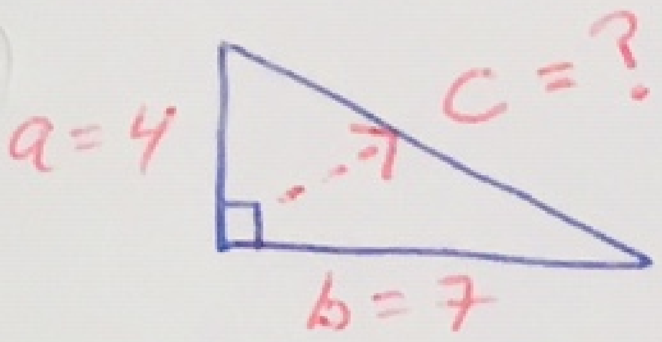
$R_{1.1}$

Pythagorean Theorem:

$$a^2+b^2=c^2$$



$$4^2+7^2=c^2$$
$$16+49=c^2$$
$$65=c^2$$
$$\sqrt{65}=c$$
OR
$$8.06 \approx c$$

Distance Formula:

$$\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$$

$(-2,2)$ and $(3,4)$

$x_1 \; y_1 \qquad x_2 \; y_2$

$$\sqrt{(3-(-2))^2+(4-2)^2}$$
$$\sqrt{5^2+2^2}$$
$$\sqrt{29}$$
OR
$$\approx 5.39$$

Midpoint Formula:

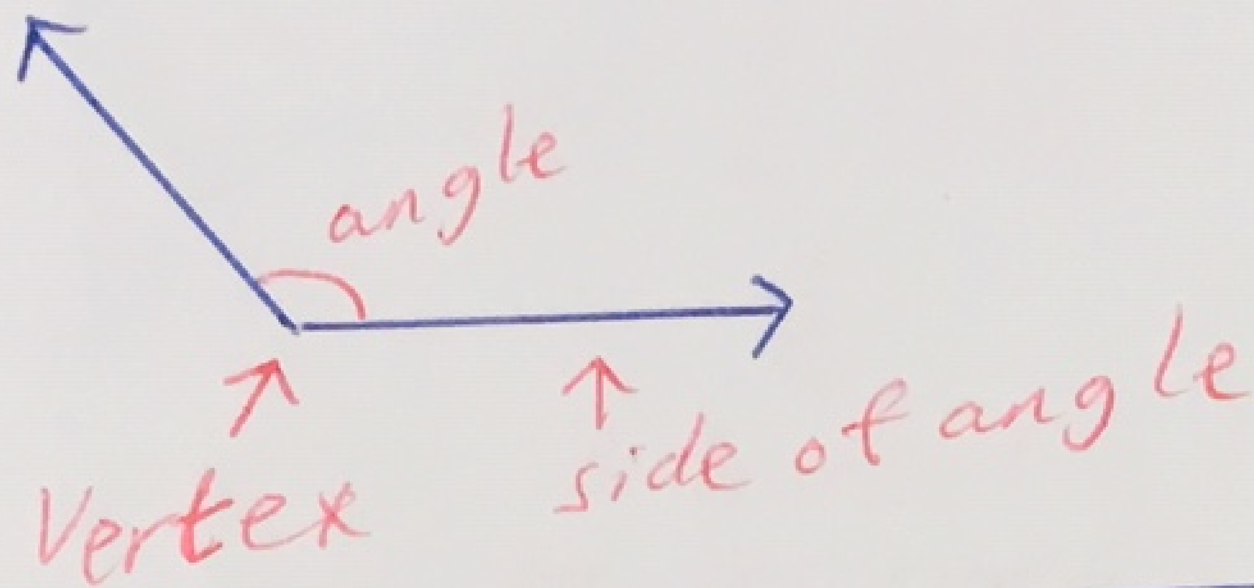
$$\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$$

