

Welcome Back MYP Math 9!

	Assignment Effort Grade (Circle One)	Comments (What was interesting or challenging?)
Monday Date: 10/23 Topic: Create your own problem!	0 1 2	I'm almost done!
Tuesday Date: 10/24 Topic: Finished create your own problem	0 1 2	
Wednesday Date: _____ Topic: _____	0 1 2	
Thursday Date: _____ Topic: _____	0 1 2	
Friday Date: _____ Topic: _____	0 1 2	

Class Plan:

1. Finish self-asses, turn in
2. Warm-up
3. Investigation:
Parallel/Perpendicular lines.
4. Video break!
5. Practice

Do: Self-assess and turn in! (4 min)

Reflect: Why did you earn that score?

What evidence supports your score?

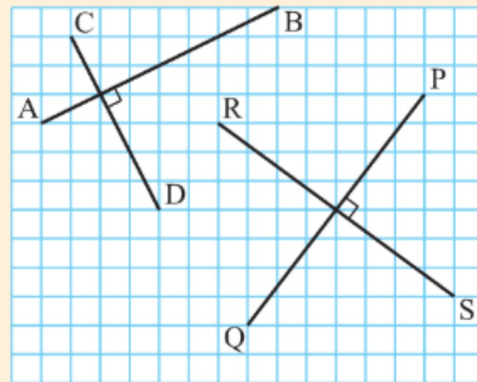
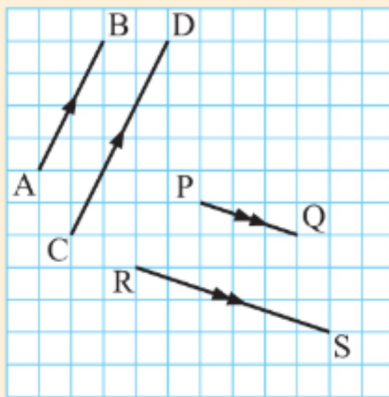
Your Level	<p>***Draw check marks in the appropriate boxes to determine your score.</p> <p>Student Reflection: (Why did you earn this score?)</p>
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Deadline: Monday all Q1 assessments

End of quarter: Wednesday 11/1

D**PARALLEL AND PERPENDICULAR LINES**

Warm-up: Explain the difference between parallel and perpendicular lines.



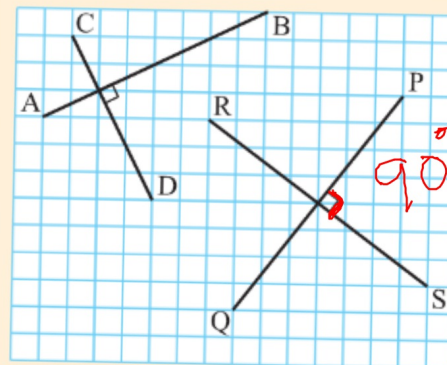
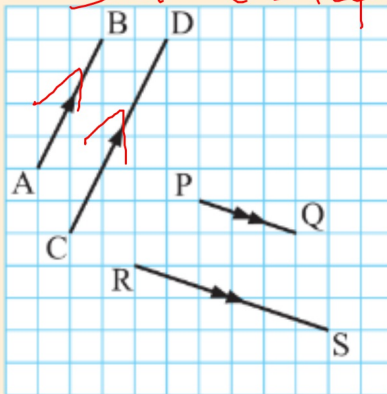
D**PARALLEL AND PERPENDICULAR LINES**

Record definition and draw image in notes.

Two lines are **parallel** if they are side by side with the same distance between them.

Two lines are **perpendicular** if they are at right angles to one another.

Same slope



Investigation: Parallel & Perpendicular Lines

- Directions: 1) Return calculator to default settings:
 2) Enter each set of equations.
 3) Describe the relationships you see on the graph.



What do we notice about the equations of these lines??

Unit 2: Coordinate Geometry
 Parallel vs. Perpendicular Line Investigation

Directions: 1) Return calculator to default settings:
 2) Enter each set of equations.
 3) Describe the relationships you see on the graph.

Part A
 $y_1 = 2x + 4$
 $y_2 = 2x - 3$
 How are the lines related? Describe what you see!

Part B
 $y_1 = -3x + 1$
 $y_2 = -3x + 5$
 $y_3 = -3x - 6$
 How are the lines related? Describe what you see!

Conclusion: Look at the equations in part A and B. What part of the equation tells us the relationship we saw in the graphs?

Part C
 $y_1 = 2x + 4$
 $y_2 = -\frac{1}{2}x - 3$
 How are the lines related? Describe what you see!

Part D
 $y_1 = -3x + 1$
 $y_2 = \frac{1}{3}x + 5$
 How are the lines related? Describe what you see!

Conclusion: Look at the pairs of equations in part C and D. What part of the equation tells us the relationship we saw in the graphs?

