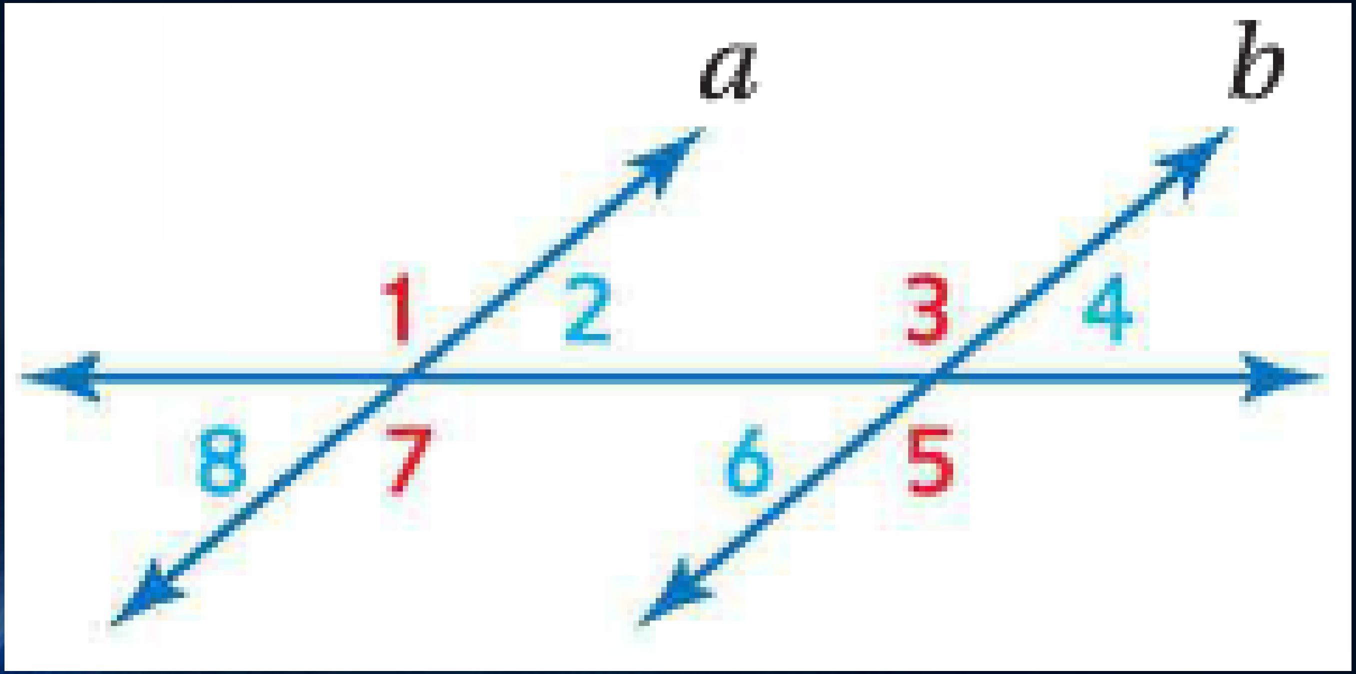
Proving Lines Parallel

PERPENDICULARS AND DISTANCE

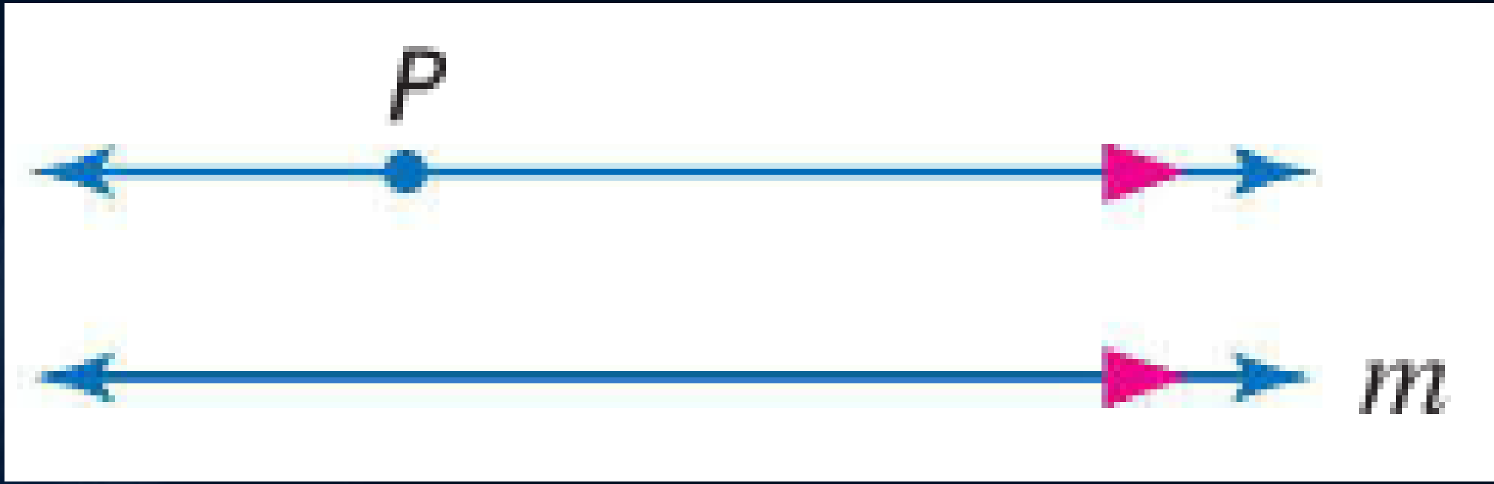
Converse of Corresponding Angles

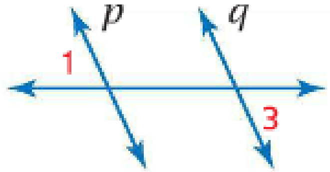
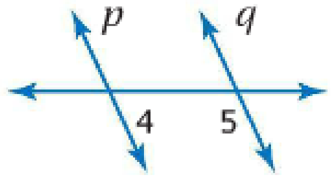
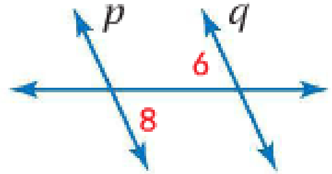
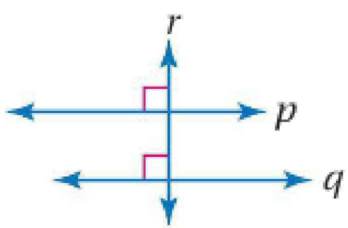