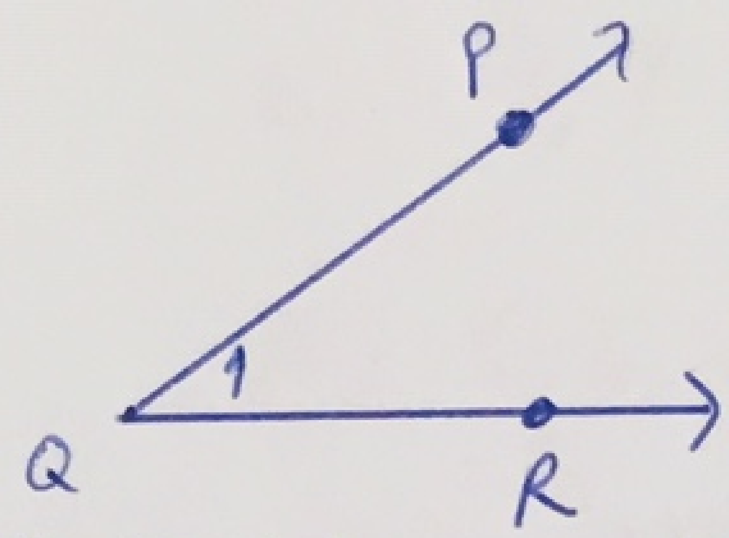
$(-2,2)$ and $(3,4)$

$x_1 \; y_1 \qquad x_2 \; y_2$

$$\left(\frac{-2+3}{2}, \frac{2+4}{2}\right)$$
$$\left(\frac{1}{2}, 3\right)$$

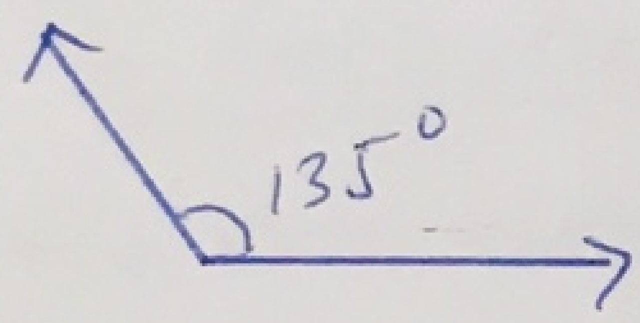
Angle Measures

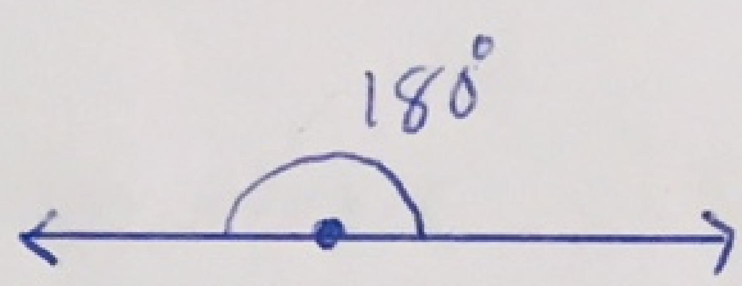


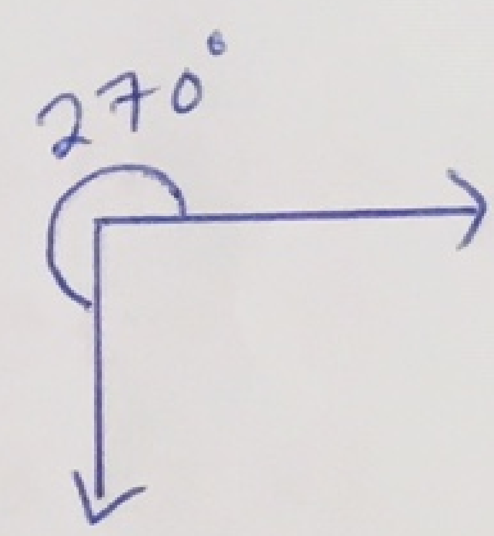


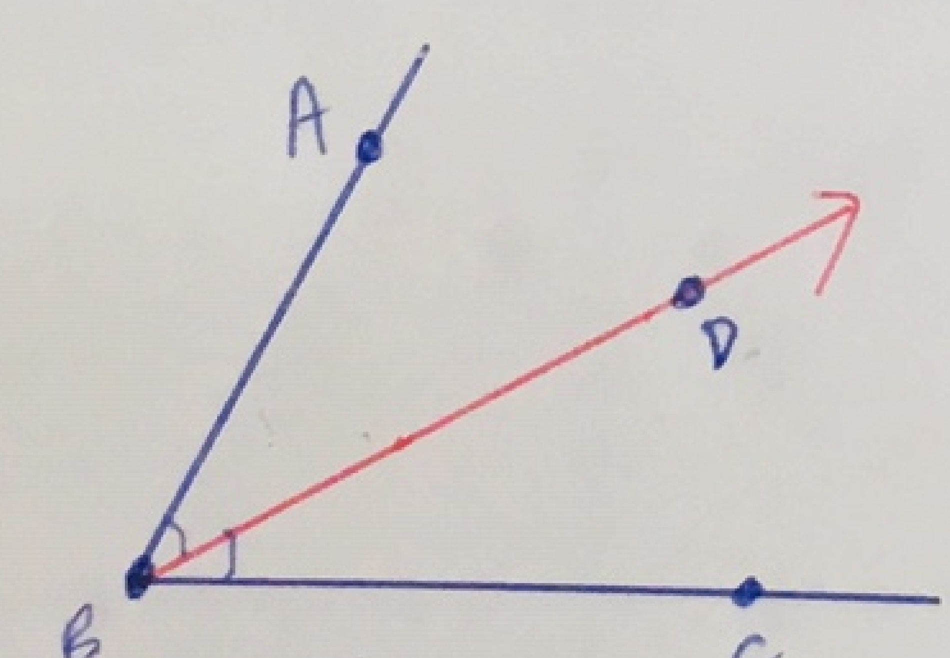
What is the angle called?

$\angle PQR$
$\angle RQP$
$\angle Q$
$\angle 1$



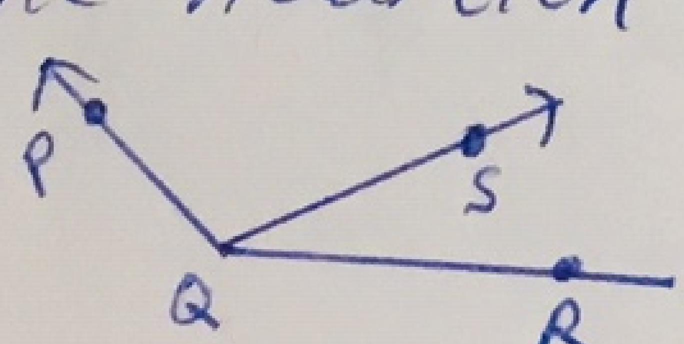






$\overrightarrow{BD}$ bisects $\angle ABC$ so that $\angle ABD = \angle CBD$

Angle Addition Postulate:

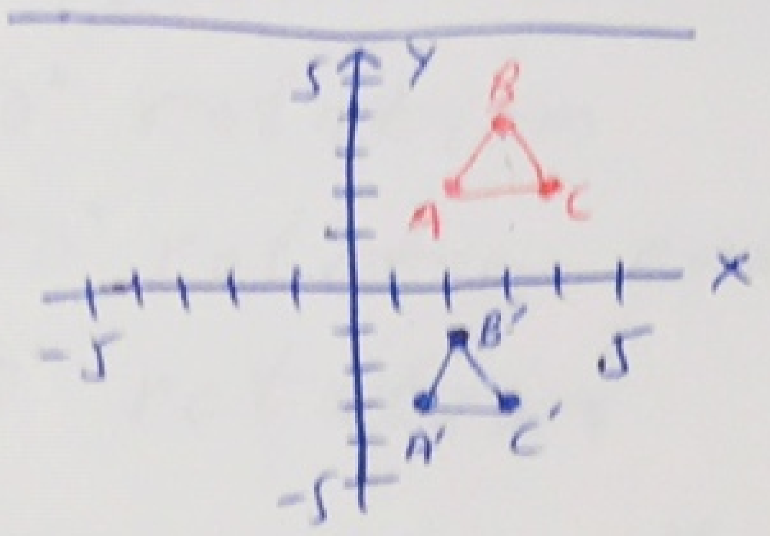


If $\angle SQR = 40°$ and $\angle RQP = 130°$ then $\angle SQR$ must be $130 - 40 = 90°$

