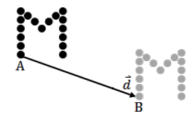
Geometry Regents Lomac 2015-2016 **Date** 10/15 **due** 10/16 **Constructing Parallel Lines** **2.10R**

Name ____ **Per**______

LO: I can construct **parallel lines** in 3 different ways and explain how the construction guarantees parallel lines.



☐ **DO NOW** On the back of this packet

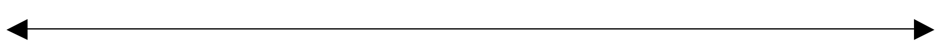
☐ (1) **Constructing parallel lines without transformation** Construct line *p* parallel to line *n*.

compass

☐ (a) Make a sketch that shows $\overleftrightarrow{AB} \perp \overleftrightarrow{CD}$ and $\overleftrightarrow{EF} \perp \overleftrightarrow{CD}$ ($\perp$ means perpendicular which means _____ angles.)

What relationship do you see between $\overleftrightarrow{AB}$ and $\overleftrightarrow{EF}$? ____

☐ (b) Construct line *m* so that it is perpendicular to the given line *n* below. (Line *m* can be constructed anywhere as long as it is perpendicular to line *n*.) Label the line you construct line *m*.



n

☐ (c) Now you have line *m* and line *n*. Remember you are constructing line *p* parallel to line *n*. You must construct another perpendicular line *p*. Should *p* be perpendicular to line *m* or line *n*? ______________

☐ (d) Construct line *p* as you described it in part *c*.

☐ (e) When two lines (*p* and *n*) are perpendicular to the same line (line *m*), the two lines are ________________.

☐ (2) **Constructing parallel lines by translation**

compass

☐ (a) Make a sketch that shows $\overleftrightarrow{AB}$ and a translation of $\overleftrightarrow{AB}$ labeled $\overleftrightarrow{A'B'}$

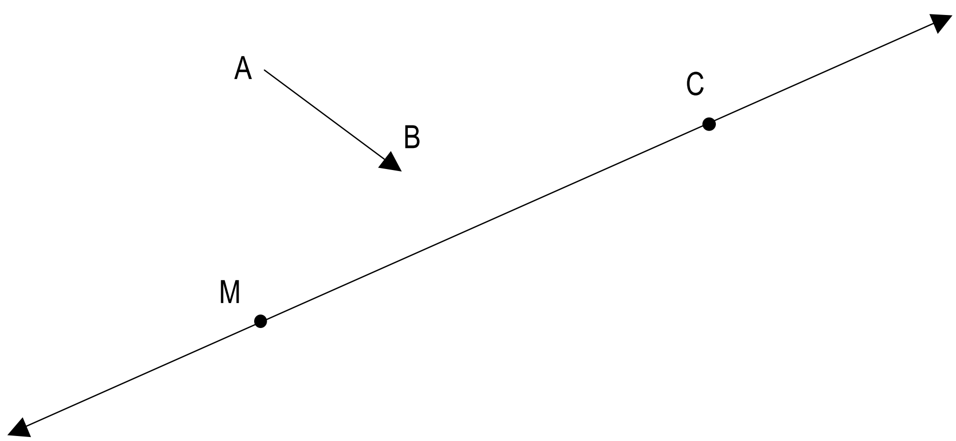
The two lines are parallel because ____

☐ (b) If you translate a line, the fewest number of points you will have to translate is _____ because __________

____.

☐ (c) Use a compass and straightedge to perform the function $T_{\overrightarrow{AB}}\,(\overleftrightarrow{MC})$. REFERENCE: Lesson 2.7

$T_{\overrightarrow{AB}}\,(\overleftrightarrow{MC})$ means ____



☐ (3) weblink compass **Constructing parallel lines by rotation**

☐ (a) Use the weblink for this lesson or transparencies to determine how many degrees a line must be rotated around a point for the image line to be parallel to the preimage line.

(1) A line must be rotated ____________ around a point for the image to be parallel to the preimage.

(2) The point that we rotate around must be **on/not on** (circle one) the line we are rotating.

☐ (b) How can we rotate a point ______ (see part a) around a center of rotation? Rotate the points below to help you answer this question.