- If two lines are cut by a transversal so that corresponding angles are congruent, then the lines are parallel.



Parallel Postulate

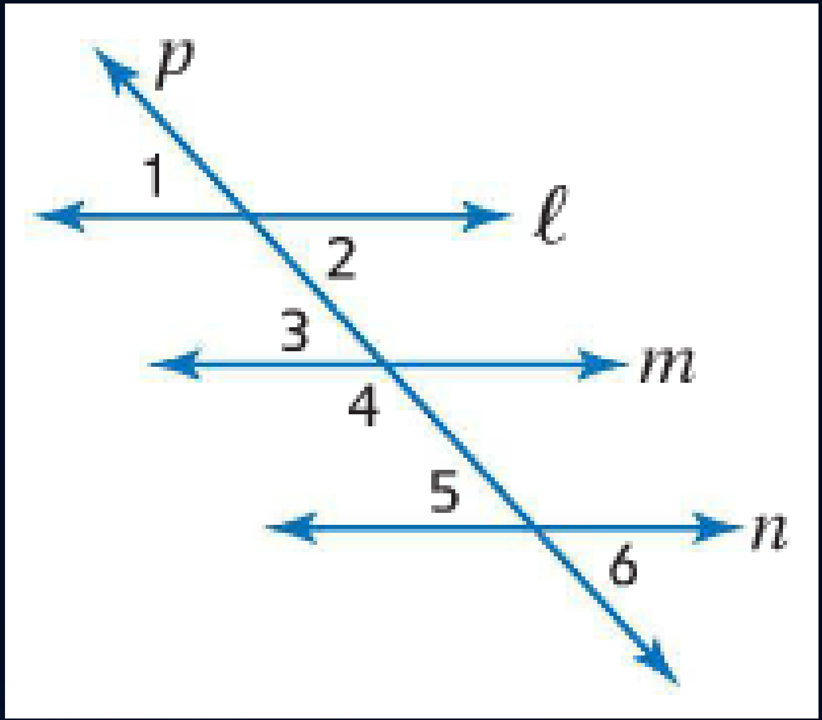
- If given a line and a point not on the line, then there exists exactly one line through the point that is parallel to the given line.