SUMMARY Translations, Reflections, Rotations

Translations

R2.1



A (2,2)
B (3,4)
C (4,2)

↓

A translation could be described in 3 ways:

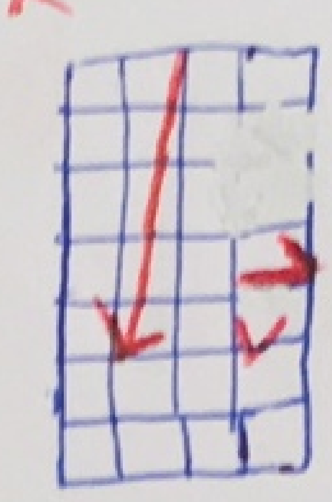
1.) $(X-1, Y-5)$ ← IN COORDINATE NOTATION

OR

2.) $\langle -1, -5 \rangle$ ← vector form OR COMPONENT FORM

OR

3.)



Reflections

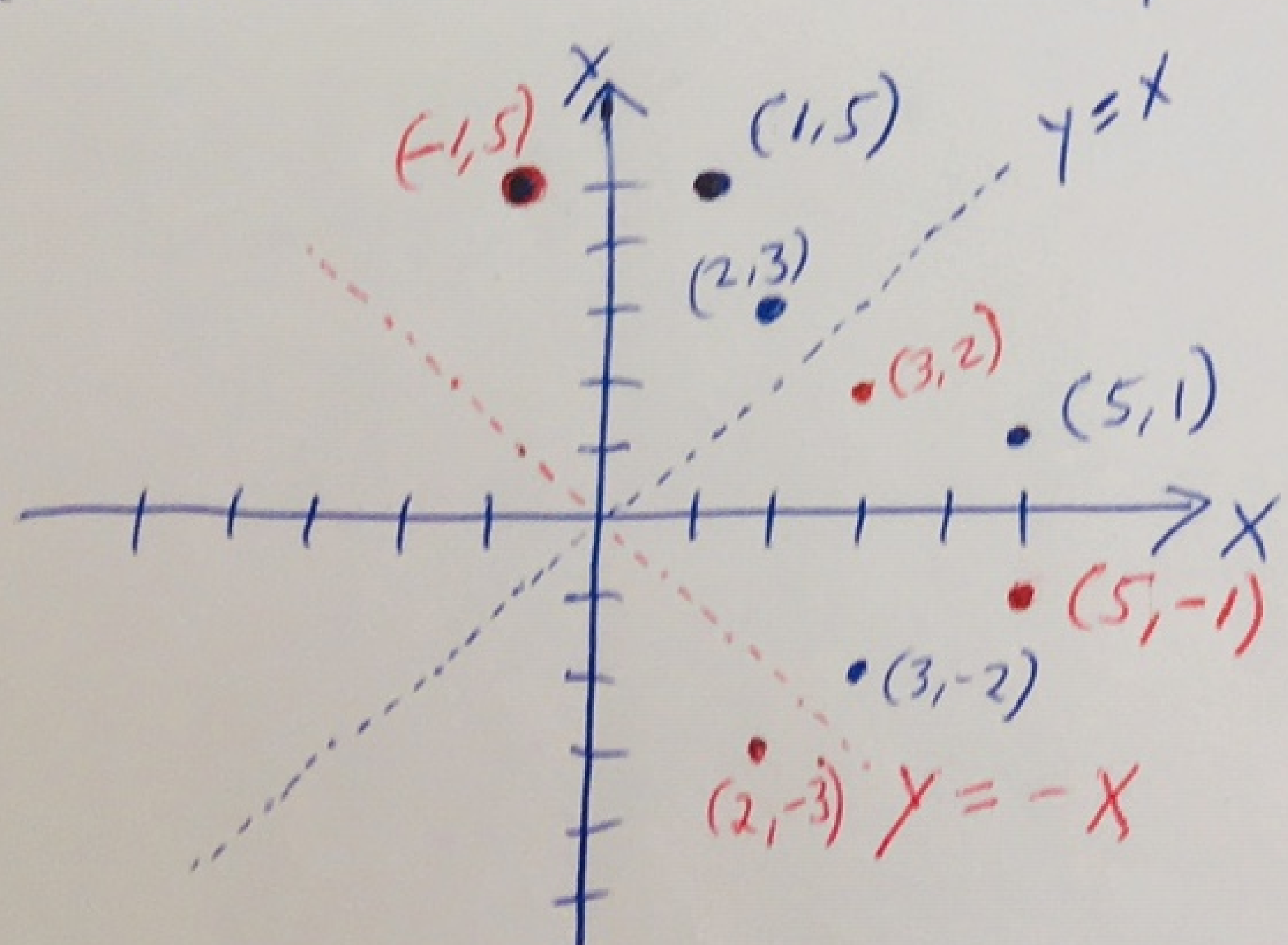
R2.2

Reflection across the x-axis $(X,Y) \rightarrow (X,-Y)$

Reflection across the y-axis $(X,Y) \rightarrow (-X,Y)$

Reflection across the line $y=x$ $(X,Y) \rightarrow (Y,X)$

Reflection across the line $y=-x$ $(X,Y) \rightarrow (-Y,-X)$



OR

Draw a perpendicular line and count squares.