(i) ☐ Rotate B ______ around point R

(ii) ☐ Rotate Z _____ around point C

So, how can we rotate a point ______ around a center of rotation? ____

____

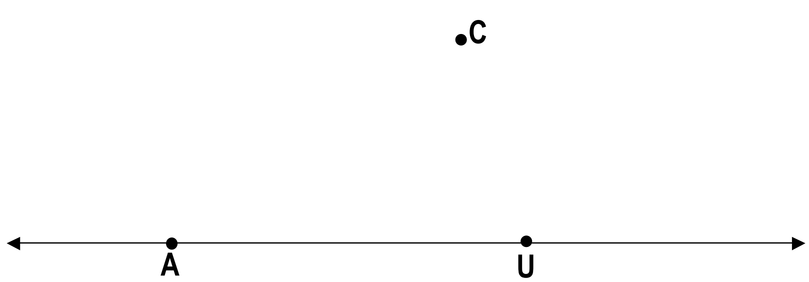
____

____

☐ (c) To rotate a line ______° (see part a), we must have a point to rotate around, and _____ points on the line that we will rotate. To have parallel lines, we must rotate around a point that **is/is not** (circle one) on the line.

☐ (d) Construct $\overleftrightarrow{A'U'}$ parallel to $\overleftrightarrow{AU}$ by performing the function $R_{C,180^\circ}(\overleftrightarrow{AU})$.

$R_{C,180^\circ}(\overleftrightarrow{AU})$ means ____



☐ (4) weblink **Parallel Lines by rotation PROOF**

☐ Prepare your mind to prove that rotating a line 180° around a point not on the line ALWAYS results in parallel lines.

(a) ☐ True or false: Two lines in a plane are either **parallel** or **not parallel**. ____________________

(b) ☐ Lines are not parallel if they ________________________.

(c) ☐ True or false: A point can be on a line and not on the line at the same time. _________________

(d) ☐ A **contradiction** happens when a claim is made that two things happen at the same time which cannot possibly happen at the same time. For example: Ms. Lomac is in Albany and in Rochester right now. Write your own contradiction:

____

☐ Prove that rotating a line 180° around a point that is not on the line ALWAYS results in parallel lines. The easiest way to prove this is by contradiction. Use the Geogebra file on Ms. Lomac's website to see what is happening at each step by checking the box. (http://tube.geogebra.org/m/54425)

Start your proof by **contradiction** by assuming the OPPOSITE of what you want to prove.

1. Assume that rotating $\overleftrightarrow{AB}$ 180° around point C not on $\overleftrightarrow{AB}$ ____________________ result in parallel lines.

2. Since the lines are not parallel, then $\overleftrightarrow{A'B'}$ must ______________ $\overleftrightarrow{AB}$ in some point X on $\overleftrightarrow{AB}$ and $\overleftrightarrow{A'B'}$.

3. Since $\overleftrightarrow{A'B'}$ is a rotation of $\overleftrightarrow{AB}$ there must exist a point X' on $\overleftrightarrow{A'B'}$ such that ______ is a diameter of circle C.

4. Since both X and X' must be on $\overleftrightarrow{A'B'}$ and $\overline{XX'}$ must contain C (since it is a diameter), then point C must be on _______. (Drag points to convince yourself that C must be on $\overleftrightarrow{A'B'}$ and $\overline{XX'}$.)

5. In step 1, we said that point C is not ________________. If point C ___________________ then it cannot be on ______________. But, in step 5 we said that point C must be on _______. This is impossible because point C cannot be ________________ AND ______________________.

Since this is a contradiction, our assumption that rotating $\overleftrightarrow{AB}$ 180° around point C not on $\overleftrightarrow{AB}$ ____________________ result in parallel lines ____________ true. The only alternative to our assumption is that ____

____

☐ (5) compass **Parallel Lines by translation practice**

☐ (a) Construct a parallel line through point P' using distance and direction to translate. Use the guidance below.

(i) ☐ To construct a specific line, we need ______ points.

(ii) ☐ Choose 2 points on the line. Label them points P and Q. (It will be easiest if P is left of Q)

(iii) ☐ To translate line PQ so that it passes through P', we must recognize that P' is an image of P. We will need to construct point Q' so that the line is translated along the vector _______.

