Lesson Plan #31

Class: Geometry

Date: Thursday December 17th, 2020

Topic: Properties of parallel lines?

Aim: What are some properties of parallel lines?

Objectives:
1) Students will be able to use properties of parallel lines.

HW #31: Pages 5 and 6 of this lesson plan

Note:

Postulate for inequalities

If a, b, c and d are real numbers, such that $a > b$ and $c > d$, then $a + c > b + d$ or

if unequal quantities are added to unequal quantities of the same order, the sums are unequal in the same order.

For example, if $7 > 5$and $3 > 2$, then $7 + 3 > 5 + 2$

Postulate

If a, b, c and d are real numbers, such that $a > b$ and $c = d$, then $a - c > b - d$ or

if equal quantities are subtracted from unequal quantities, the differences are unequal in the same order.

For example,$7 > 5$and $2 = 2$, then $7 - 2 > 5 - 2$

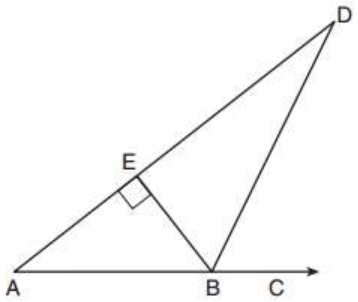
Do Now:

The diagram below shows $\triangle ABD$, with $\overrightarrow{ABC}$, $\overline{BE} \perp \overline{AD}$, and $\angle EBD \cong \angle CBD$.

If $m\angle ABE = 52$, what is $m\angle D$?

(1) 26 (3) 52

(2) 38 (4) 64



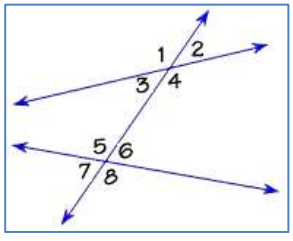
PROCEDURE:
Write the Aim and Do Now
Get students working!
Take attendance
Give Back HW
Collect HW
Go over the Do Now

Assignment:

Using a straight edge, draw two lines, then draw a third line that intersecting the first two lines.

What do we call the line that intersects two or more coplanar lines in different points?

Definition: A **transversal** is a line that intersects two or more coplanar lines in different points.

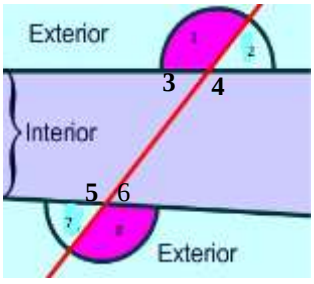


How many angles are formed?

Which angles are in the interior of the two lines?

Which angles are exterior to the two lines?

Which are pairs of alternate interior angles?



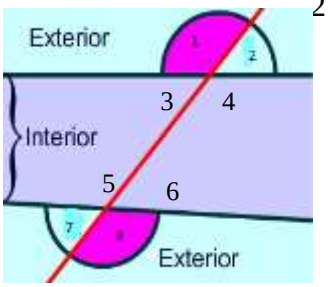
Define *alternate interior angles*.

Which are pairs of alternate exterior angles?

Define *alternate exterior angles*.

Which are pairs of *interior angles on the same side of the transversal*?

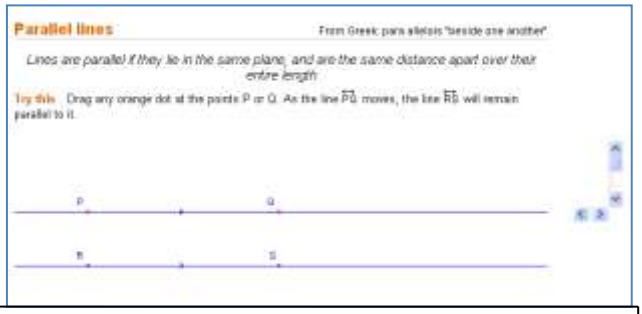
Definition: *Corresponding angles* are a pair of angles on the same side of the transversal, not sharing a common vertex, and one is interior and one is exterior.



Name pairs of corresponding angles:

Let's examine parallel lines.

