Unit 5 Parallel and Perpendicular Lines

Date	Target	In Class Assignment	Done!
M 10-30	5.1a	5.1a Worksheet	
T 10-31	5.1b	5.1b Worksheet	
W 11-1	5.2a	5.2a Worksheet	
R 11-2	5.2b	5.2b Worksheet	
F 11-3		NO SCHOOL – PT CONFERENCES	
M 11-6	Rev	5.1-5.2 Quiz Review	
T 11-7	5.1-5.2	Quiz 5.1-5.2	
W 11-8	5.3a	5.3a Worksheet	
R 11-9	5.3b	5.3b Worksheet	
F 11-10	5.3	Quiz 5.3	
W 11-13	5.4	5.4 Worksheet	
T 11-14	Rev	5.4 Quiz Review	
W 11-15	5.4	Quiz 5.4	
R 11-16	Rev	Unit 5 Test Review	
F 11-17	Rev	Unit 5 Test Review	
M 11-20	Test	Unit 5 Test	
T 11-21	Test	Unit 5 Test	

Target 5.1: Classify and identify angles formed by parallel lines and transversals

- ***5.1a – Parallel and Perpendicular lines***
- ***5.1b – Parallel Lines and its Angle Relationships***

Target 5.2: Apply and prove statements using perpendicularity theorems

- ***5.2a – Prove Theorems about Perpendicular Lines***
- ***5.2b – Constructions: Perpendicular and Parallel Lines***

Target 5.3 : Use parallel and perpendicular lines to write linear equations and to determine the distance between a point and a line

- ***5.3a – Determine Whether Lines are Parallel or Perpendicular Using Linear Equations***
- ***5.3b – Finding the Distance Between a Point and a Line***

Target 5.4: Use angle properties in triangles to determine unknown angle measurements

- ***5.4: Parallel Lines and Triangles***

NAME: _____

5.1a – Draw and Classify Angles formed by Transversals

Target 1: Classify and find measures of angles formed by parallel lines and transversals

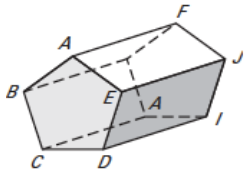
Vocabulary:

Parallel Lines: _____

_____

Example 1: Identify relationship in space

Think of each segment in the figure as part of a line. Which lines(s) or plane(s) in the figure appear to fit the description?



a) Line(s) parallel to $\overleftrightarrow{AF}$ and containing point E.

b) Plane(s) parallel to plane FGJ and containing point E.

Drawing with your teacher!	

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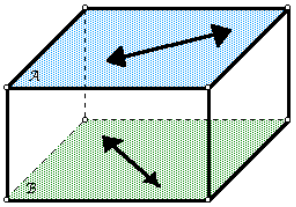
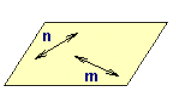
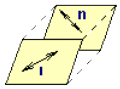
Skew



Coplanar



Coplanar lines

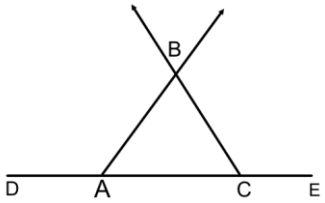


Noncoplanar lines
(also called skew lines)

What is a way you can tell that lines are parallel in a diagram?

Example 2: Identify angle relationships

Identify the special angle pairs in the diagram



a) Corresponding Angles

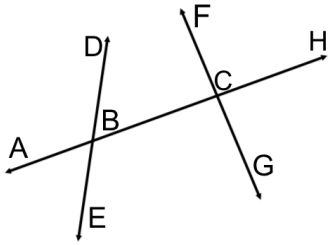
b) Alternative Interior Angles

c) Alternate Exterior Angles

d) Consecutive Interior Angles

YOU TRY NOW!

1) Identify special angle pair relationships in the diagram



a) Corresponding Angles

b) Alternative Interior Angles

c) Alternate Exterior Angles

d) Consecutive Interior Angles

Annotate Here

Were you able to identify all of the angle pairs WITHOUT looking at the answers first?