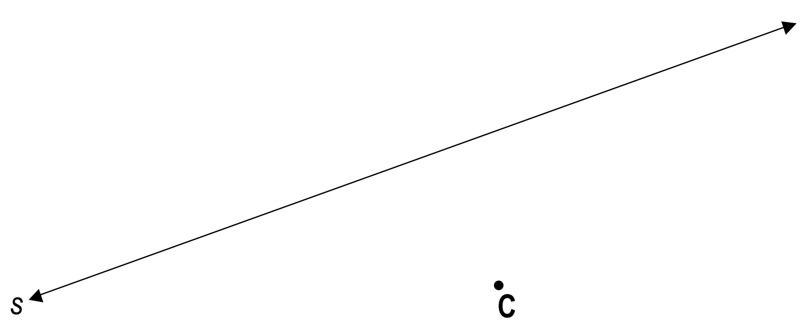
(iv) ☐ Measure the distance from _____ to _____ and use the distance to construct circle _____.

(v) ☐ Measure the distance from _____ to _____ and use the distance to construct circle _____.

(vi) ☐ Label Q' and connect to make P'Q'.

(vii) ☐ Line P'Q' is parallel to line PQ because _____________________ and ______________________ are preserved under translation.

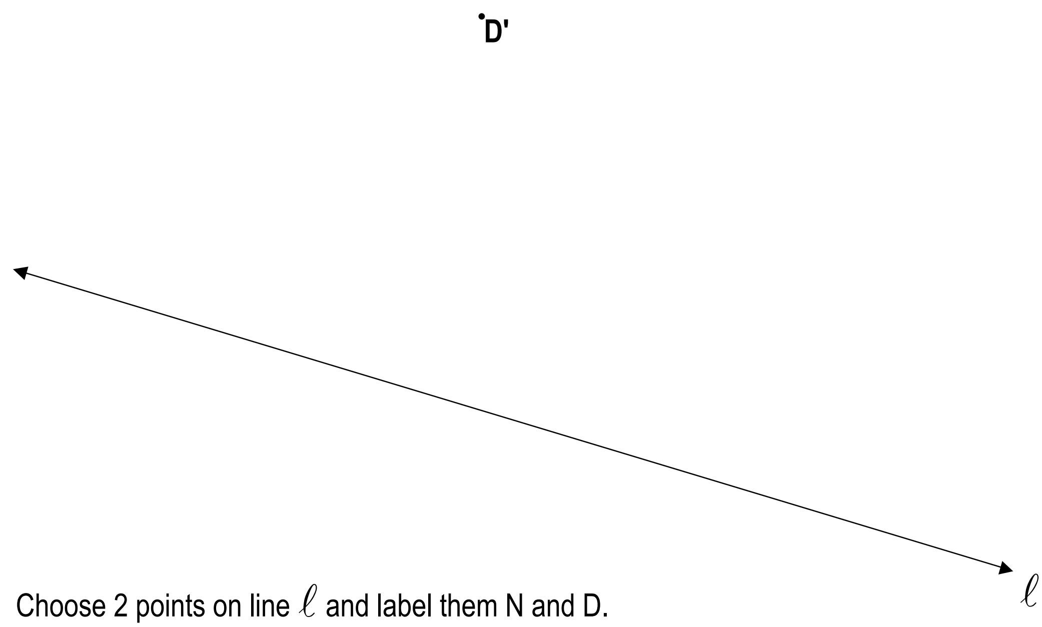
☐ (b) Construct a line parallel to line *s* that passes through point C.



☐ (6) **Parallel Lines by rotation practice**

compass

☐ (a) Construct a line parallel to line ℓ through point D' lines by rotation. Use the guidance below.



☐ Choose 2 points on line ℓ and label them N and D.

☐ Draw line segment DD'.

☐ Construct the midpoint of $\overline{DD'}$ and label it O.

You can fold to check your construction, but you must construct the perpendicular bisector of $\overline{DD'}$.

