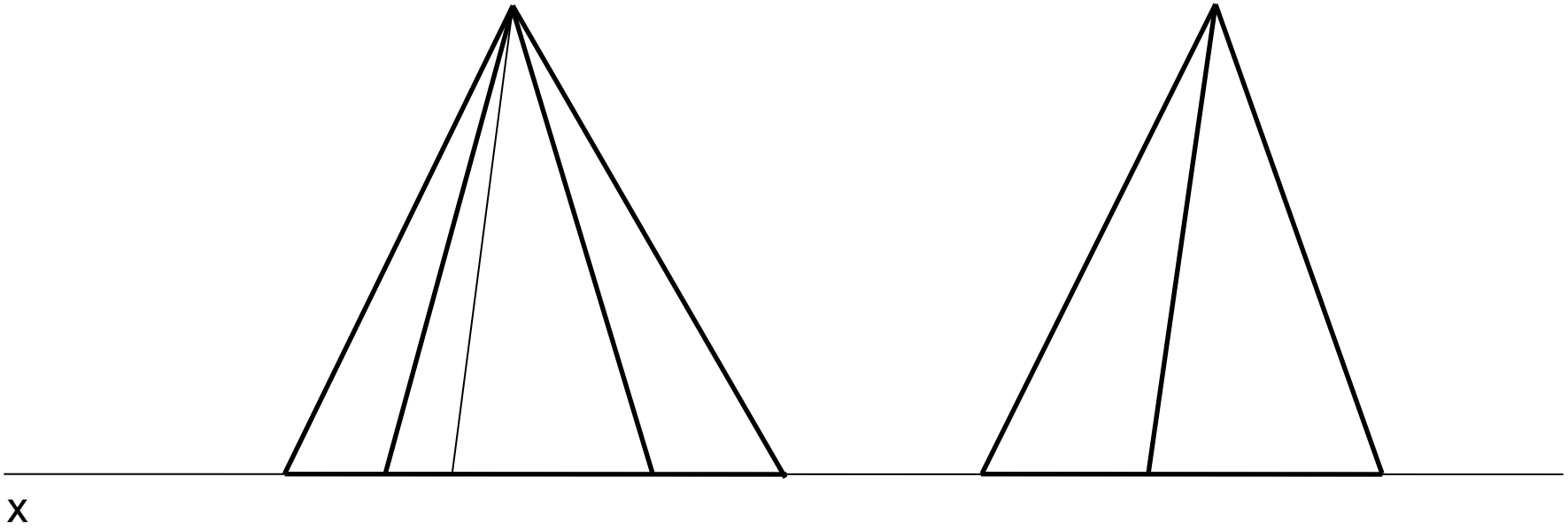
Задача1. Построить три проекции сечения пятиугольной пирамиды, усеченной фронтально- проецирующей плоскостью.

Группы I и III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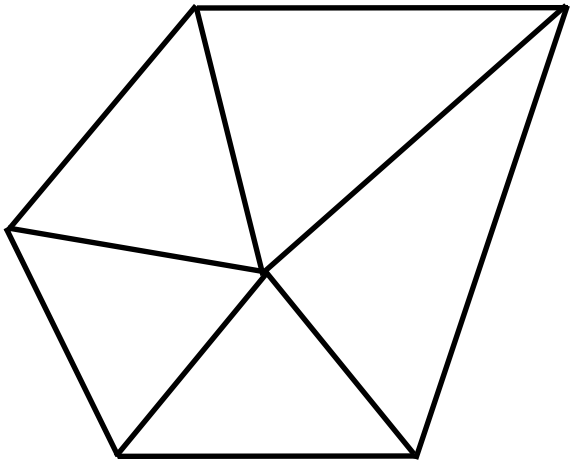

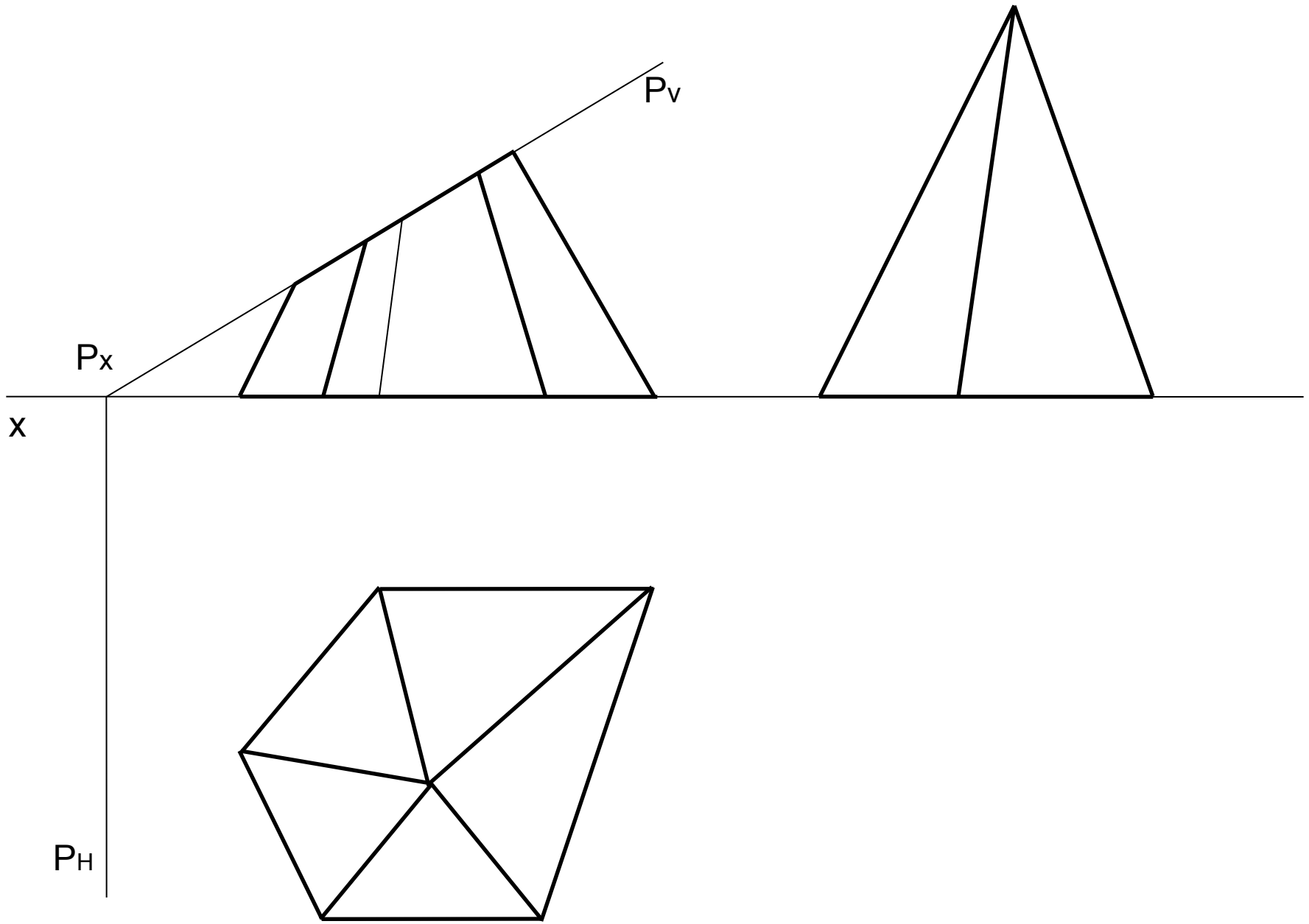
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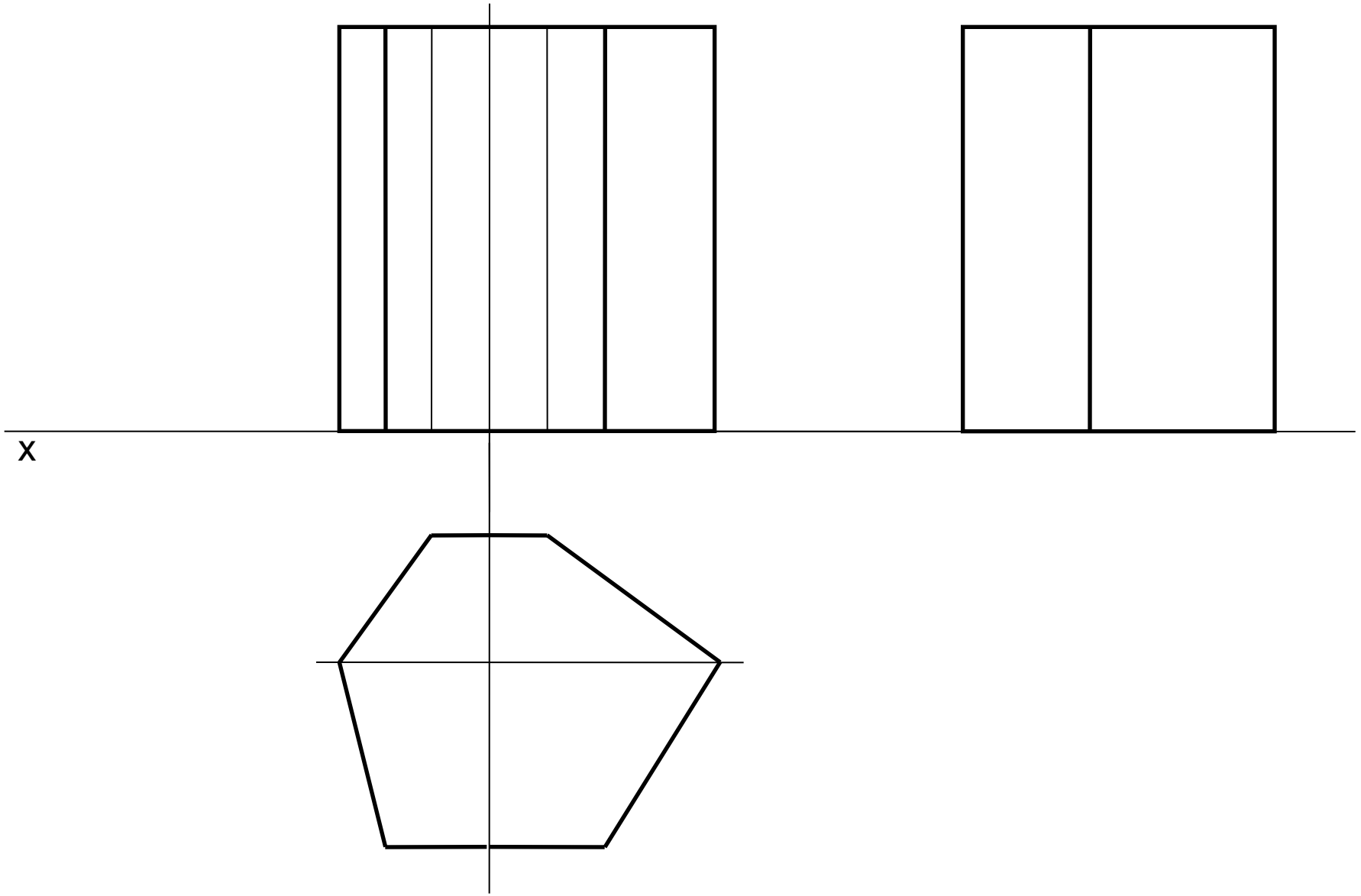
Задача 1. Построить три проекции сечения шестиугольной призмы, усеченной фронтально-проецирующей плоскостью.