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Rotations

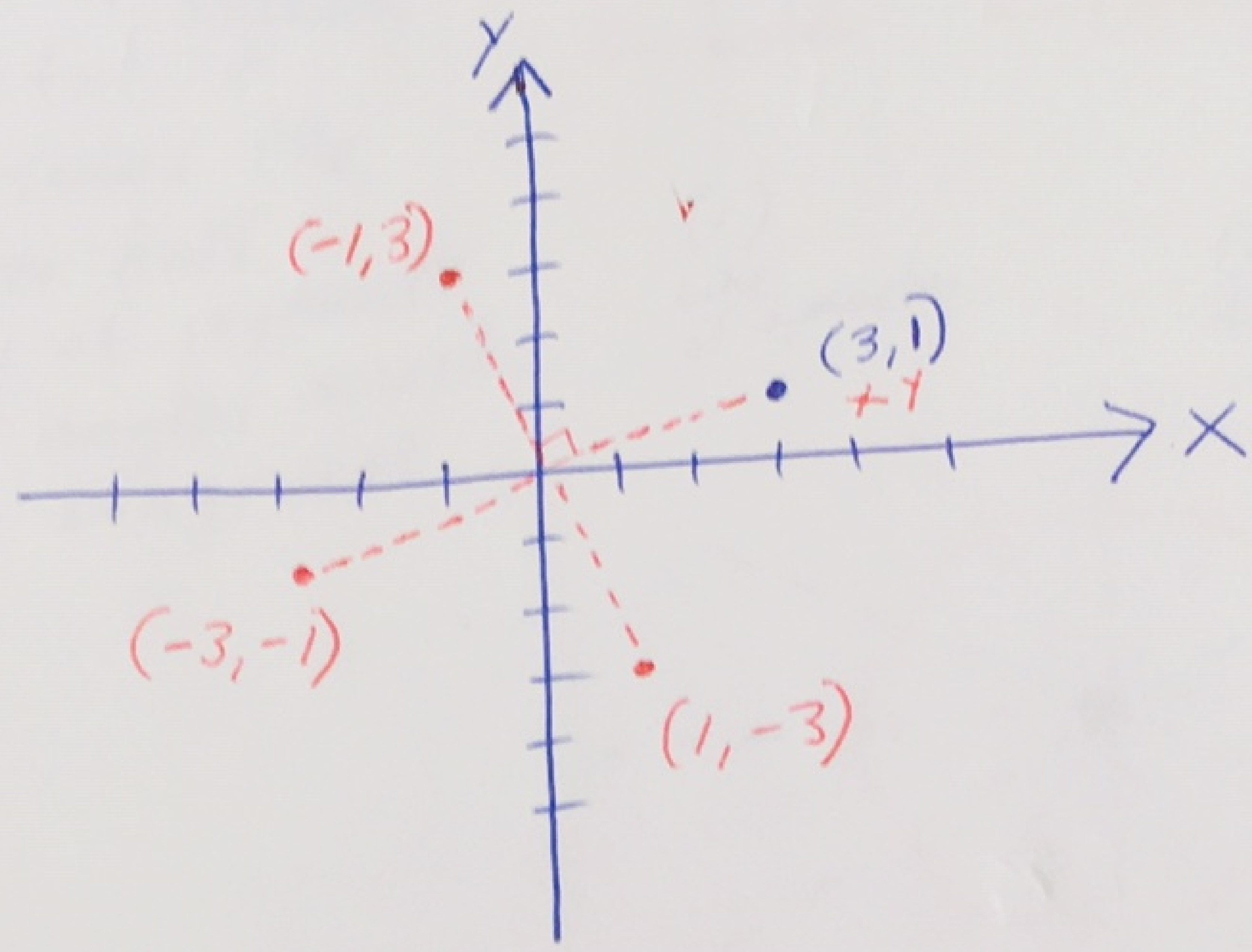
(R 2.3)