Online Interactive Activity: Let's go to http://www.mathopenref.com/parallel.html.



Definition: *Parallel lines* are coplanar lines that do not intersect or coplanar lines are *parallel* if and only if they have no points in common or if the lines coincide and, therefore, have all points in common.

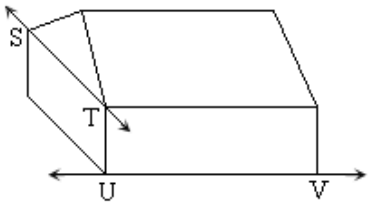
Skew Lines

Definition of Skew Lines

- Two nonparallel lines in space that do not intersect are called skew lines.
- Skew lines are non-coplanar lines. Therefore, they are neither parallel nor intersecting

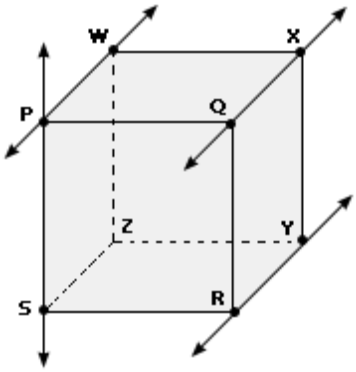
Examples of Skew Lines

- $\overleftrightarrow{ST}$ and $\overleftrightarrow{UV}$ are skew lines in the figure shown. →



Solved Example on Skew Lines

Which of the following are skew lines? →



Choices:

A. $\overleftrightarrow{RY}$ and $\overleftrightarrow{YR}$

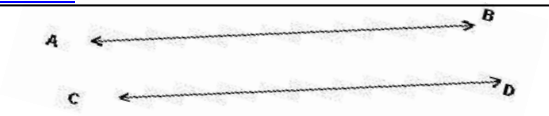
B. $\overleftrightarrow{PS}$ and $\overleftrightarrow{PQ}$

C. $\overleftrightarrow{QR}$ and $\overleftrightarrow{RY}$

D. $\overleftrightarrow{RY}$ and $\overleftrightarrow{PS}$

Source: http://www.icoachmath.com/math_dictionary/Skew_Lines.html

How would you read the notation at right? $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$



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If two coplanar lines are not parallel, then what can we say about those two lines?

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Theorem: If coplanar lines are not parallel lines, then they are intersecting lines.

Is Parallelism an *equivalence relation*? In other words, does it satisfy the reflexive property, symmetric property and transitive property?

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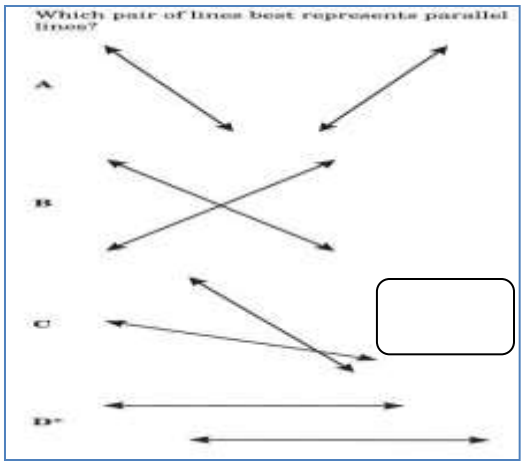


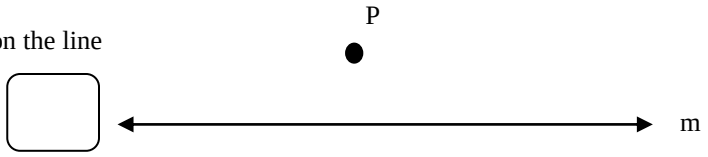
Postulates:

A line is parallel to itself
A parallelism of lines may be expressed in either order
Two lines each parallel to same line are parallel to each other.

Hands on Activity:

Draw a line parallel to the given line through the point not on the line

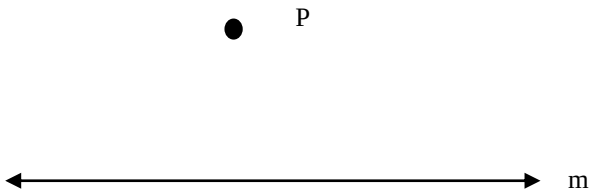
How many lines can you draw through P and parallel to m?