Alternate Exterior Angles Converse If two lines in a plane are cut by a transversal so that a pair of alternate exterior angles is congruent, then the two lines are parallel.	 If $\angle 1 \cong \angle 3$, then $p \parallel q$.
Consecutive Interior Angles Converse If two lines in a plane are cut by a transversal so that a pair of consecutive interior angles is supplementary, then the lines are parallel.	 If $m\angle 4 + m\angle 5 = 180$, then $p \parallel q$.
Alternate Interior Angles Converse If two lines in a plane are cut by a transversal so that a pair of alternate interior angles is congruent, then the lines are parallel.	 If $\angle 6 \cong \angle 8$, then $p \parallel q$.
Perpendicular Transversal Converse In a plane, if two lines are perpendicular to the same line, then they are parallel.	

Examples

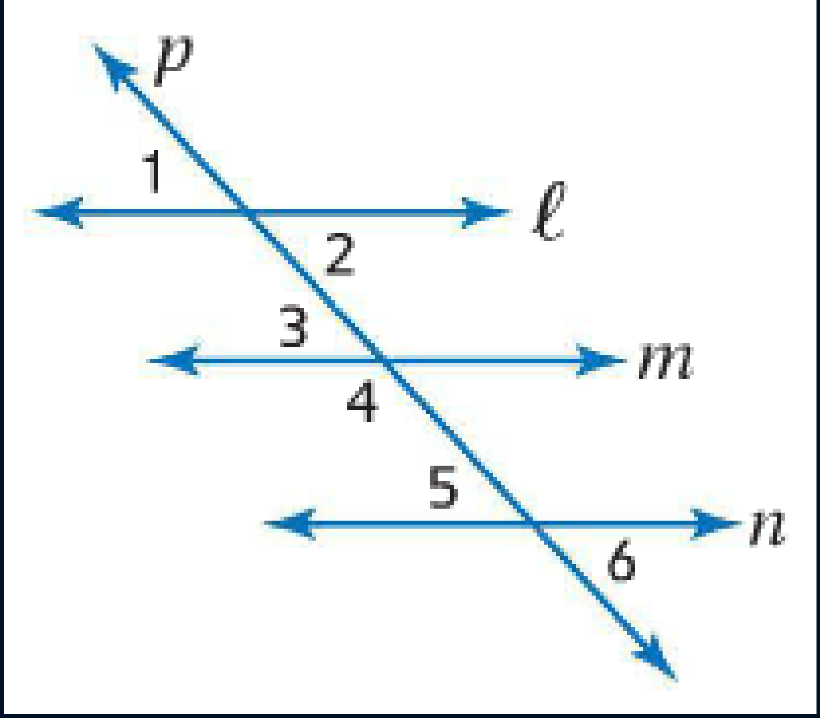
- Determine which lines, if any, are parallel. State the postulate or theorem that justifies your answer.