Группы II и IV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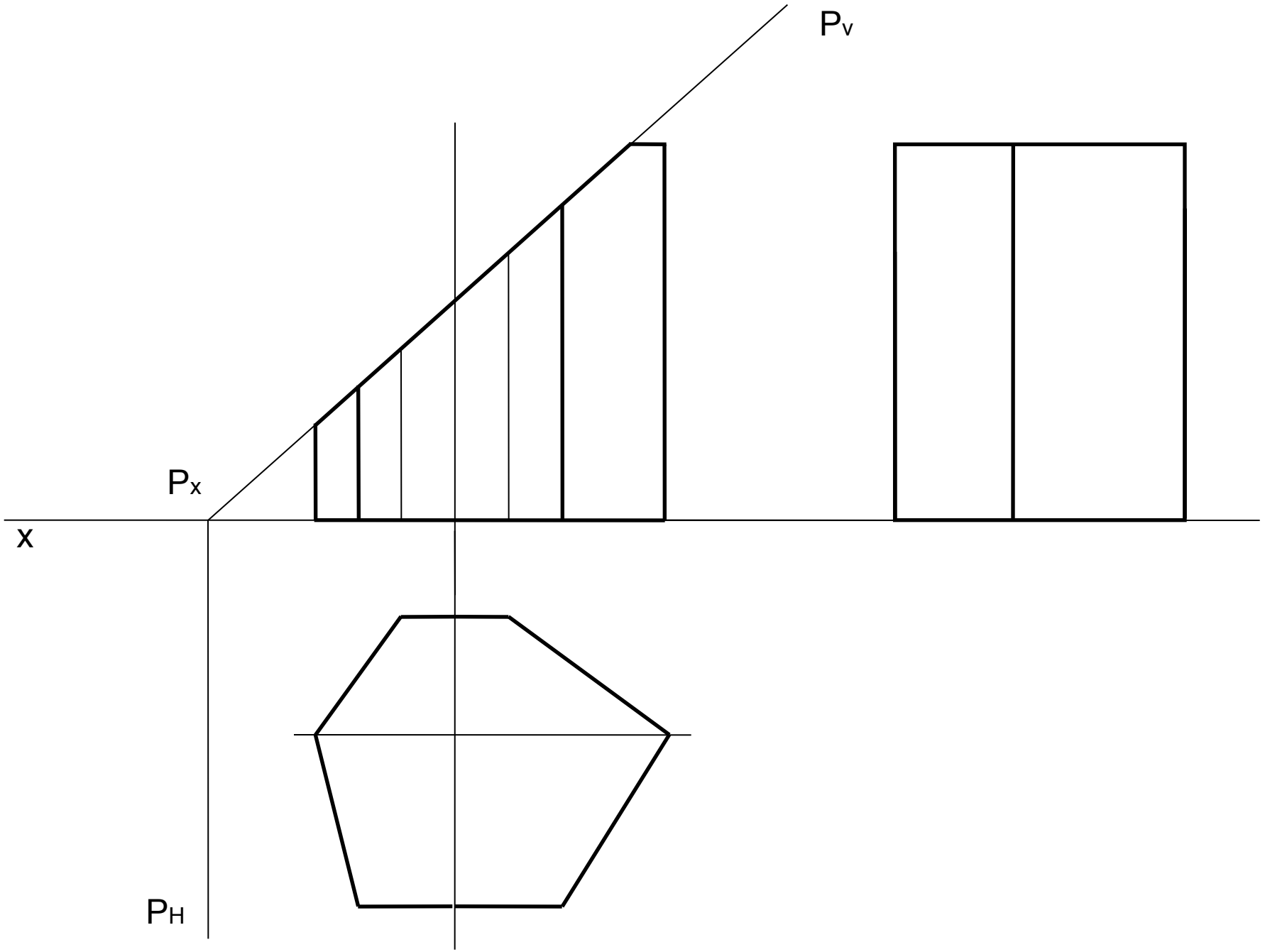
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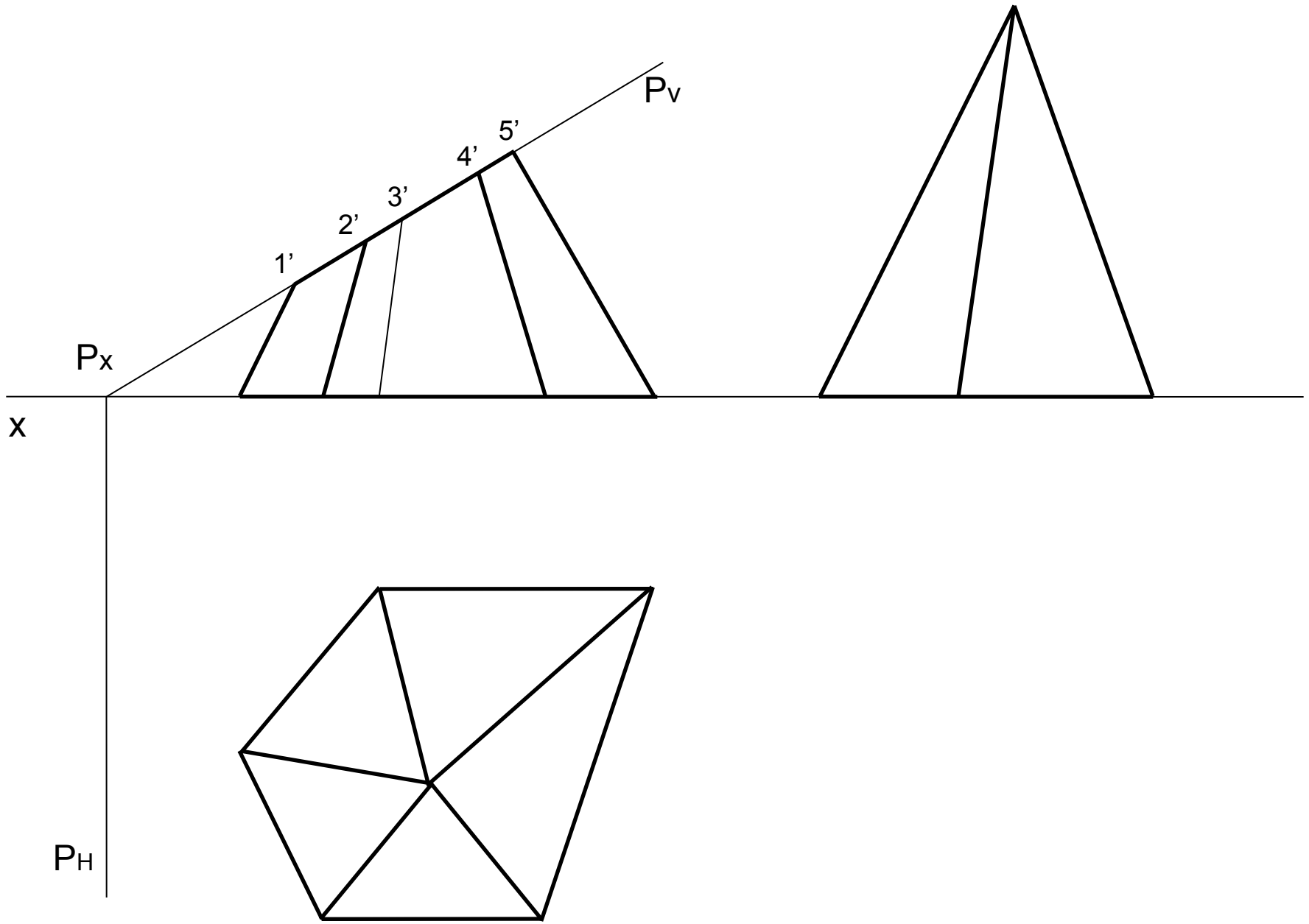
Проверка решения задач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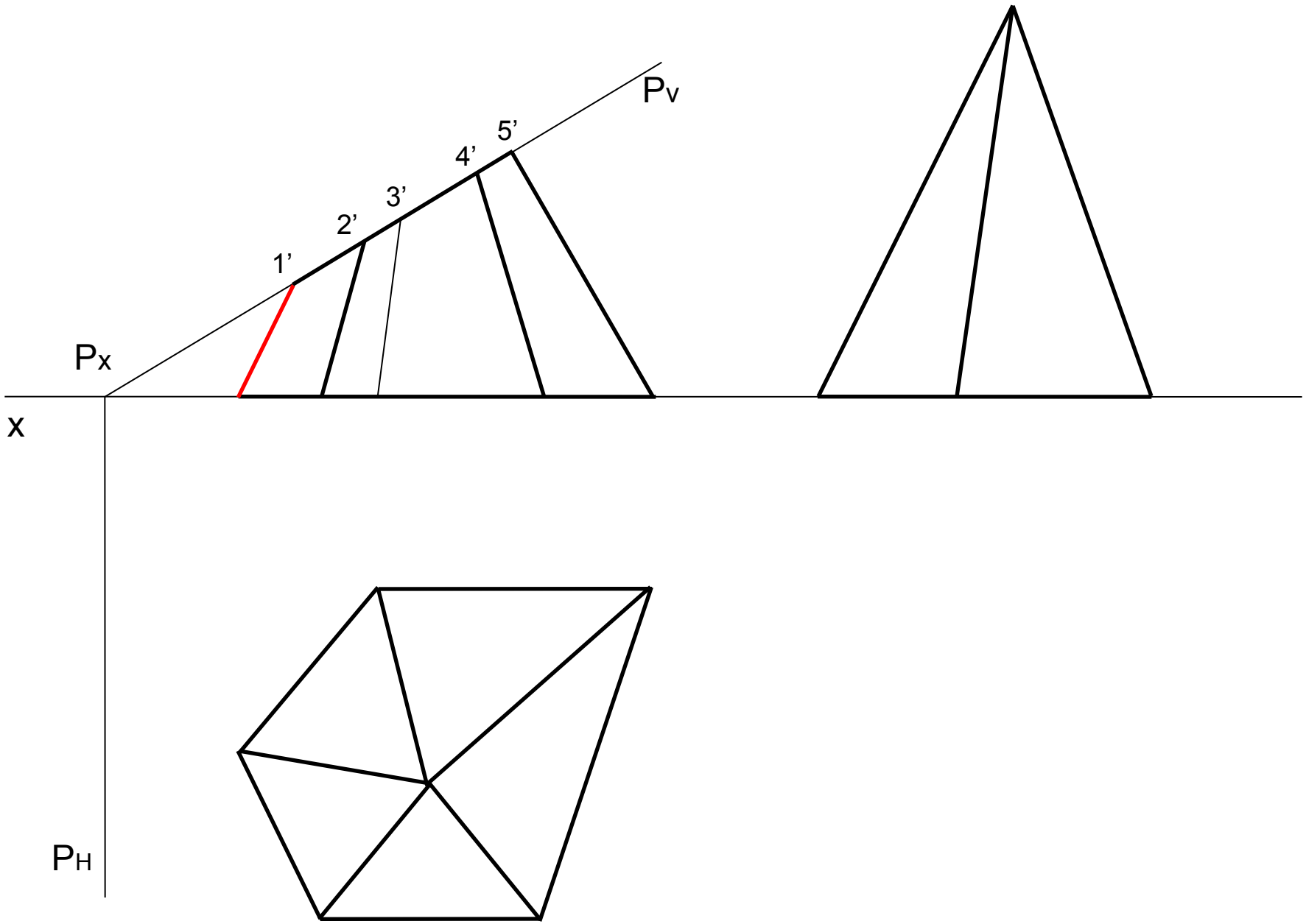
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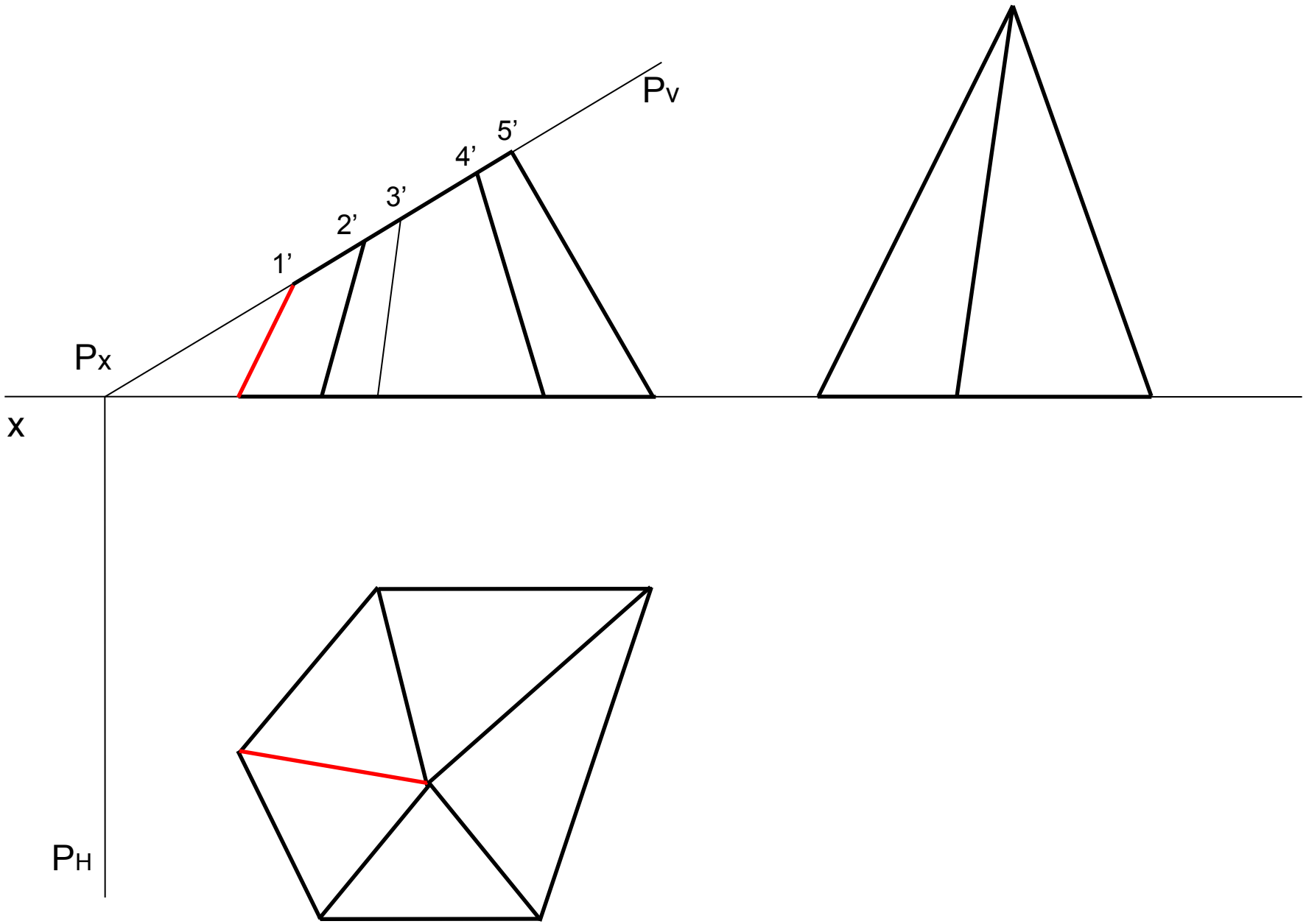
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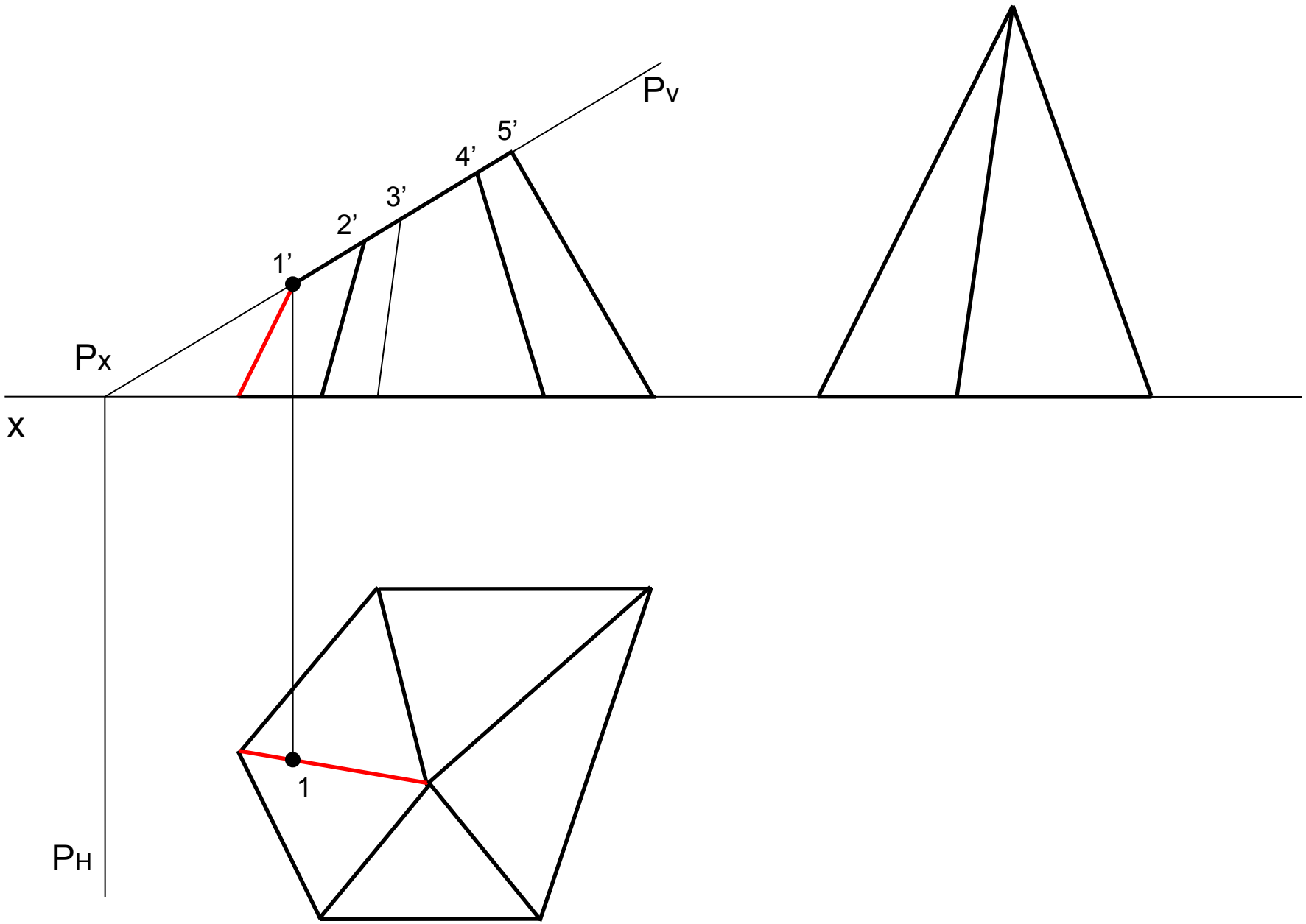
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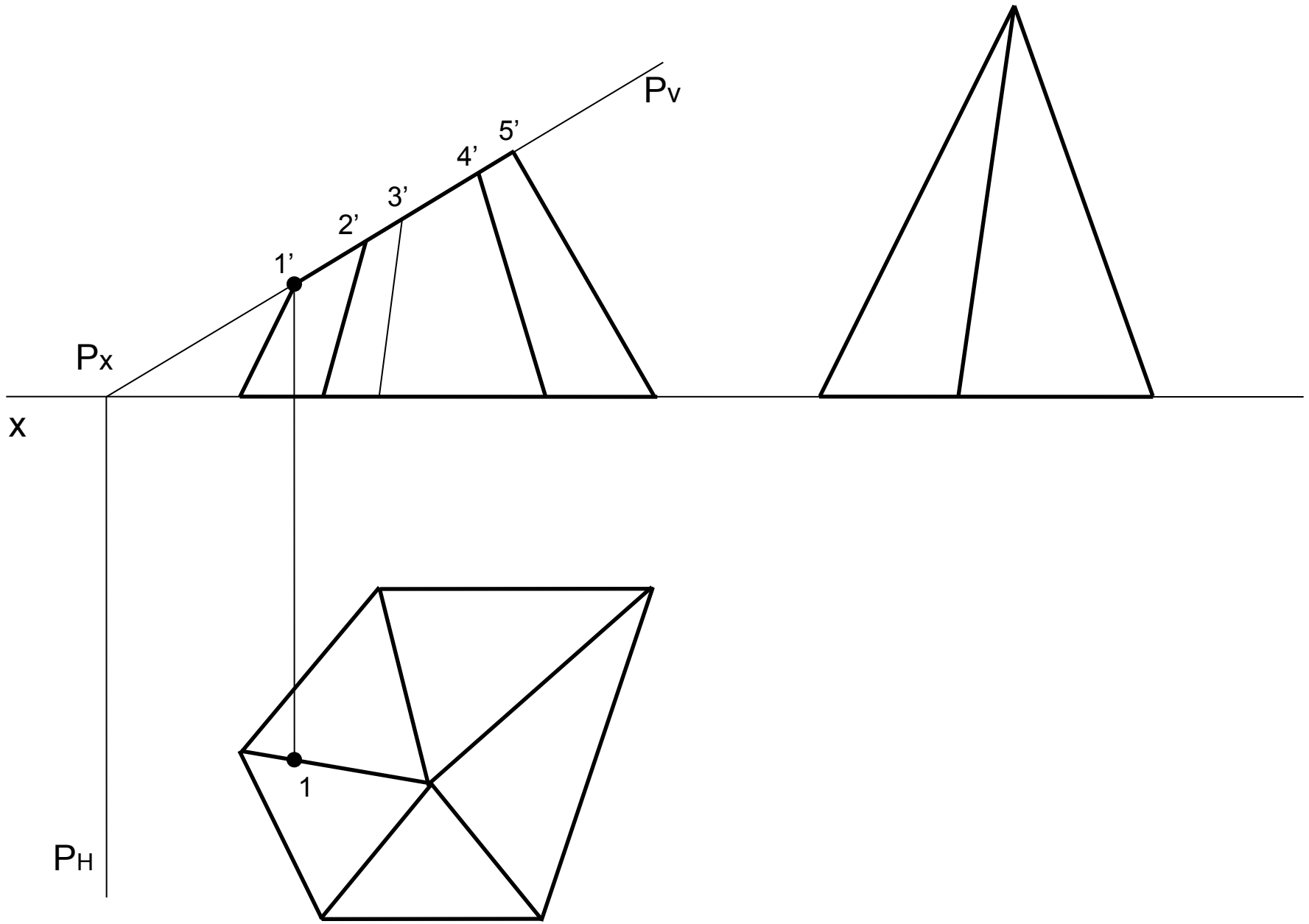
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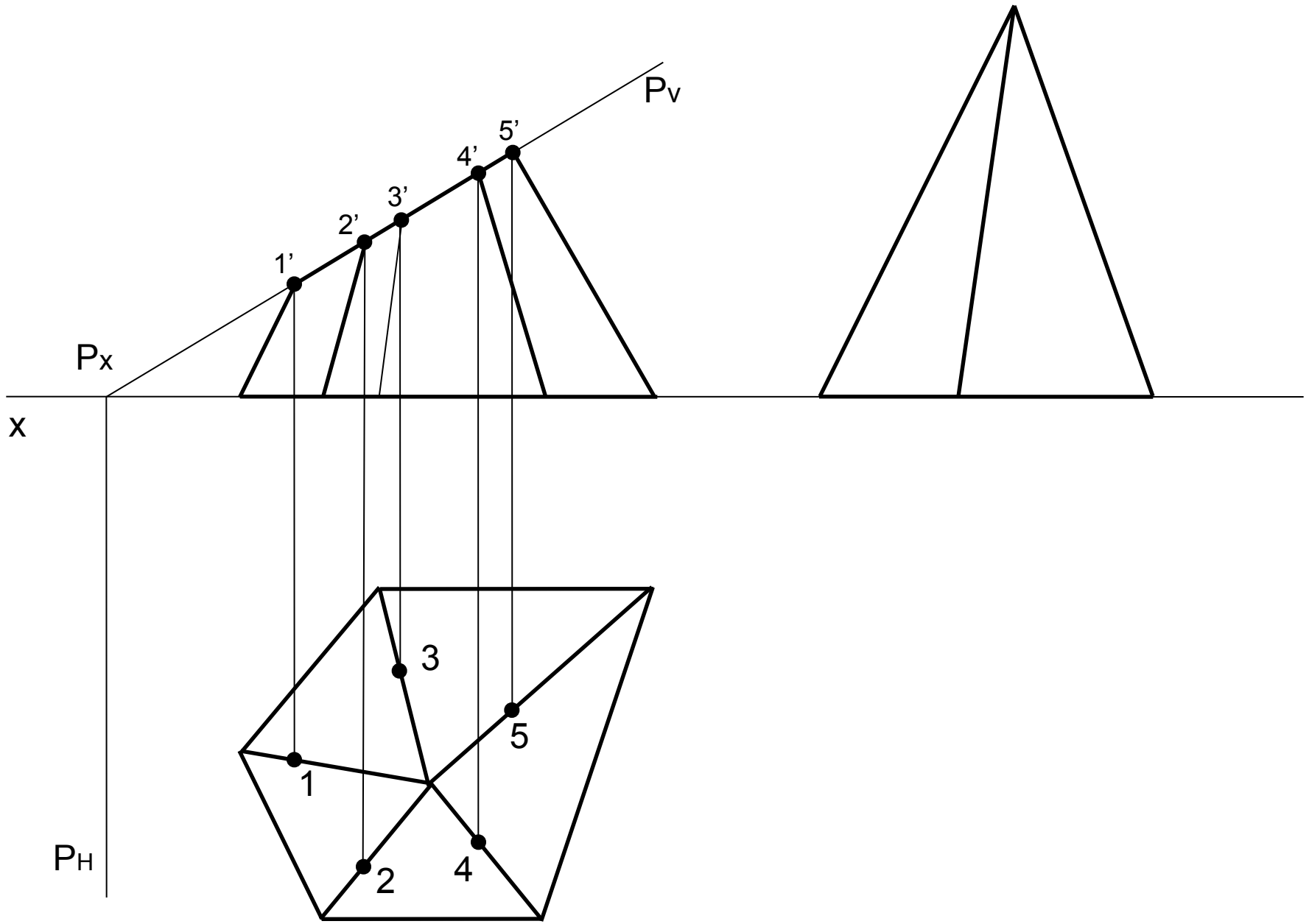
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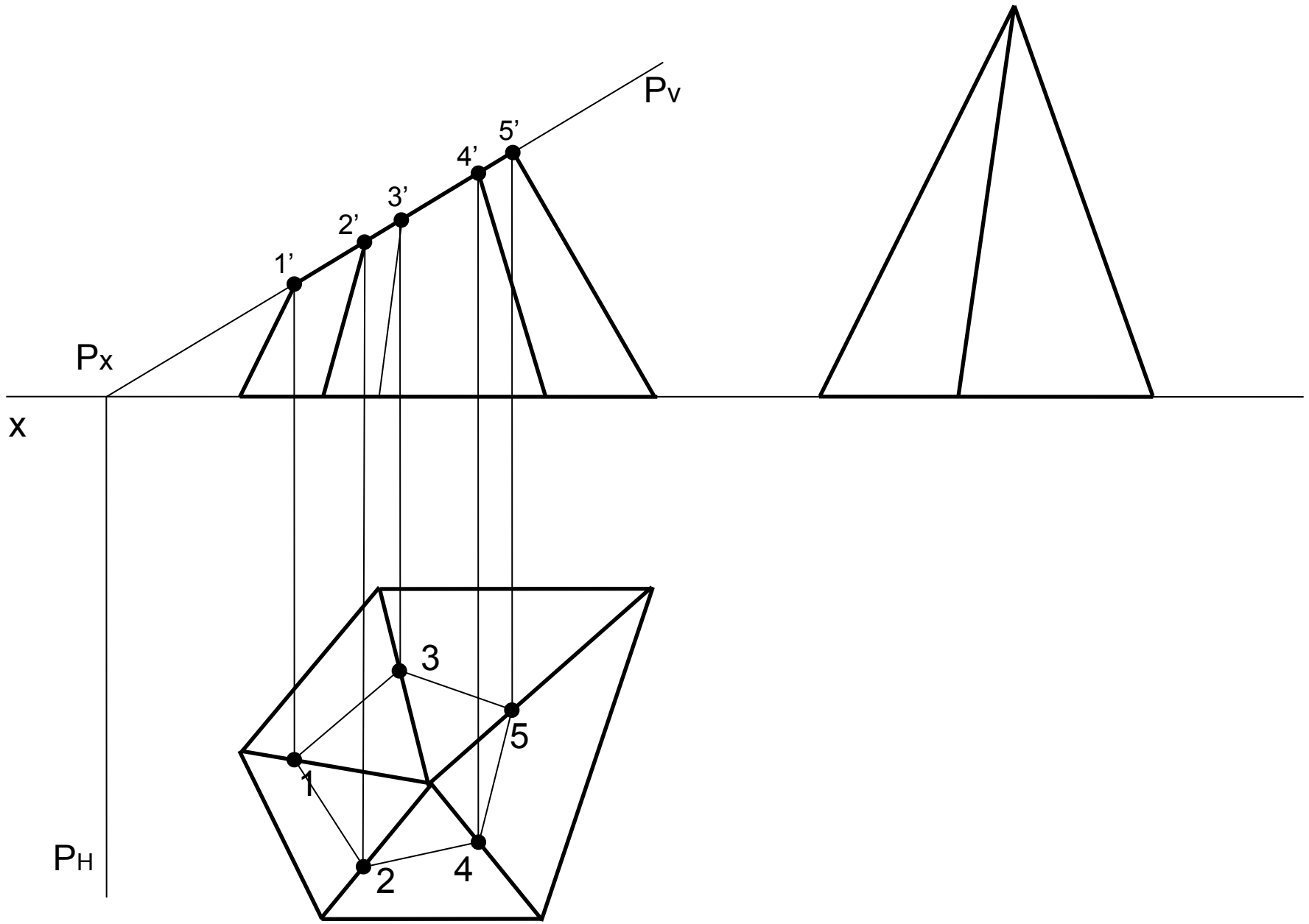
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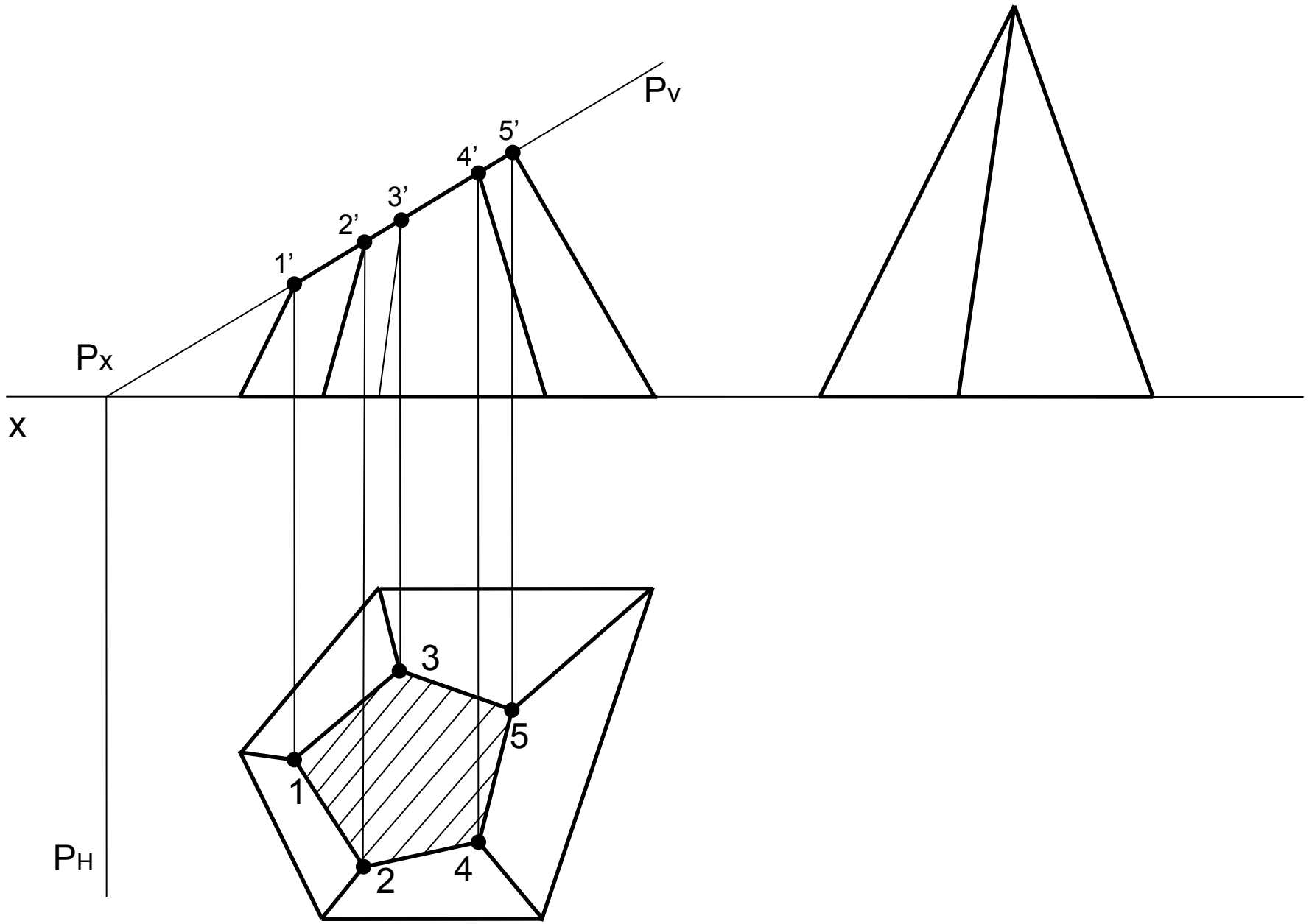
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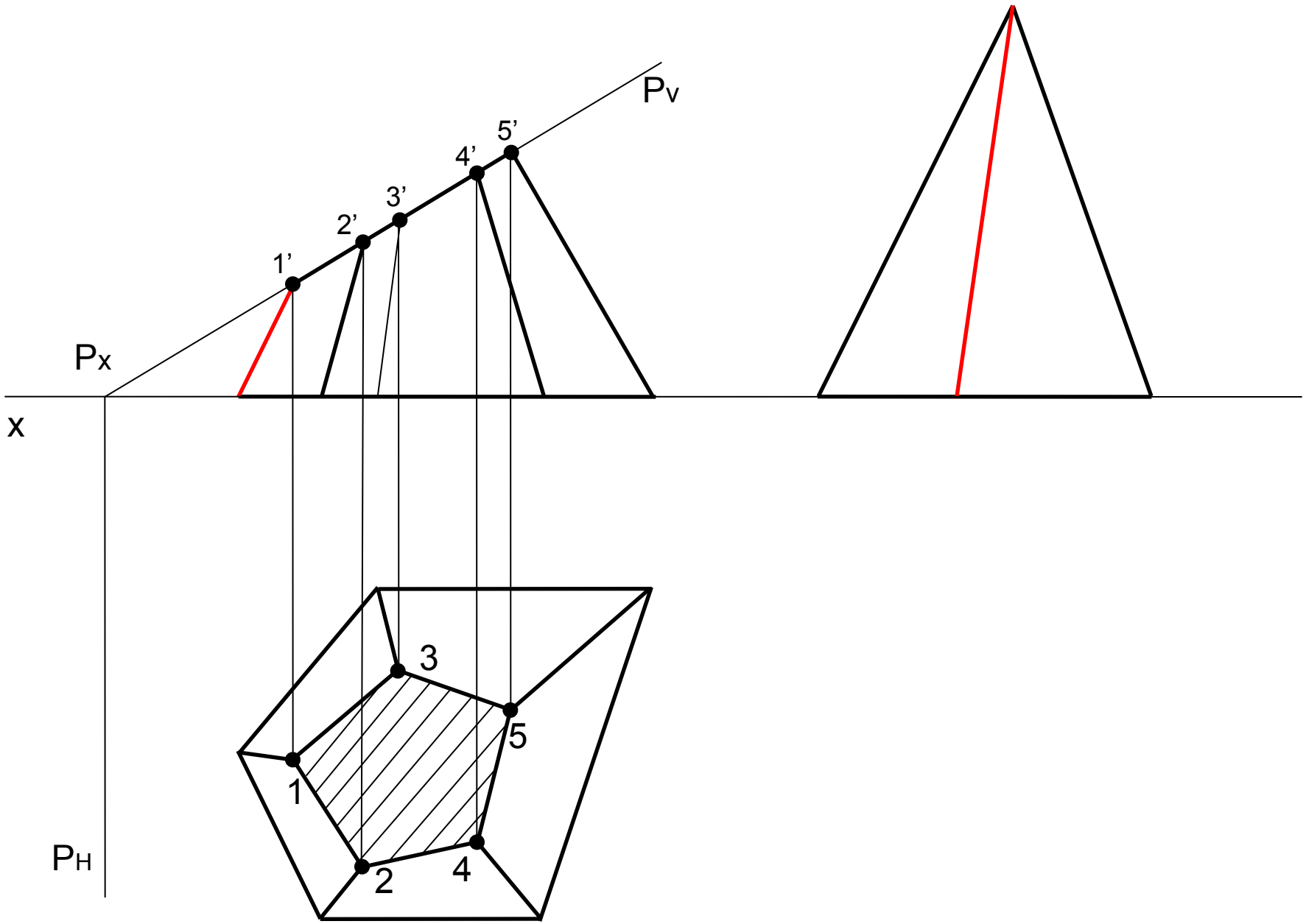
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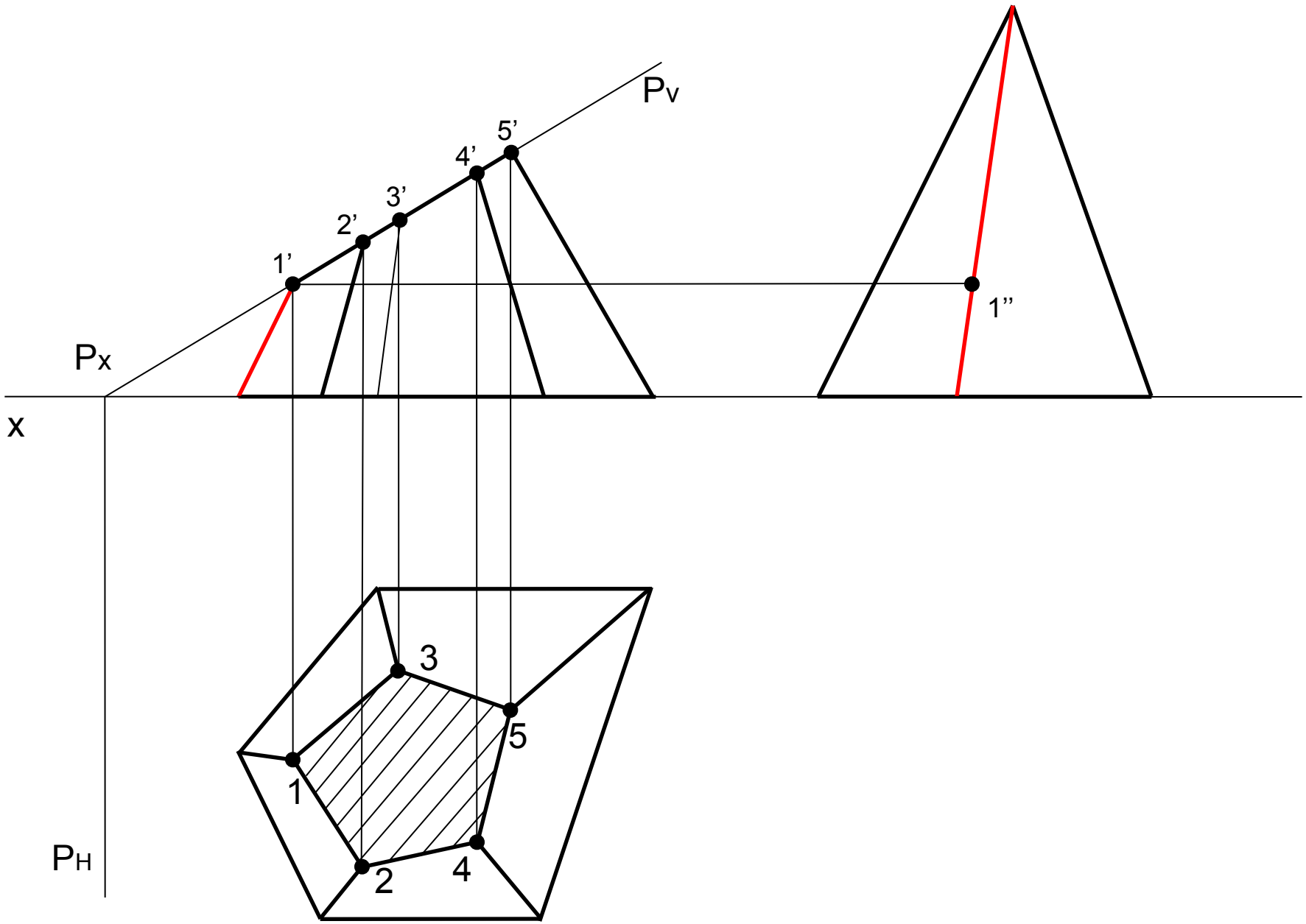
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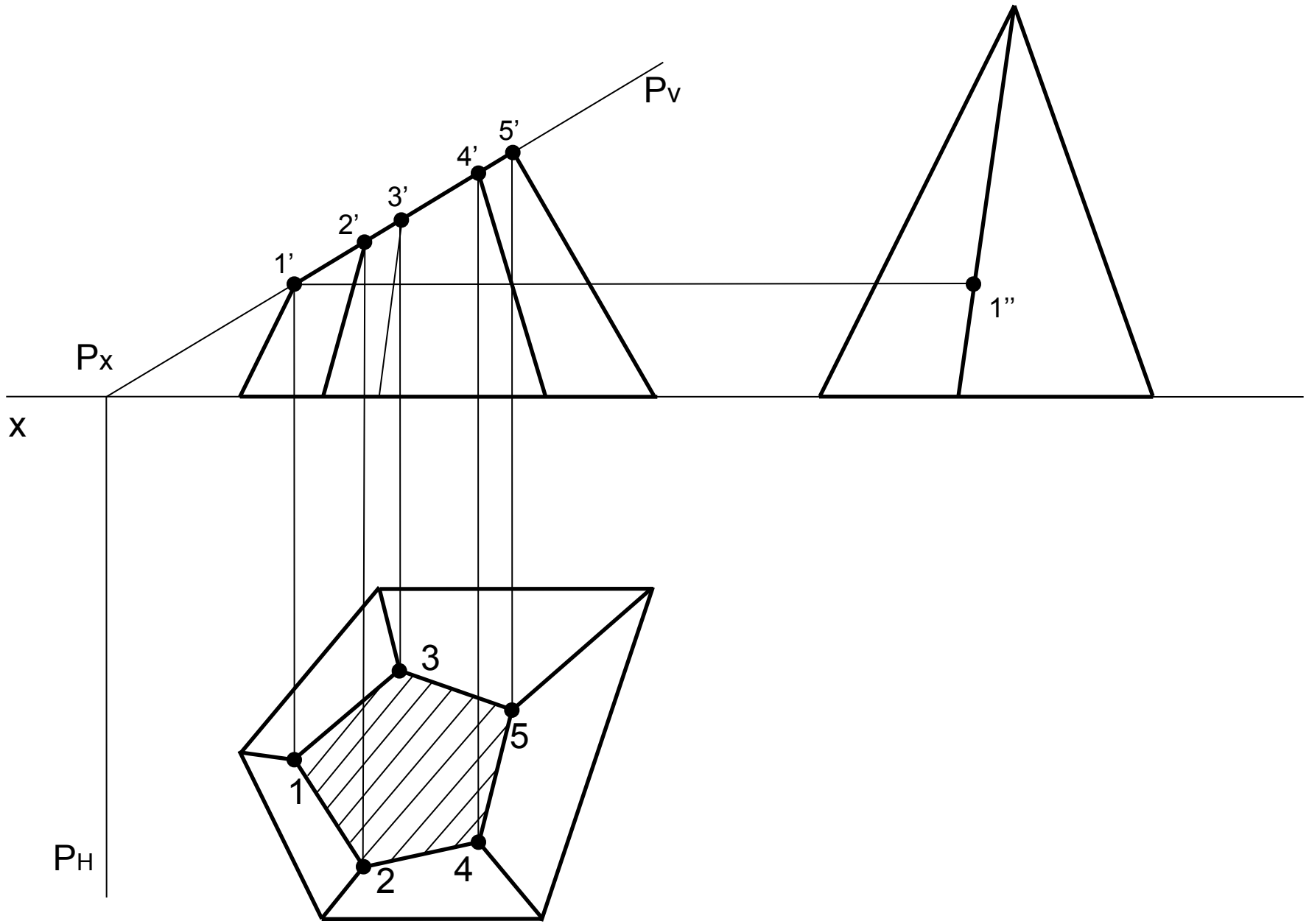