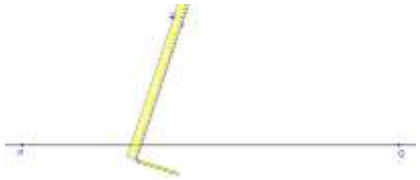
Theorem: Through a given point not on a given line, there exists one and only one line parallel to the given line.

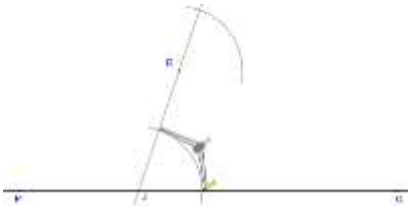
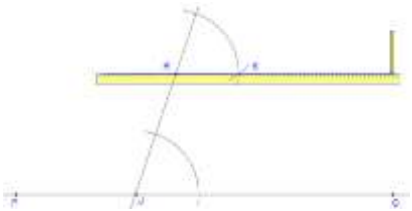
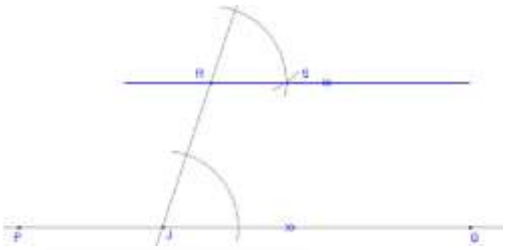
Hands on Activity:
Animation of construction at :http://www.mathopenref.com/constparallel.html.

Let's see how we can construct a line parallel to a given line through a given external point.

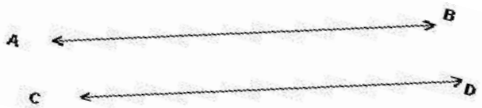


Steps:

After doing this	Your work should look like this
Start with a line PQ and a point R off the line.	
1. Draw a transverse line through R and across the line PQ at an angle, forming the point J where it intersects the line PQ. The exact angle is not important.	
2. With the compass width set to about half the distance between R and J, place the point on J, and draw an arc across both lines.	

After doing this	Your work should look like this
3. Without adjusting the compass width, move the compass to R and draw a similar arc to the one in step 2.	
4. Set compass width to the distance where the lower arc crosses the two lines.	
5. Move the compass to where the upper arc crosses the transverse line and draw an arc across the upper arc, forming point S.	
6. Draw a straight line through points R and S.	
Done. The line RS is parallel to the line PQ	

Given the parallel lines at right, is it possible to draw a line intersecting one line but not the other?



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Theorem: If a line intersects one of two parallel lines, it intersects the other.

Assignment: A parallelogram is a quadrilateral with both pair of opposite sides parallel. Construct a parallelogram in the space below

HW#31: Name _____ Date _____ Per. _____

1) In $\triangle CAT$, $m\angle C = 65$, $m\angle A = 40$, and B is a point on side $\overline{CA}$, such that $\overline{TB} \perp \overline{CA}$. Which line segment is shortest?

(1) $\overline{CT}$ (3) $\overline{TB}$

(2) $\overline{BC}$ (4) $\overline{AT}$

2) In $\triangle ABC$, an exterior angle at C measures 50°. If $m\angle A > 30$, which inequality must be true?

(1) $m\angle B < 20$ (3) $m\angle BCA < 130$

(2) $m\angle B > 20$ (4) $m\angle BCA > 130$

3) Which numbers could represent the lengths of the sides of a triangle?

(1) 5, 9, 14 (3) 1, 2, 4

(2) 7, 7, 15 (4) 3, 6, 8

4) The three medians of a triangle intersect at a point. Which measurements could represent the segments of one of the medians?

(1) 2 and 3 (3) 3 and 6

(2) 3 and 4.5 (4) 3 and 9

5) In the diagram of $\overline{WXYZ}$ below, $\overline{WY} \cong \overline{XZ}$.

Which reasons can be used to prove $\overline{WX} \cong \overline{YZ}$?