90° rotation counterclockwise $(x,y) \to (-y,x)$

180° rotation $(x,y) \to (-x,-y)$

270° rotation counterclockwise $(x,y) \to (y,-x)$

360° rotation $(x,y) \to (x,y)$



OR

Use a protractor

OR

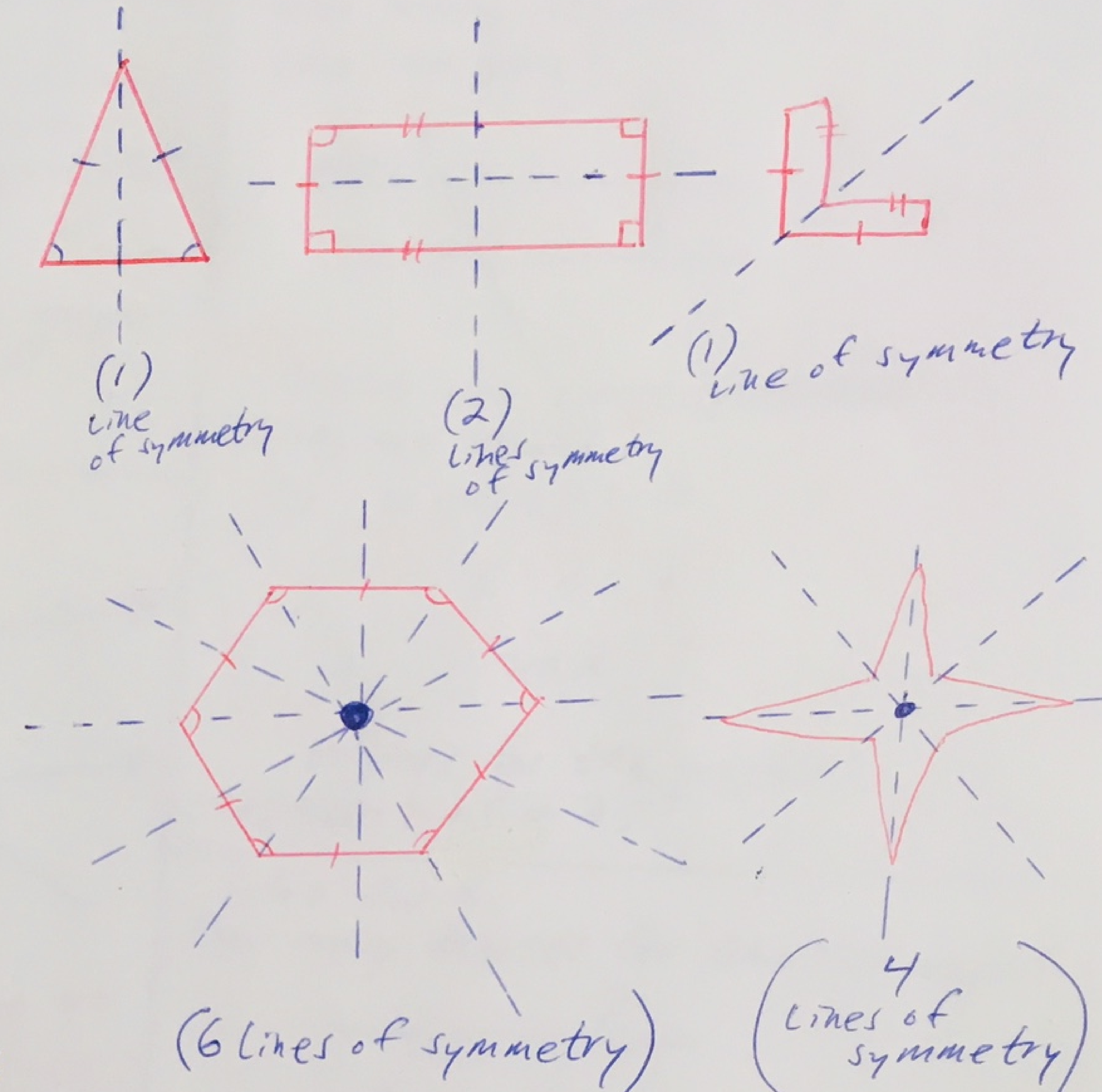
Use tracing paper

R 2.4

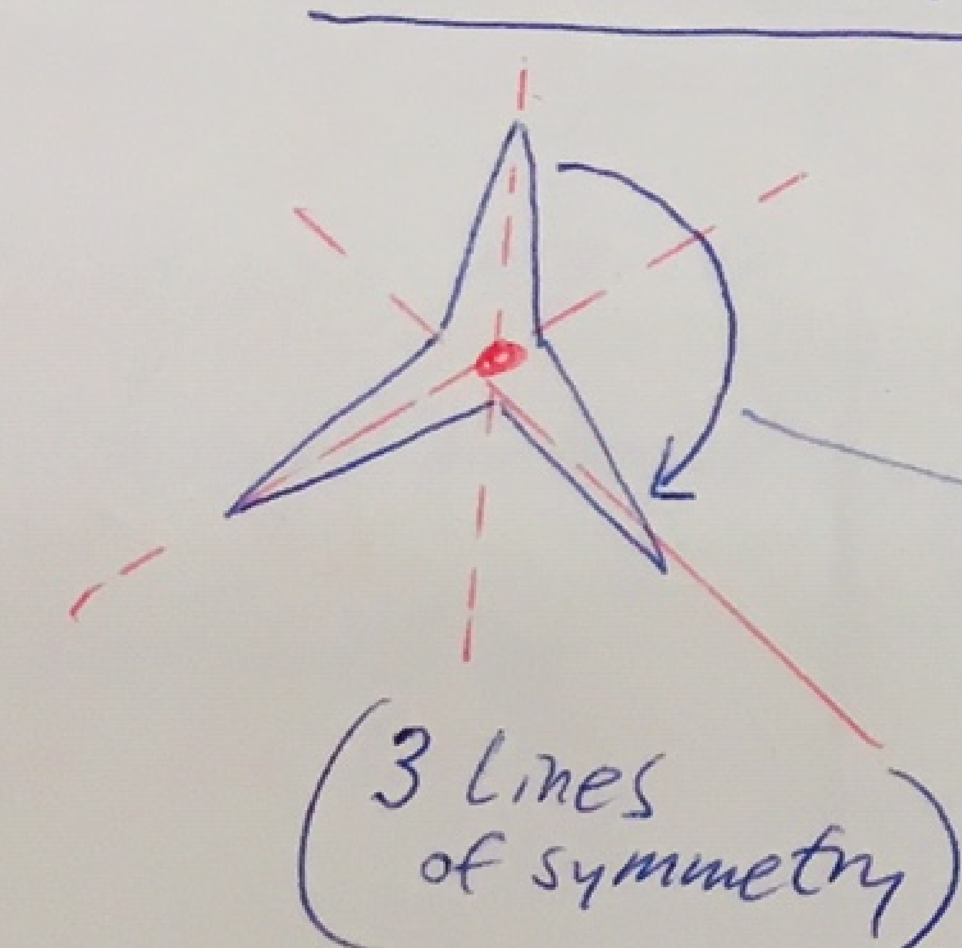
Symmetry

Line Symmetry:

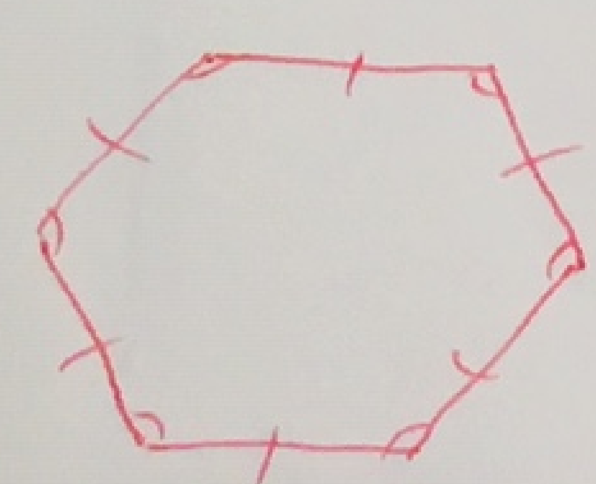
If a figure can be folded so that it matches the other half. Pairs of segments and angles must be congruent.