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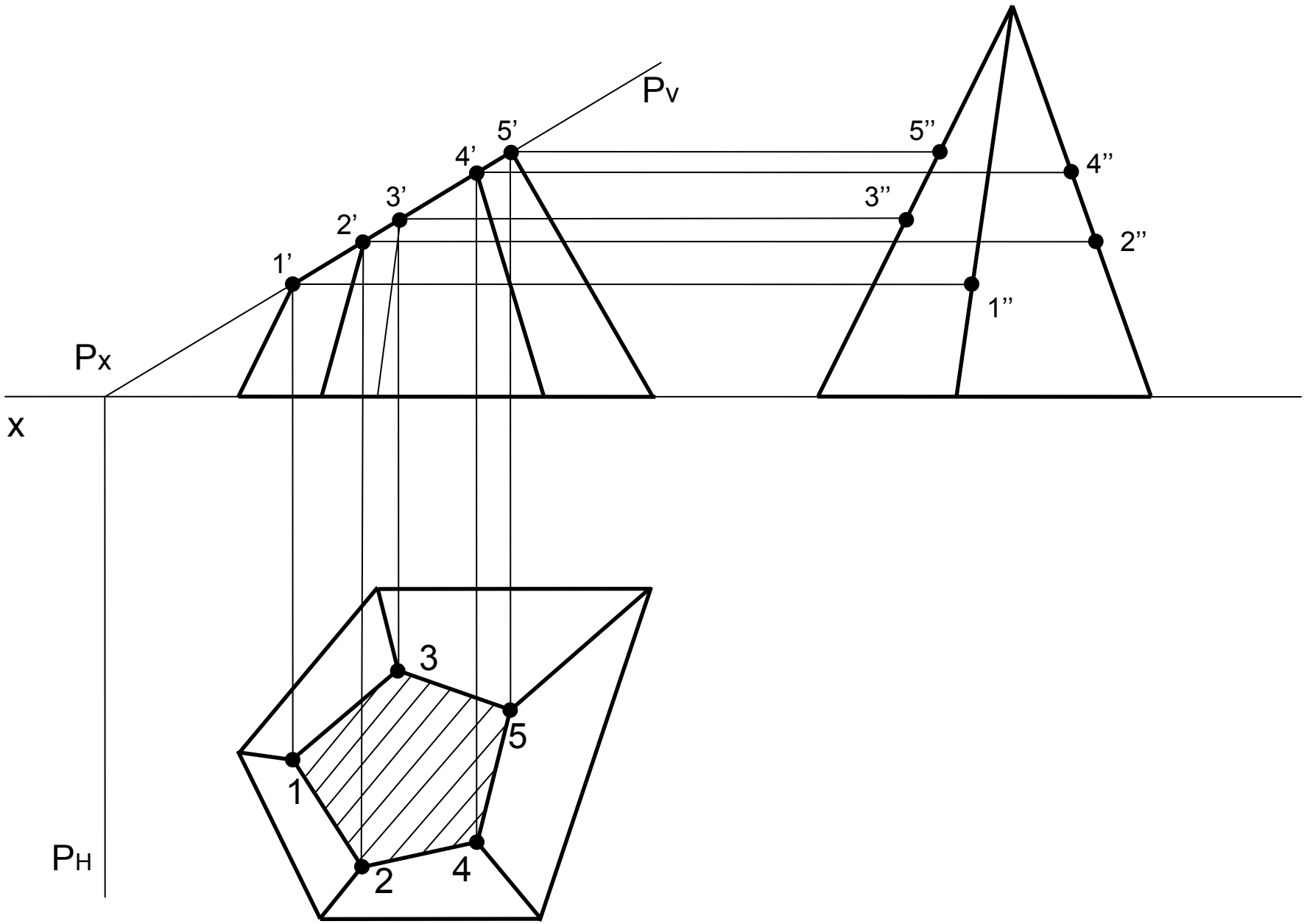
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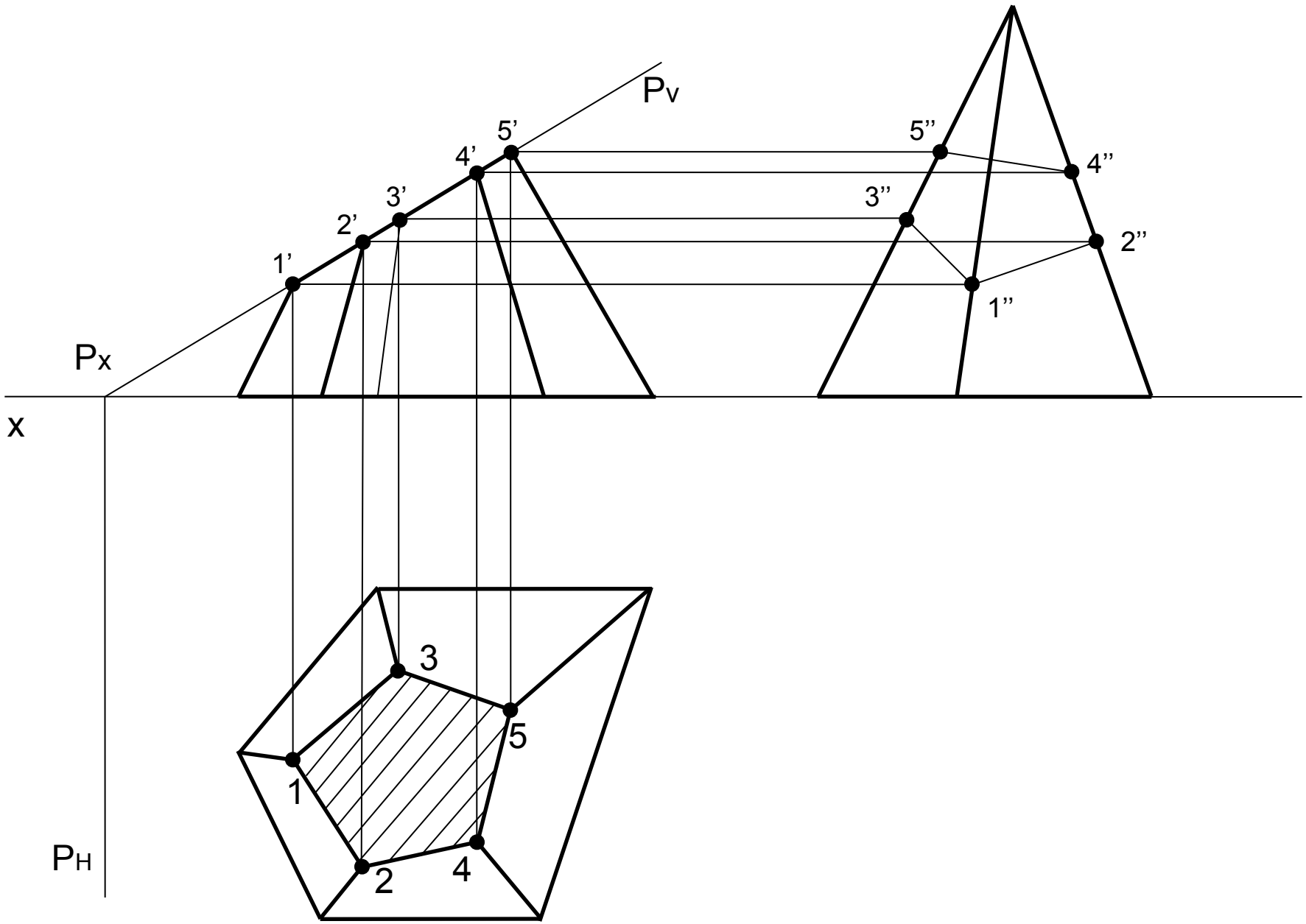
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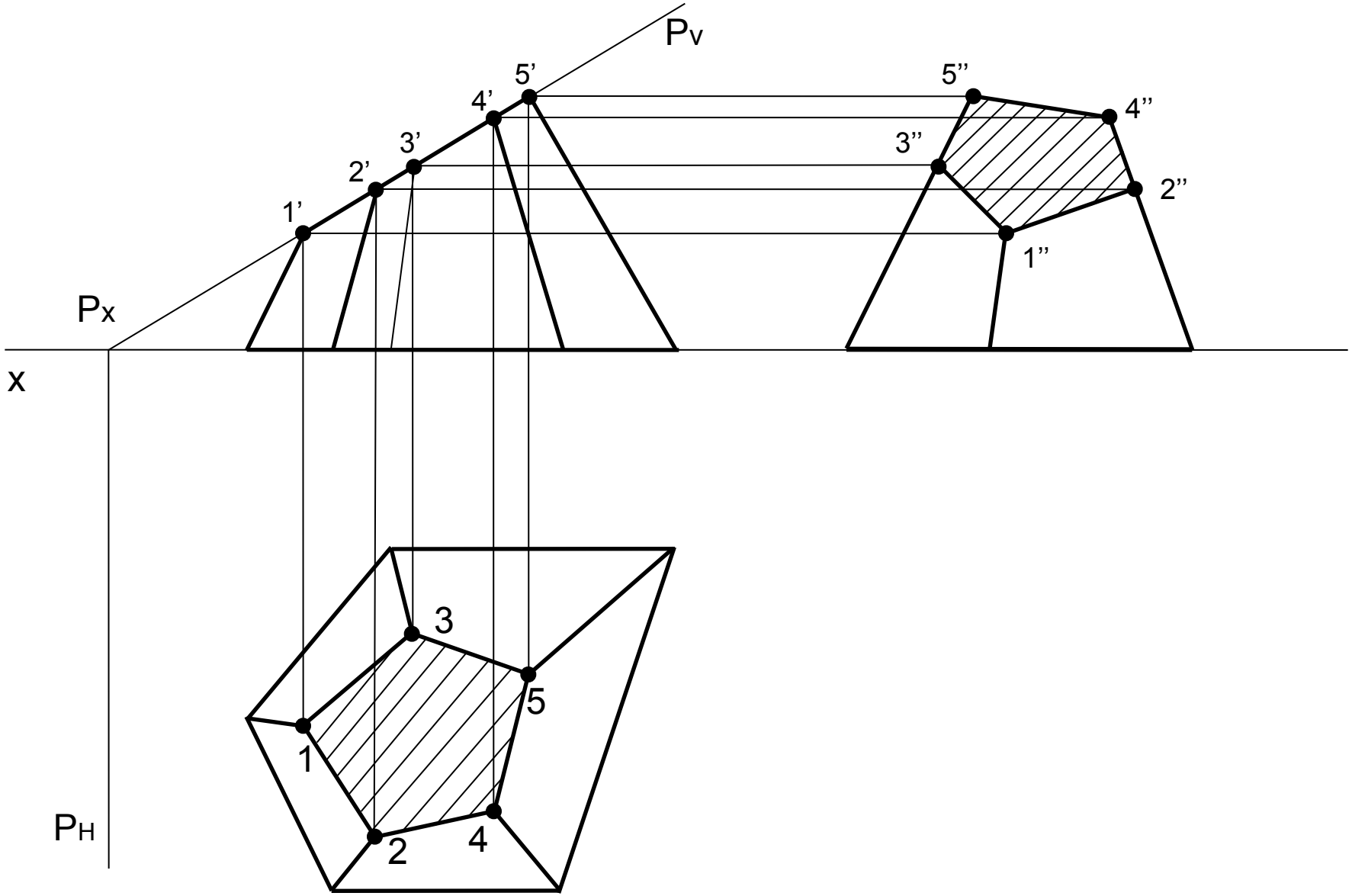
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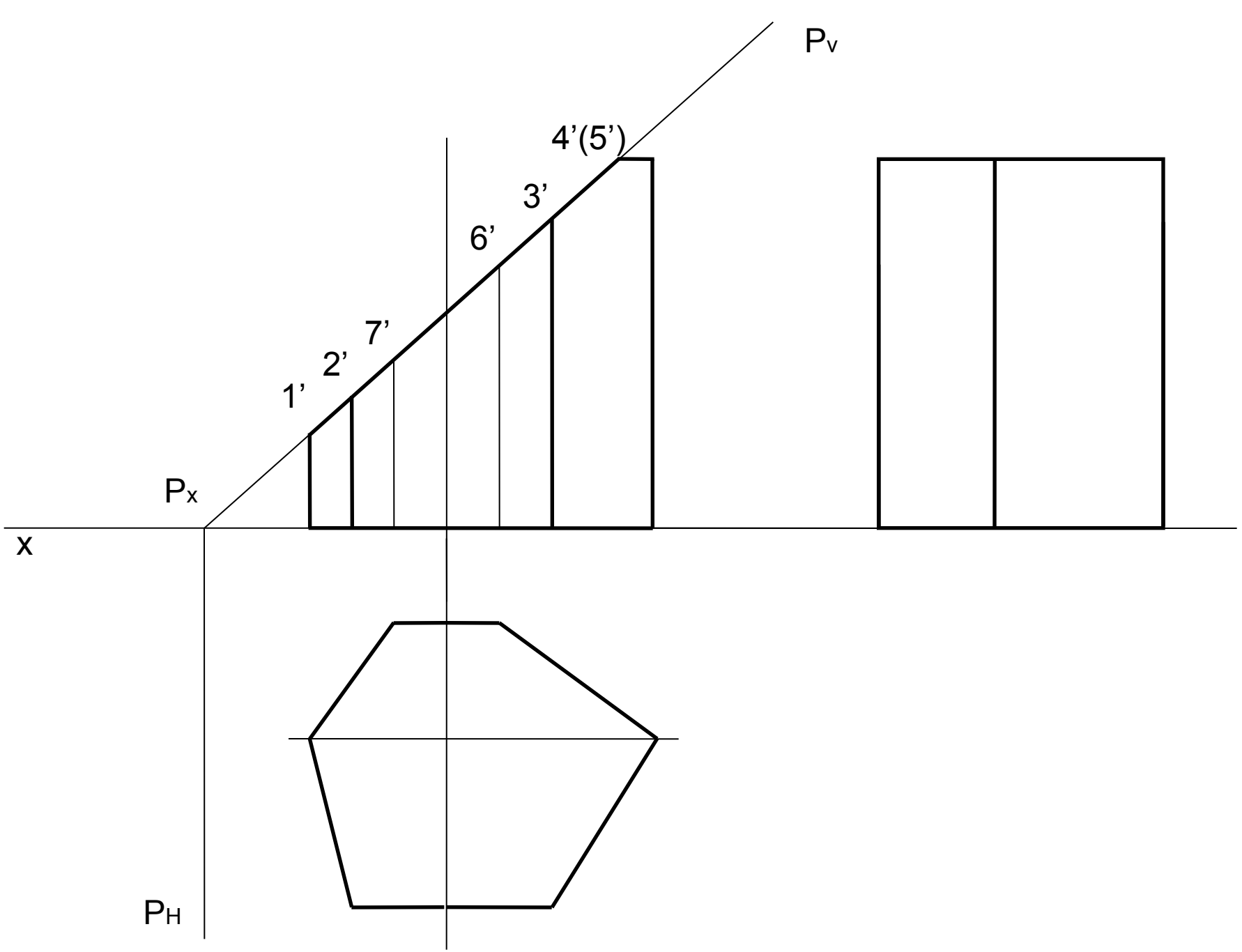
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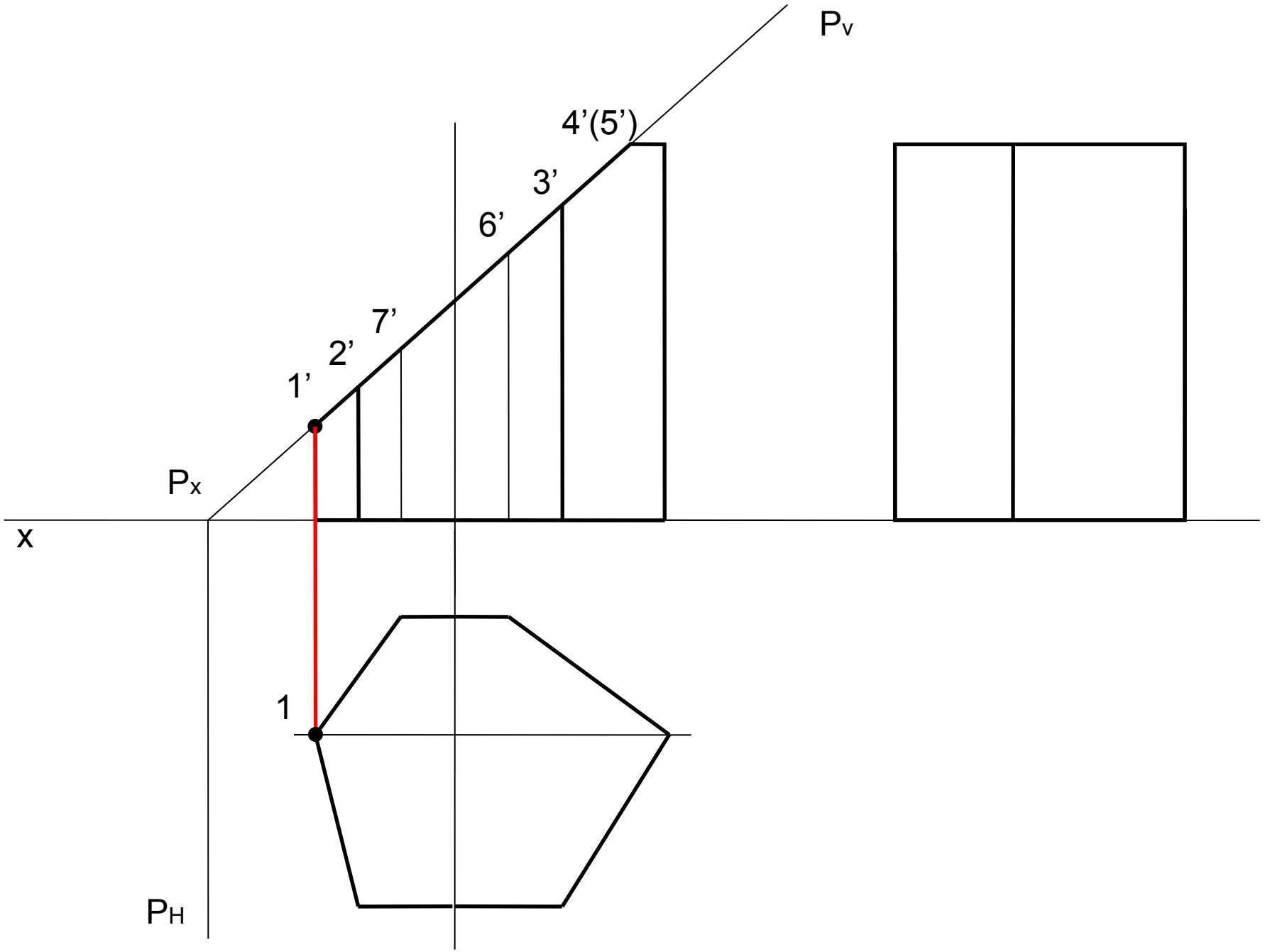
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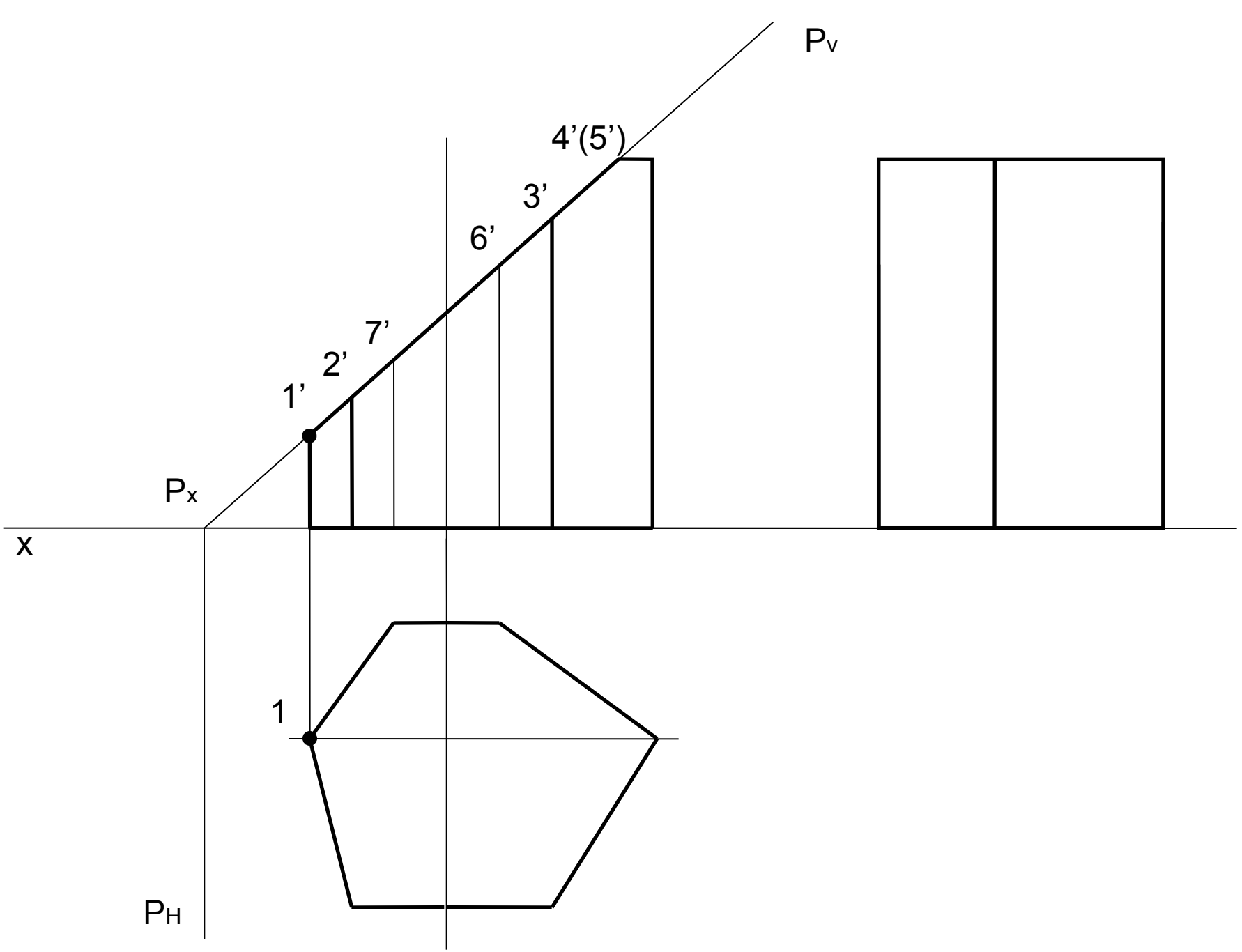
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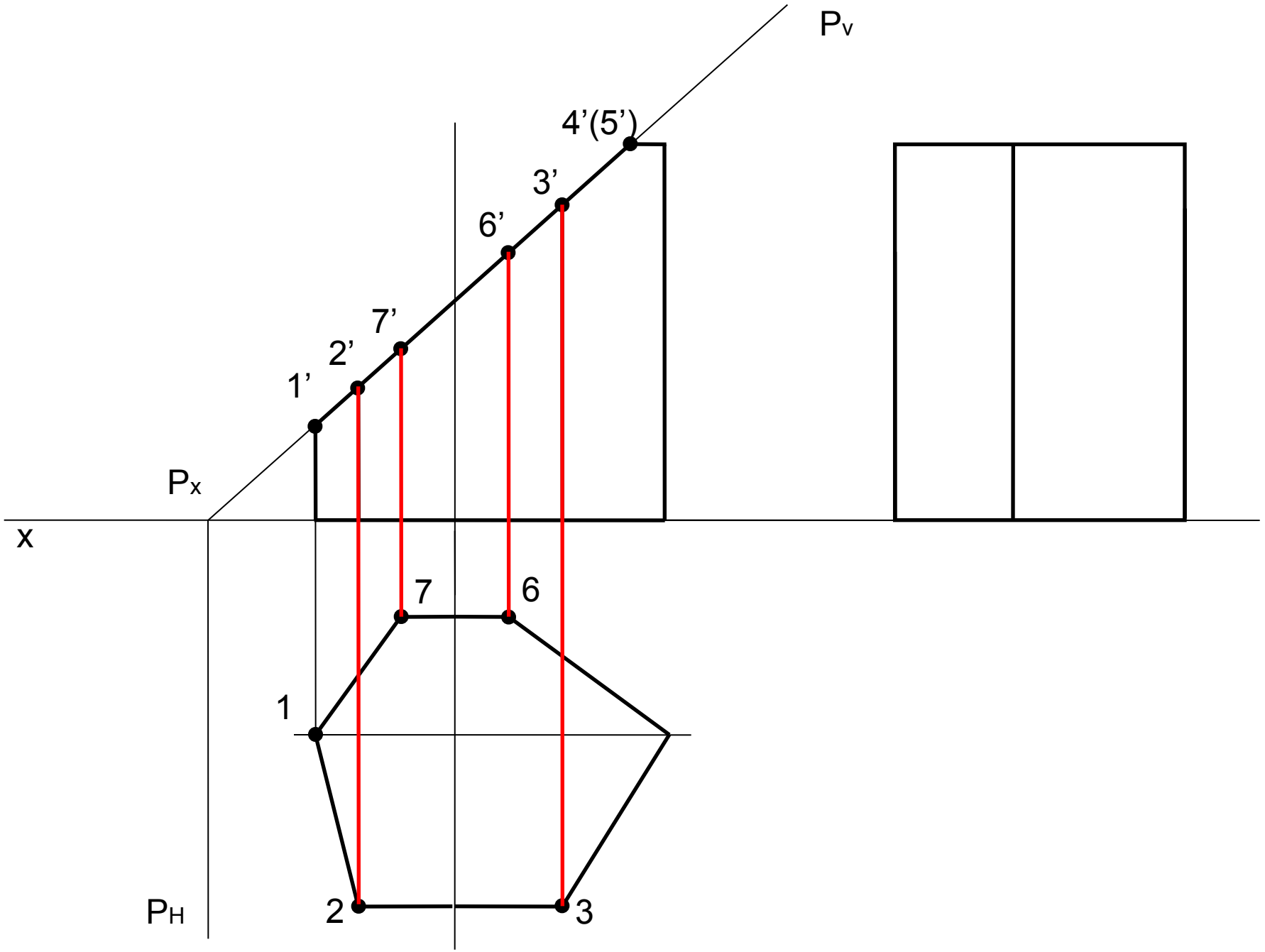
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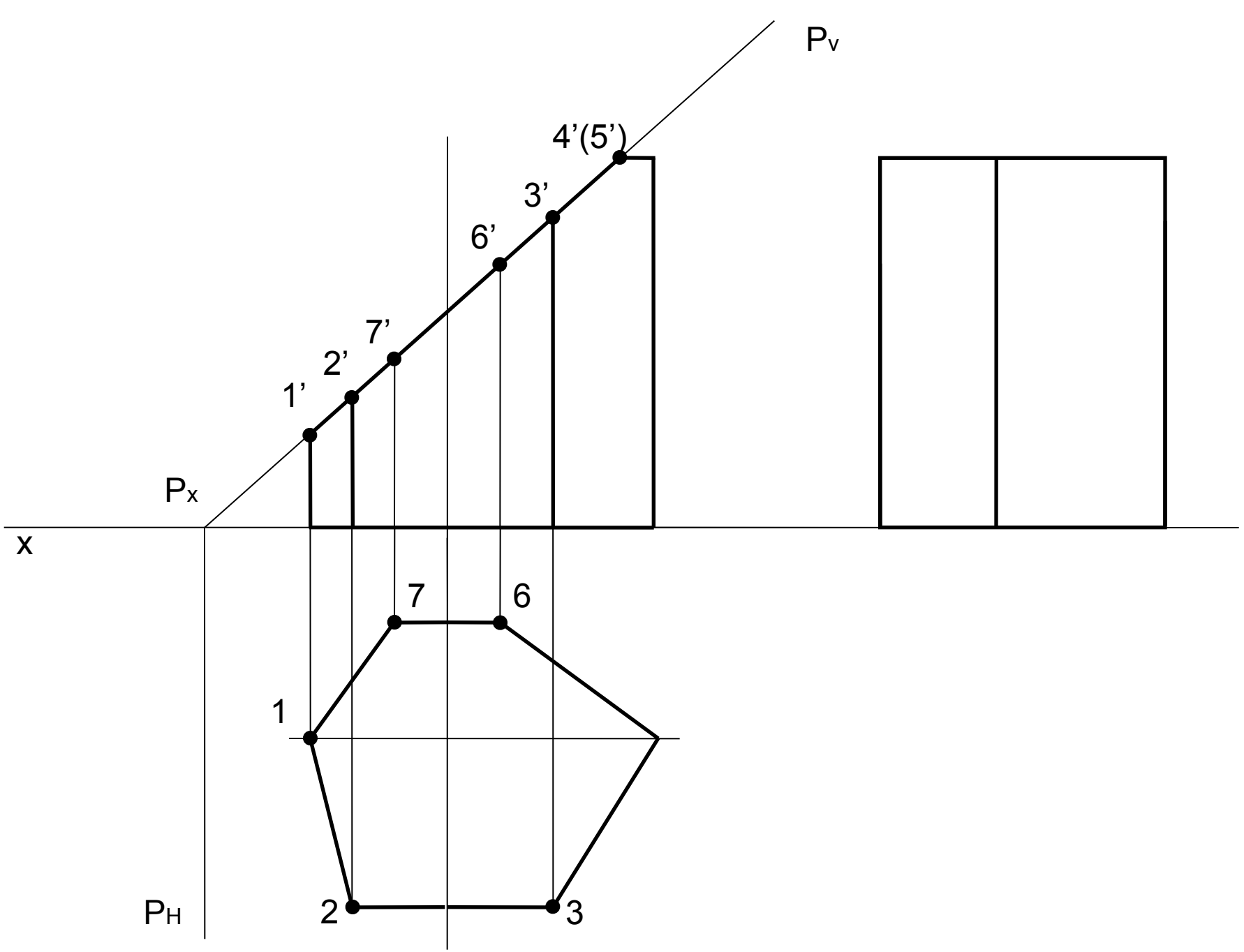
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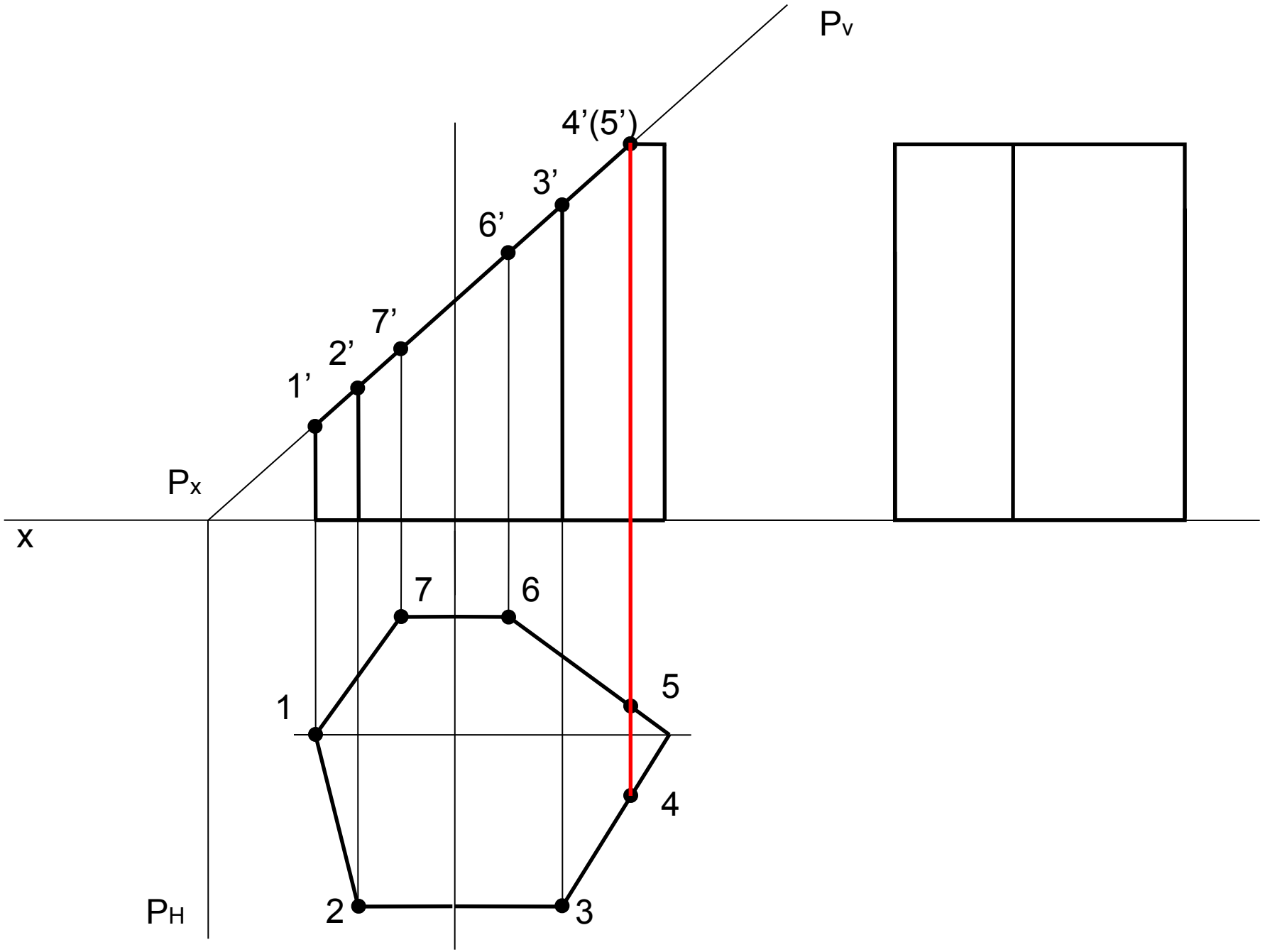
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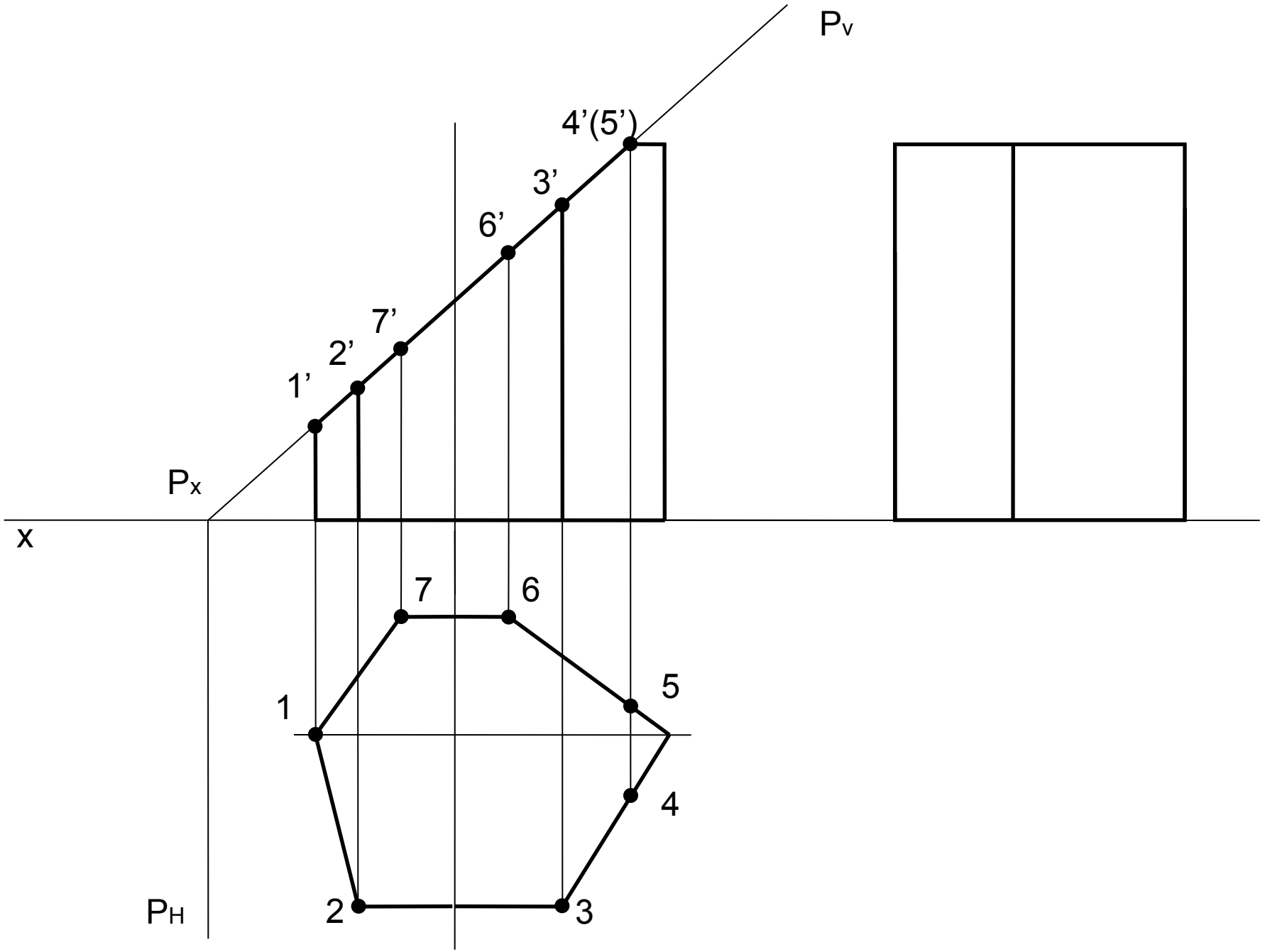
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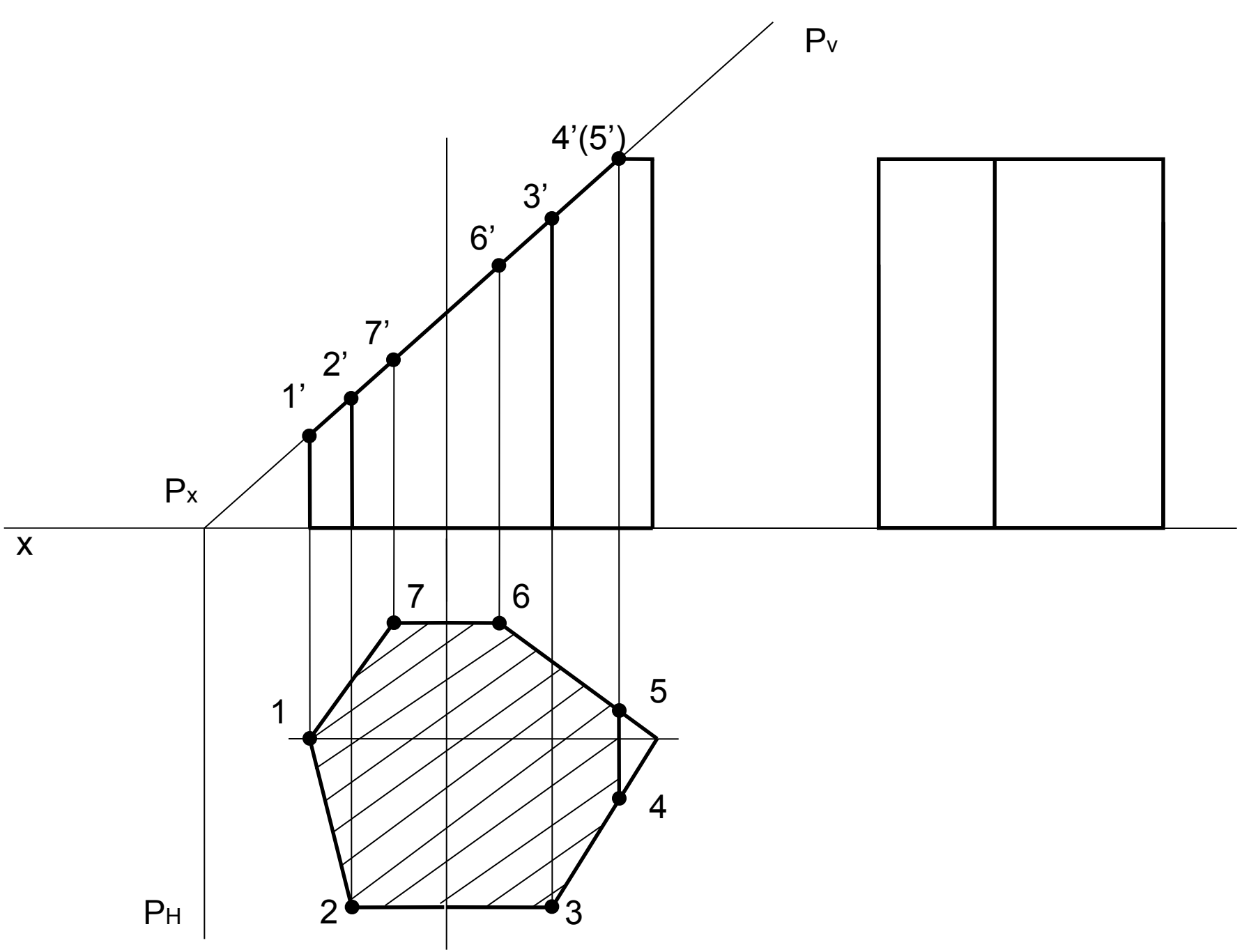
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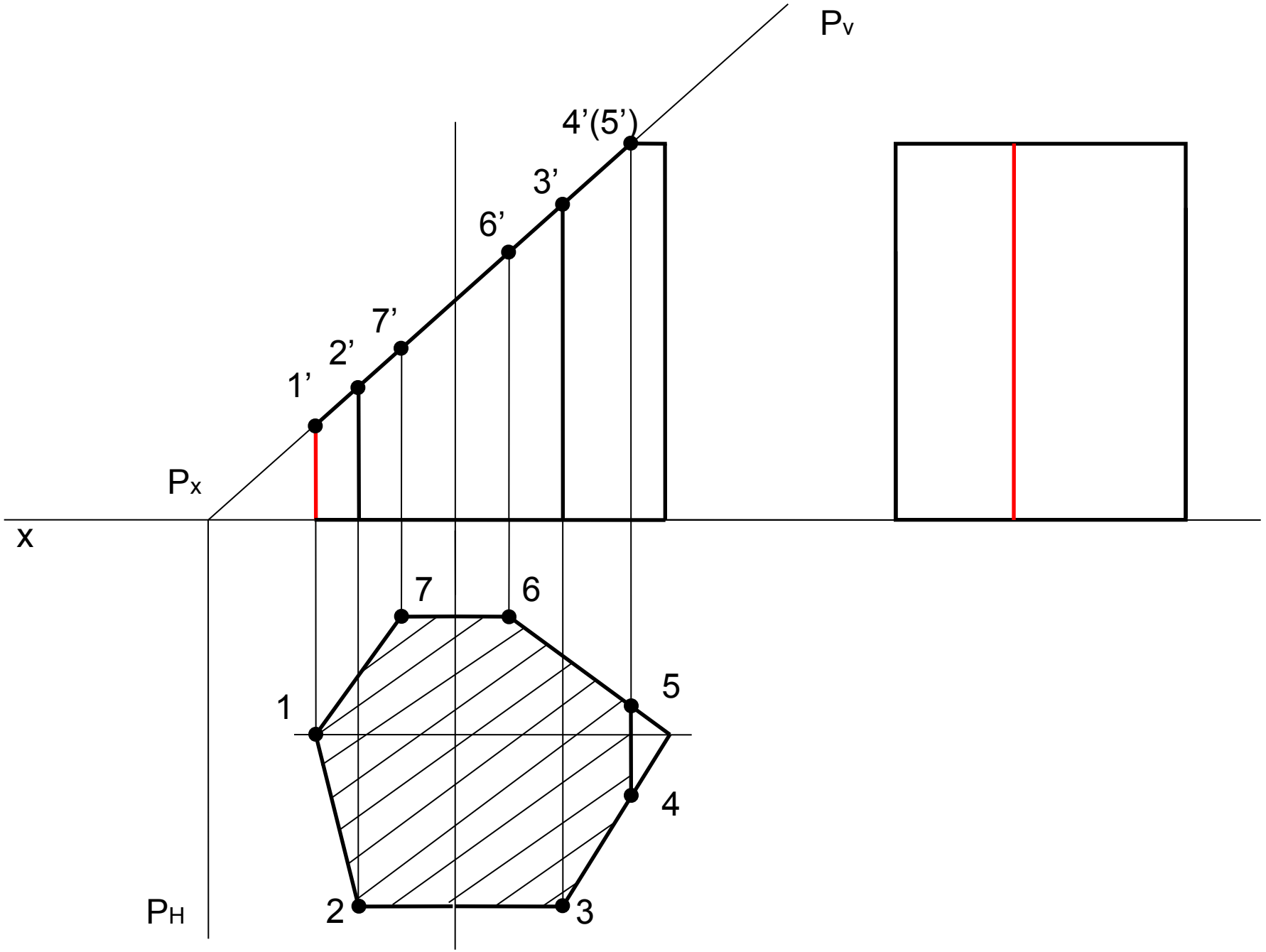