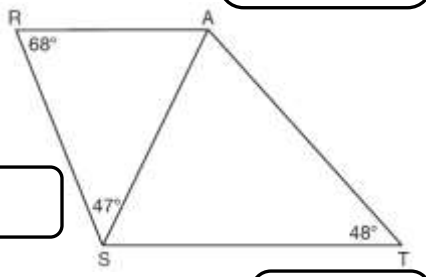
(1) reflexive property and addition postulate

(2) reflexive property and subtraction postulate

(3) transitive property and addition postulate

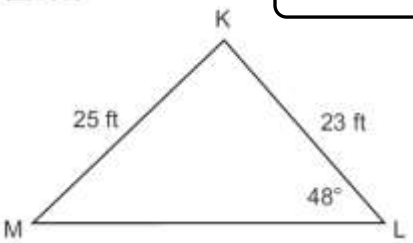
(4) transitive property and subtraction postulate

6) As shown in the diagram below, $\overline{AS}$ is a diagonal of trapezoid $STAR$, m<RAS = m<AST, $m\angle ATS = 48$, $m\angle RSA = 47$, and $m\angle ARS = 68$.



Determine and state the longest side of $\triangle SAT$.

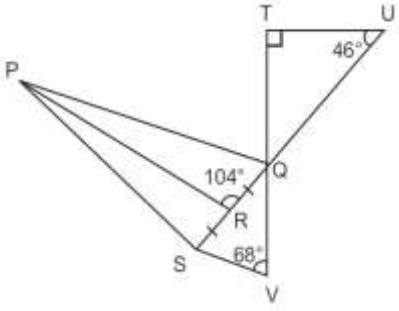
7) Acute triangle KLM is shown below.



Which could be the measure of ∠M?

A. 38° B. 42° C. 44° D. 52°

8) A diagram is shown below.



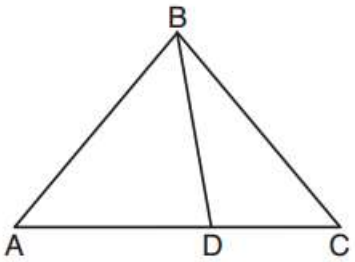
Which of the triangles **must** be isosceles?

A. △SPR B. △SPQ C. △QTU D. △SQV

9) Which transformation would *not* always produce an image that would be congruent to the original figure?

(1) translation (2) dilation (3) rotation (4) reflection

10) In the diagram below, $m\angle BDC = 100°$, $m\angle A = 50°$, and $m\angle DBC = 30°$.



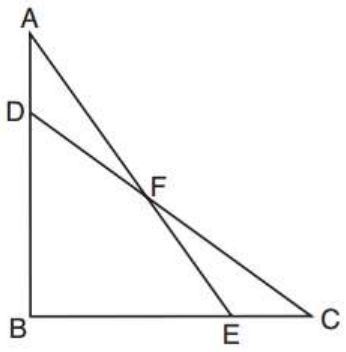
Which statement is true?

(1) $\triangle ABD$ is obtuse.
(2) $\triangle ABC$ is isosceles.
(3) $m\angle ABD = 80°$
(4) $\triangle ABD$ is scalene.

11) Segment CD is the perpendicular bisector of $\overline{AB}$ at E. Which pair of segments does *not* have to be congruent?

(1) $\overline{AD}, \overline{BD}$
(2) $\overline{AC}, \overline{BC}$
(3) $\overline{AE}, \overline{BE}$
(4) $\overline{DE}, \overline{CE}$

12) Given: $\triangle ABE$ and $\triangle CBD$ shown in the diagram below with $\overline{DB} \cong \overline{BE}$



Which statement is needed to prove $\triangle ABE \cong \triangle CBD$ using only SAS $\cong$ SAS?

(1) $\angle CDB \cong \angle AEB$
(2) $\angle AFD \cong \angle EFC$
(3) $\overline{AD} \cong \overline{CE}$
(4) $\overline{AE} \cong \overline{CD}$

13) In the diagram of $\triangle ABC$ shown below, use a compass and straightedge to construct the median to $\overline{AB}$. [Leave all construction marks.]