YOUTRYNOW

1a) Corresponding Angles: $\angle HCF$ & $\angle CBD$; $\angle FCB$ & $\angle DBA$; $\angle HCG$ & $\angle CBE$; $\angle GCB$ & $\angle ABE$
1b) Alternate Interior Angles: $\angle FCB$ & $\angle EBC$; $\angle DBC$ & $\angle GCB$
1c) Alternate Exterior Angle: $\angle HCF$ & $\angle ABE$; $\angle HCG$ & $\angle DBA$
1d) Consecutive Interior Angles: $\angle FCB$ & $\angle DBC$; $\angle GCB$ & $\angle EBC$

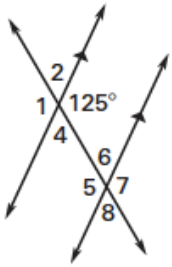
5.1b – Use Parallel Line and Transversals

Target 1: Classify and find measures of angles formed by parallel lines and transversals

Congruent Angle Pairs	Supplementary Angle Pairs
If _____ are intersected by a transversal, then…	
Corresponding Angles are Congruent	***Consecutive Interior Angles are Supplementary***
Alternate Interior Angles are Congruent	
Alternate Exterior Angles are Congruent	

Example 1: Identify Congruent Angles

The measure of three of the number angles is 125°*. Identify those angles. For each pair of angles, identify which angles are congruent and explain why.*



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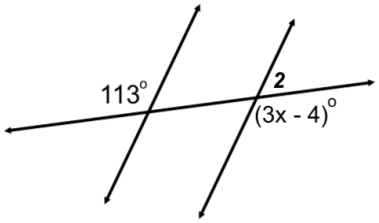
What measure do supplementary angles add up to?

What does congruent mean?

Which angles are supplementary?

Example 2: Use properties of parallel lines

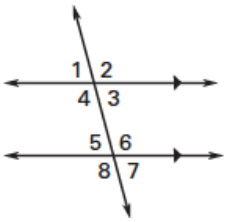
Find the value of x, and then find the measure of angle 2.



YOU TRY NOW!

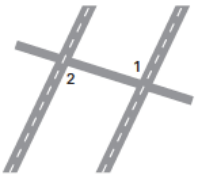
1) If the $m\angle 7 = 75^\circ$, what other angles are congruent to ∠7? Explain how you know.

Congruent Angles:

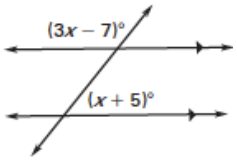


Explanation:

2) A taxiway is being constructed that intersects two parallel runways at an airport. You know that m ∠2 = 98°. What is m ∠1? How do you know?



3) Find the value of x and explain your reasoning for your initial equation.



YouTryNow

1) ∠5 – vertical angles are congruent;
∠3 – corresponding angles are congruent since the two parallel lines are cut by a transversal
∠1 – vertical angles to ∠5 and alternate exterior angles are congruent since the two parallel lines are cut by a transversal

2) $m\angle 1 = 98$ because both ∠1 *and* ∠2 are alternate interior angles and must be congruent since the two runways are parallel

3) x = 45.5 because both given angle expressions should be supplementary. So the missing angle adjacent and to the right of the ∠ marked 3x – 7 must also be x + 5. Now, we have a linear pair.

Annotate Here

Name all vertical angles in the diagram.

5.2a – Prove Theorems about Perpendicular Lines

Target 2: Apply and prove statements using perpendicularity theorems

Vocabulary/Concept

Draw a horizontal line below and draw a smiley face somewhere above the line. How would you calculate the shortest diance from the smile face to the line?

Annotate Here

What symbol would you see that IMMEDIATELY indicates that two lines are intersecting at a right angle?

Angles Formed with Perpendicular lines

Linear Pairs of Congruent Angles

If two lines intersect to form a _____ of congruent angles, then _____

_____.

Apply and prove statements using perpendicularity theorems

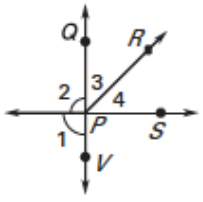
Perpendicular Lines and Right Angles Theorem

If two lines are perpendicular, then

_____.

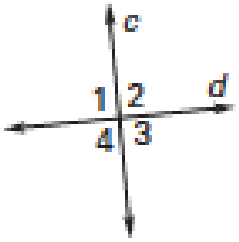
Example 1: Explain how you know that angles have specific properties

In the diagram, ∠1 ≅ ∠2. Prove that ∠3 and ∠4 are complementary using complete sentences.