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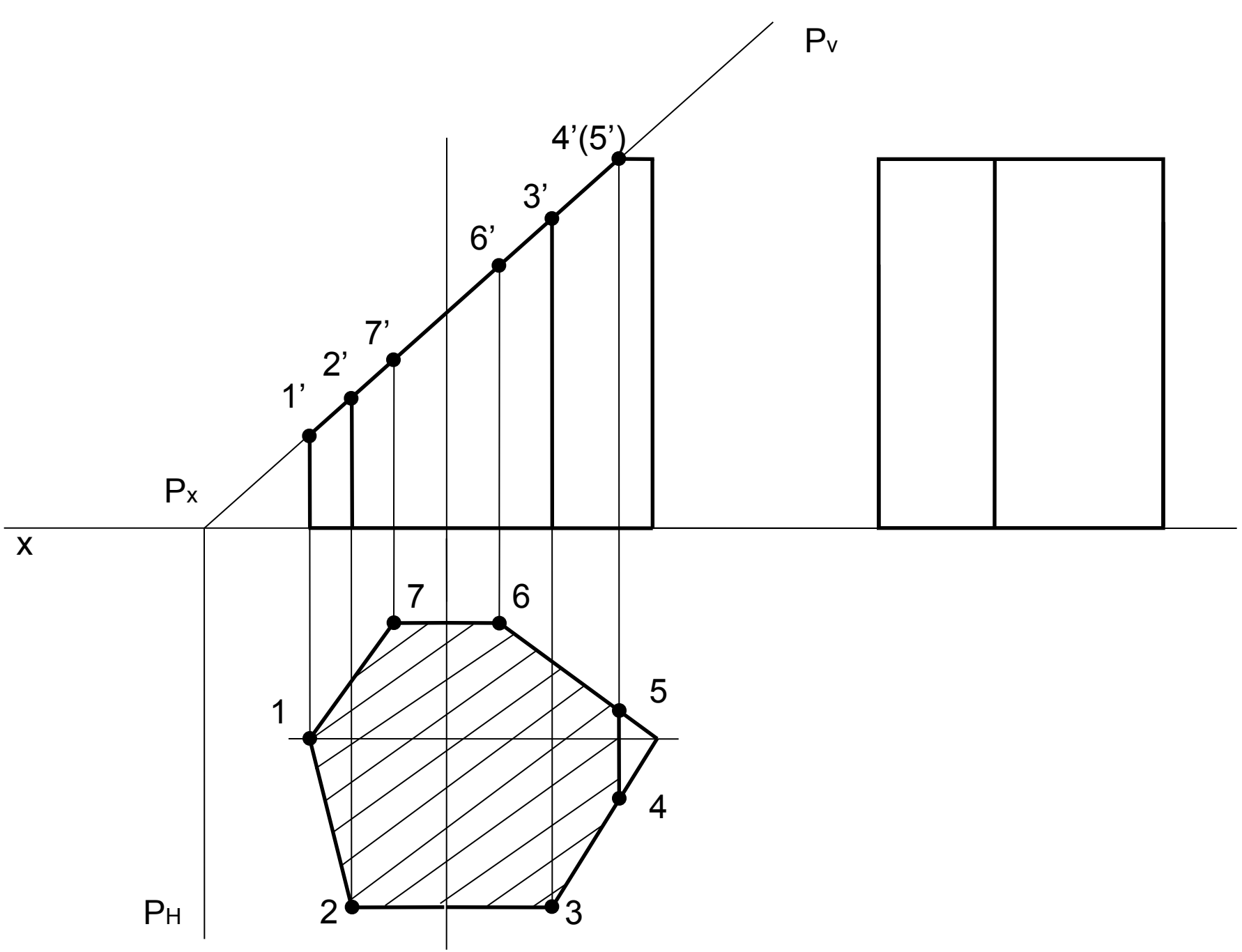
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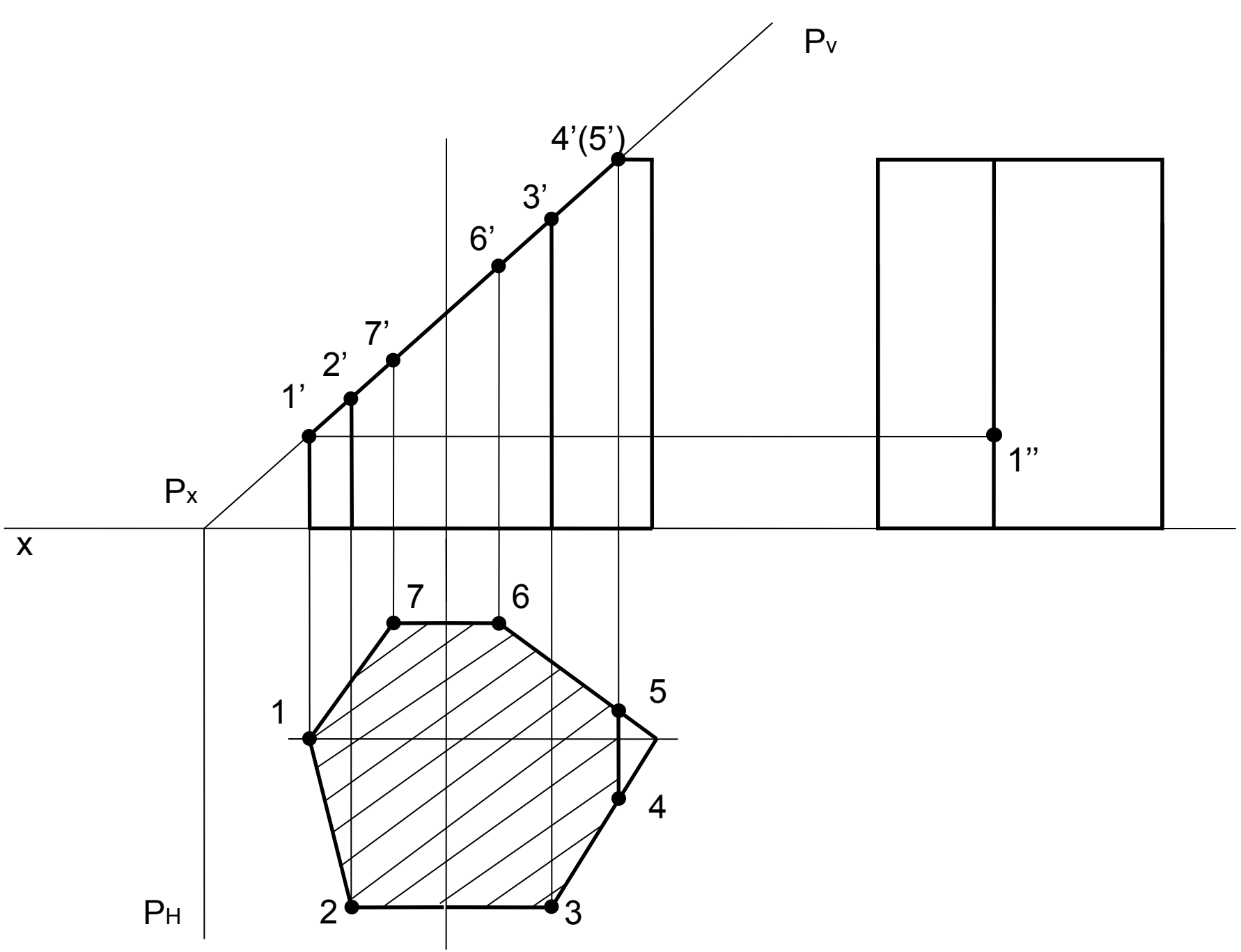
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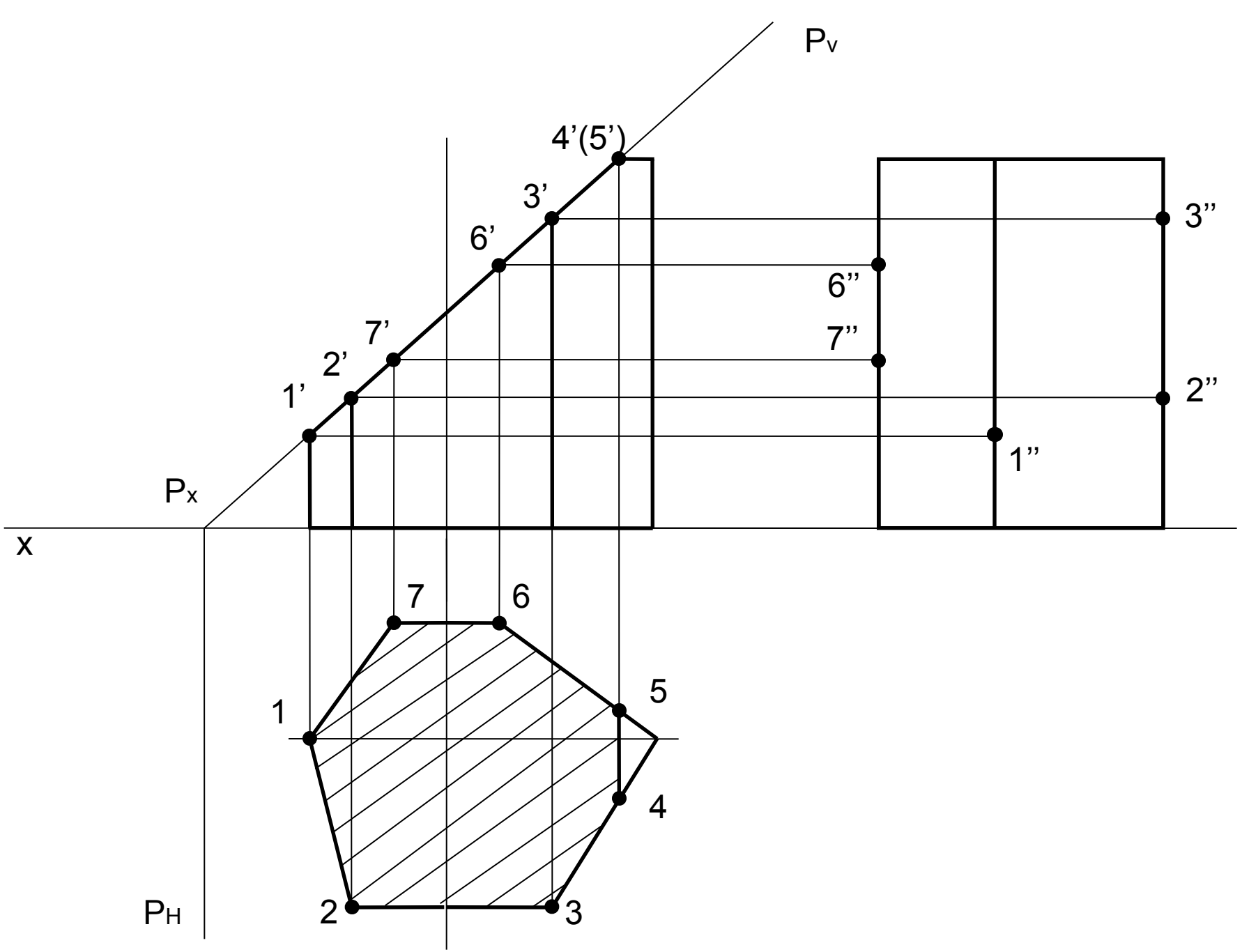
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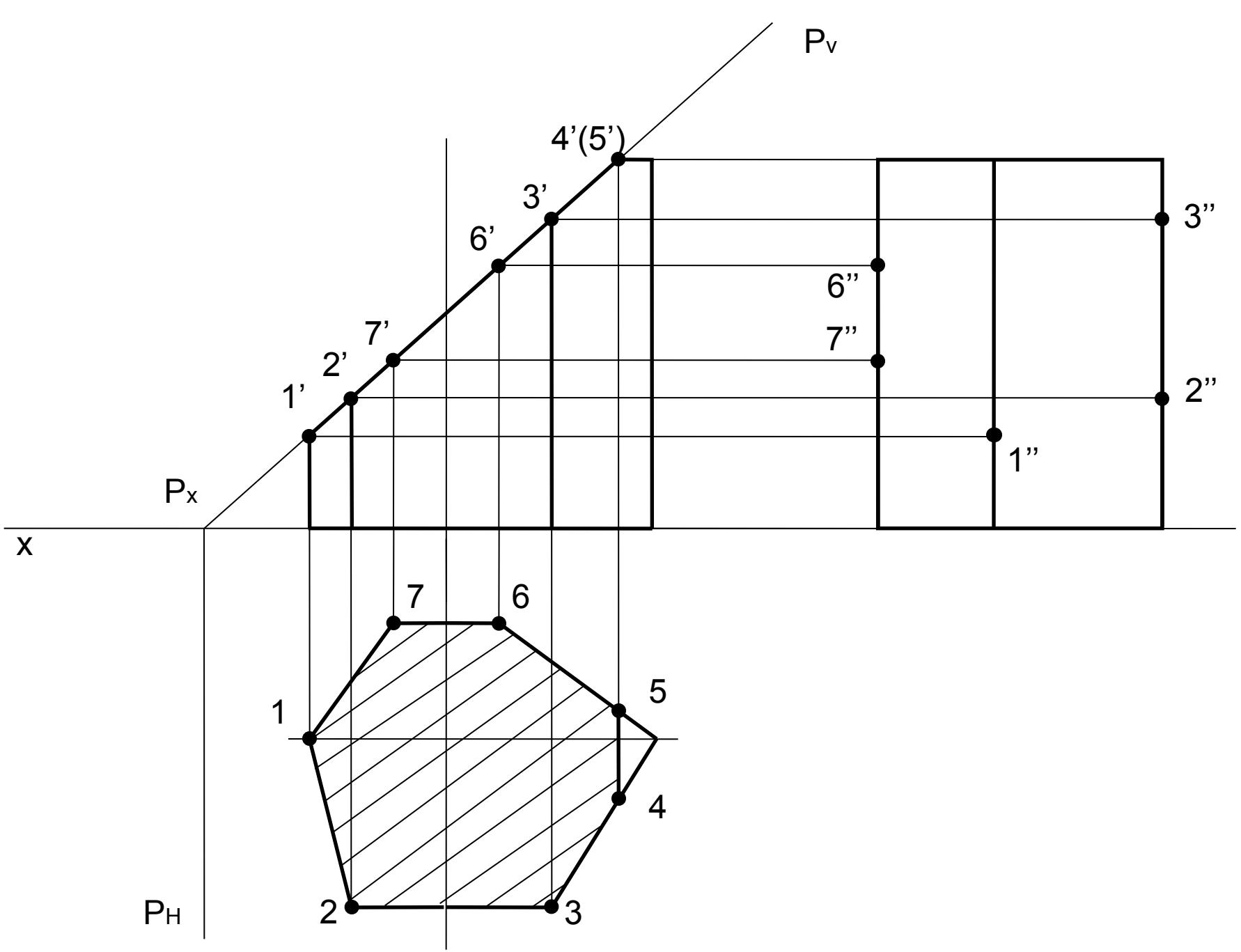
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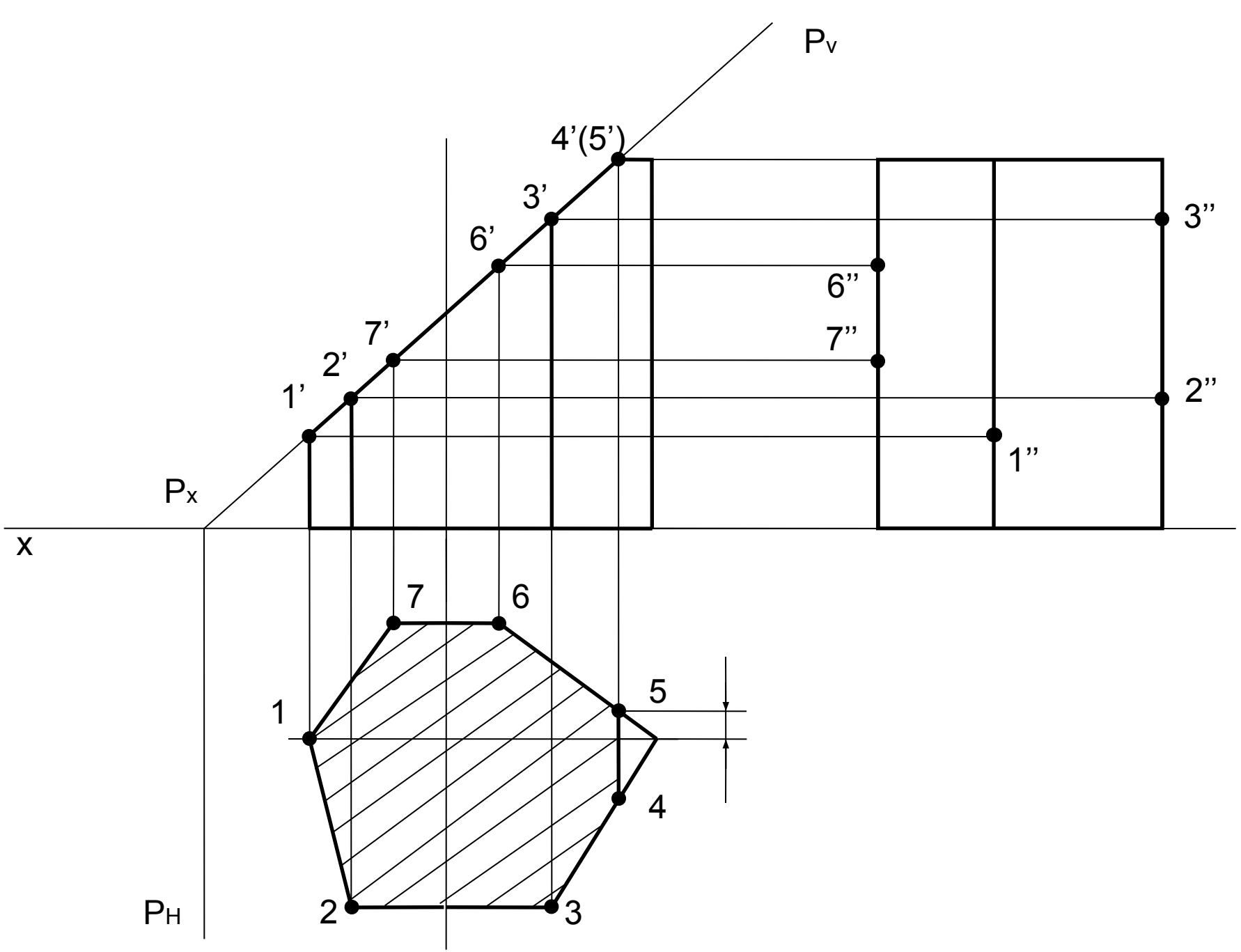
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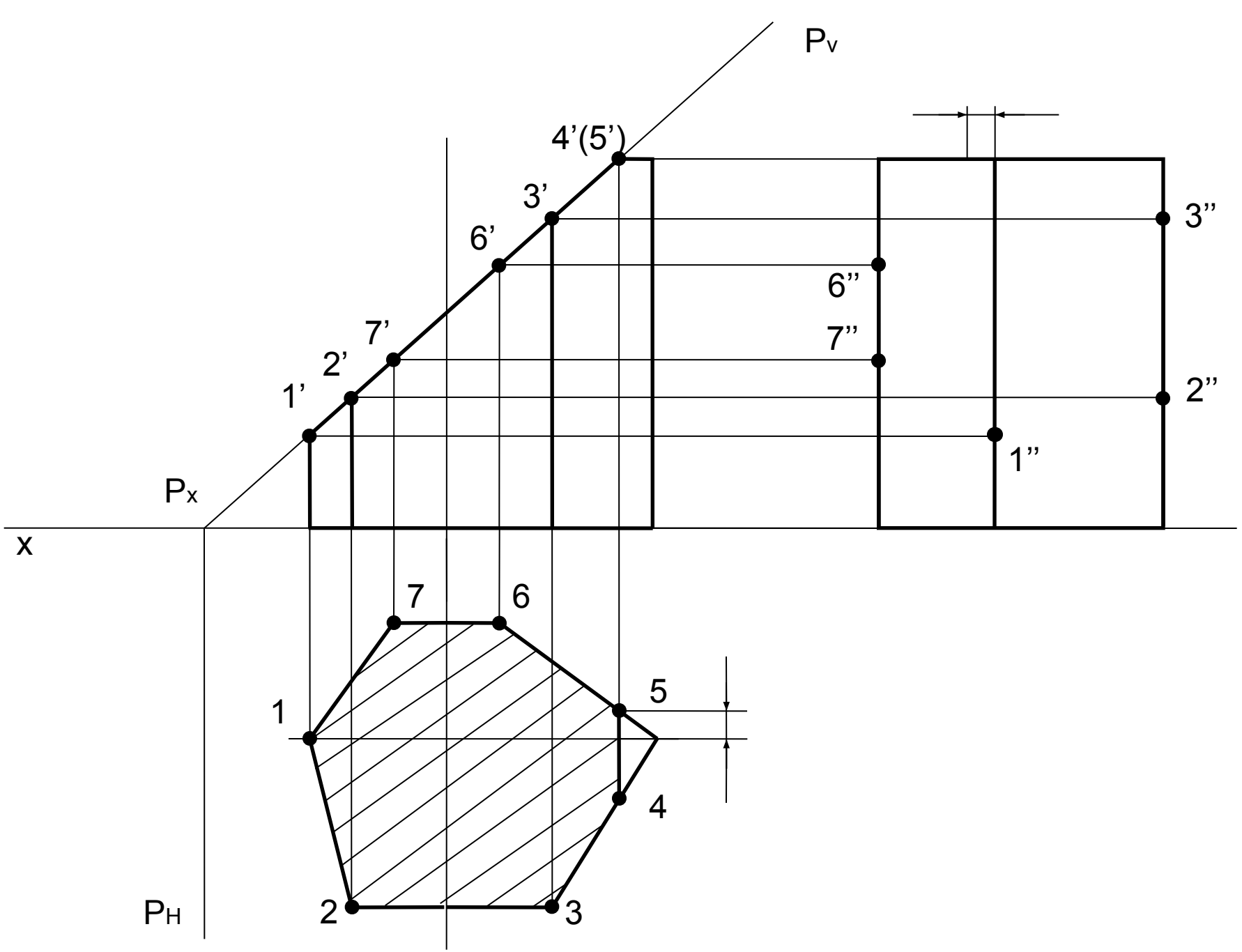
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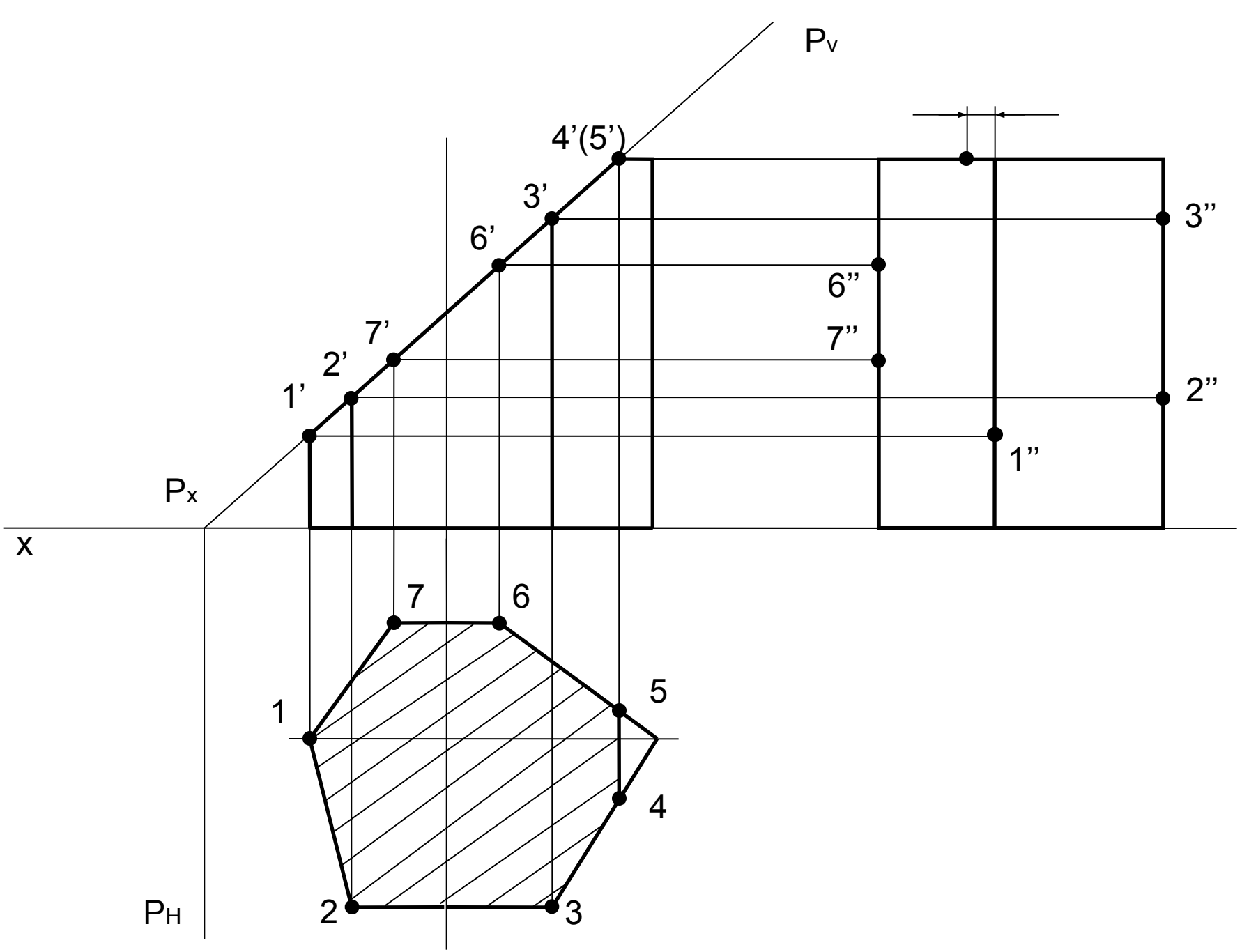
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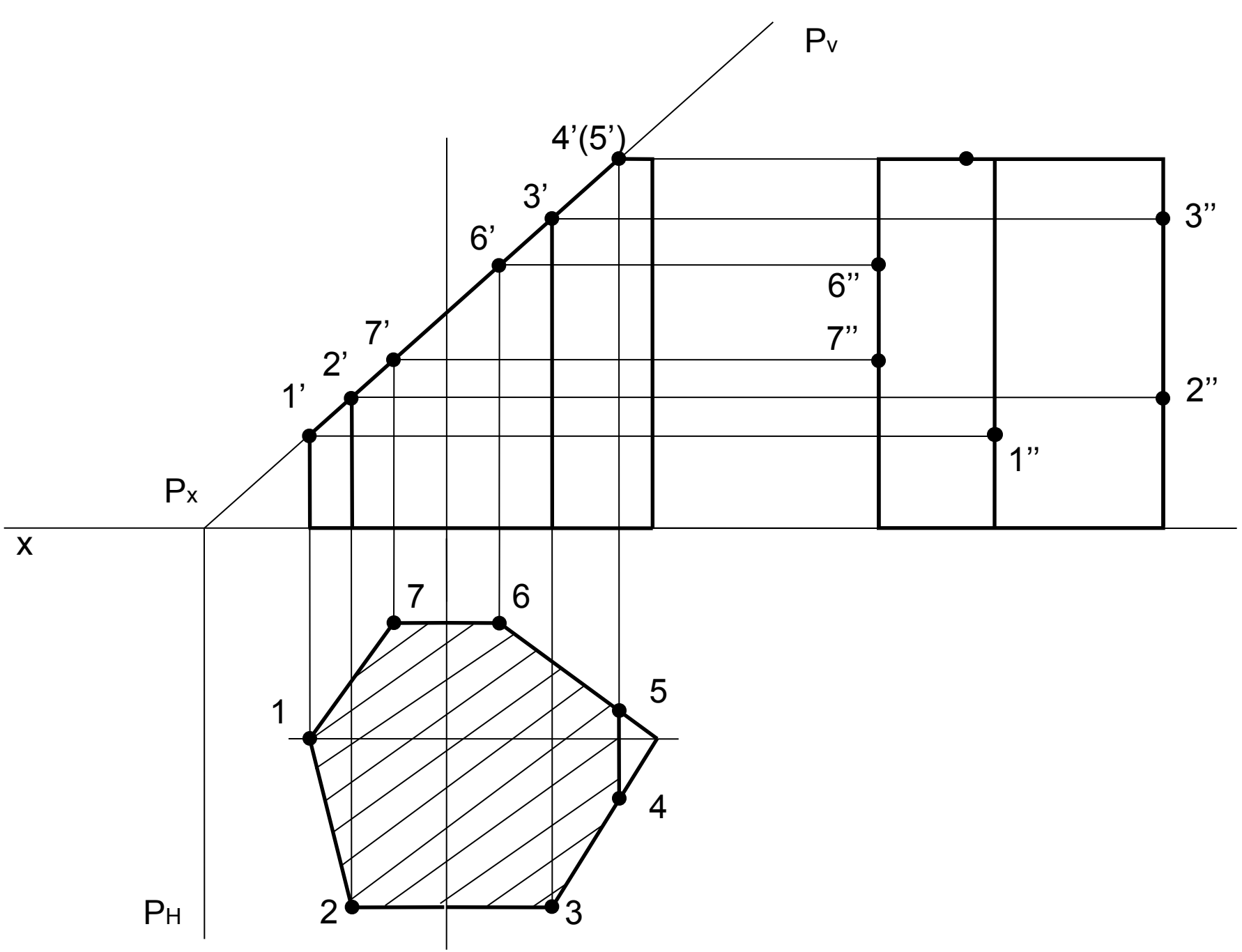
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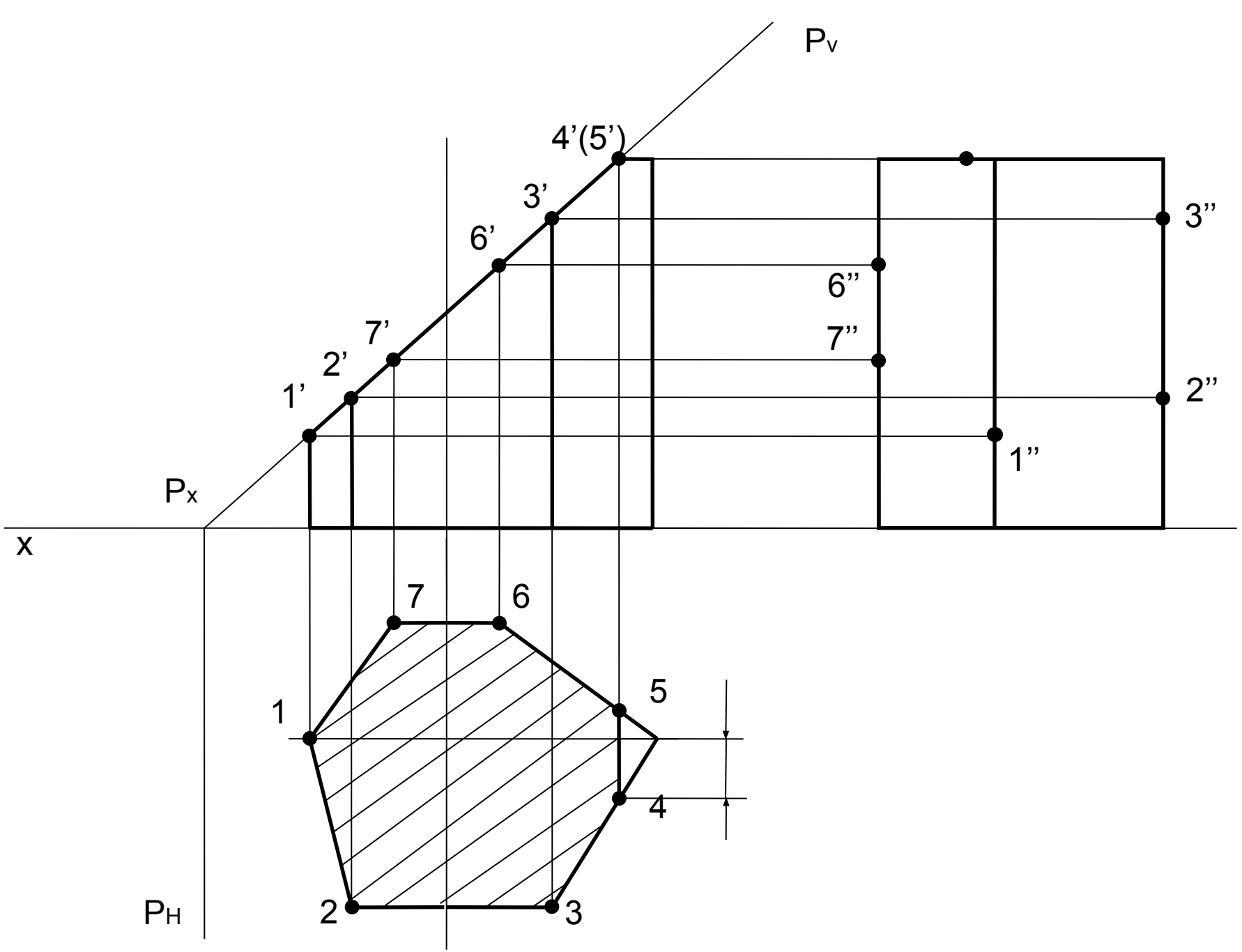
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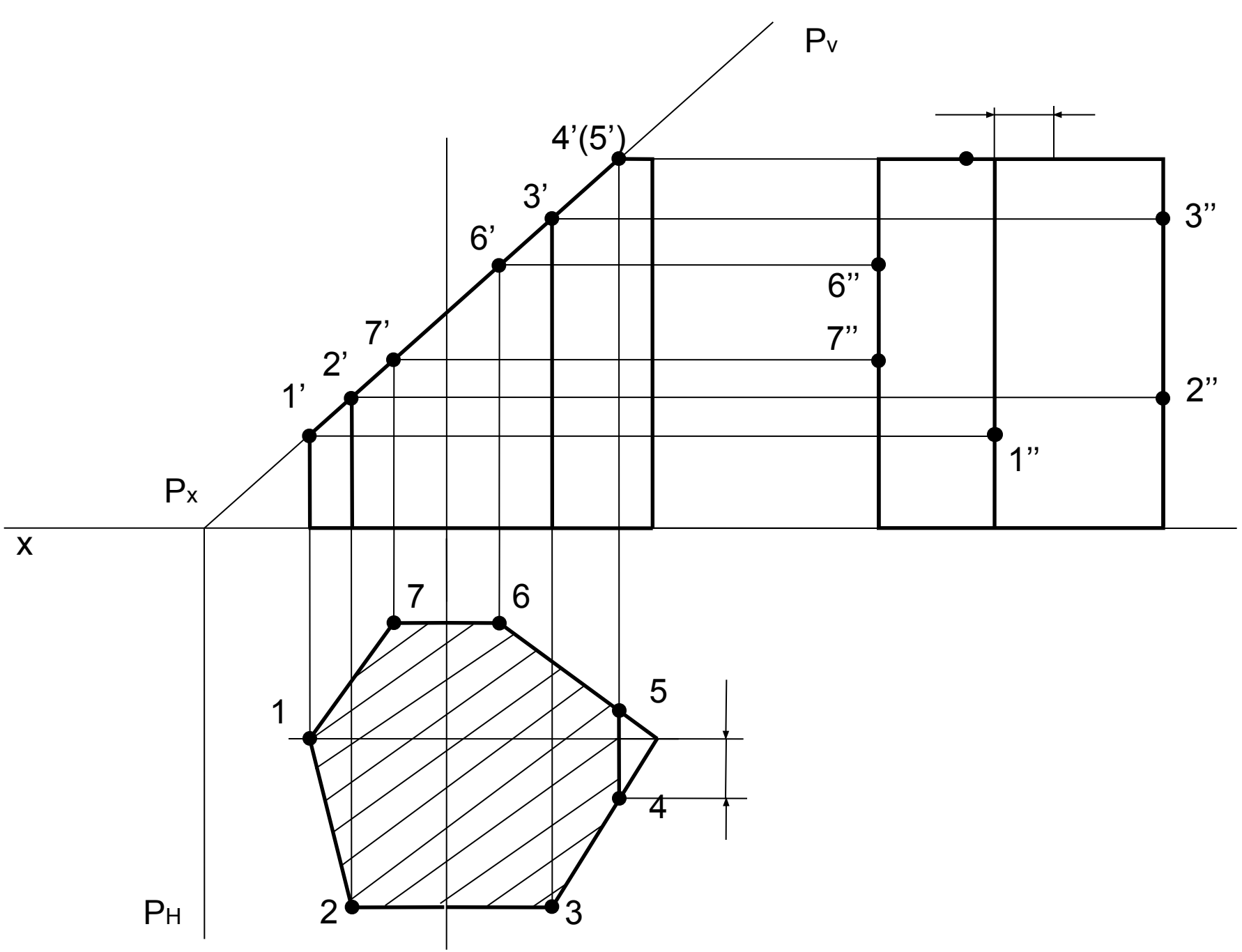
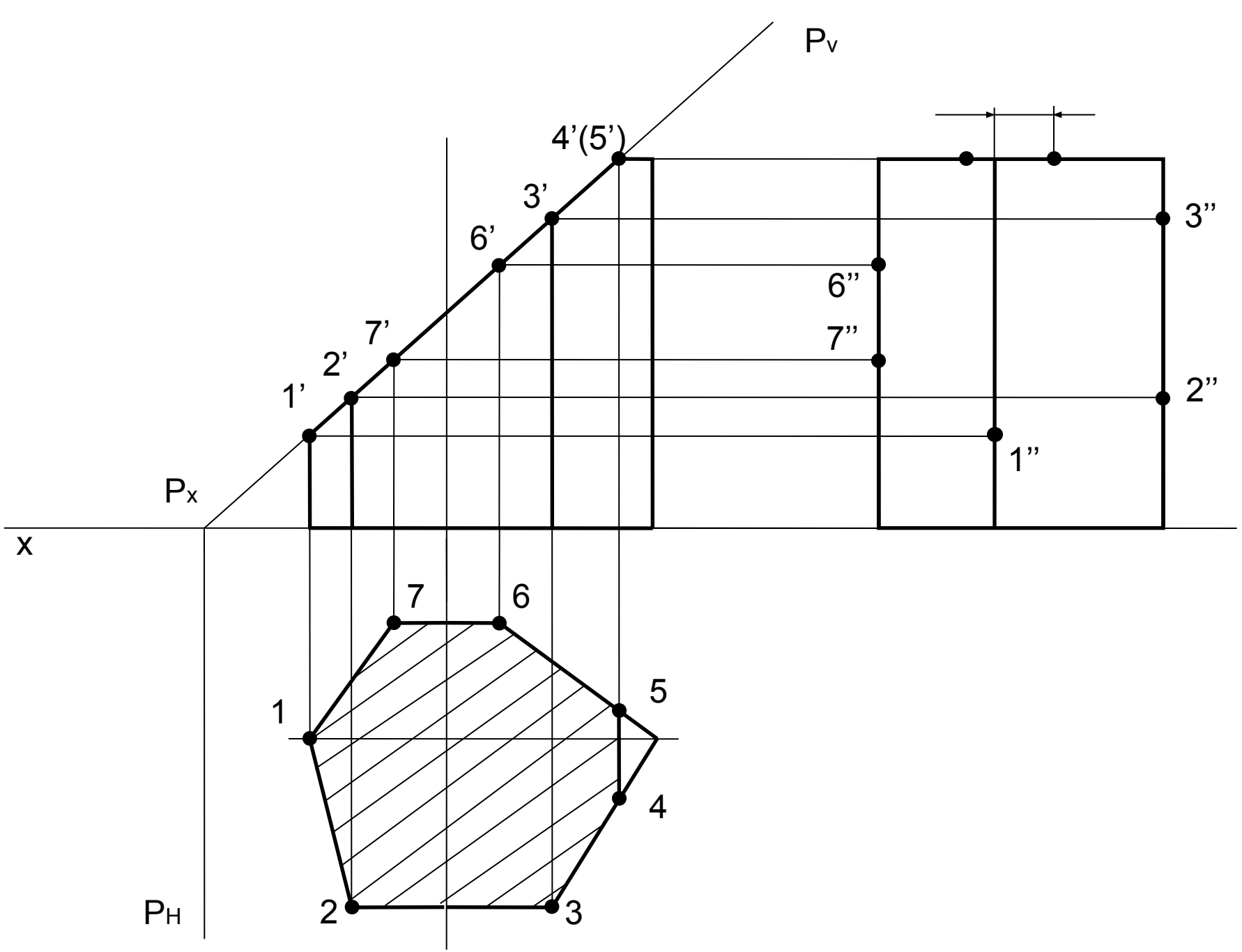
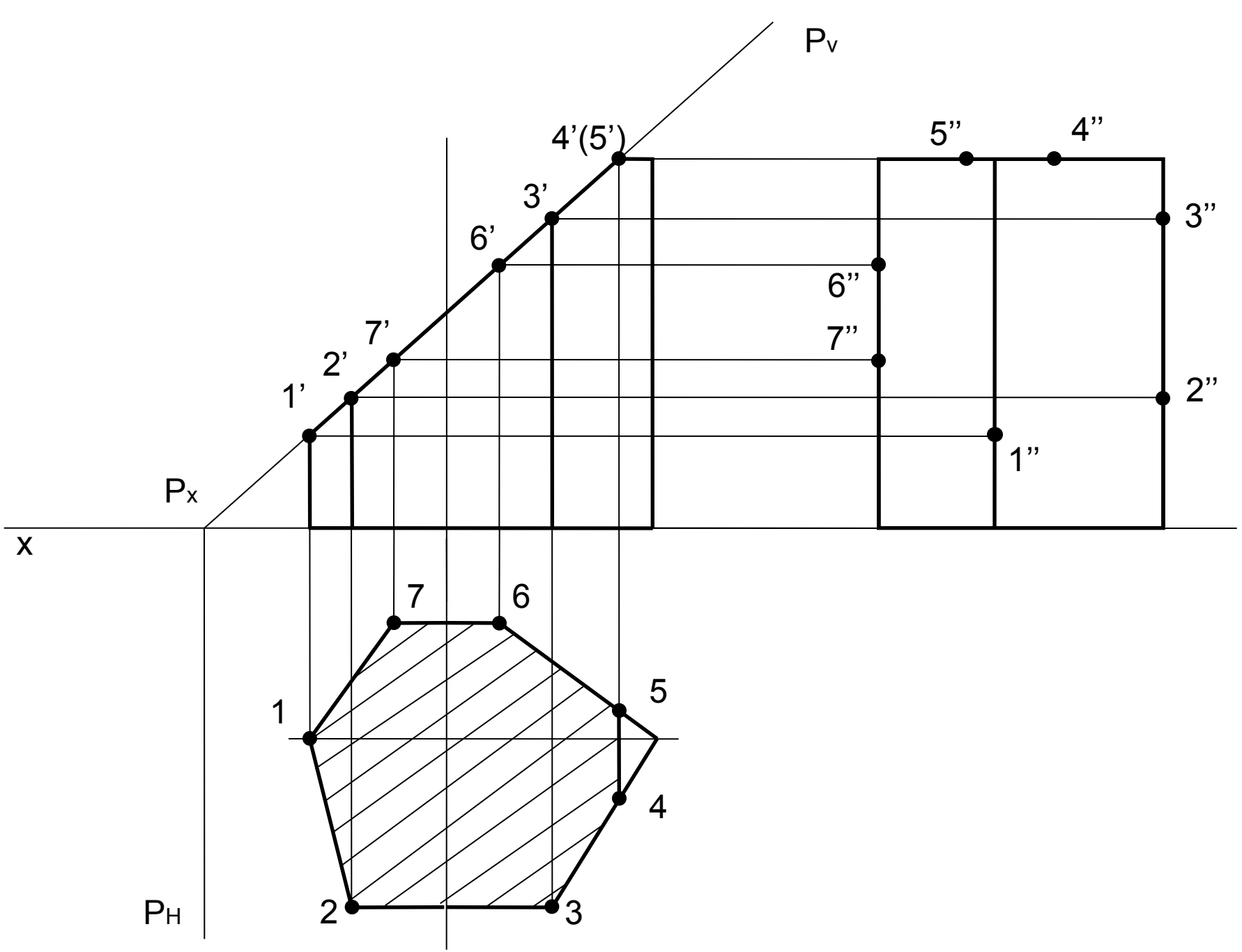
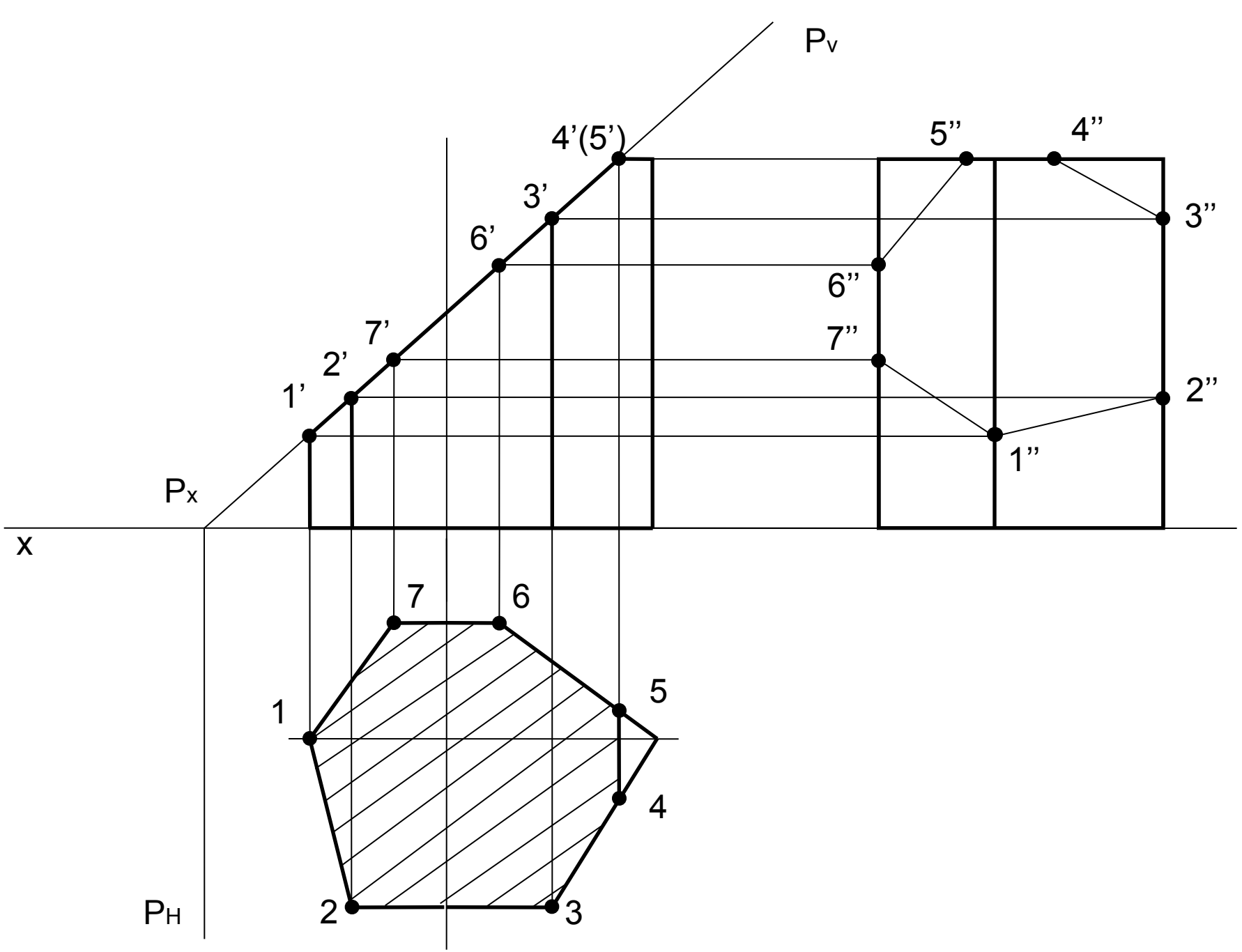
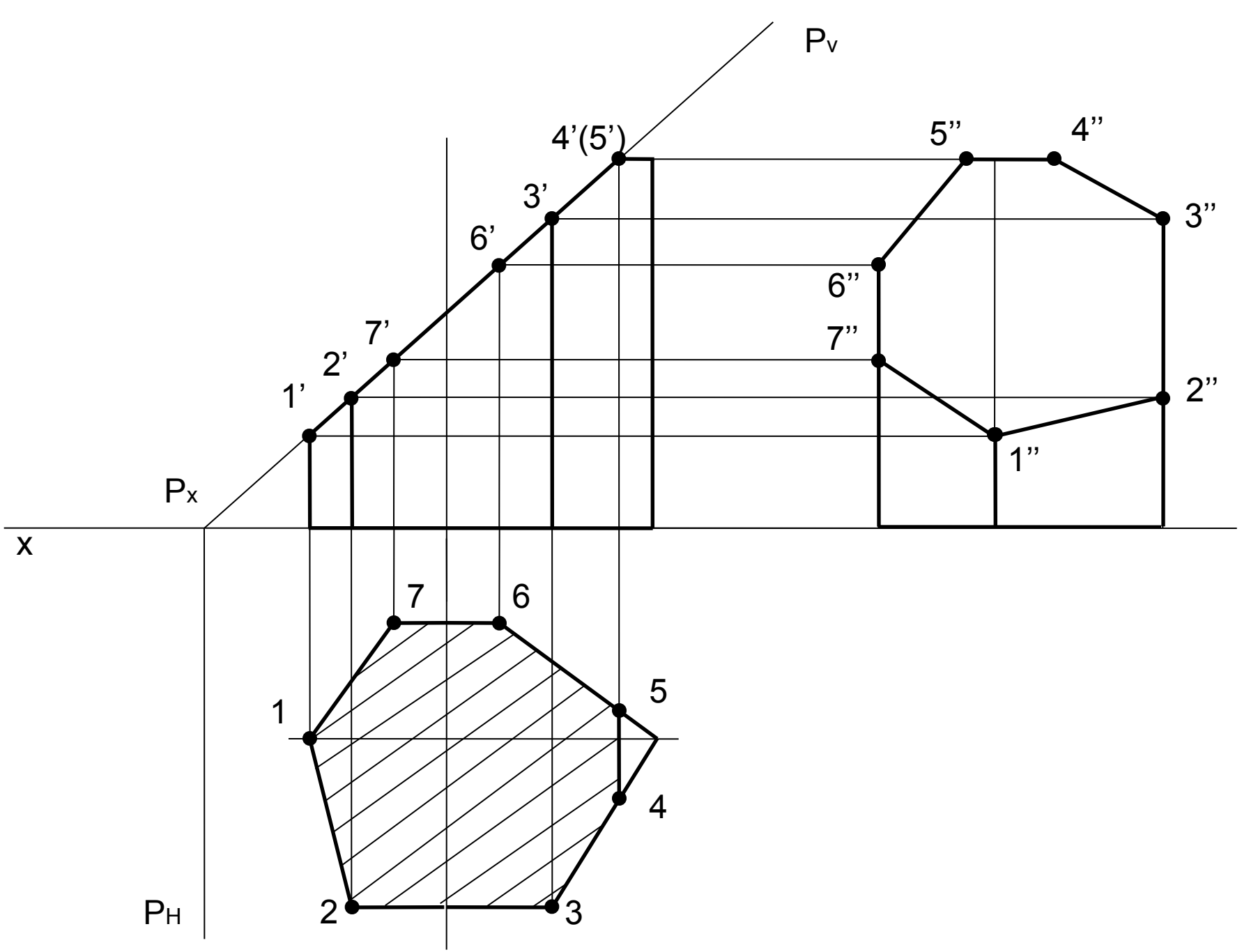
6’’
7’’
2’’
1’’
7
6
1
5
4
2
3