Rotational Symmetry:



For Rotational Symmetry, how much do you have to turn the top arm of the star to overlap? $\frac{360}{3} = 120°$



For this one rotational symmetry would be $\frac{360}{6} = 72°$

6 sides

Revised January 5, 2015

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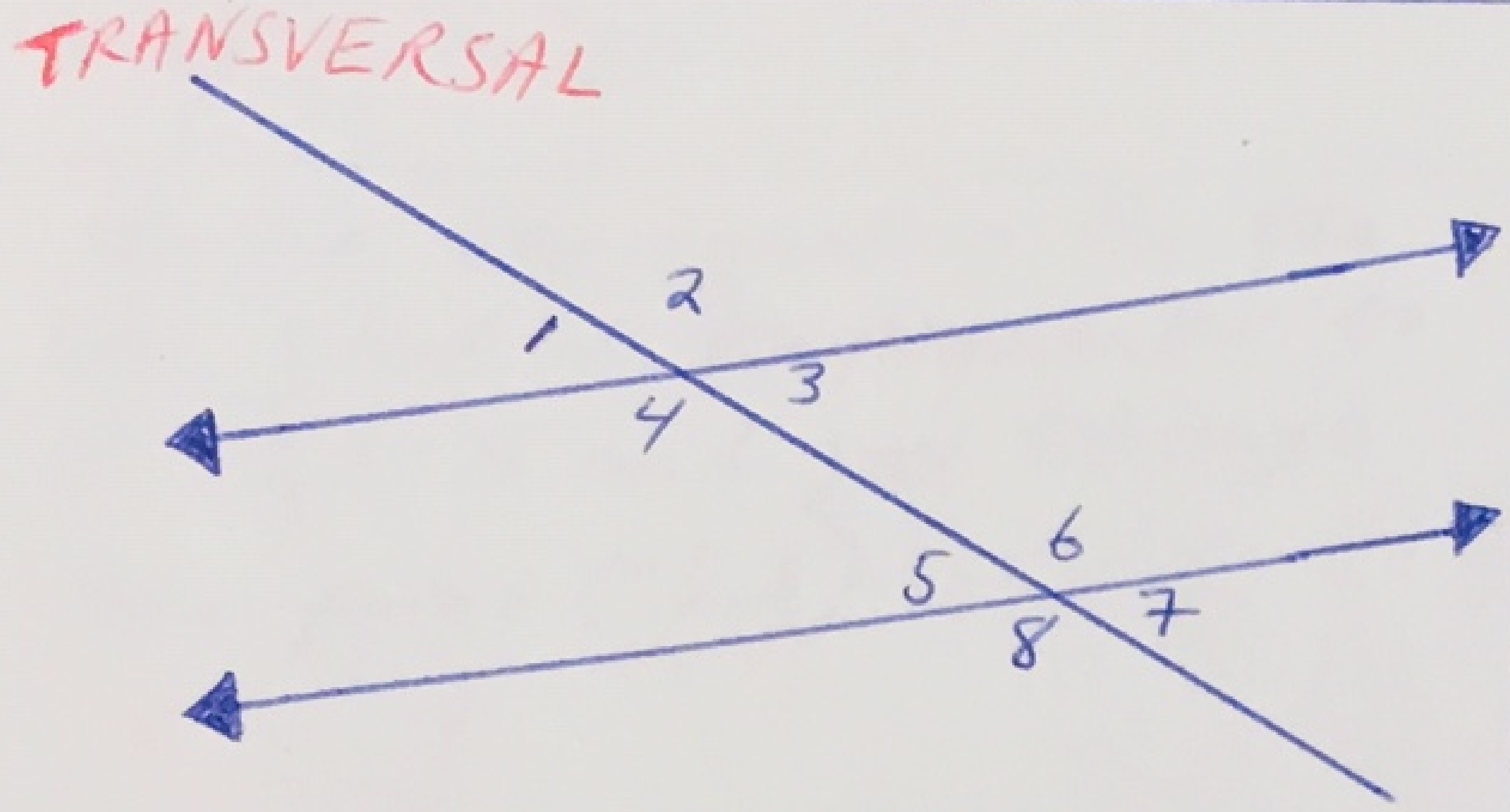
R4.1
4.2

Congruent angles = same degree measure

Supplementary angles = if sum of two angles equal 180°

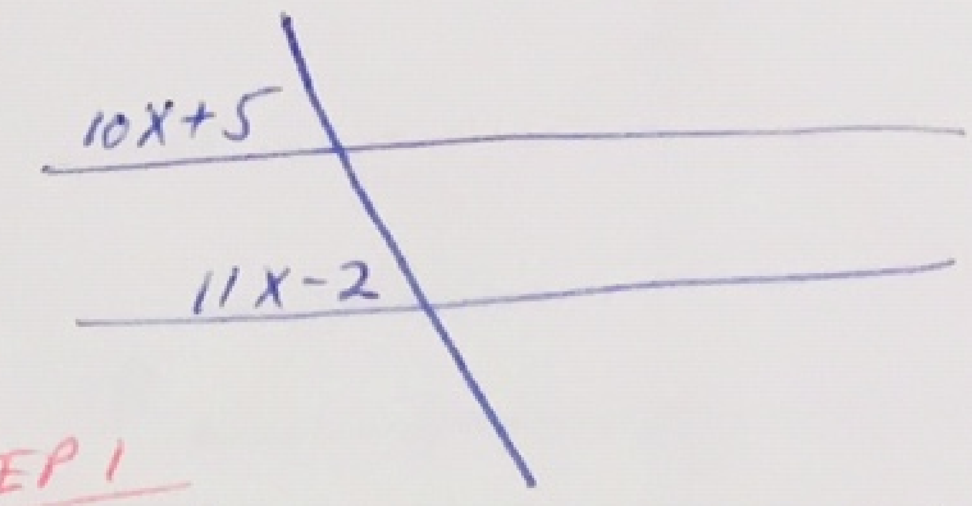
Complementary angles = if sum of two angles equal 90°