- $\angle 1 \cong \angle 6$

Examples

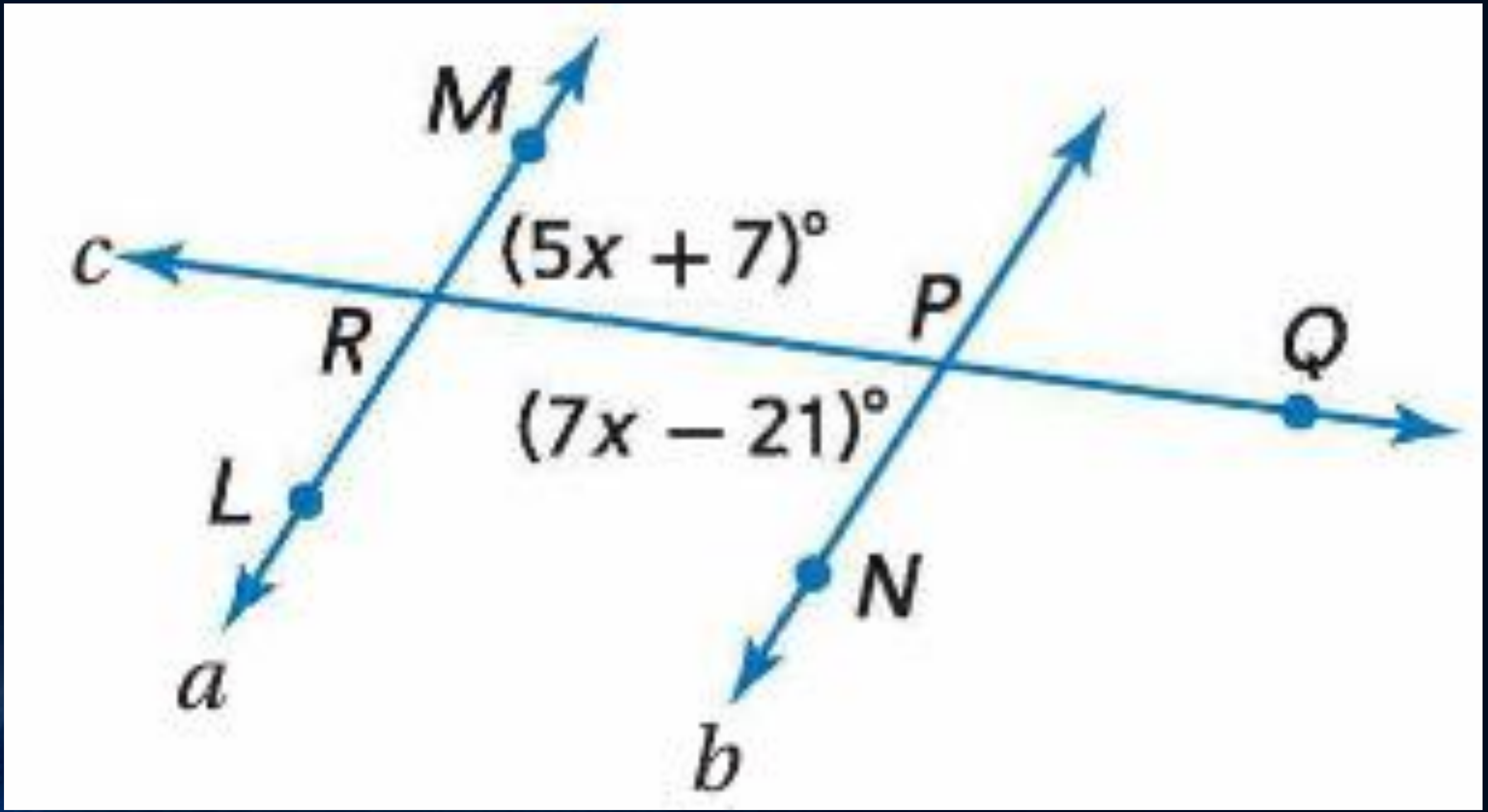
- Determine which lines, if any, are parallel. State the postulate or theorem that justifies your answer.