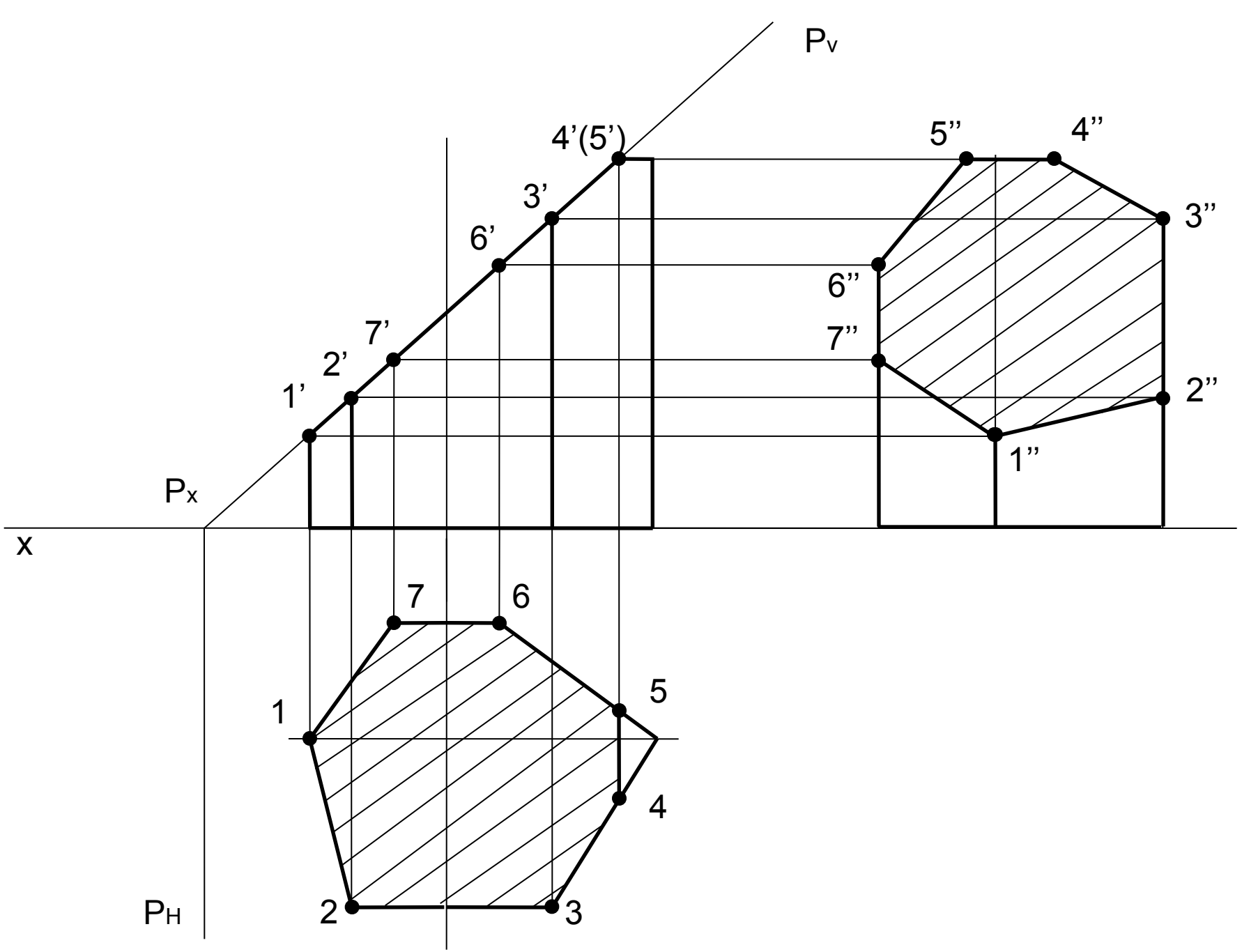

Pv
4’(5’)
3’
6’
7’
2’
1’
Px
x
PH
7
6
1
5
4
2
3
3”
6”
7”
2”
1”

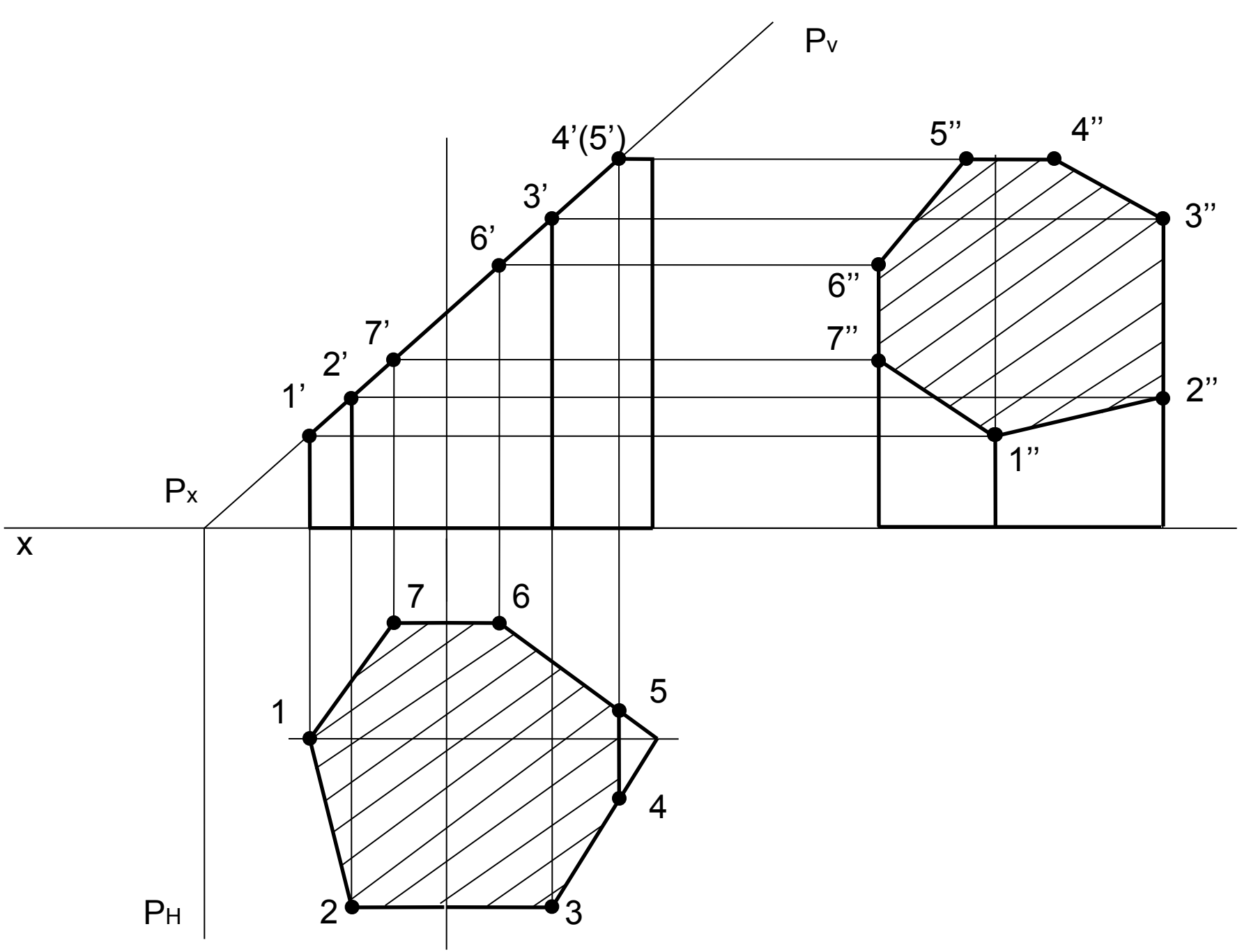

Pv
4’(5’)
3’
6’
7’
2’
1’
Px
x
PH
7
6
1
5
4
2
3
3”
6”
7”
2”
1”