TRANSVERSAL



Equal Angles *	Different ** (but add up to 180°)
• Vertical or Opposite 1,3 2,4	• Linear Pair 1,2 2,3 3,4 1,4
• Alternate Interior 3,5 4,6	• Same Side Interior 4,5 3,6
• Alternate Exterior 1,7 2,8	• Same Side Exterior 1,8 2,7
• Corresponding 1,5 2,6 4,8 3,7	

Solve for X.
How many degrees are the angles?

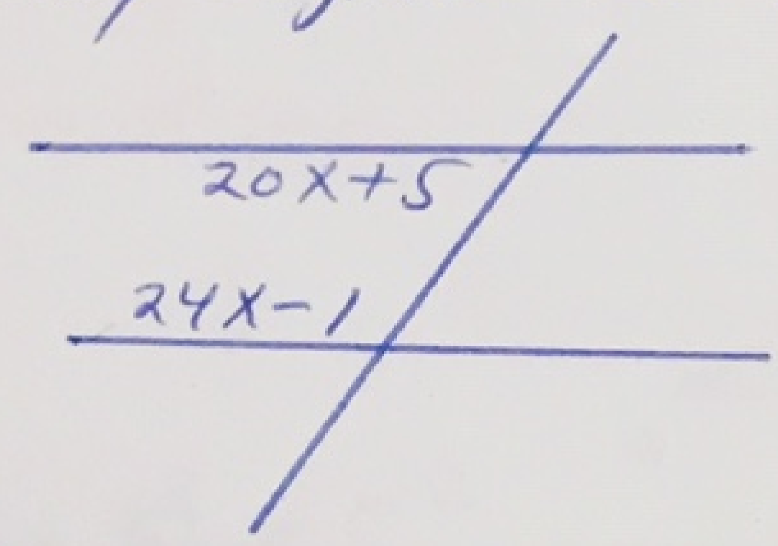


STEP 1
Angles are corresponding so they are equal *

So $10x+5 = 11x-2$
$-10x \quad\quad -10x$
$5 = x - 2$
$+2 \quad\quad +2$
$7 = x$

STEP 2
Degrees for the angles:
$10x+5 = 10 \cdot 7 + 5 = 75°$

Solve for X.
How many degrees for the top angle?



STEP 1
Angles are Same Side Interior so DIFFERENT and ADD UP TO 180°.

So $(20x+5)+(24x-1) = 180$
$44x + 4 = 180$
$-4 \quad\quad -4$
$44x = 176$
$\frac{44x}{44} = \frac{176}{44}$
$x = 4$

So top angle is $20x+5 = 20 \cdot 4 + 5 = 85°$

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$R_{4.4,\ 4.5}$

$$\boxed{y - \underline{y_1} = \underline{m}(x - \underline{x_1})}$$

POINT SLOPE FORMULA

Write the equation for the line that is parallel to $y = 3x + 2$ and goes through the point $(2, -4)$
$x_1,\ y_1$

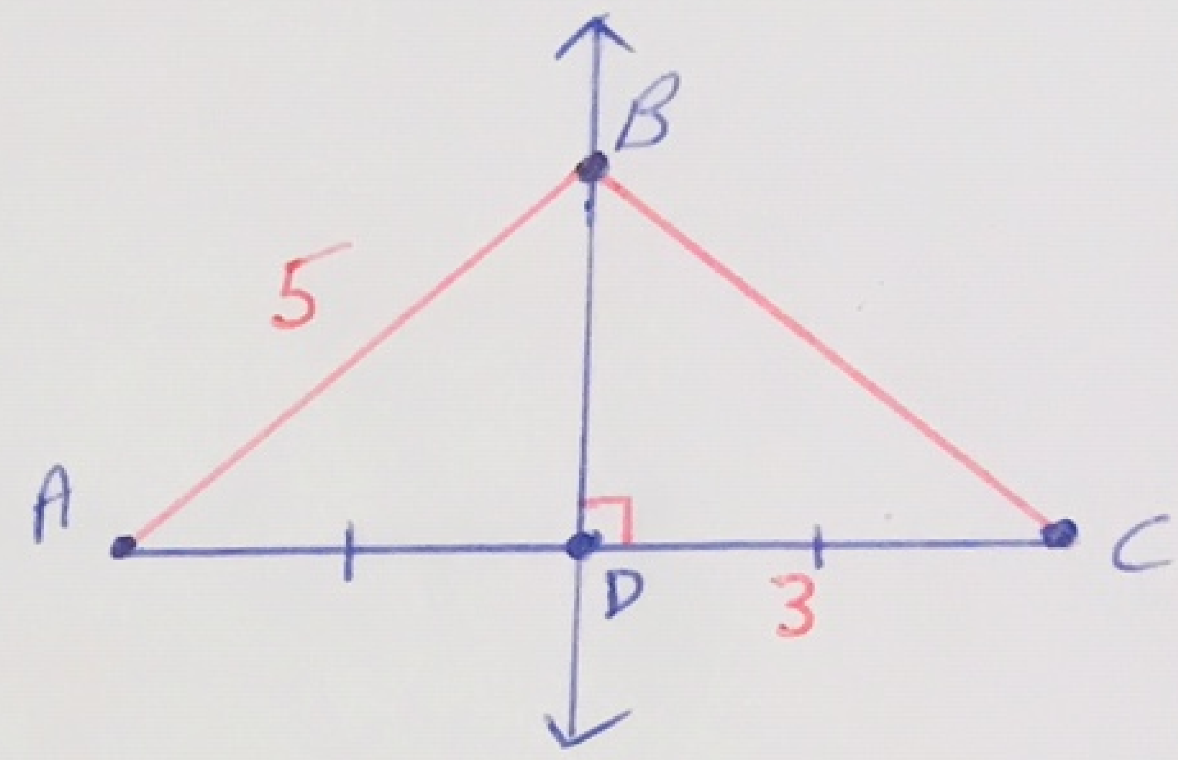
$$y - (-4) = 3(x - 2)$$
$$y + 4 = 3x - 6$$
$$-4 \qquad\qquad -4$$
$$y = 3x - 10$$