- $\angle 2 \cong \angle 3$

Examples

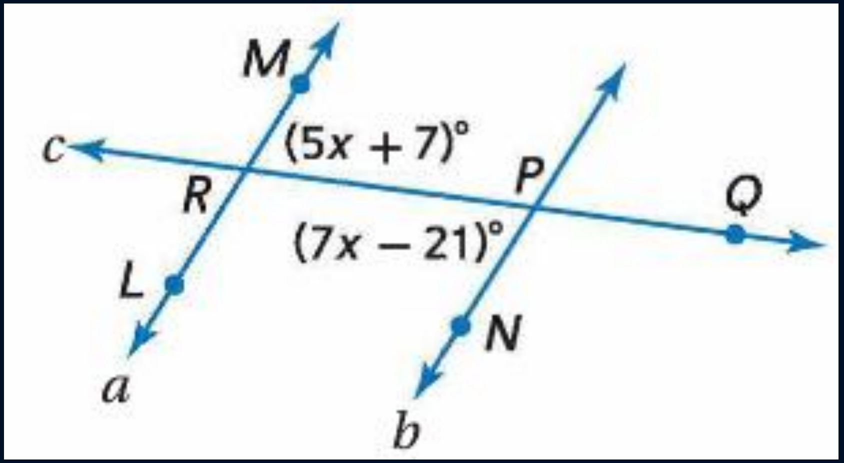
- Find $m\angle MRQ$ so that a ∥ b.



Examples

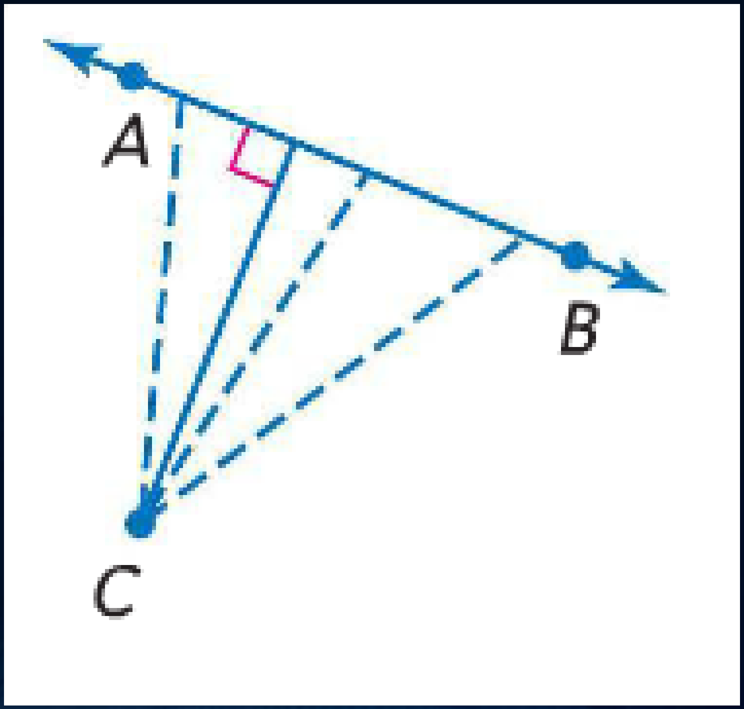
- Find $m\angle MRQ$ so that a ∥ b.