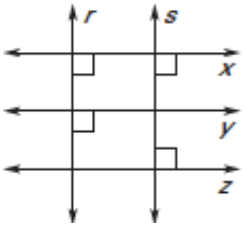


YOU TRY NOW!

1) If $c \perp d$, what do you know about the sum of the measure of $\angle 3$ and $\angle 4$? Answer in complete sentences



2) Determine which lines, if any, must be parallel in the diagram. Explain

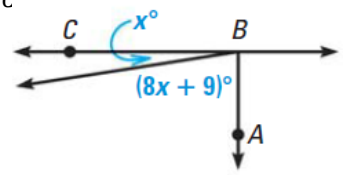


Are they parallel?	Reasoning
$x \parallel y$	
$y \parallel z$	
$x \parallel z$	
$r \parallel s$	

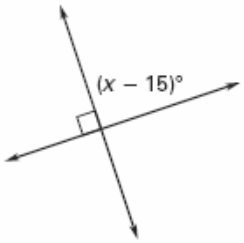
3) Make a conclusion. $\angle 1$ and $\angle 2$ are congruent and supplementary angles. Which of the following must be true?

(A) Ð1+Ð2 = 90°
(B) Ð1+Ð2 = 180°
(C) Ð1 = 45°
(D) Ð1 & Ð2 are a linear pair.
(E) Ð2 is a right angle

4) Find the value of x that makes $\overline{AB} \perp \overline{BC}$



5) Find the value of x



4) x= 9 5) x = 105

Are they parallel?	Reasoning
$x \parallel y$	Yes; Both ⊥ to line r
$y \parallel z$	No; Both ⊥ to different lines
$x \parallel z$	Yes; Both ⊥ to line s
$r \parallel s$	Yes; Both ⊥ to line x

2)

3) B & E

YOU TRY NOW

1) $\angle 3$ and $\angle 4$ must be supplementary for two reasons. 1. Because $c \perp d$, both angles measure 90 degrees. 2. $\angle 3$ and $\angle 4$ are adjacent and lie on the line d.

5.2b – Constructions: Perpendicular and Parallel Lines

Target 2: Apply and prove statements using perpendicularity theorems

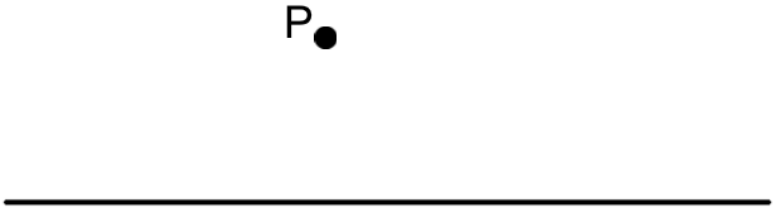
Constructions of Perpendicular lines

Example 1: Construct a perpendicular line from a point on line

Video: "The perpendicular from a point on a line"

Example 2: Construct a perpendicular line to the original line and that passes through a given point not on the line.

Video: "Geometry – Construction 4 – Perpendicular to Line Through Point Not on Line"



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https://www.youtube.com/watch?v=z-qdyuQ-JSw

https://www.youtube.com/watch?v=I4dh2R6b1N0

Constructions of Parallel Lines

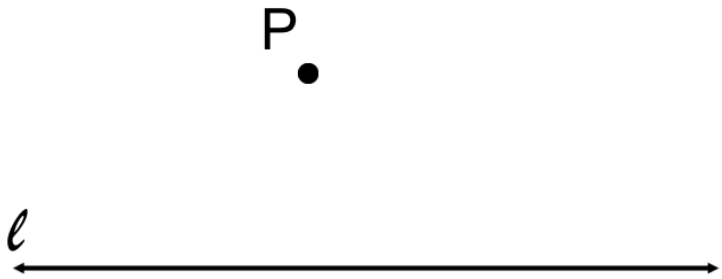
Example 3: Construct a line parallel to a given line

Video: "Constructing Parallel Lines (using a straightedge and a compass)"