Practice:
 1) Find the gradient of a line that is parallel to a line with gradient:
 (a) $\frac{2}{3}$ (b) 0 (c) $\frac{1}{2}$
 2) Find the gradient of a line that is perpendicular to a line with gradient:
 (a) $\frac{2}{3}$ (b) 0 (c) $\frac{1}{2}$
 3) Write an equation of a line that is perpendicular to: $y_1 = -2x + 1$.

Equation: _____ Then graph both equations to verify they are perpendicular.

ENTER
 FRACTION:
 use ()
 $y = (-\frac{1}{2})x - 3$

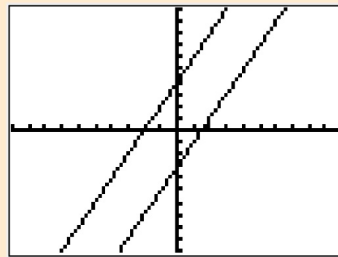
SOLUTION

Investigation: Parallel & Perpendicular Lines

Part A

$$y_1 = 2x + 4$$

$$y_2 = 2x - 3$$



How are the lines related? Describe what you see!

Lines are parallel.

SOLUTION

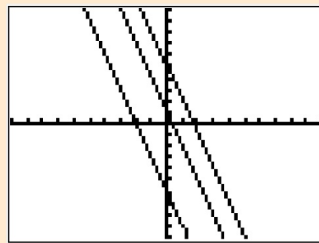
Investigation: Parallel & Perpendicular Lines

Part B

$$y_1 = -3x + 1$$

$$y_2 = -3x + 5$$

$$y_3 = -3x - 6$$



How are the lines related? Describe what you see!

Lines are parallel.

SOLUTION

Investigation: Parallel & Perpendicular Lines

Conclusion: Look at the equations in part **A** and **B**. What part of the equation tells us the relationship we saw in the graphs?

Slope/gradient is always the same!

- the lines are **parallel** \Leftrightarrow they have **equal gradient**

\Leftrightarrow means
"if and only if".



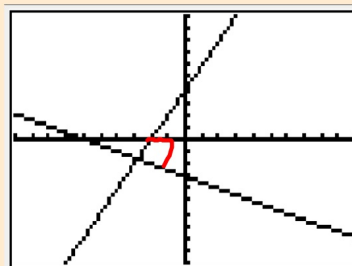
SOLUTION

Investigation: Parallel & Perpendicular Lines

Part C

$$y_1 = 2x + 4$$

$$y_2 = -\frac{1}{2}x - 3$$



How are the lines related? Describe what you see!

Lines are perpendicular

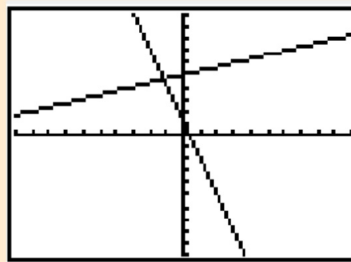
SOLUTION

Investigation: Parallel & Perpendicular Lines

Part D

$$y_1 = -3x + 1$$

$$y_2 = \frac{1}{3}x + 5$$



How are the lines related? Describe what you see!

Lines are perpendicular

SOLUTION

Investigation: Parallel & Perpendicular Lines

Conclusion: Look at the pairs of equations in part C and D. What part of the equation tells us the relationship we saw in the graphs?

Slopes are opposite sign & reciprocals.

- the lines are **perpendicular** \Leftrightarrow their gradients are **negative reciprocals**.

The negative
reciprocal of
 $\frac{a}{b}$ is $-\frac{b}{a}$.



- the lines are **perpendicular** \Leftrightarrow their gradients are **negative reciprocals**.

Reciprocal of a fraction... turn it upside down!

The negative reciprocal of

$$\frac{a}{b} \text{ is } -\frac{b}{a}.$$

(flip!)



Video break!

[https://www.youtube.com/watch?](https://www.youtube.com/watch?v=vnnwfcDcNIY)

[v=vnnwfcDcNIY](https://www.youtube.com/watch?v=vnnwfcDcNIY)

... and where are parallel or perpendicular lines around us...?