Write the equation for the Line that is perpendicular to $y = \frac{5}{9}x - 4$ and goes through the point $(-5, 5)$.
$x_1,\ y_1$

$$m = -\frac{9}{5}$$

$$y - 5 = -\frac{9}{5}(x - (-5))$$
$$y - 5 = -\frac{9}{5}(x + 5)$$
$$y - 5 = -\frac{9}{5}x - \frac{45}{5}$$
$$y - 5 = -\frac{9}{5}x - 9$$
$$+5 \qquad\qquad +5$$
$$y = -\frac{9}{5}x - 4$$

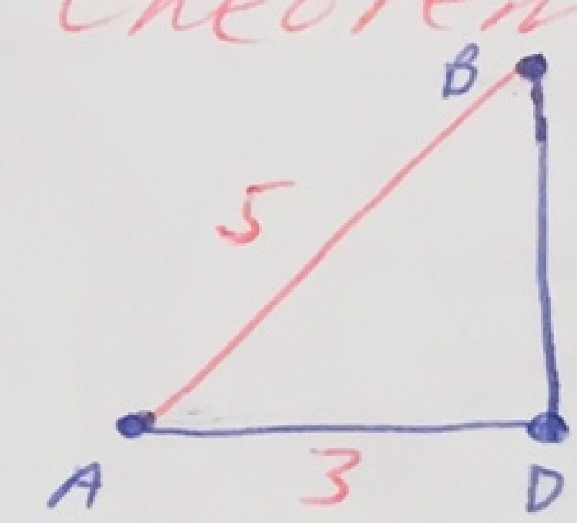
Perpendicular Bisector Theorem



What is AD?
Same as CD so 3.

What is BC?
Same as AB so 5.

What is BD?
Solve by using the pythagorean theorem
$a^2 + b^2 = c^2$



$$3^2 + b^2 = 5^2$$
$$9 + b^2 = 25$$
$$-9 \qquad\quad -9$$
$$b^2 = 16$$
$$b = \sqrt{16} = \underline{\underline{4}}$$

R essential questions

Why are proofs necessary?

- They explain our reasoning in a step-by-step process.
- They help establish new knowledge

How do we construct a formal proof?

We link previous knowledge of theorems to build a systematic chain of reason to justify a specific fact.

How are geometric tools useful in real life?

- To ensure proper measurements
- To ensure accuracy when making models.

R properties of equality = POE

Addition P.O.E.
Subtraction POE
Multiplication POE
Division POE
Reflexive POE
Symmetric POE
Transitive POE
Substitution POE

exampel on p. 177
in your text book

Explain 1 Proving that Alternate Interior Angles are Congruent

p.177

Other pairs of angles formed by parallel lines cut by a transversal are alternate interior angles.

Alternate Interior Angles Theorem

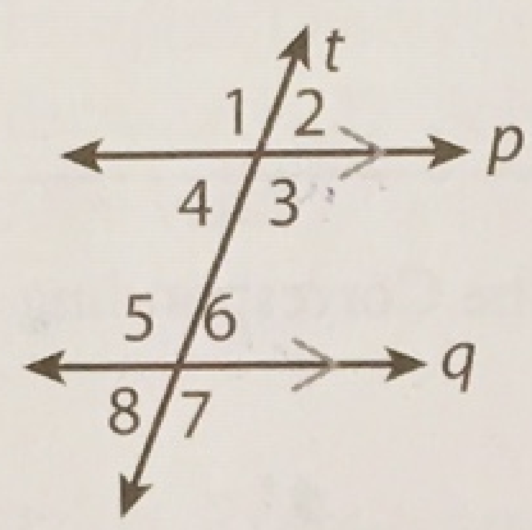
If two parallel lines are cut by a transversal, then the pairs of alternate interior angles have the same measure.

To prove something to be true, you use definitions, properties, postulates, and theorems that you already know.

Example 1 **Prove the Alternate Interior Angles Theorem.**

Given: $p \parallel q$

Prove: $m\angle 3 = m\angle 5$



Complete the proof by writing the missing reasons. Choose from the following reasons. You may use a reason more than once.

- Same-Side Interior Angles Postulate
- Given
- Definition of supplementary angles
- Subtraction Property of Equality
- Substitution Property of Equality
- Linear Pair Theorem

Statements	Reasons
1. $p \parallel q$ "is parallel to"	Given
2. $\angle 3$ and $\angle 6$ are supplementary.	Same Side Int. Ang. Post.
3. $m\angle 3 + m\angle 6 = 180°$	Def. of Supplementary Ang.
4. $\angle 5$ and $\angle 6$ are a linear pair.	Given (figure)
5. $\angle 5$ and $\angle 6$ are supplementary.	Linear Pair Theorem
6. $m\angle 5 + m\angle 6 = 180°$	Def. of Suppl. Ang.
7. $m\angle 3 + m\angle 6 = m\angle 5 + m\angle 6$ Subtraction $- m\angle 6$ $- m\angle 6$ PoE	~~[illegible]~~ Substitution PoE
8. $m\angle 3 = m\angle 5$ Substitution PoE	~~Subtraction PoE~~

Reflect

3. In the figure, explain why $\angle 1$, $\angle 3$, $\angle 5$, and $\angle 7$ all have the same measure.

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