Pv
4’(5’)
5”
4”
3’
3”
6’
6”
7’
7”
2’
1’
2”
1”
Px
x
7
6
1
5
4
2
3
PH


Pv
4’(5’)
3’
6’
7’
2’
1’
Px
x
5’’
4’’
3’’
6’’
7’’
2’’
1’’
7
6
1
5
4
2
3
PH


Pv
4’(5’)
5”
4”
3’
3”
6’
6”
7’
7”
2’
2”
1’
1”
Px
x
7
6
5
1
4
2
3
PH

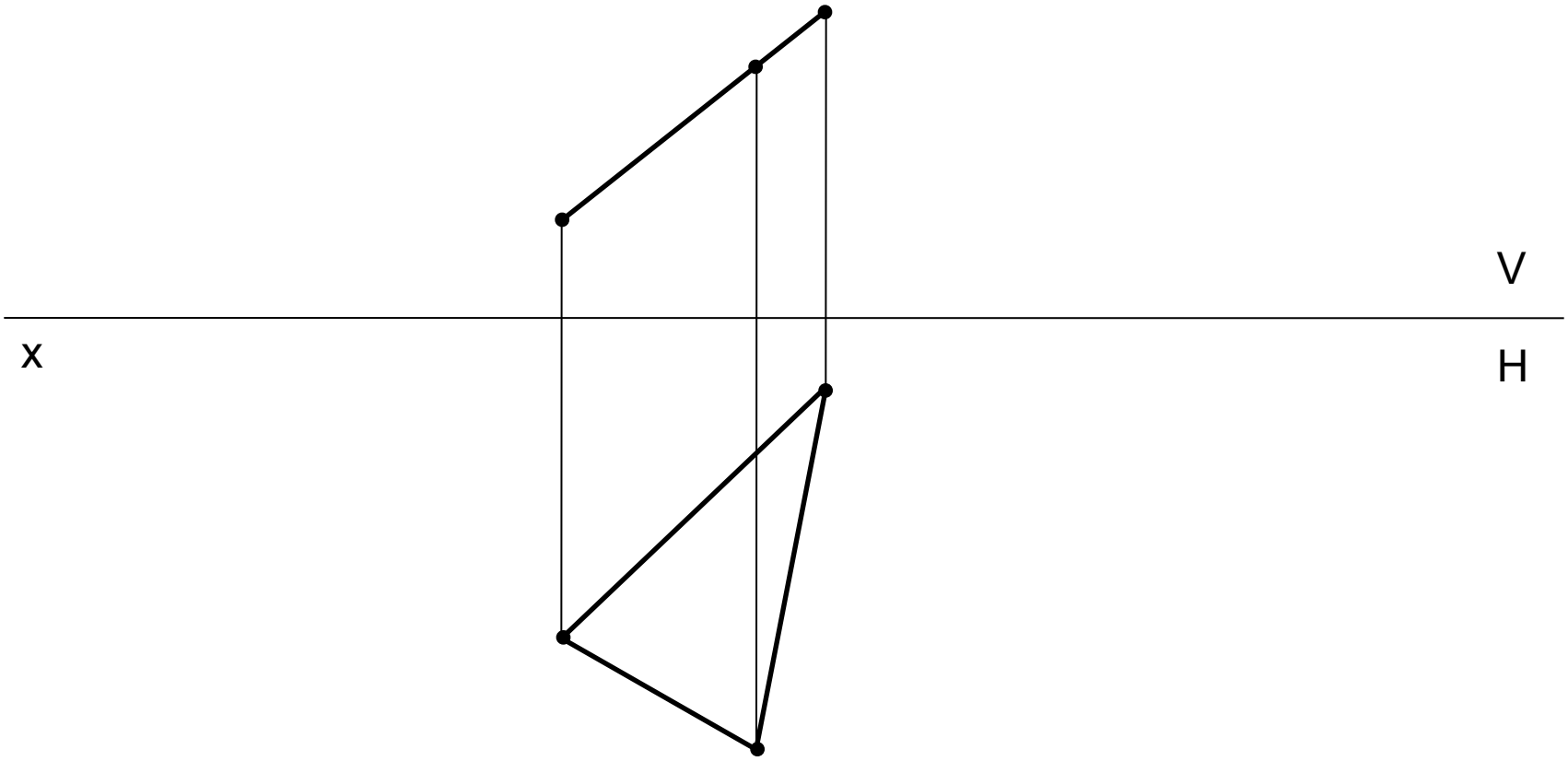

Pv
4’(5’)
3’
6’
7’
2’
1’
Px
x
5’’
4’’
3’’
6’’
7’’
2’’
1’’
7
6
1
5
4
2
3
PH

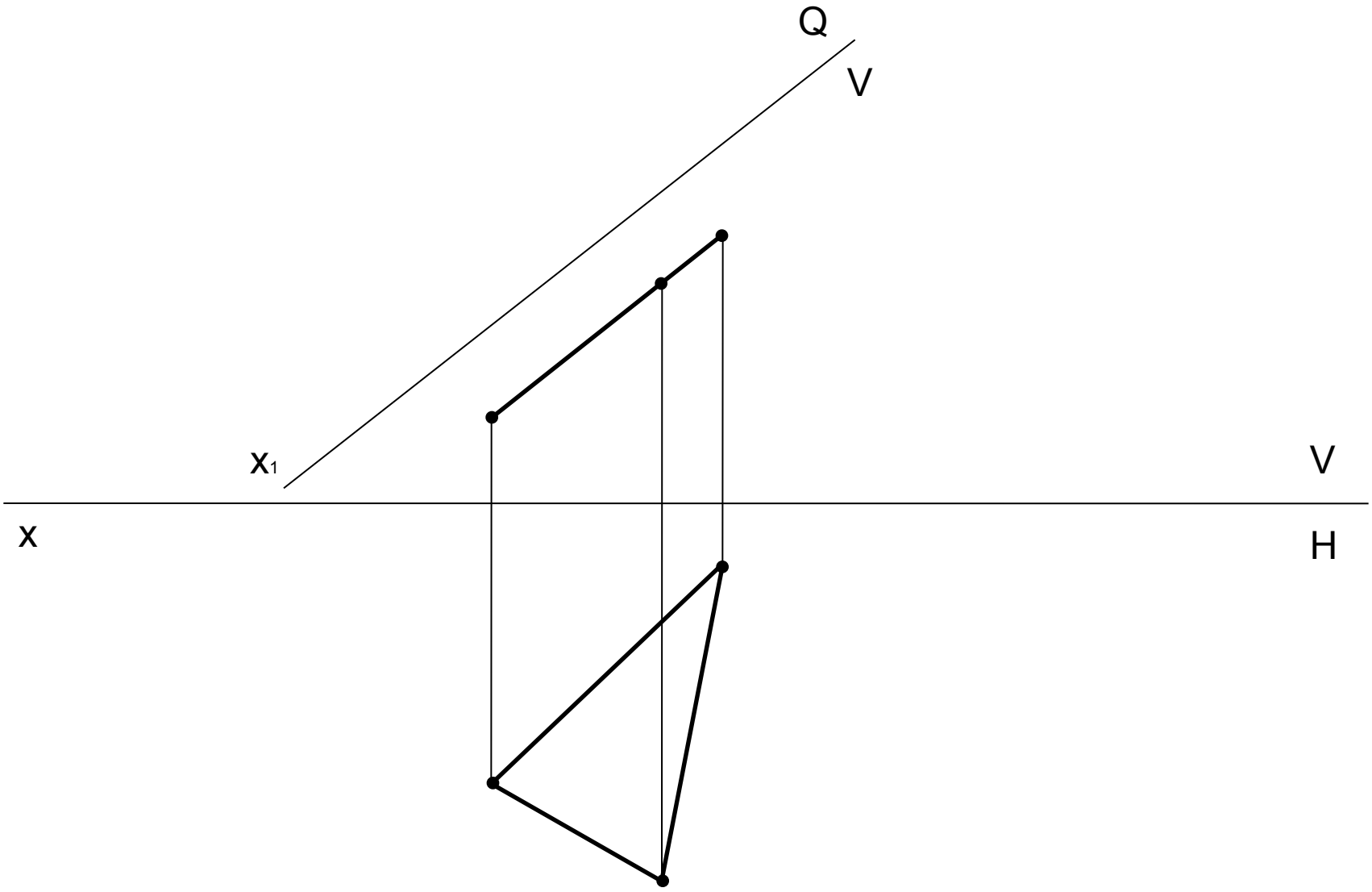

Pv
4’(5’)
3’
6’
7’
2’
1’
Px
x
5’’
4’’
3’’
6’’
7’’
2’’
1’’
7
6
1
5
4
2
3
PH

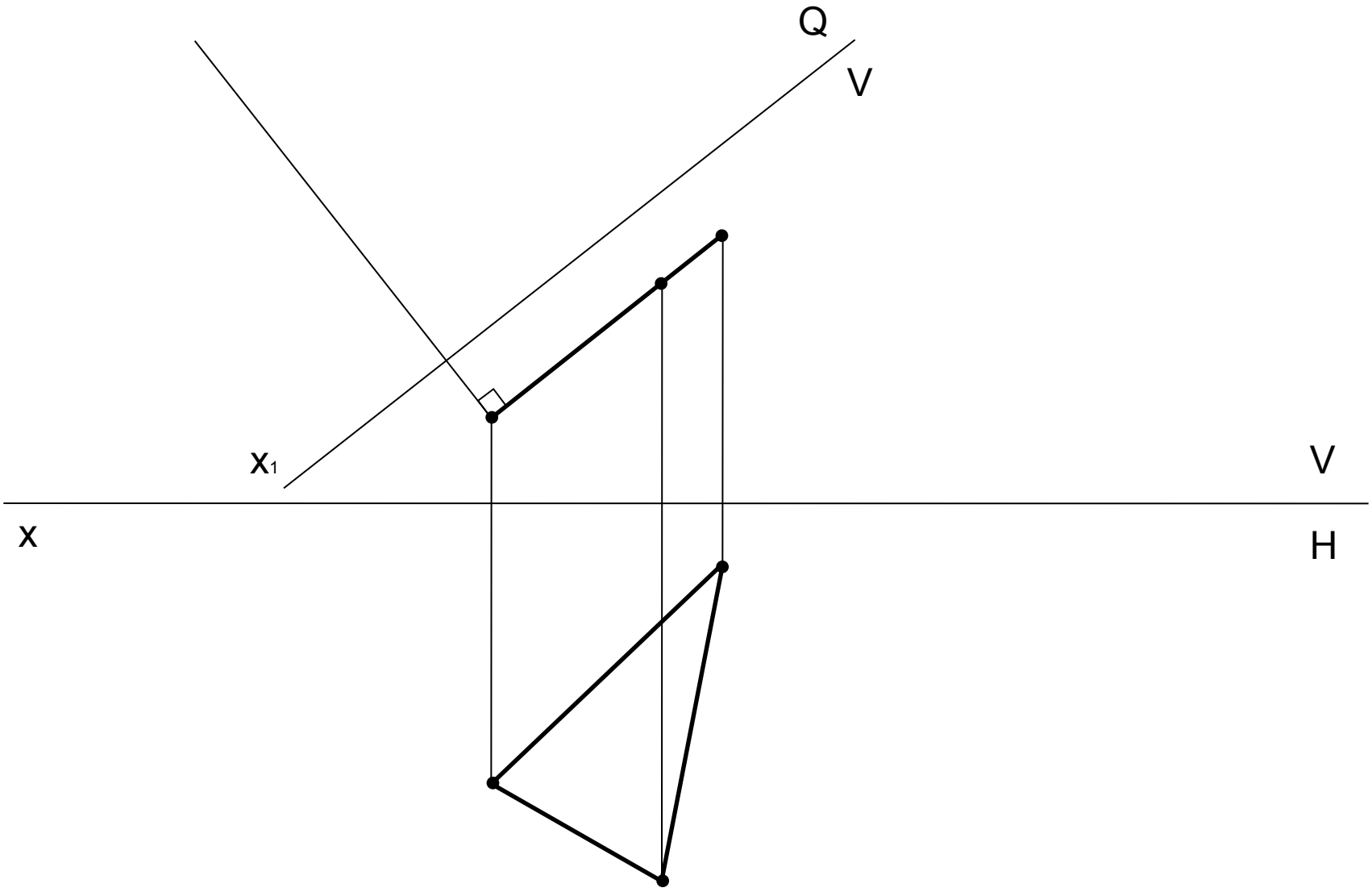
Способы преобразования проекций

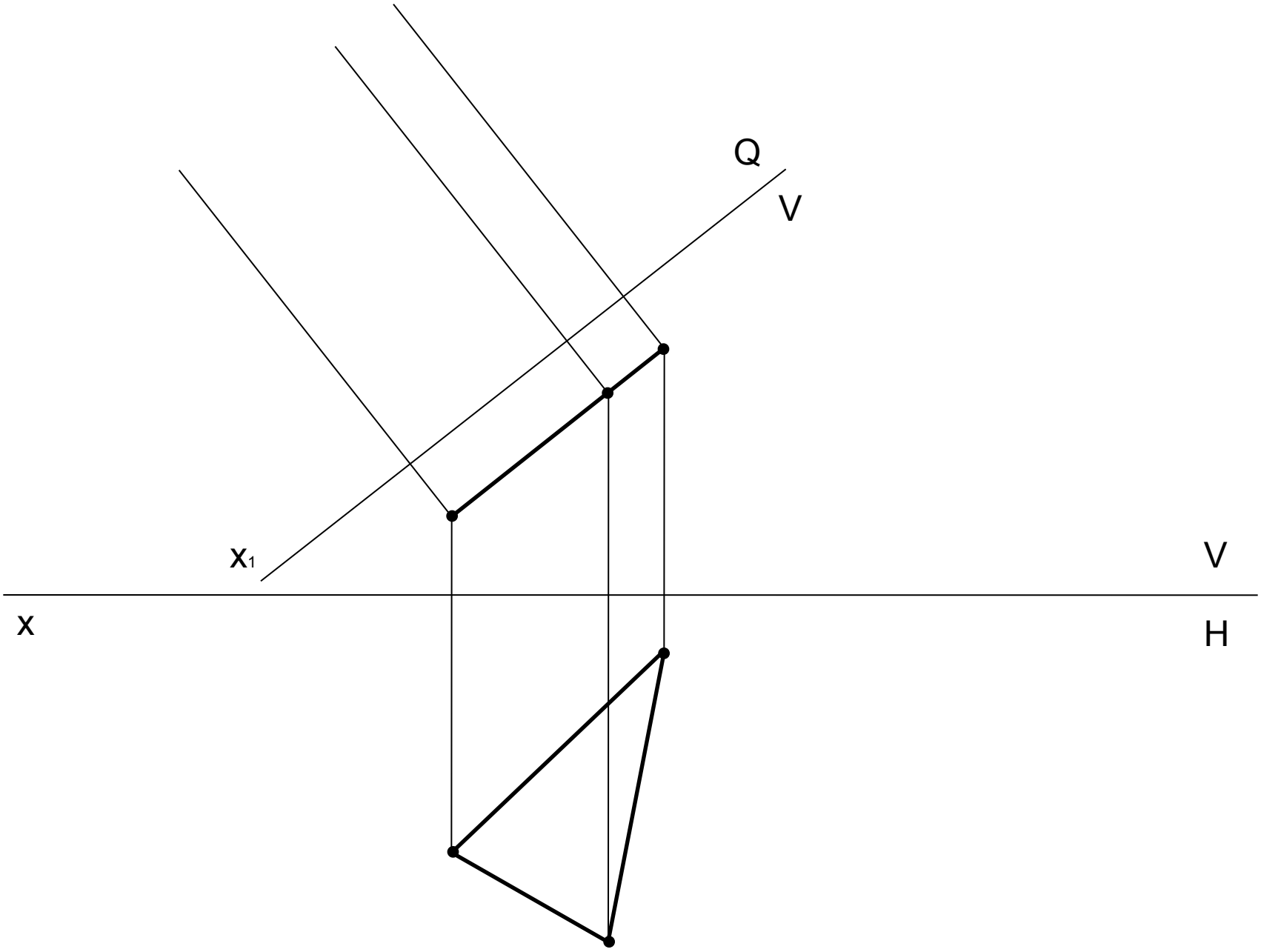
Способы преобразования проекций

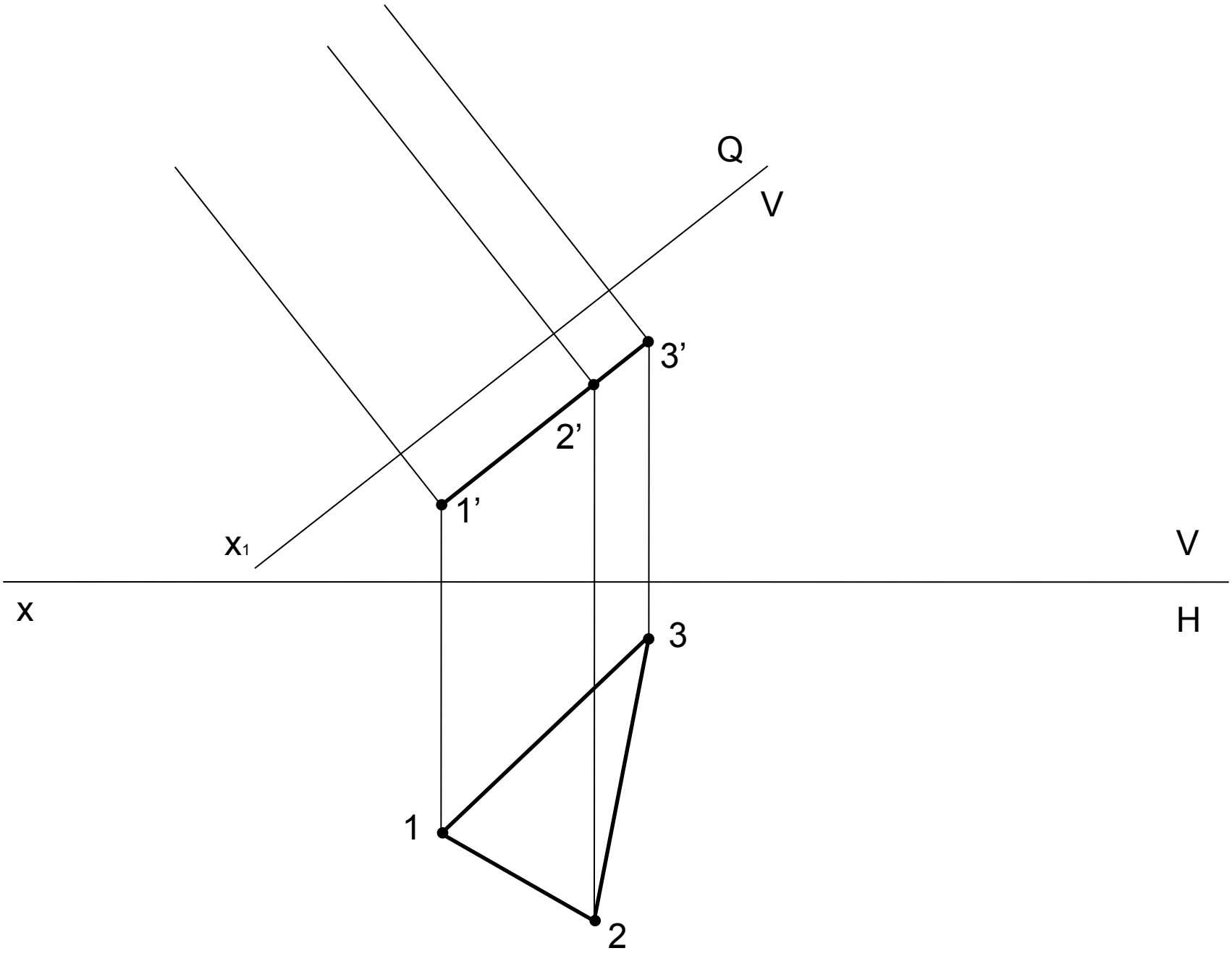
Способ перемены плоскостей проекций

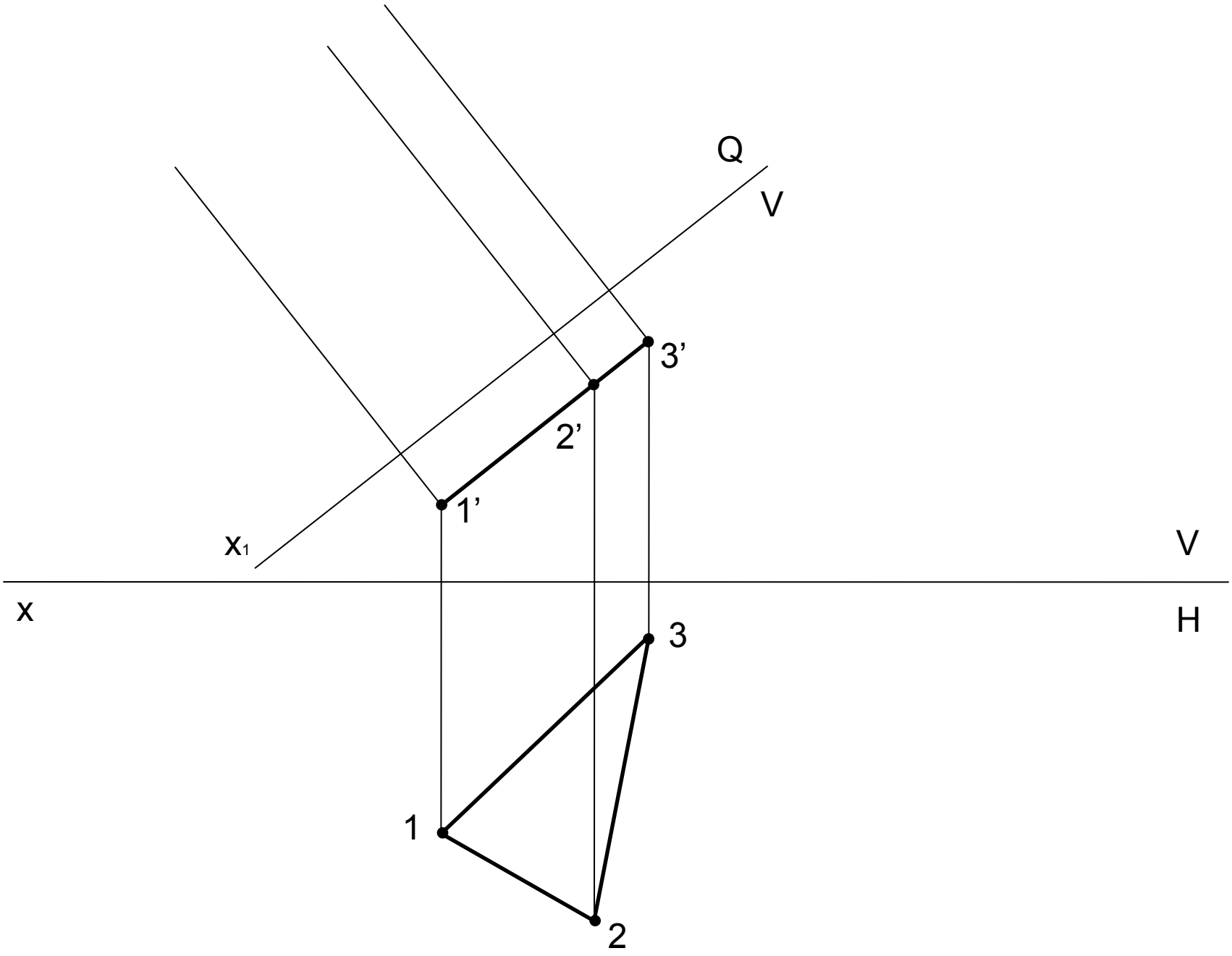


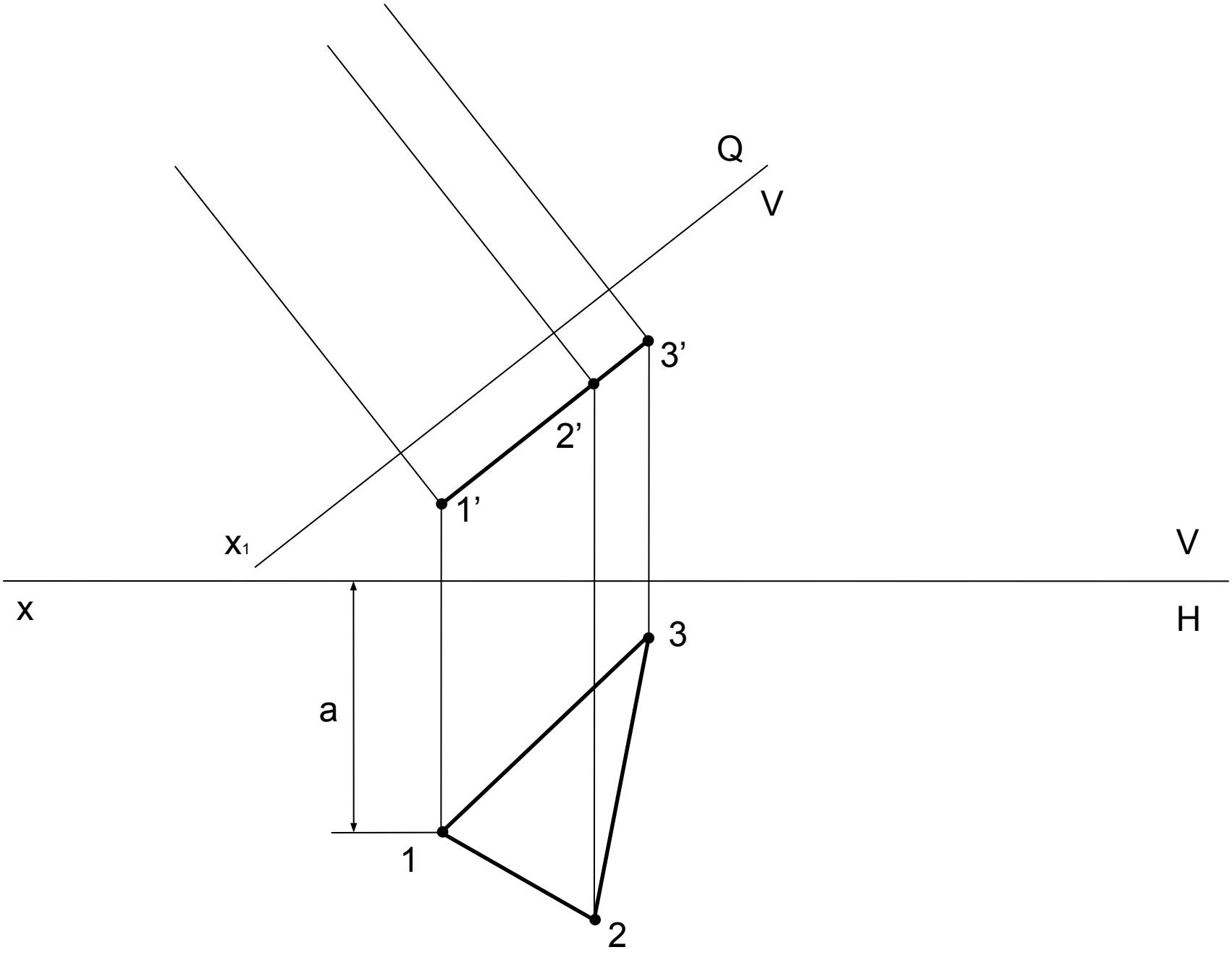

Q
V
x_1
V
x
H

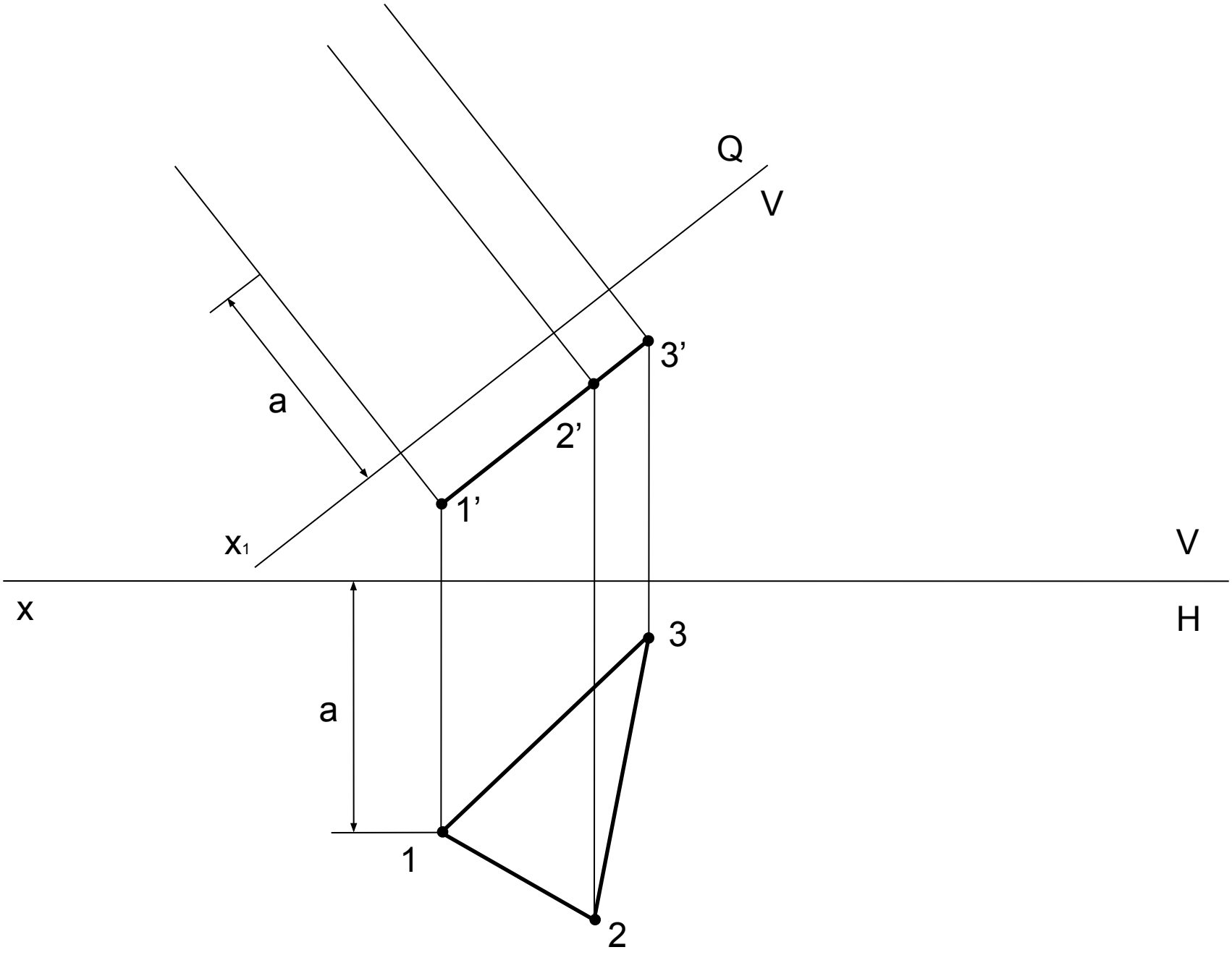

Q
V
x_1
V
x
H

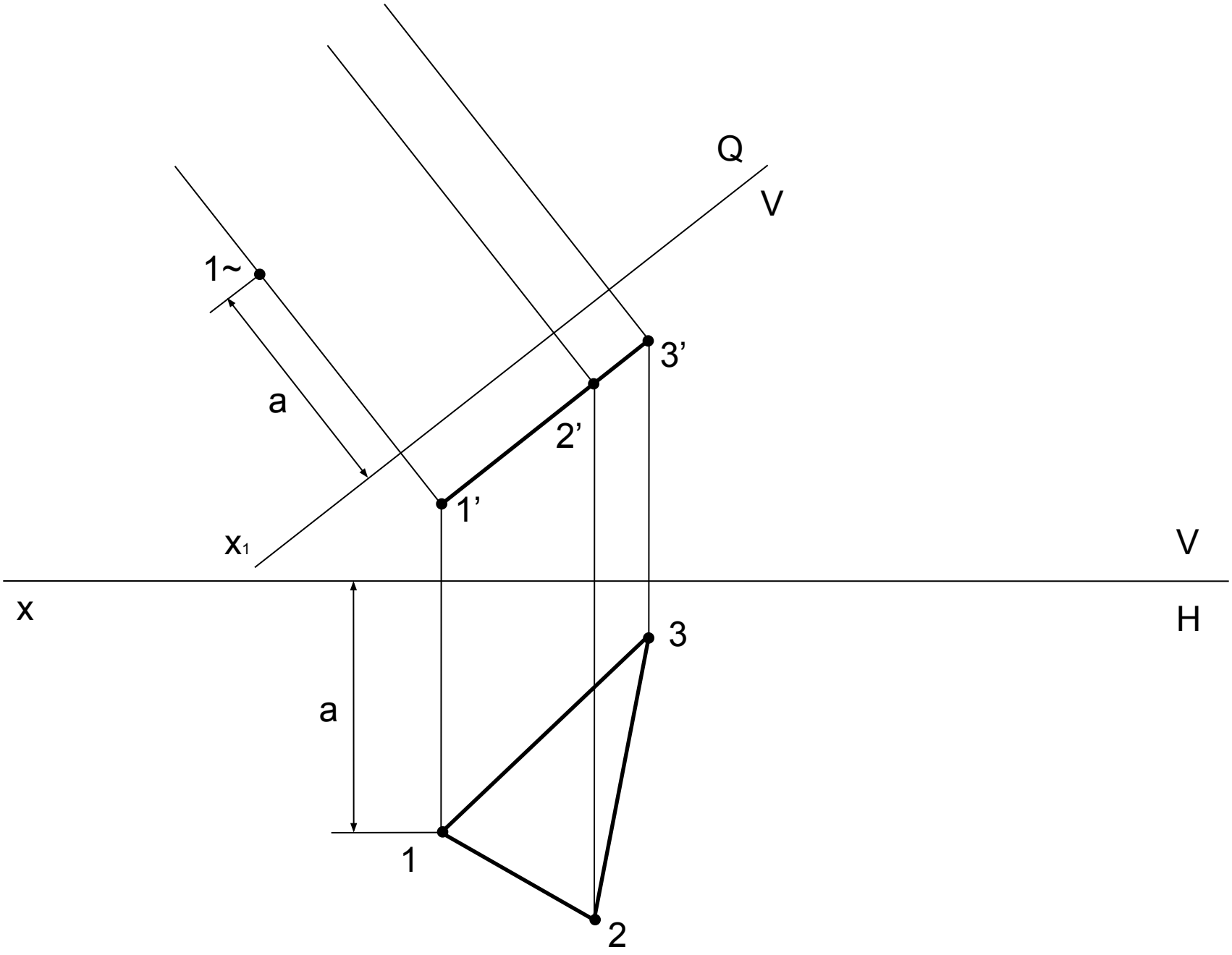

Q
V
x1
V
x
H

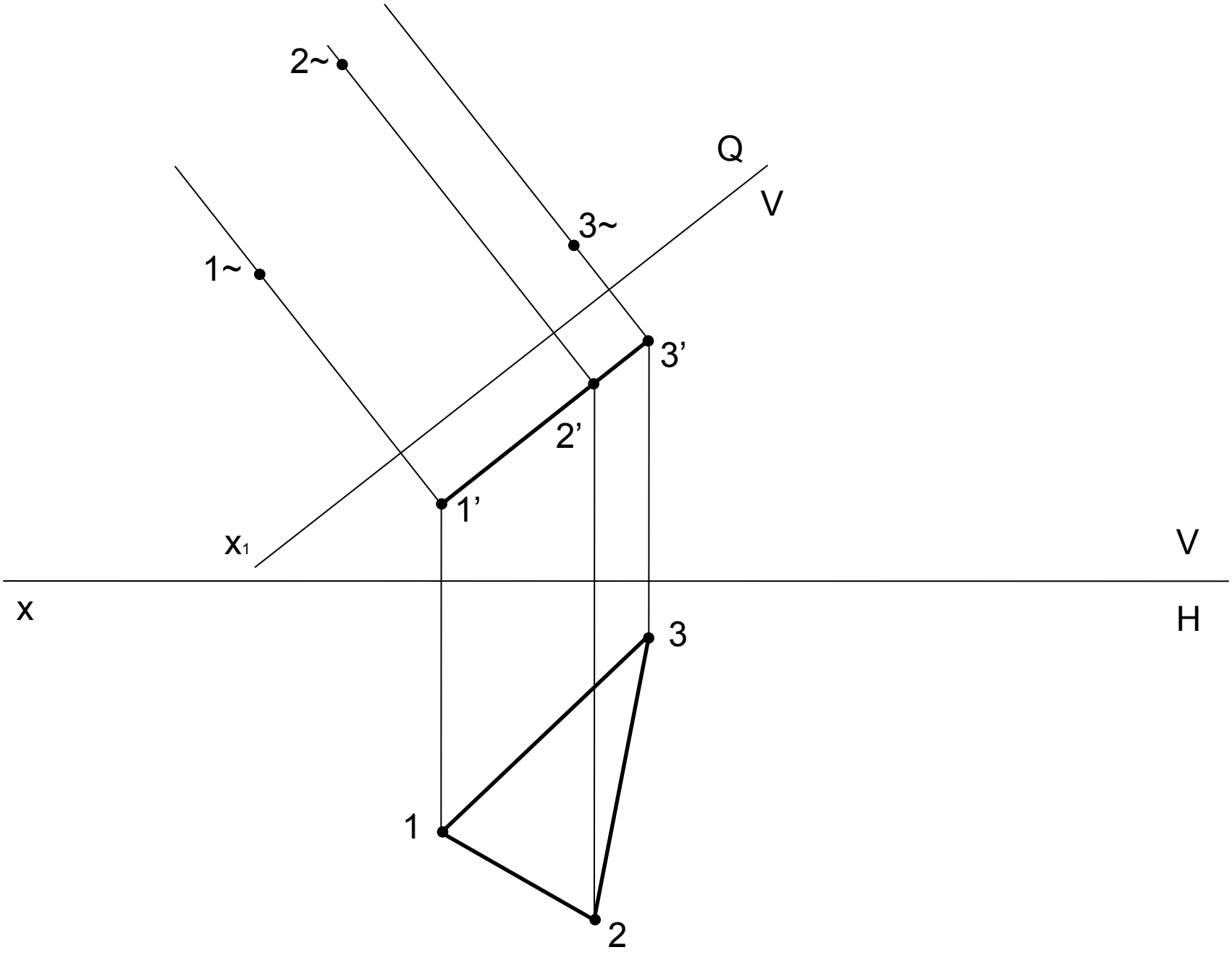

Q
V
3’
2’
1’
x1
V
x
H
3
1
2

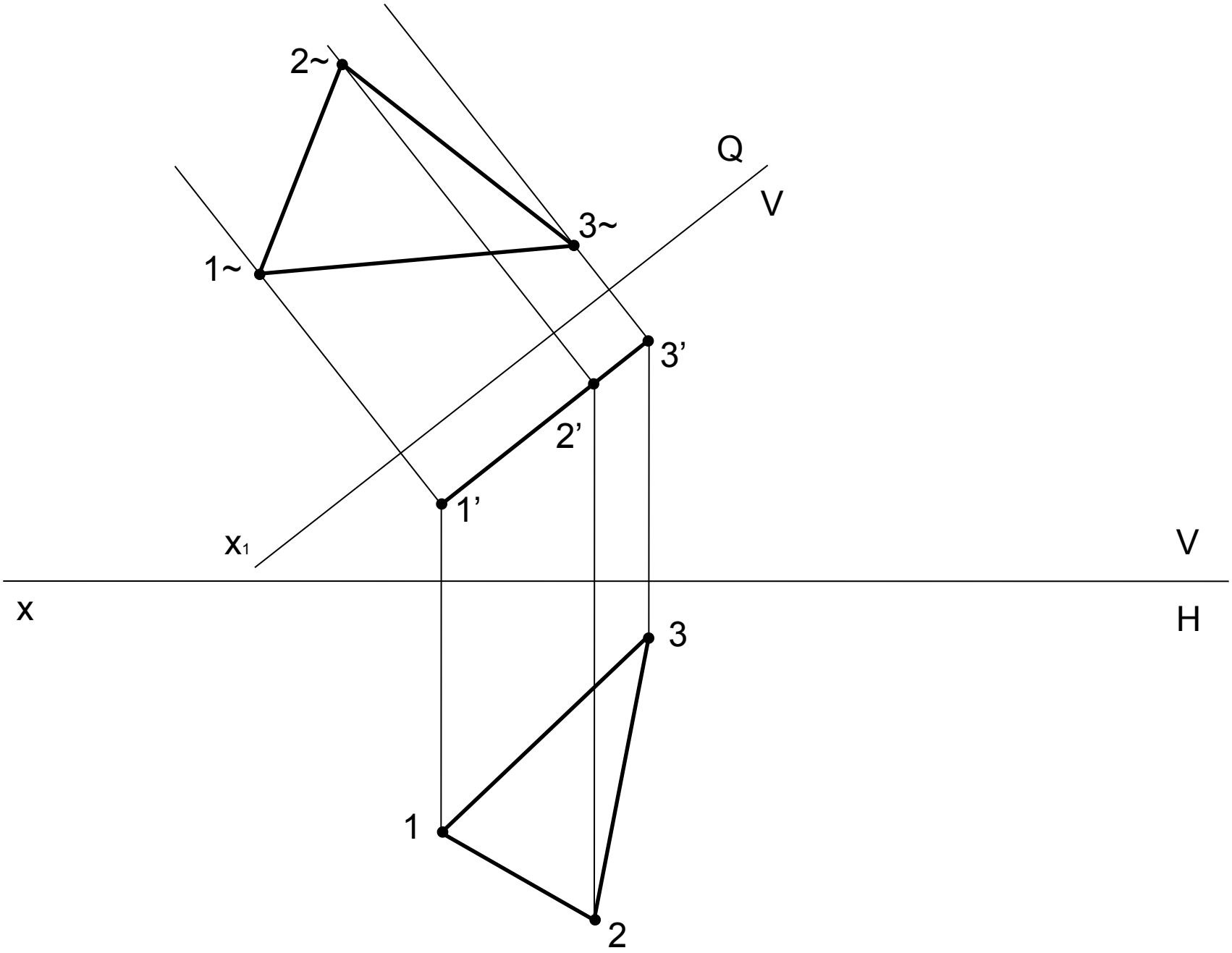

Q
V
3’
2’
1’
x1
V
x
H
3
1
2

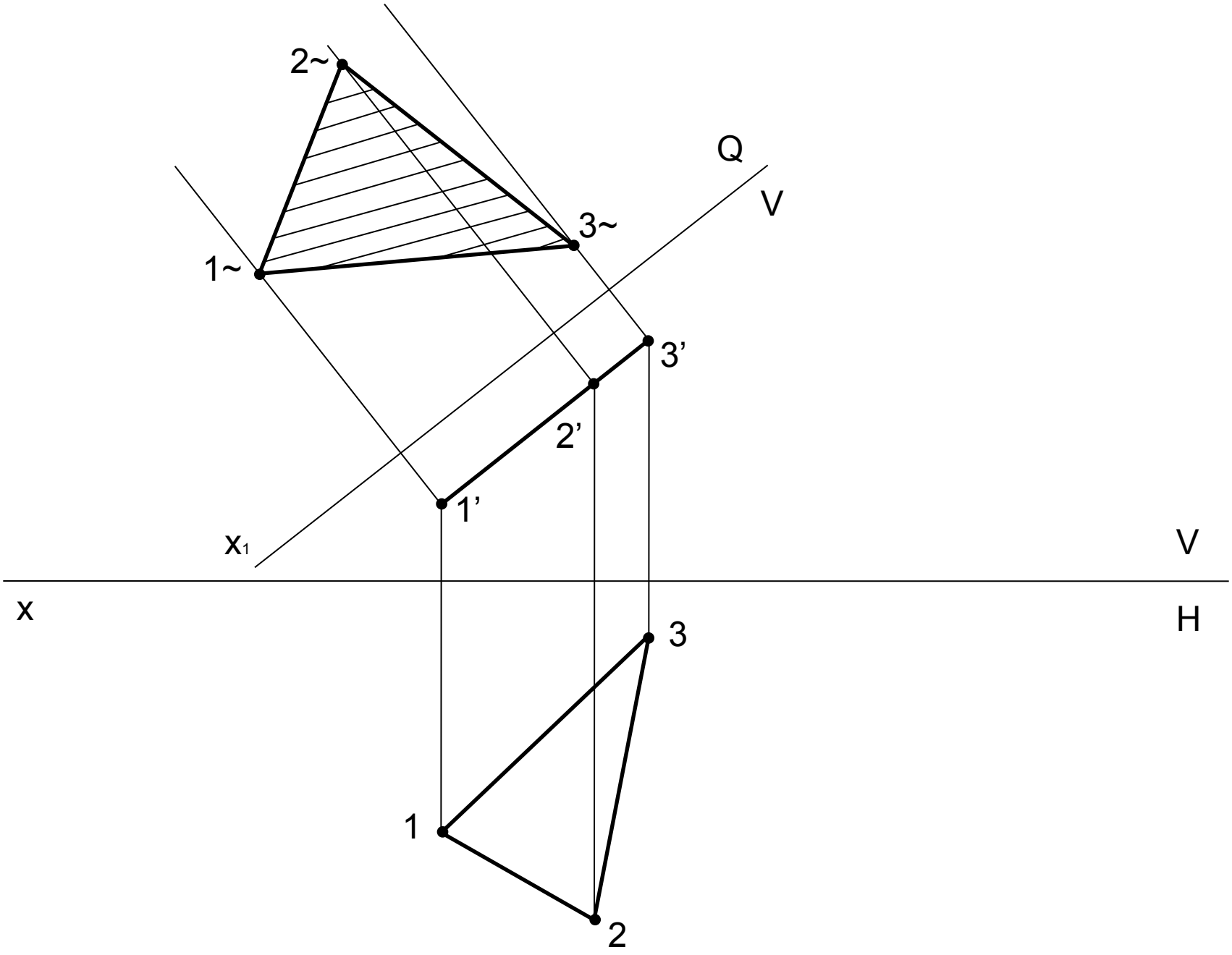

Q
V
3’
2’
1’
x1
V
x
H
3
a
1
2


Q
V
a
3’
2’
1’
x1
V
x
H
3
a
1
2

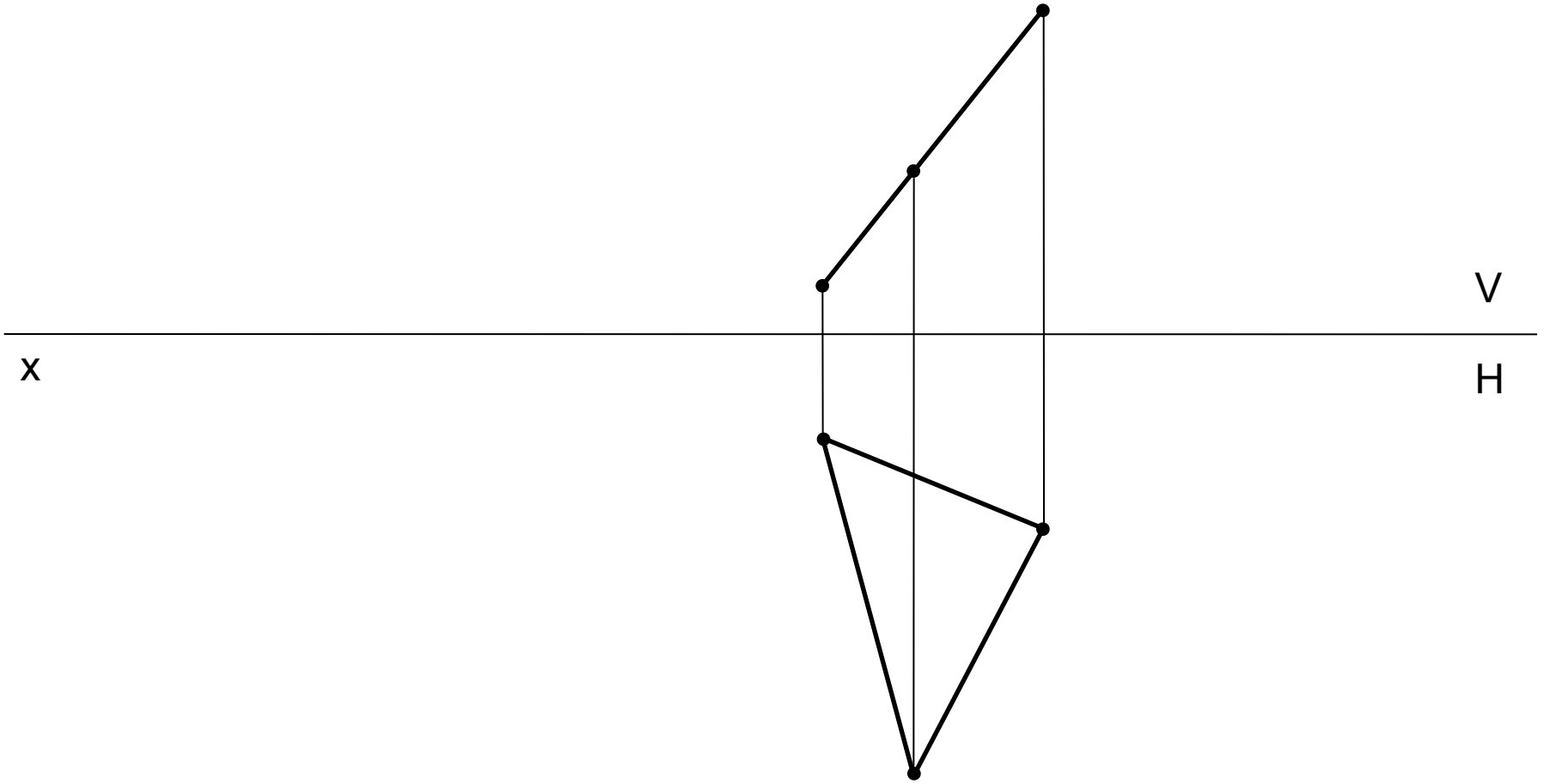