- Alt. Int. Angles
- $5x + 7 = 7x - 21$
- $28 = 2x$
- $14 = x$



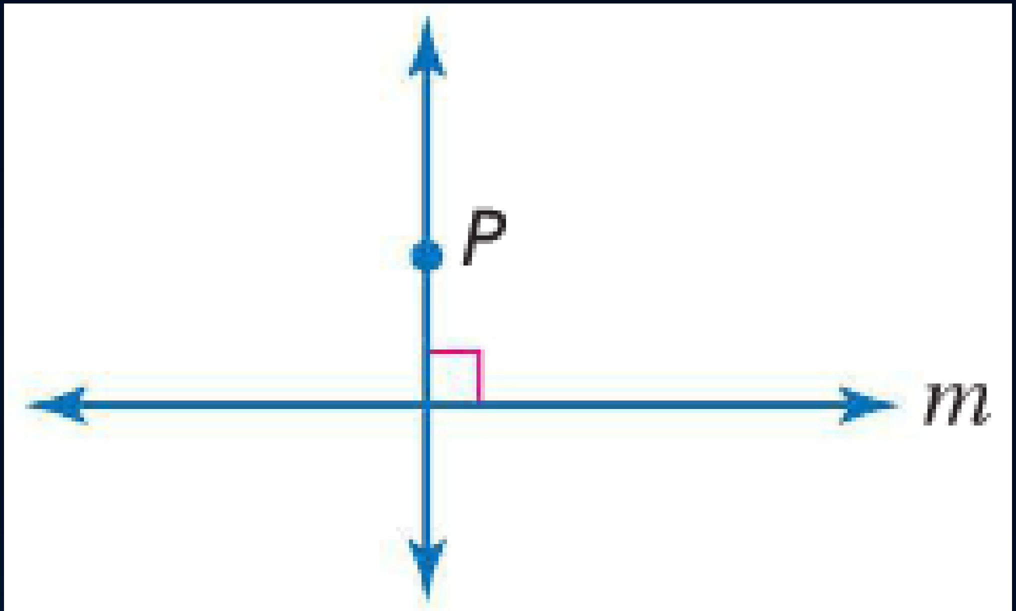
Perpendiculars and Distance

- The distance between a line and a point not on the line is the length of the segment perpendicular to the line from the point.



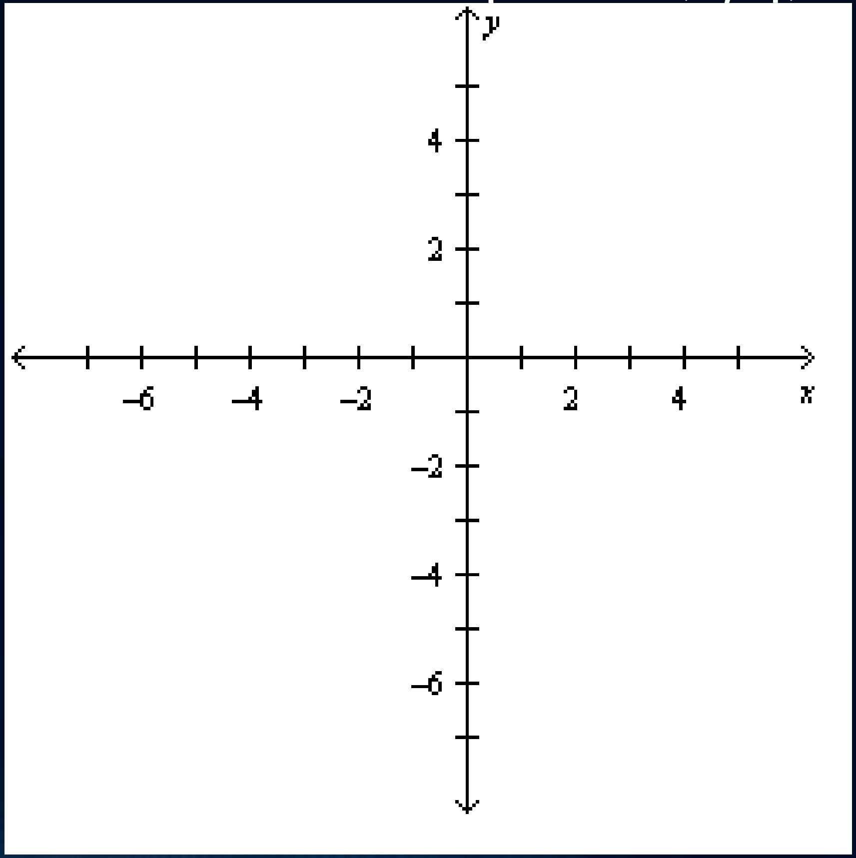
Perpendicular Postulate

- If given a line and a point not on the line, then there exists exactly one line through the point that is perpendicular to the given line.



Examples

- Line ℓ contains points at (-5, 3) and (4, -6). Find the distance between line ℓ and point *P*(2, 4).