Example 4: Construct a line parallel to a given line through a specific point

Video: "Constructing Parallel Line Through a Given Point 128-2.21"

https://www.youtube.com/watch?v=im81vHIhZS8



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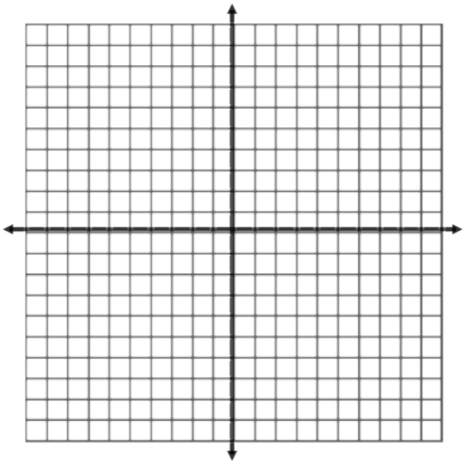
5.3a – Determine Whether Lines are Parallel or Perpendicular Using Linear Equations

Target 3: Use parallel and perpendicular lines to write linear equations and to determine the distance between a point and a line

Parallel Lines

If two NONVERTICAL lines have the same _____, then the lines are _____.



Given Line: $f(x) = -3x + 1$

Line 1:

Line 2:

Example 1: Write an equation of a parallel line

Write an equation of the line that passes through (2, 4) AND is parallel to the line $f(x) = 4x + 1$.

Annotate Here

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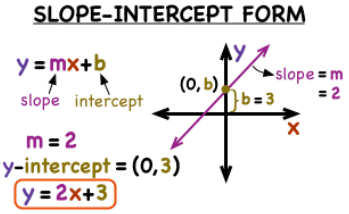
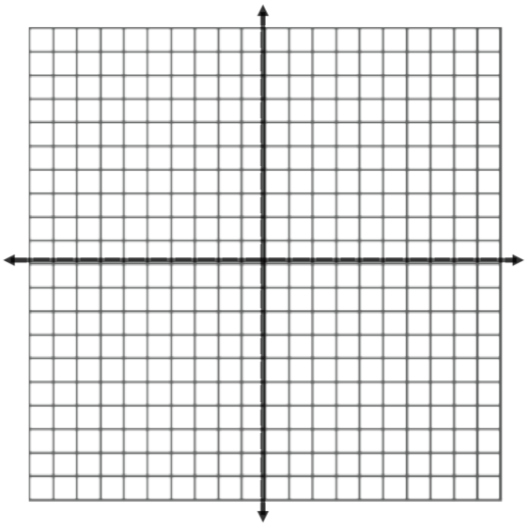


Perpendicular Lines

If two NONVERTICAL lines have the slopes that are _____, then the lines are _____.

***opposite reciprocal example**



Given Line: $f(x) = -\frac{2}{3}x - 2$

Line 1:

Line 2:

Annotate Here

***Example 2:* Determine parallel or perpendicular lines**

Determine which lines of the following lines, IF ANY, are parallel or perpendicular:

Line a: $12x - 3y = 3$
Line b: $y = 4x + 2$
Line c: $4y + x = 8$

YOU TRY NOW!

1) Write an equation of the line that passes through (-4, 6) and is parallel to the line $f(x) = -3x + 2$.

YOU TRY NOW
1) $f(x) = -3x - 6$

YOU TRY NOW!

2) Determine which of the following lines, if any, are parallel or perpendicular.

Line a: $4x + y = 2$

Line b: $5y + 20x = 10$

Line c: $8y = 2x + 8$

How do you know?_____

3) Write an equation of a perpendicular line

Write an equation of the line that passes through (-3, 4) and is perpendicular to the line $f(x) = \frac{1}{3}x + 2$.

Annotate Here

YOU TRY NOW

1) $y = -3x - 6$

2) Lines a and b are parallel because they have same slope. Lines a and b are both perpendicular to line c because the slope of line c is the opposite reciprocal of lines a and b.

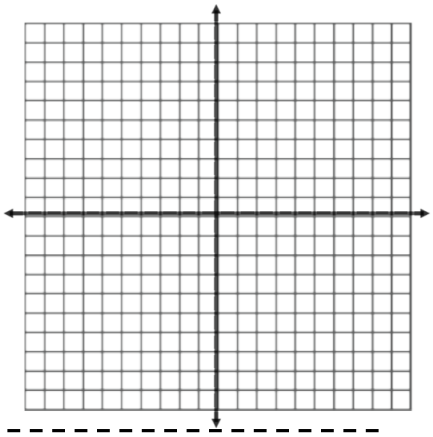
3) $f(x) = -3x - 5$

5.3b – Finding the Distance Between a Point and a Line

Target 3: Use parallel and perpendicular lines to write linear equations and to determine the distance between a point and a line

VIDEO TITLE :
"MPM2D-2.1- Finding Distance Between a Point and a Line"

***Example 1:* Calculate the shortest distance between point A(6, 5) and the line $f(x) = 2x + 3$.**



YOU TRY NOW!