Q
V
1~
a
3’
2’
1’
x1
V
x
H
3
a
1
2

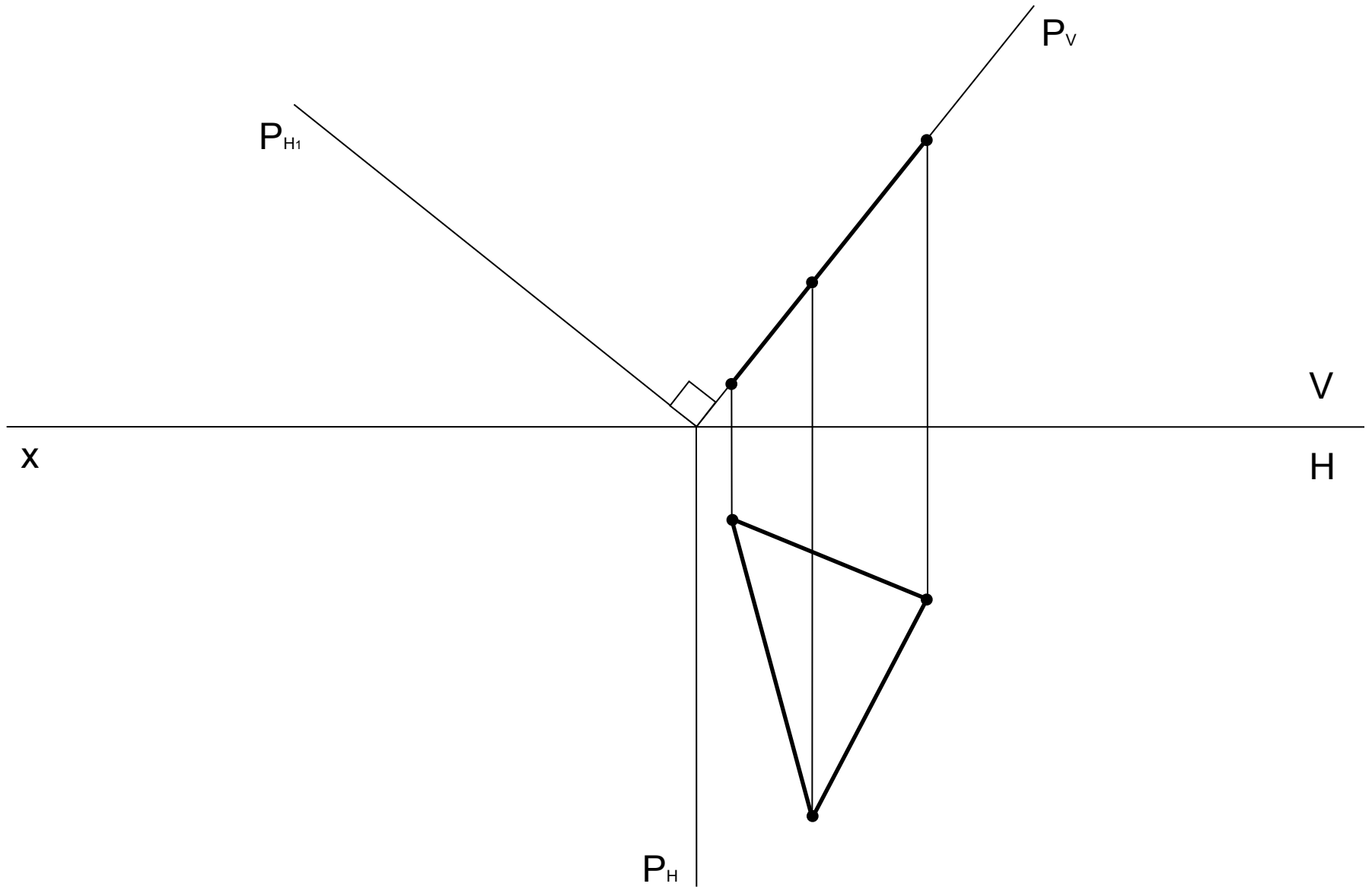

2~
Q
V
3~
1~
3'
2'
1'
x1
V
x
H
3
1
2

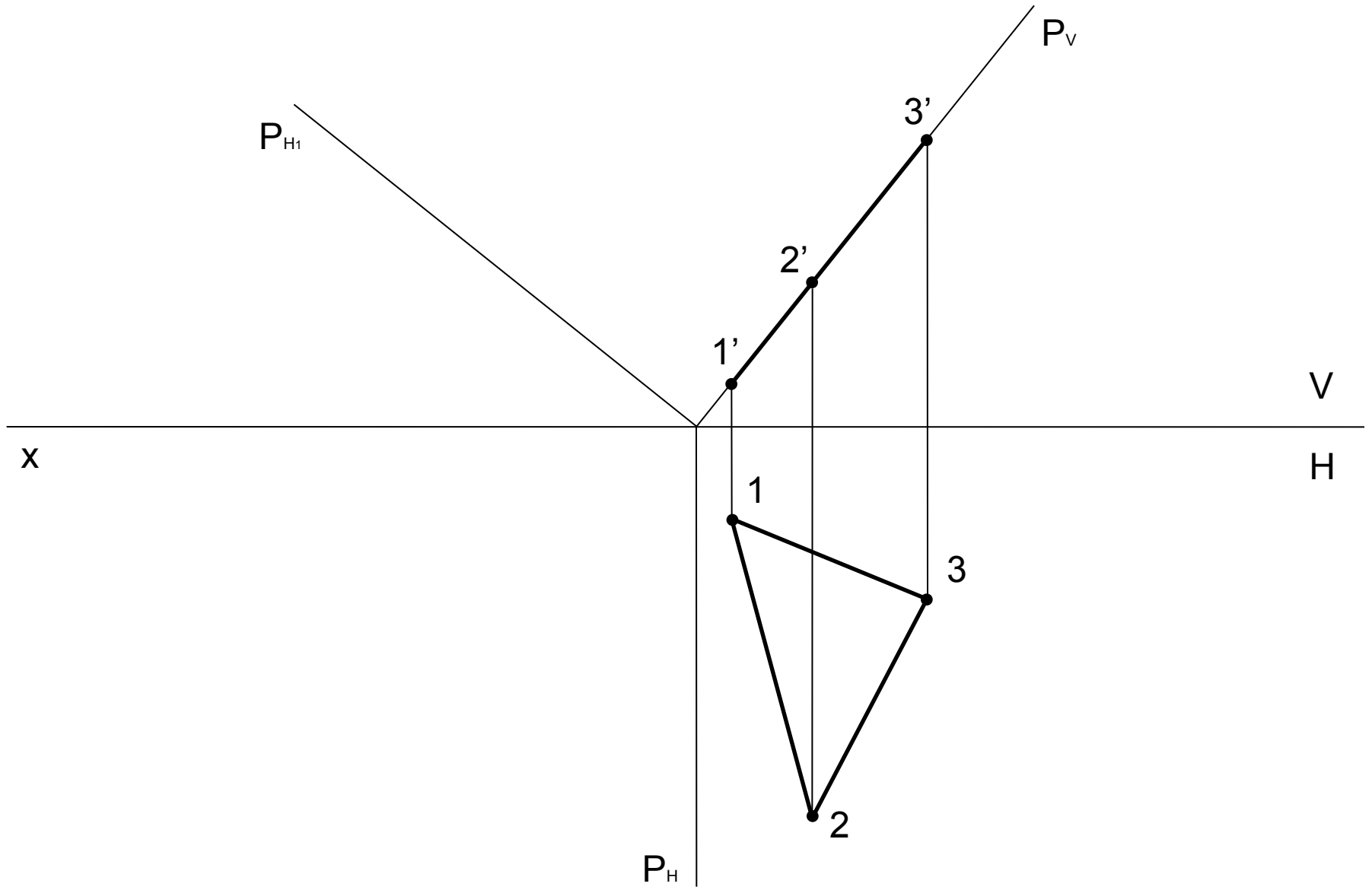

2~
Q
V
3~
1~
3’
2’
1’
x1
V
x
H
3
1
2

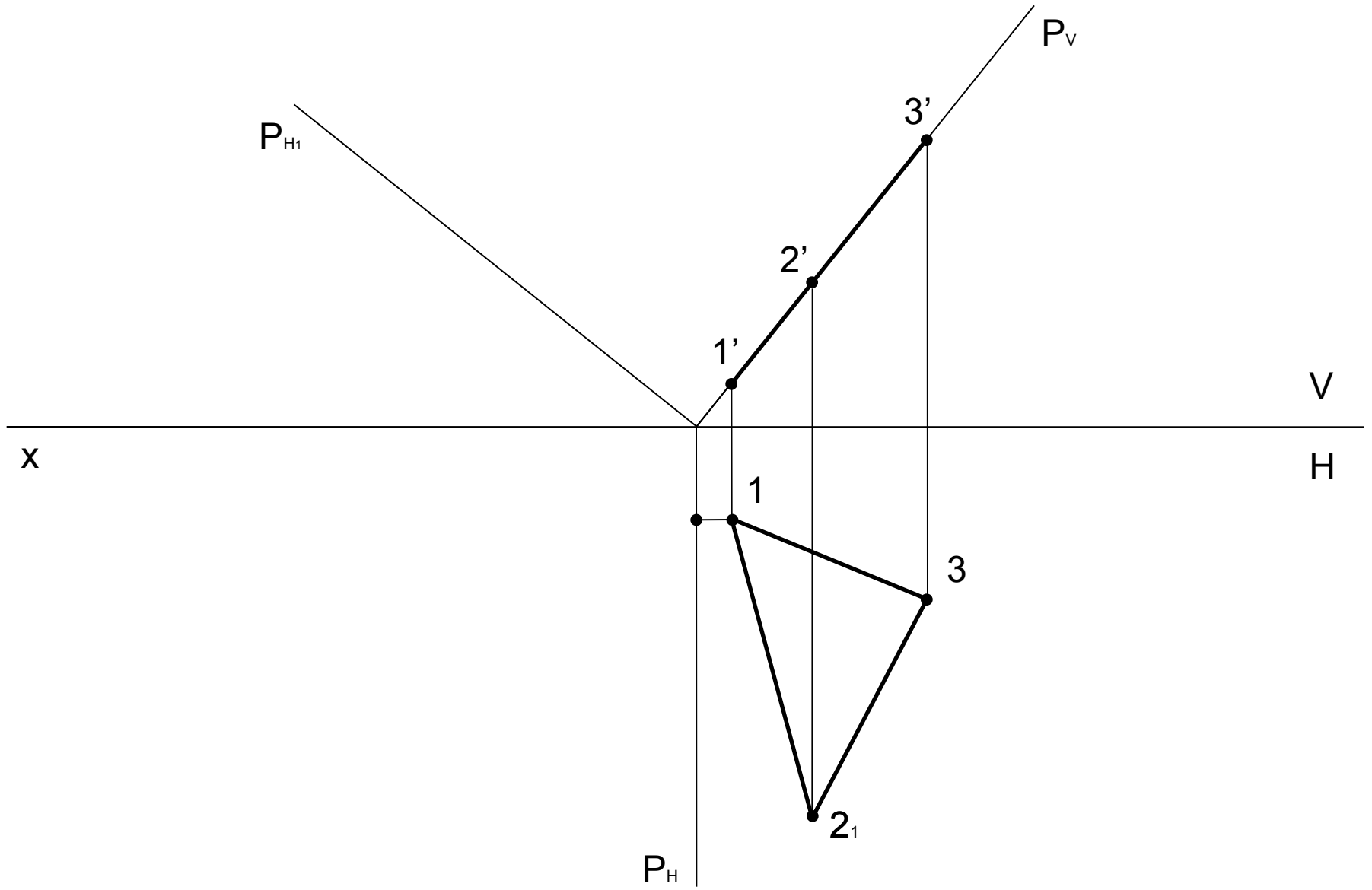

2~
Q
V
3~
1~
3’
2’
1’
x1
V
x
H
3
1
2

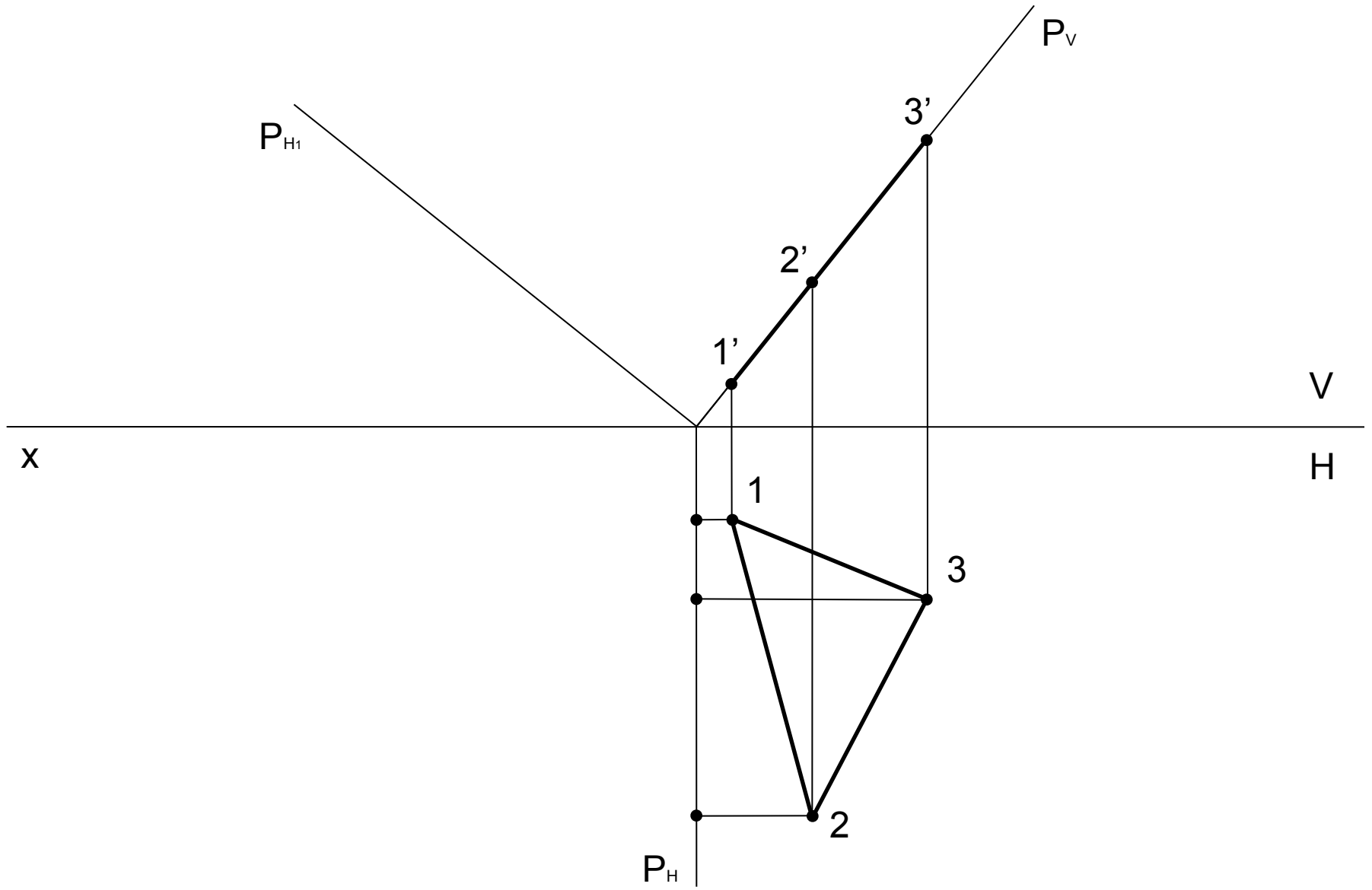
Способ совмещения

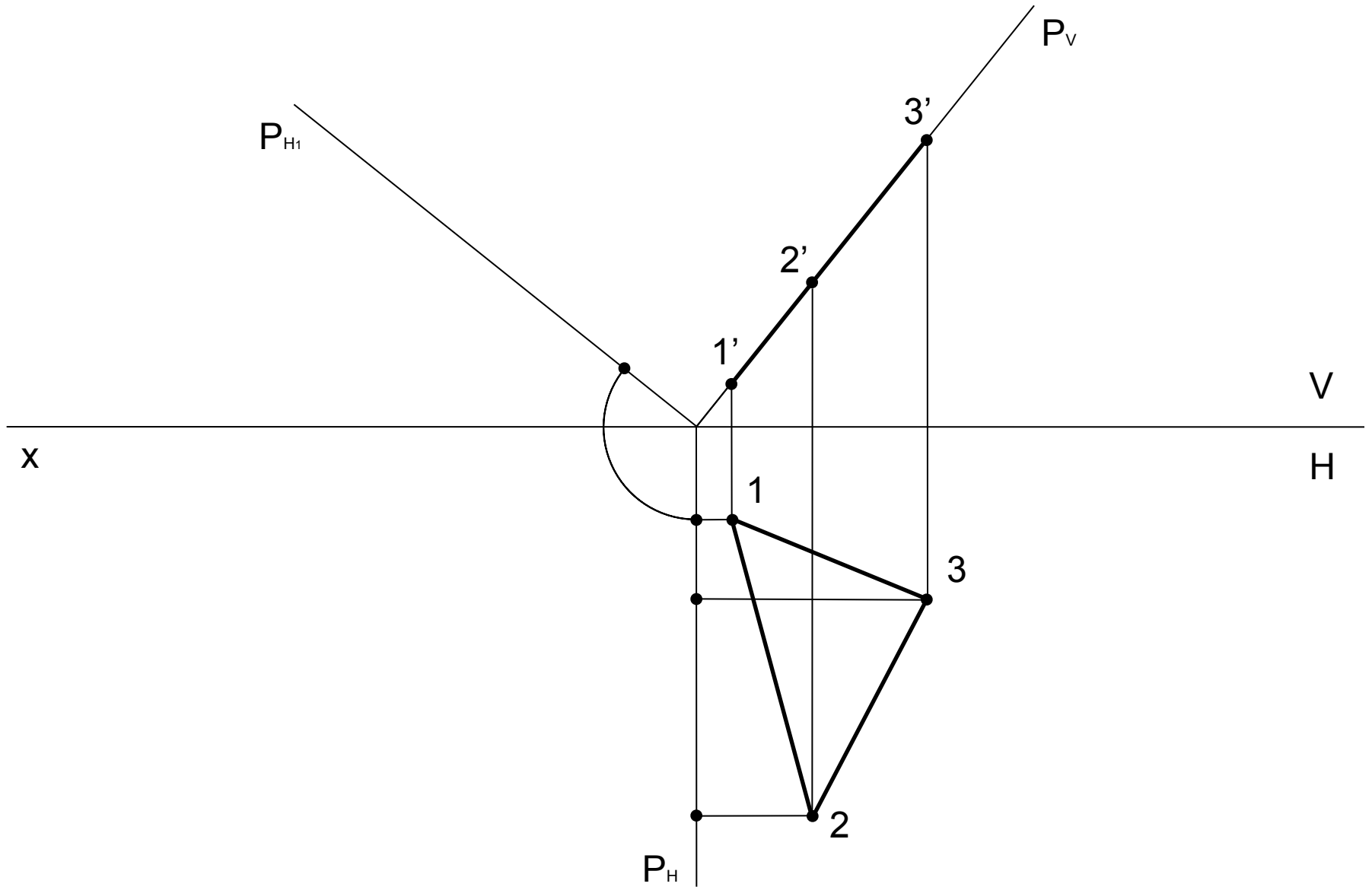


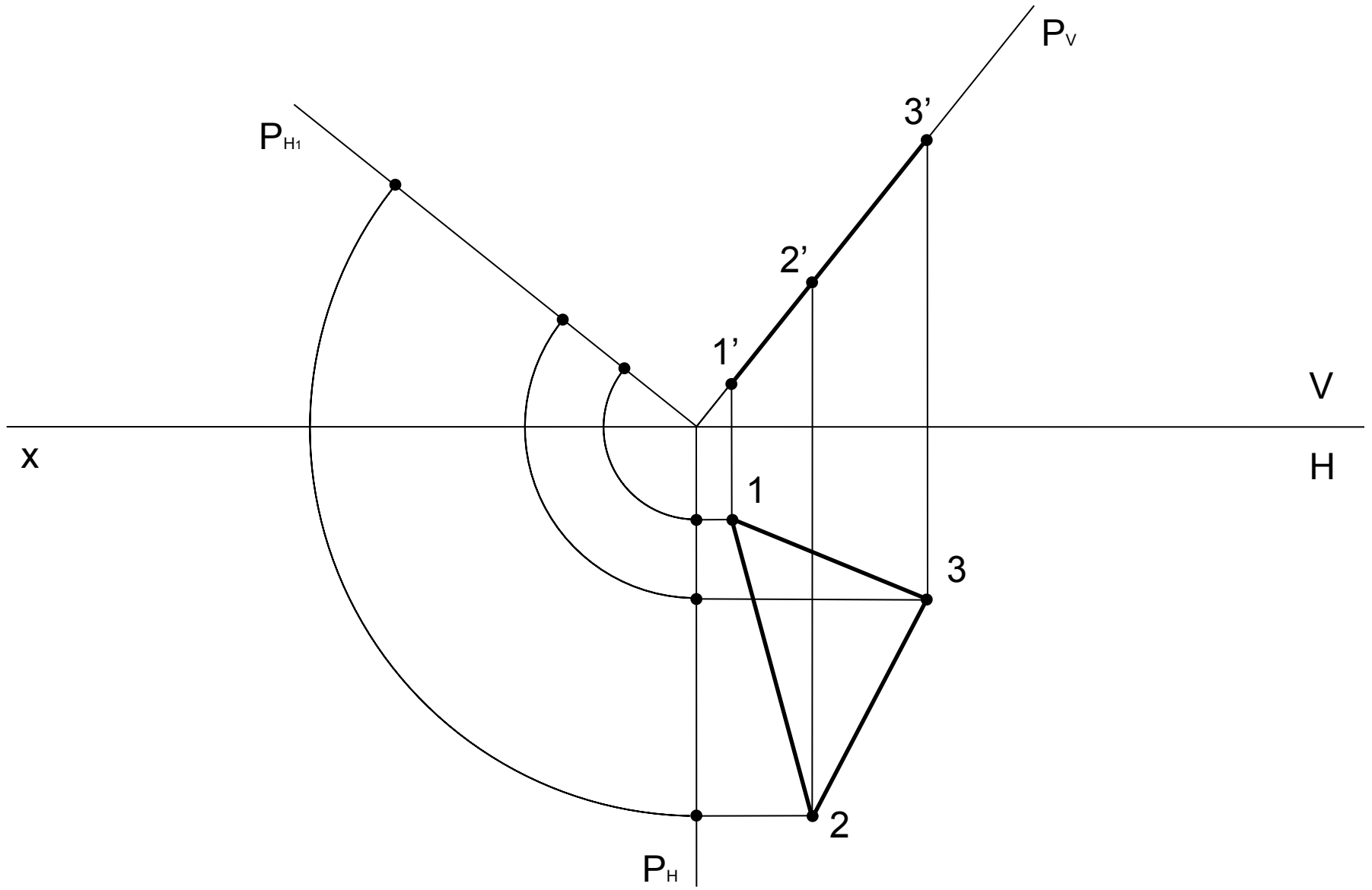

P_V
P_{H1}
V
x
H
P_H

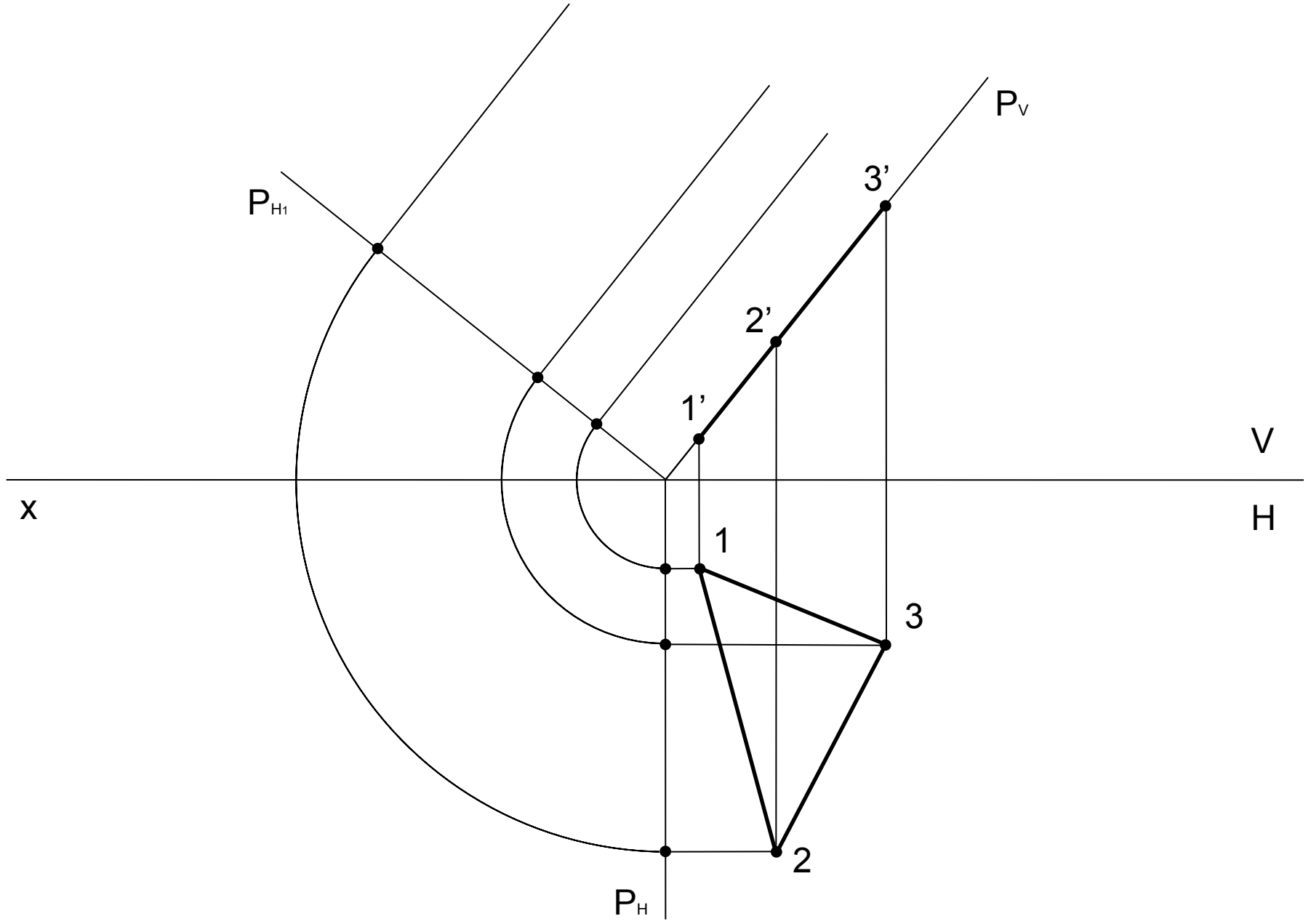

P_V
P_{H1}
3’
2’
1’
V
x
H
1
3
2
P_H

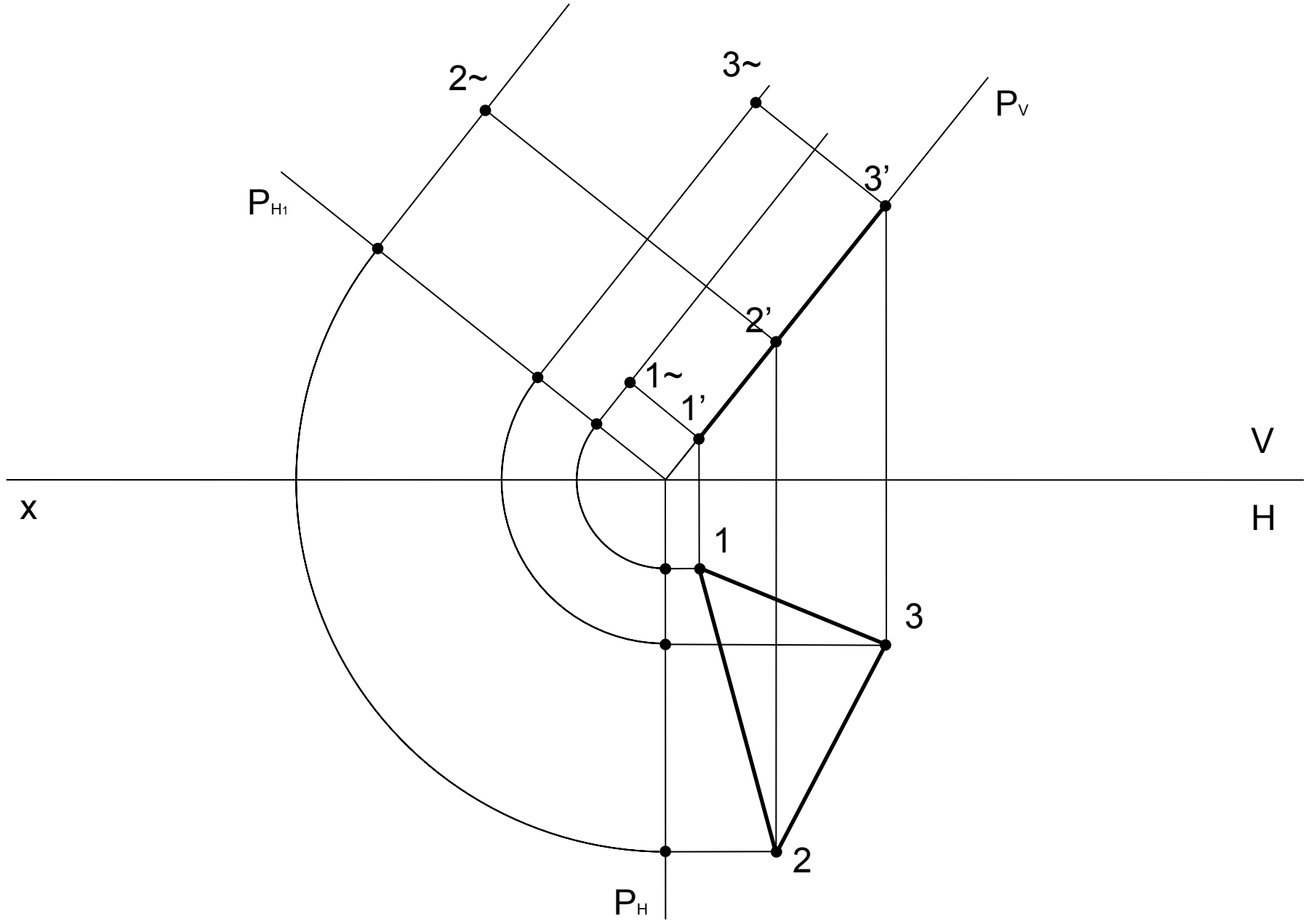

P_V
P_{H1}
3’
2’
1’
V
x
H
1
3
2_1
P_H

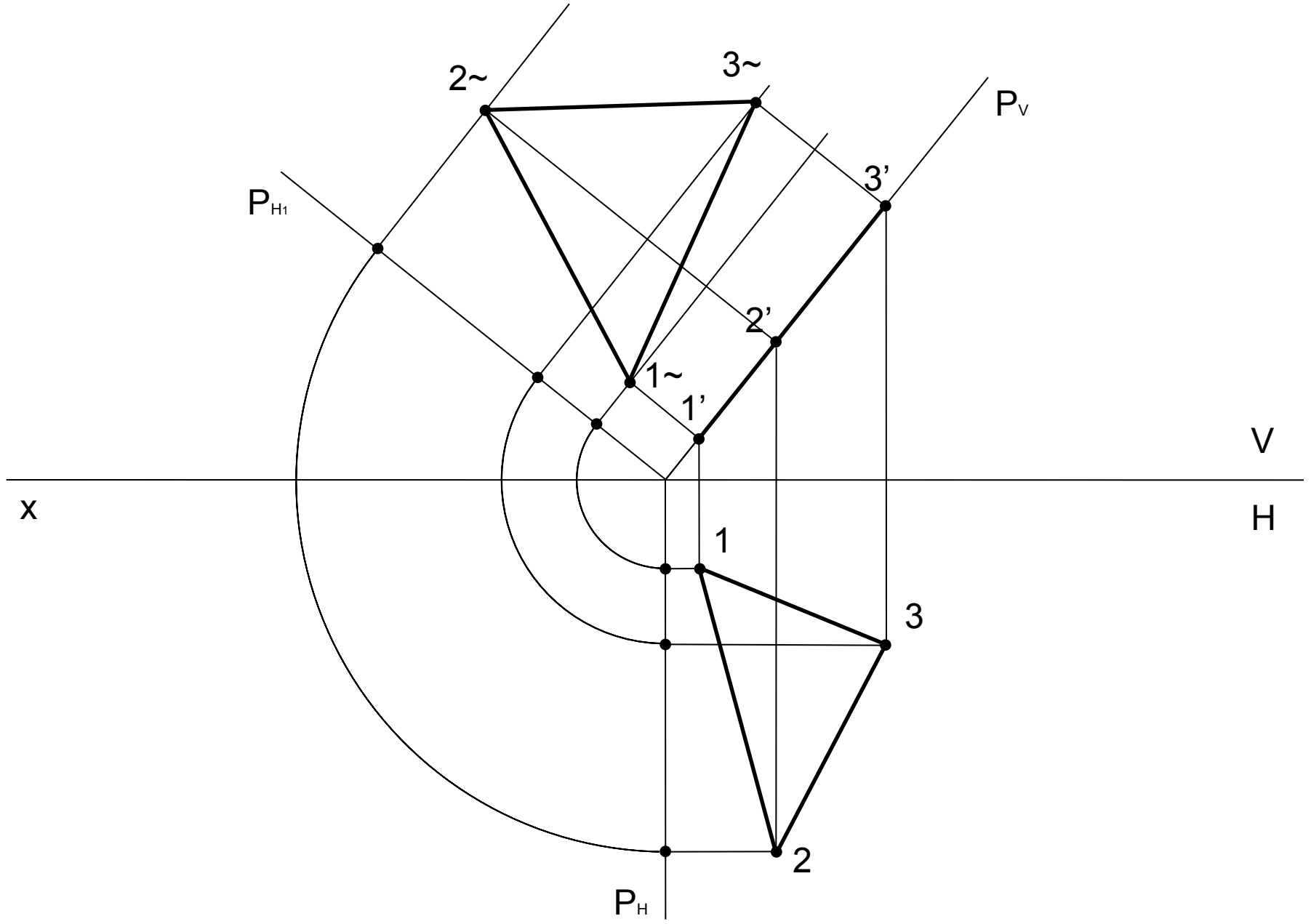

P_V
P_{H1}
3’
2’
1’
V
x
H
1
3
2
P_H

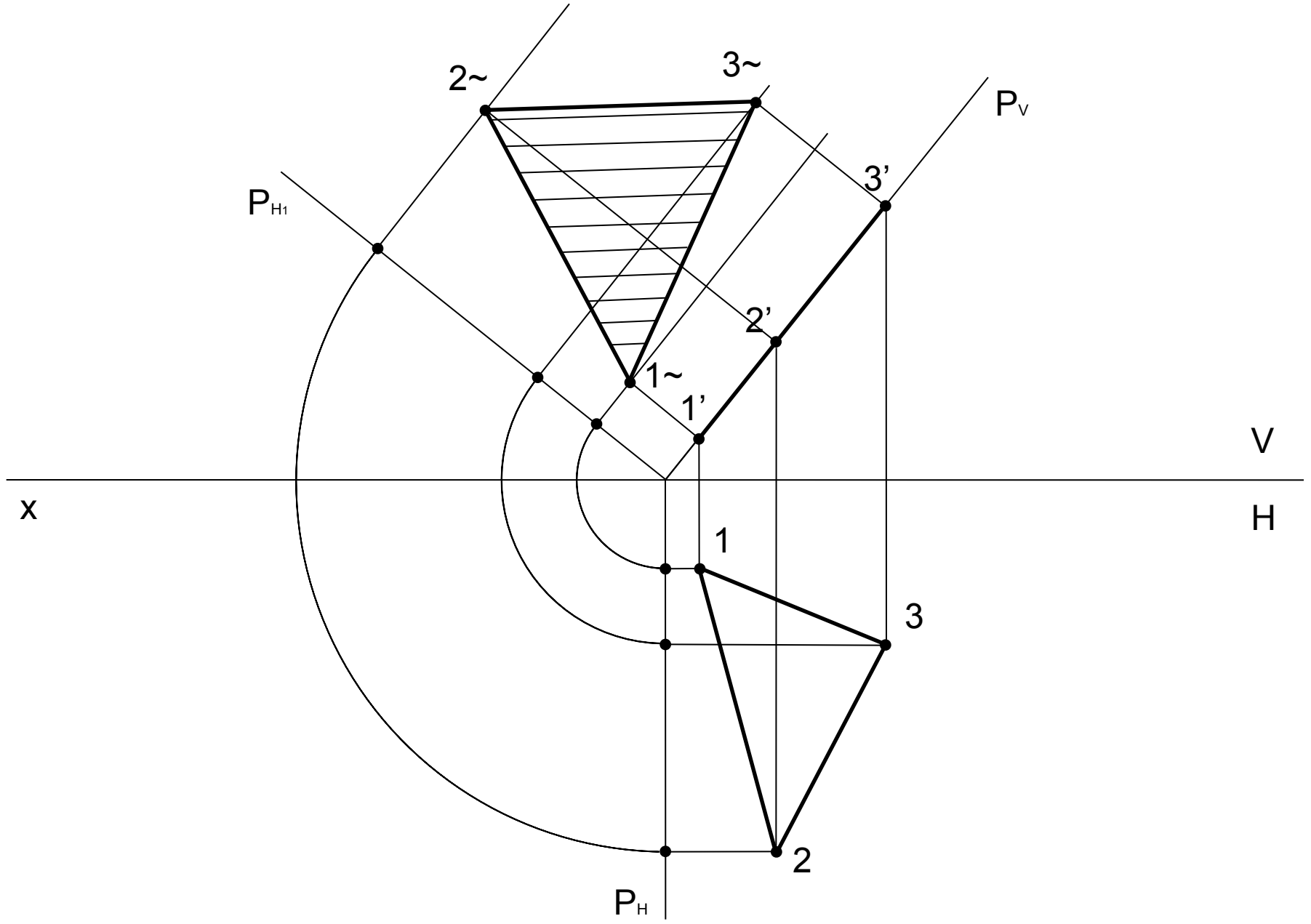

P_V
P_{H1}
3’
2’
1’
V
x
H
1
3
2
P_H


P_V
P_{H1}
3’
2’
1’
V
x
H
1
3
2
P_H


P_{H1}
P_V
3’
2’
1’
V
x
H
1
3
2
P_H


2~
3~
P_V
P_{H1}
3'
2'
1~
1'
V
x
H
1
3
2
P_H

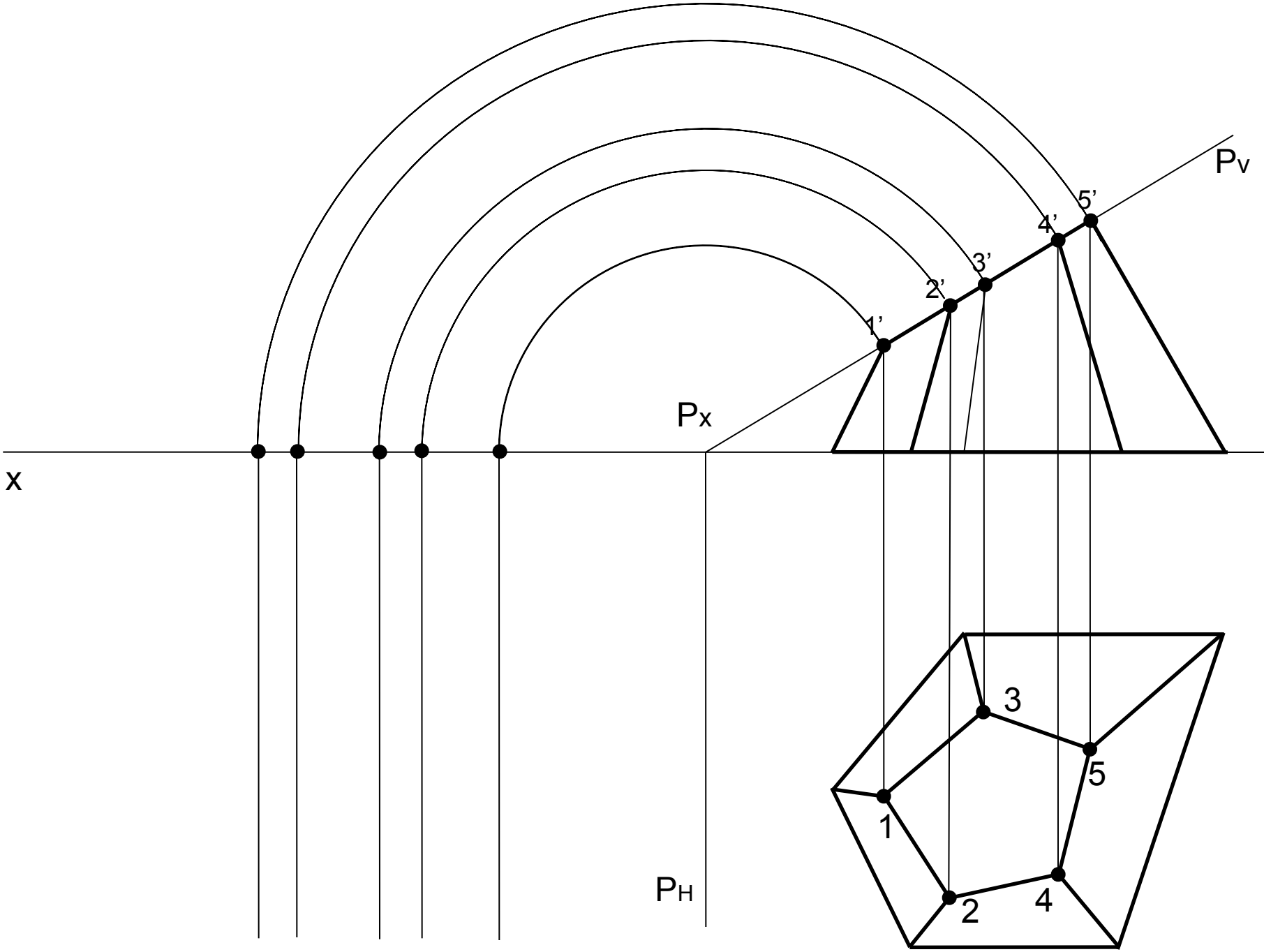

2~
3~
P_V
P_{H1}
3'
2'
1~
1'
V
x
H
1
3
2
P_H

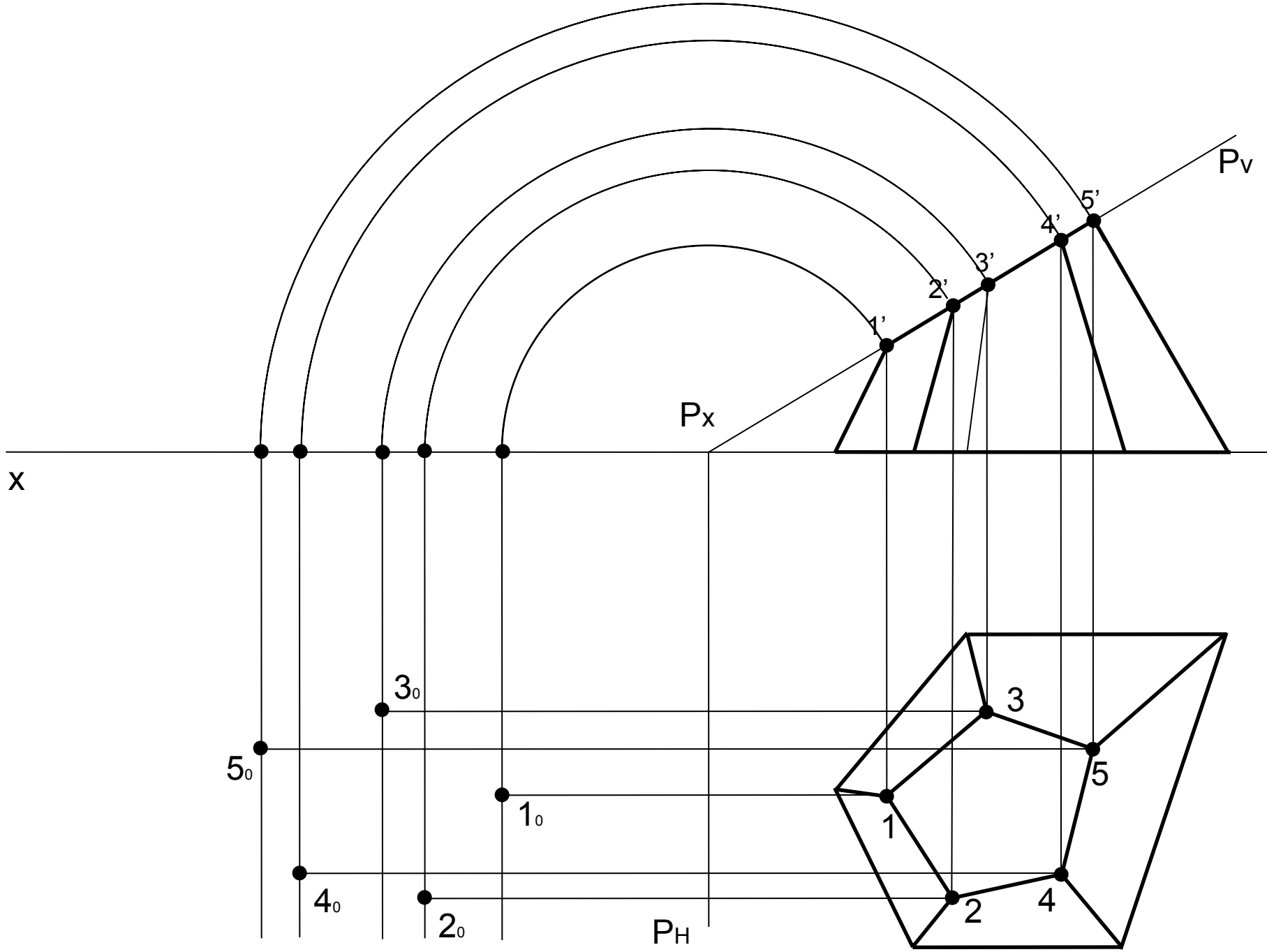

2~
3~
P_V
P_{H1}
3'
2'
1~
1'
V
x
H
1
3
2
P_H

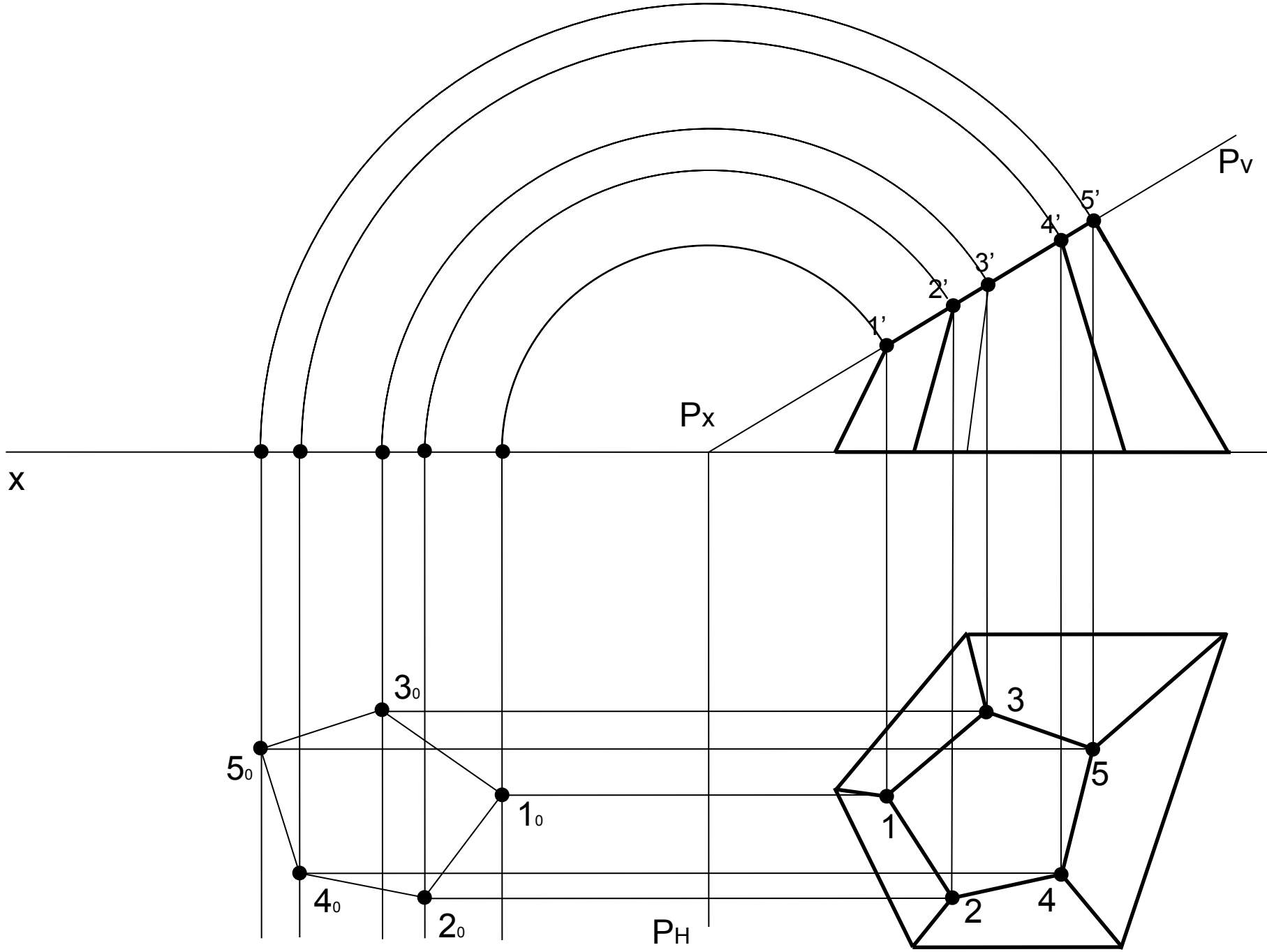
Задача 2. Определить действительную величину сечения (среза)