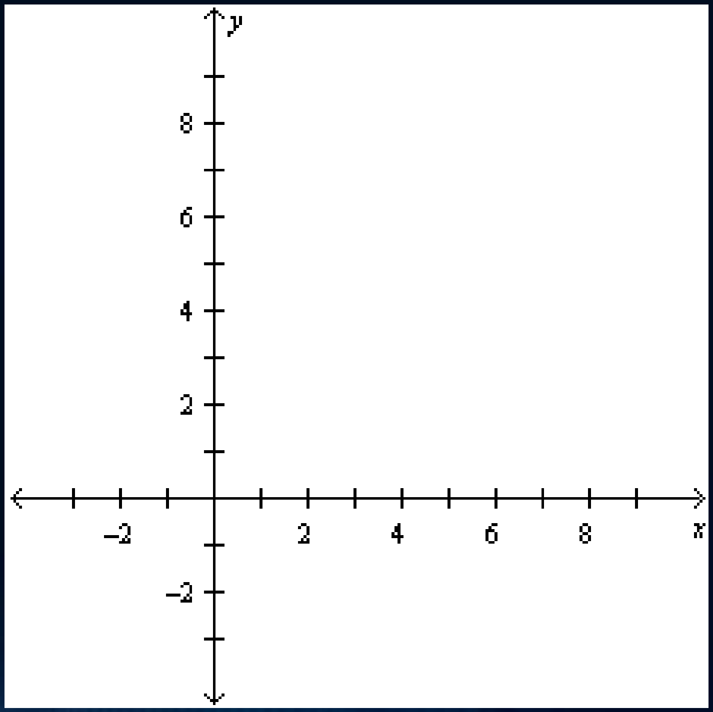
Examples

- Line ℓ contains points at (-5, 3) and (4, -6). Find the distance between line ℓ and point *P*(2, 4).

- x: 4 units
- y: 4 units
- distance is $\sqrt{(4^2 + 4^2)} = \sqrt{32} = 4\sqrt{2}$

Examples

- Line ℓ contains points at (1, 2) and (5, 4). Construct a line perpendicular to l through *P*(1, 7). Then find the distance from *P* to ℓ.



Examples

- Line $\boldsymbol{\ell}$ contains points at (1, 2) and (5, 4). Construct a line perpendicular to l through *P*(1, 7). Then find the distance from *P* to $\boldsymbol{\ell}$.

x: 2 units

y: -4 units

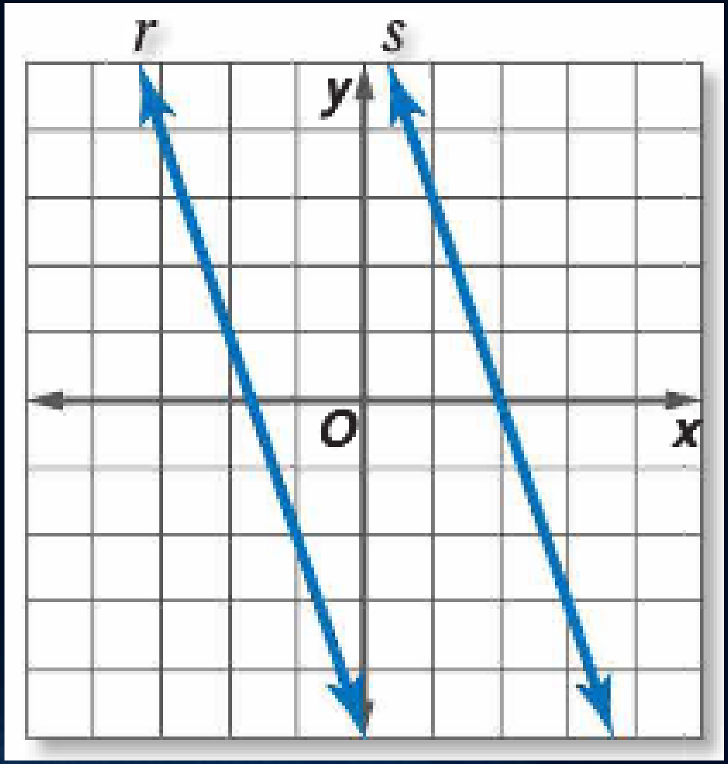
distance is $\sqrt{(2^2 + 4^2)} = \sqrt{20} = 2\sqrt{5}$

Theorem

- In a plane, if two lines are each equidistant from a third line, then the two lines are parallel to each other.

Examples

- Find the distance between the parallel lines r and s whose equations are $y = -3x - 5$ and $y = -3x + 6$, respectively.



Examples

- Find the distance between the parallel lines r and s whose equations are $y = -3x - 5$ and $y = -3x + 6$, respectively.

- $m_{\perp} = 1/3$
- point = (-2, 1)