1)Calculate the shortest distance between point A(4, 4) and the line
$f(x) = -5x - 2$.

2) Calculate the distance between point A(6, 5) and point B (3, 0)
Option 1 – Distance Formula *Option 2 - Pythagorean Theorem*

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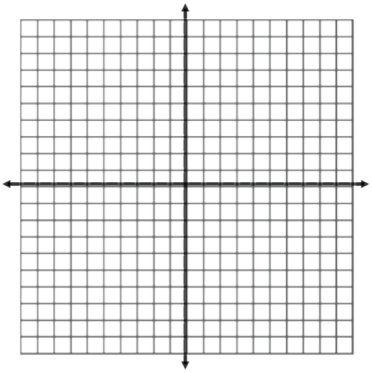
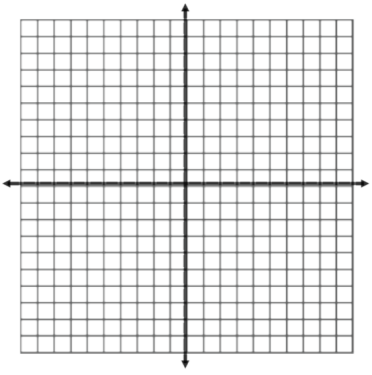




YouTryNow
1) $\sqrt{26}$ units or ≈ 5.099
2) $\sqrt{34}$ units or ≈ 5.83

5.4 – Parallel Lines and Triangles

Target 4: Use angle properties in triangles to determine unknown angle measurements

Vocabulary

Triangle: _____

_____

Interior Angles: _____

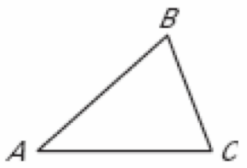
_____

Exterior Angles: _____

_____

Triangle Sum Theorem

The sum of the measures of the interior angles of a triangle is _____.

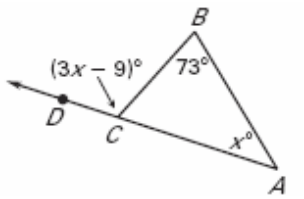


$m\angle A + m\angle B + m\angle C =$

Exterior Angle Theorem

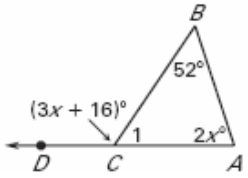
The measure of an exterior angle of a triangle is equal to the SUM of the measures of the two_____ angles.

Example 1: *Find the measure of* $\measuredangle$**DCB.**



YOU TRY NOW! (continued on the next page)

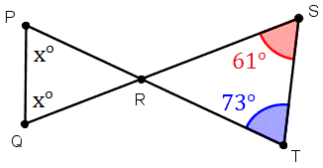
1. Find the measure of $\measuredangle$1 in the diagram showr



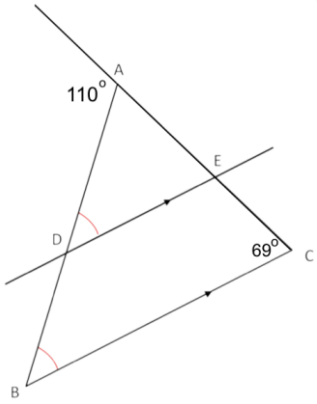
YOU TRY NOW
1) $m\angle 1 = 56°$

Annotate Here

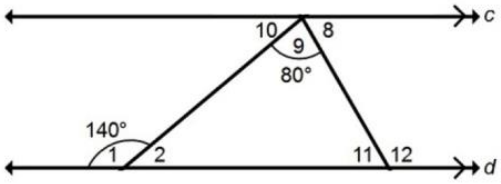
2. Find the measure of the interior and exterior angles given various situations



b) Find the measure of the $\angle ADE$ & $\angle ABC$?



c) Find the measure of the $\angle 2,\ \angle 10,\ \angle 8,\ \angle 11,\ \angle 12$?



YOUTRYNOW

2Q) $x = 67°$

2b) $20.5°$

2c) $m\angle 2 = 40°,\ m\angle 10 = 40°,\ m\angle 8 = 60°,$
$m\angle 11 = 60°,\ m\angle 12 = 120°$