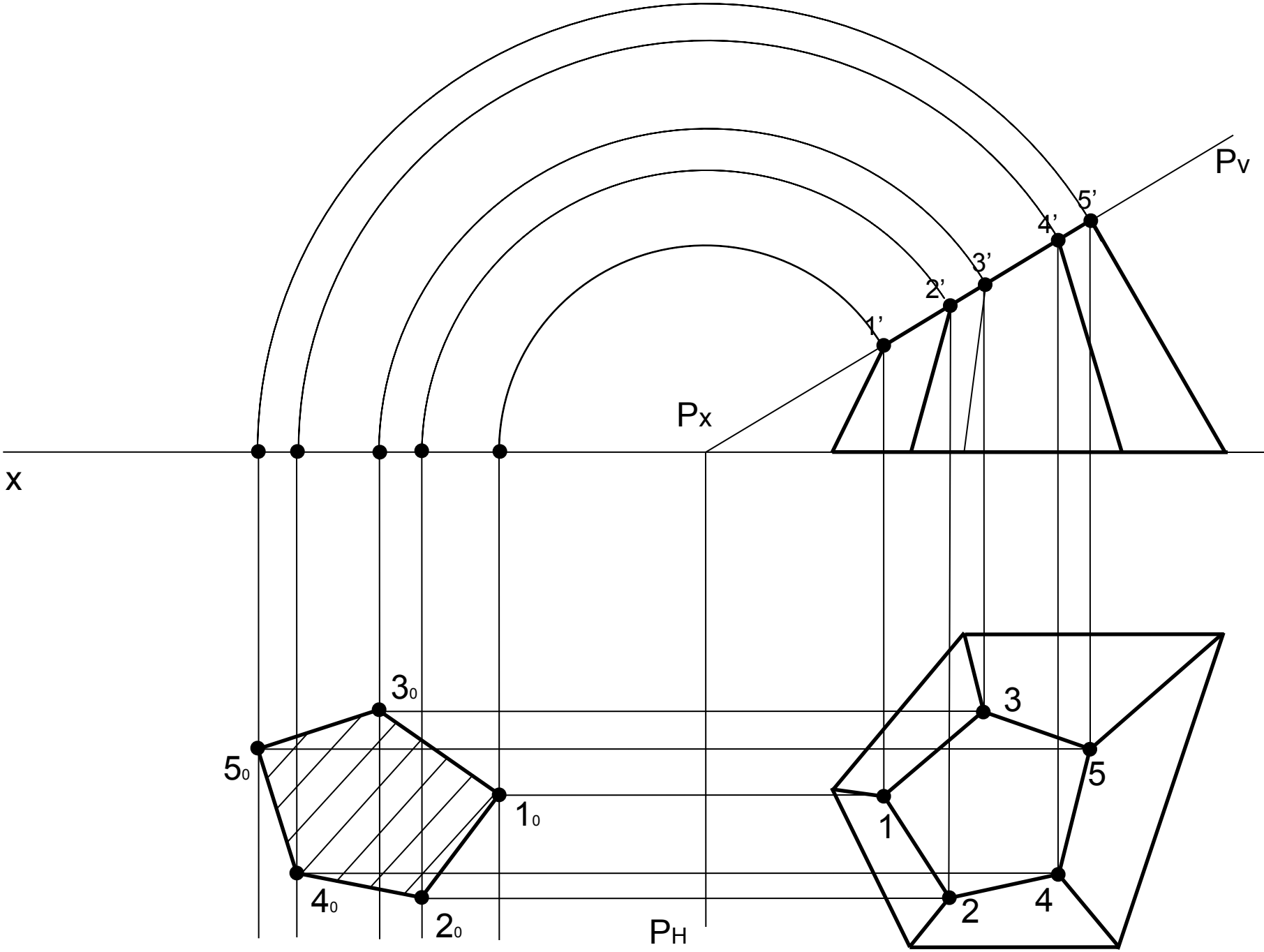
Группы I и III	Группы II и IV
способ совмещения	Способ перемены плоскостей проекций

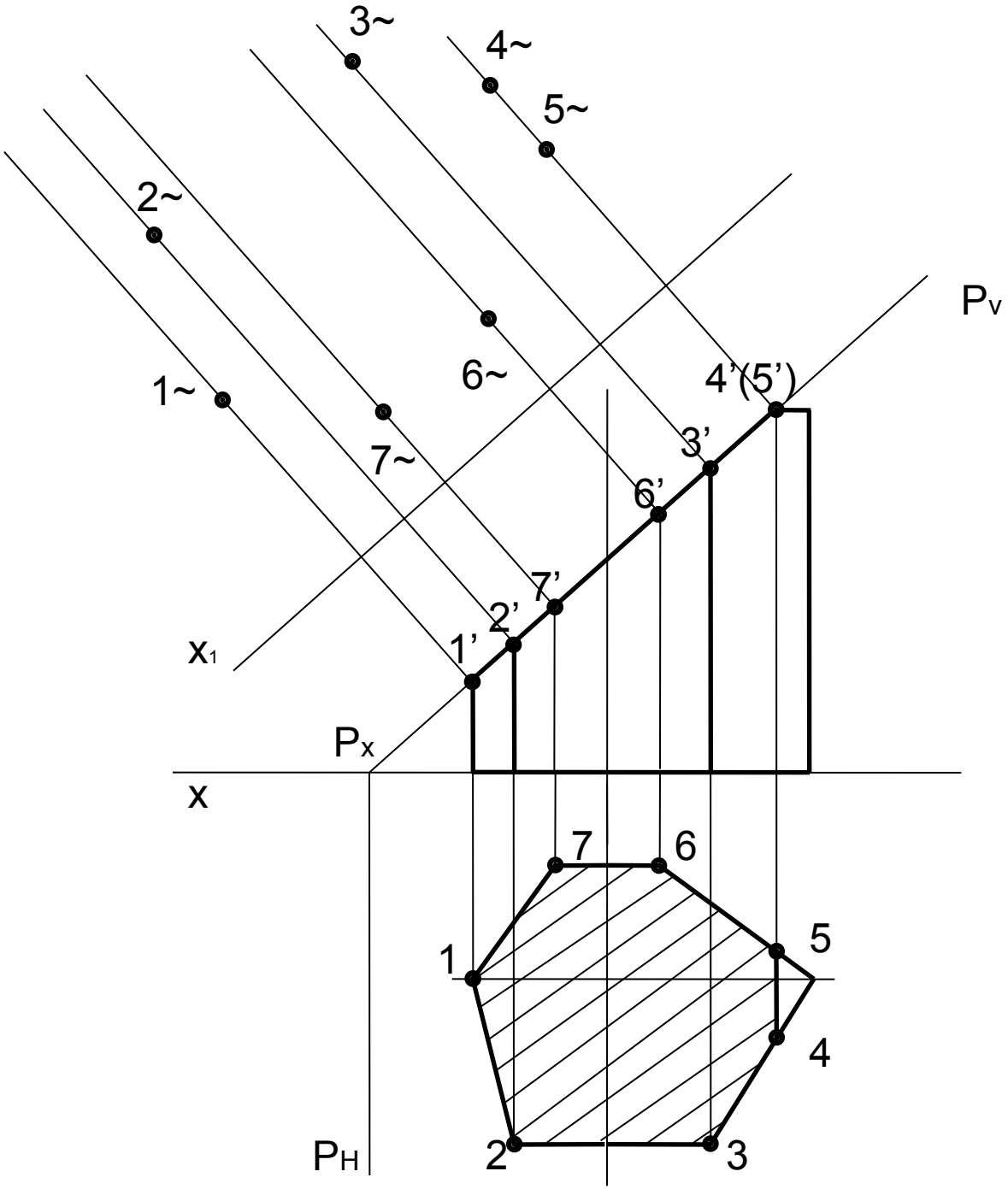
Проверка решений

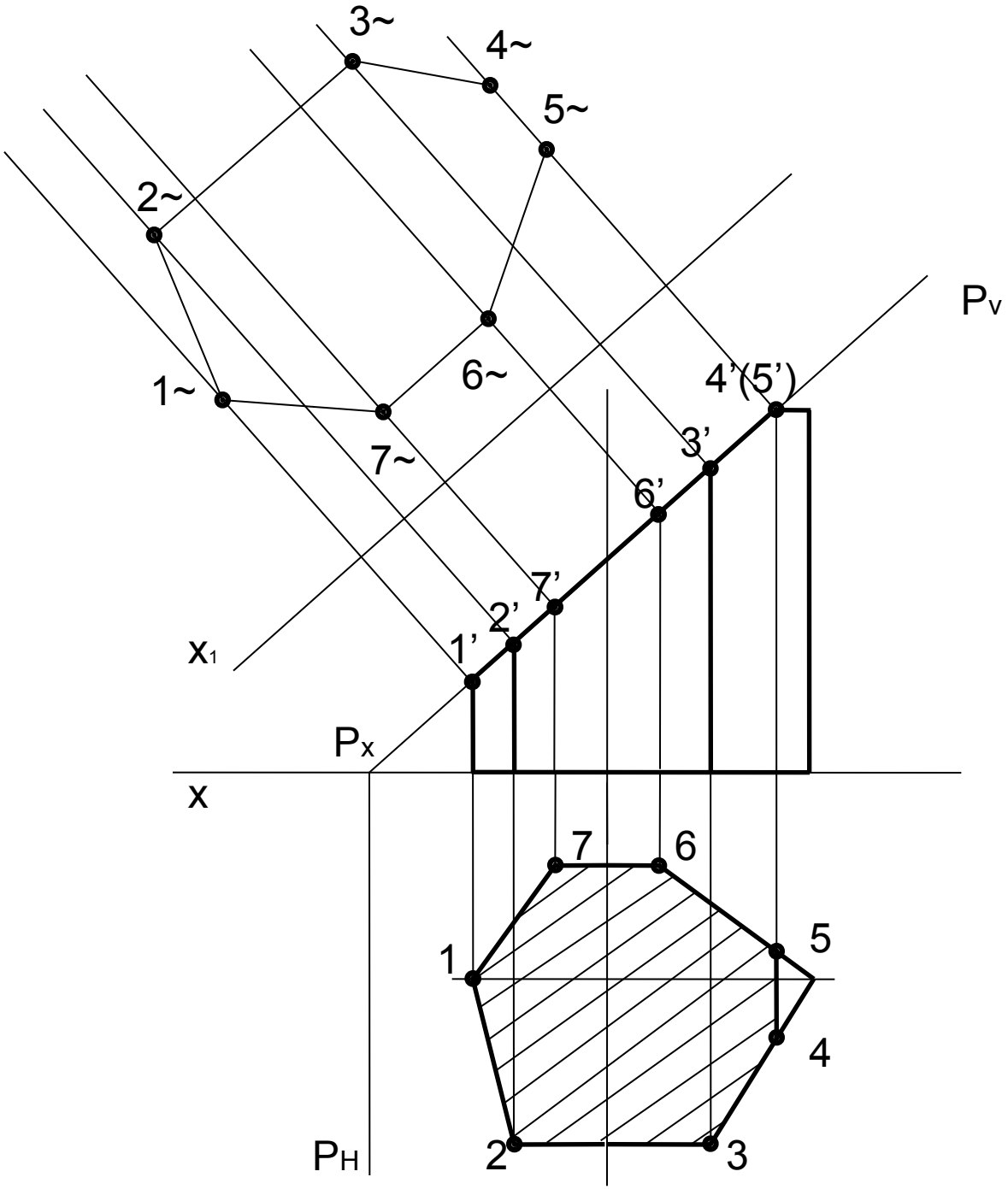

Pv
5'
4'
3'
2'
1'
Px
x
3
5
1
2
4
PH

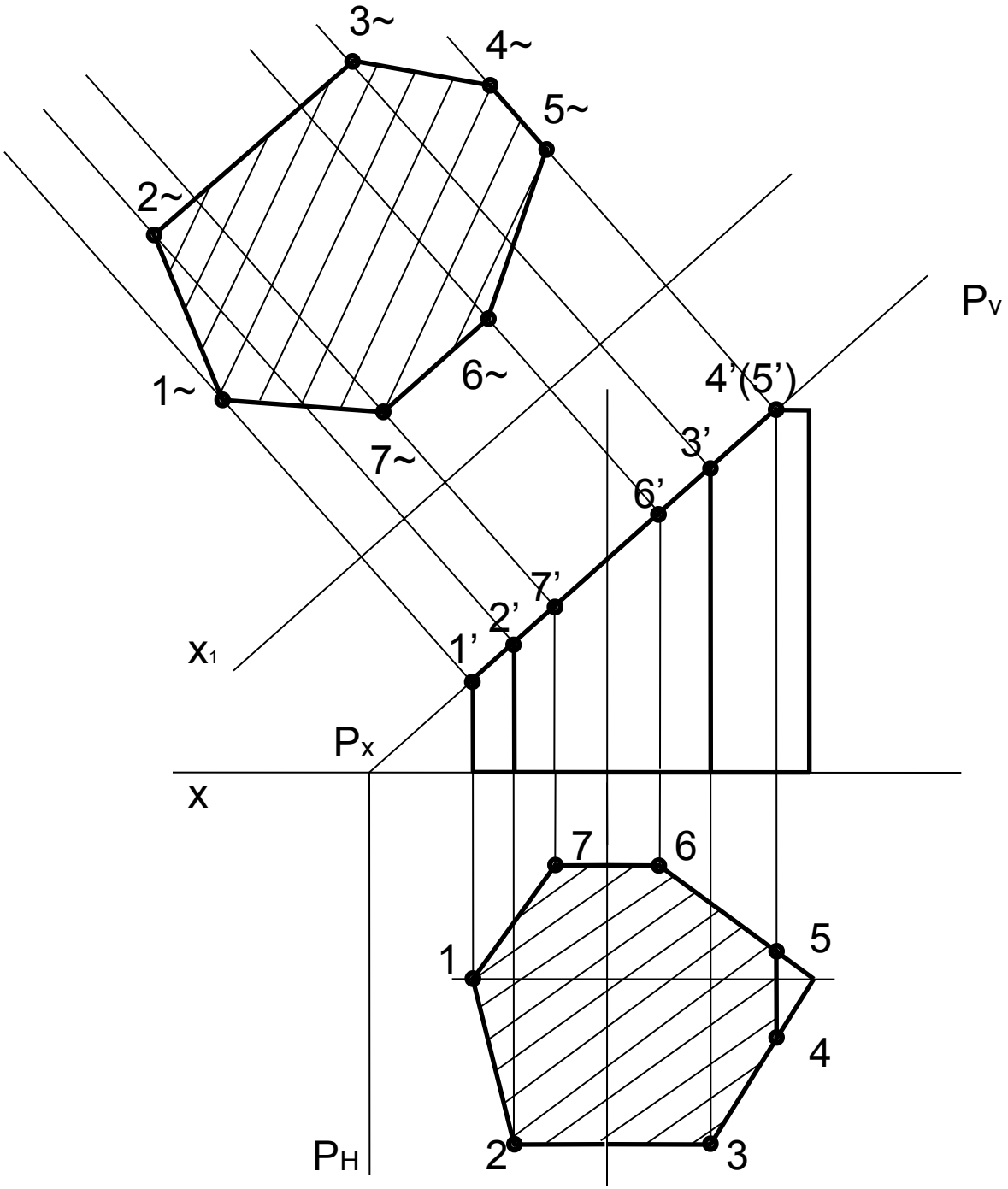

Pv
5’
4’
3’
2’
1’
Px
x
30
50
10
40
20
PH
3
5
1
2
4


Pv
5'
4'
3'
2'
1'
Px
x
30
50
10
40
20
PH
3
5
1
2
4

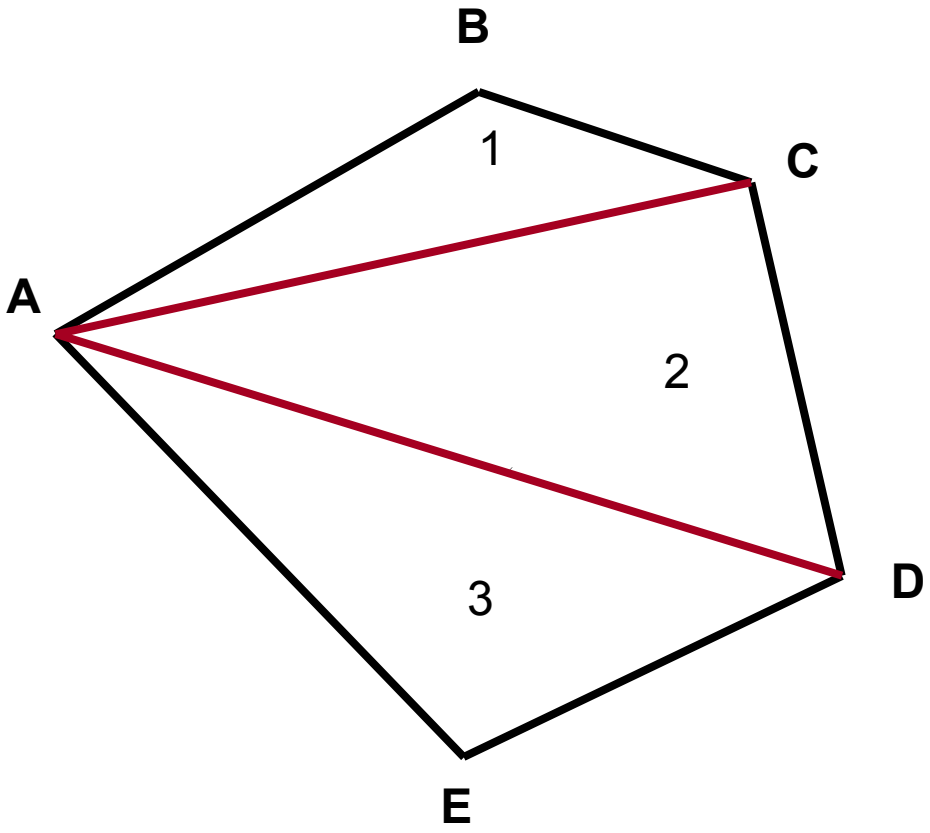

Pv
5'
4'
3'
2'
1'
Px
x
30
50
10
40
20
PH
3
5
1
2
4


3~
4~
5~
2~
1~
6~
7~
P_V
4'(5')
3'
6'
7'
2'
1'
x_1
P_X
x
7
6
1
5
4
2
3
P_H


3~
4~
5~
2~
1~
6~
7~
P_V
4'(5')
3'
6'
7'
2'
1'
x_1
P_X
x
7
6
1
5
4
2
3
P_H

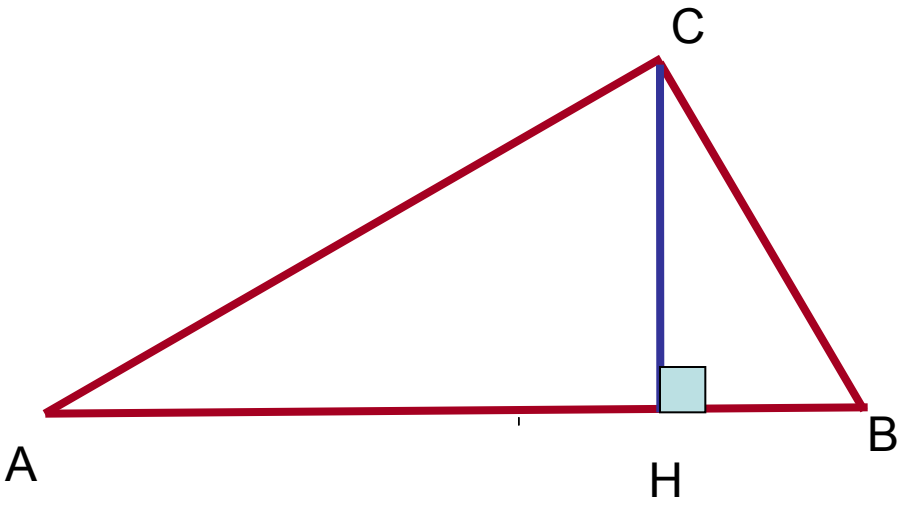

3~
4~
5~
2~
1~
6~
7~
Pv
4'(5')
3'
6'
7'
2'
1'
x1
Px
x
7
6
1
5
4
2
3
PH

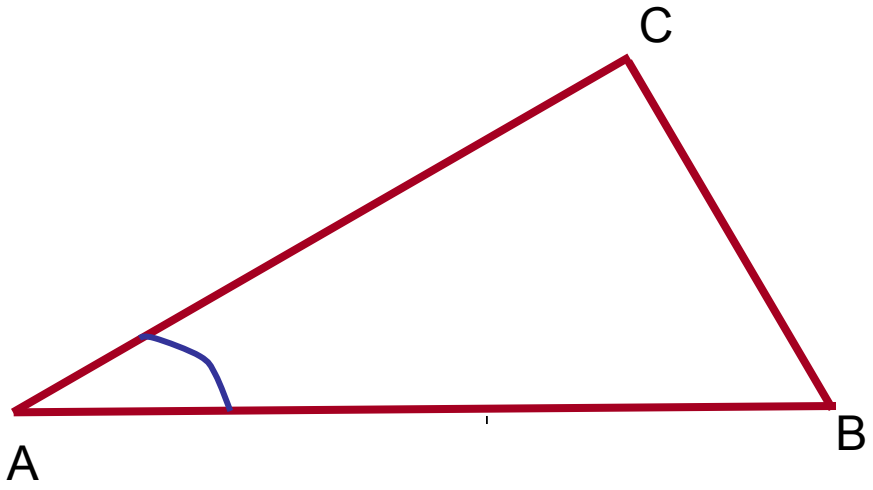
Вычисление площади многоугольника



$$S = S_1 + S_2 + S_3$$

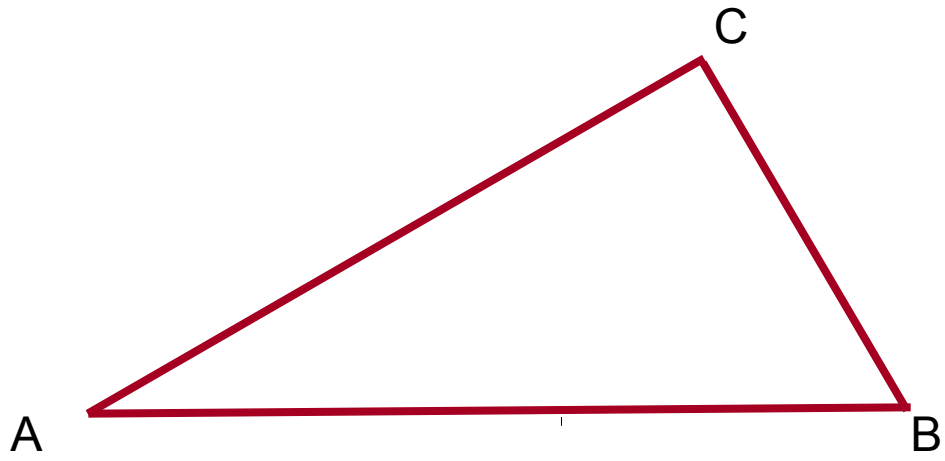
ВЫЧИСЛЕНИЕ ПЛОЩАДИ ТРЕУГОЛЬНИКА





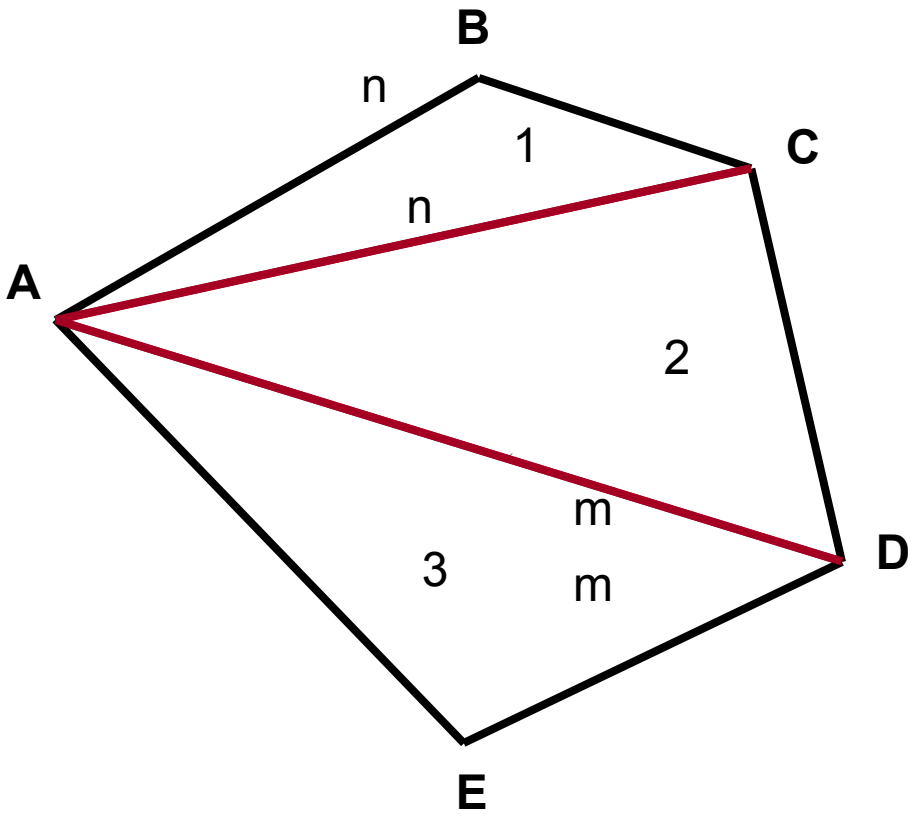
$$S = \frac{1}{2} CH\ AB$$

$$S = \frac{1}{2} AC\ AB \sin A$$



$$S = \sqrt{p(p-AB)(p-BC)(p-AC)}, \text{где } p = \frac{AB+BC+AC}{2}$$

Вычисление площади многоугольника



$$S = S_1 + S_2 + S_3$$