Why does a perpendicular bisector locate the midpoint? ____

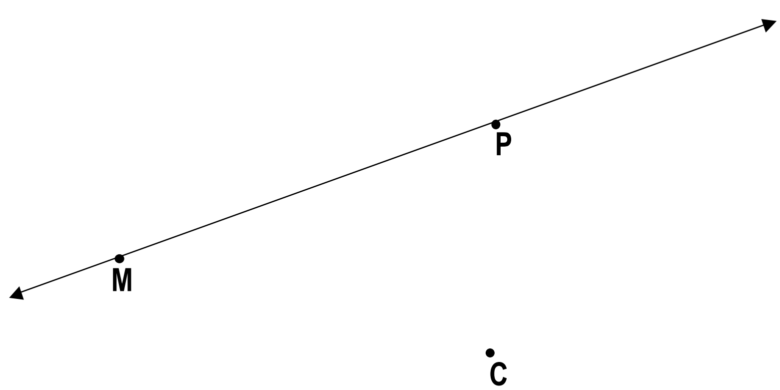
____

☐ Construct the rotation of line ℓ 180° around point O by rotating N (D is already rotated).

☐ Label the image N'

☐ Construct the line containing D' and N'.

☐ (b) Use rotation to construct a line parallel to line MP that passes through point C. (C can be an image of M or P, you decide.)



☐ (6) **Exit Ticket**

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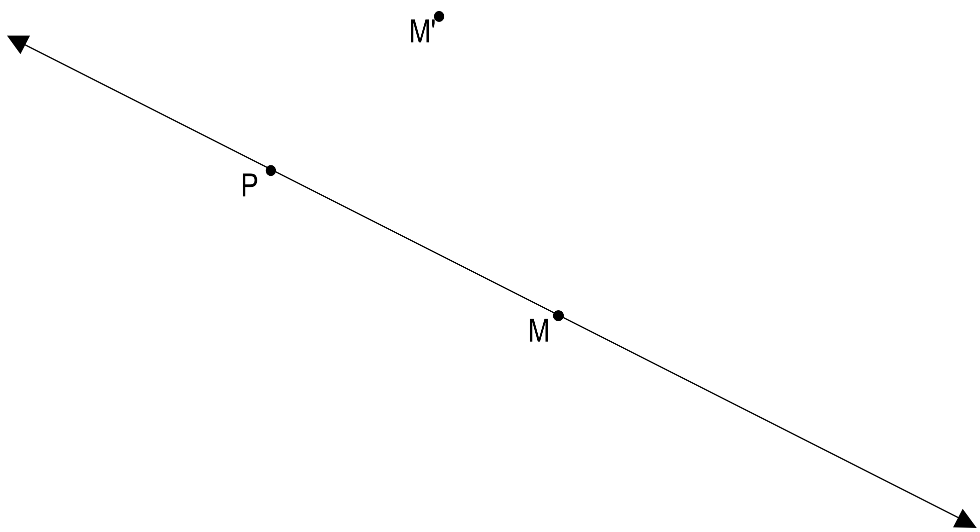
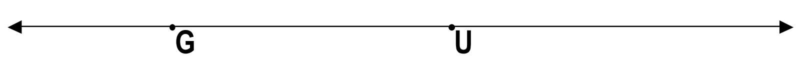
☐ (8) **Homework**

☐ (1) Use translation to construct a line parallel to line MP that passes through M'.



☐ (2) Construct $\overleftrightarrow{G'U'}$ parallel to $\overleftrightarrow{GU}$ by choosing a point L not on $\overleftrightarrow{GU}$ and rotating $\overleftrightarrow{GU}$ 180° around point L



☐ L is the midpoint of _____ and ______

because____

☐ (8) cont **Homework**

☐ (3) In the space below, draw your own line and construct a parallel line by the method stated.

☐ (a) Constructing 2 perpendicular lines

☐ (b) Translation

☐ (c) Rotation

EXIT TICKET Name________________________________ Date ______ _____ Per_ _____ 2.10R

(1) The LO (Learning Outcomes) are written below your name on the front of this packet. Demonstrate your achievement of these outcomes by doing the following:

Describe the three ways to construct parallel lines. State the method you like best and what you like about the method.

DO NOW **Name________________________________ Date ___________ Per______** **2.10R**

(1) Describe 3 or more examples of parallel lines in the world. Where do you see them? Sketch if it helps your description.

(2) The sets of short dashes are clearly parallel to each other within the set (8 sets). What about the long lines that the dashes are drawn on? Are they parallel? Or not? Describe how you know.