Applying what we learned in the Investigation:

Practice:

1) Find the gradient of a line that is **parallel** to a line with gradient:

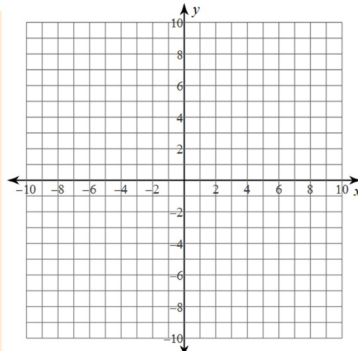
(a) $\frac{-3}{4}$ $-\frac{3}{4}$ (b) 8 (c) $\frac{2}{7}$

2) Find the gradient of a line that is **perpendicular** to a line with gradient:

(a) $\frac{-3}{4}$ $\frac{4}{3}$ (b) 8 (c) $\frac{2}{7}$

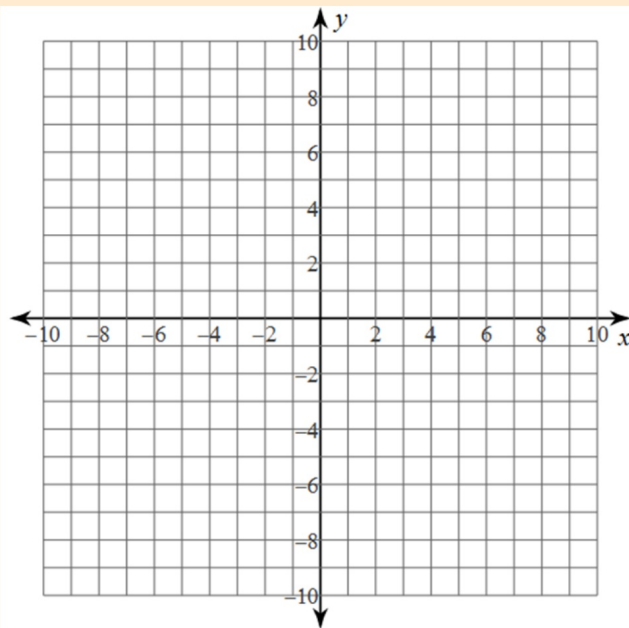
3) Write an equation of a line that is **perpendicular** to: $y_1 = -2x + 1$.

Equation: _____ Then graph both equations to verify they are perpendicular.



3) Write an equation of a line that is *perpendicular* to: $y_1 = -2x + 1$.

Equation: _____ Then graph both equations to verify they are perpendicular.



Applying what we learned in the Investigation:

Practice:

$$y = mx + b$$

1) Find the gradient of a line that is **parallel** to a line with gradient:

Solutions!

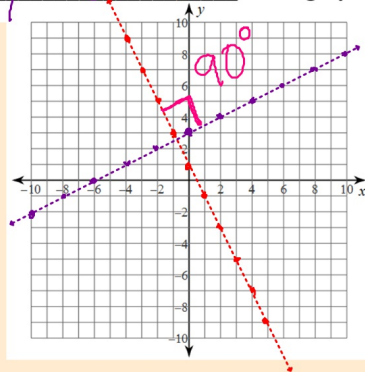
(a) $\frac{-3}{4}$ $m = -\frac{3}{4}$ (b) 8 $m = 8$ (c) $\frac{2}{7}$ $m = \frac{2}{7}$

2) Find the gradient of a line that is **perpendicular** to a line with gradient:

(a) $\frac{-3}{4}$ $m = \frac{4}{3}$ (b) 8 $m = -\frac{1}{8}$ (c) $\frac{2}{7}$ $m = -\frac{7}{2}$

3) Write an equation of a line that is **perpendicular** to: $y_1 = -2x + 1$.

Equation: $y = \frac{1}{2}x + 3$ Then graph both equations to verify they are perpendicular.



$$y_1 = -2x + 1 \quad \star \text{ y-intercept}$$
$$y_2 = \frac{1}{2}x + 3 \quad \text{can be any \#!}$$

Exercises...page 159

8D #1-3, 4 (classify the triangle!)

1,2

EXERCISE 8D

1 Line M has gradient $\frac{3}{5}$, and line N has gradient 6. Find the gradient of any line which is:

a parallel to M

b perpendicular to M

c parallel to N

d perpendicular to N .

2 Find the gradient of a line which is perpendicular to a line with gradient:

a $\frac{4}{5}$

b $\frac{1}{3}$

c $-\frac{3}{7}$

d 2

e -11

f 0

g undefined

h $-1\frac{1}{2}$

Exercises...

8D #1-3, 4 (classify the triangle!)

3

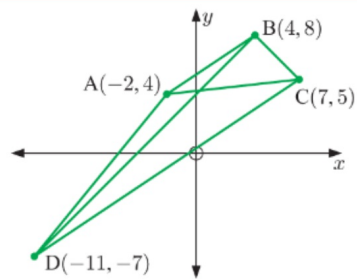
3 Consider the points $A(-2, 4)$, $B(4, 8)$, $C(7, 5)$, and $D(-11, -7)$.

a Find the gradient of:

- | | | |
|------------------|------------------|-------------------|
| i $[AB]$ | ii $[BC]$ | iii $[CD]$ |
| iv $[DA]$ | v $[AC]$ | vi $[BD]$ |

b Which of the line segments are:

- | | |
|-------------------|--------------------------|
| i parallel | ii perpendicular? |
|-------------------|--------------------------|



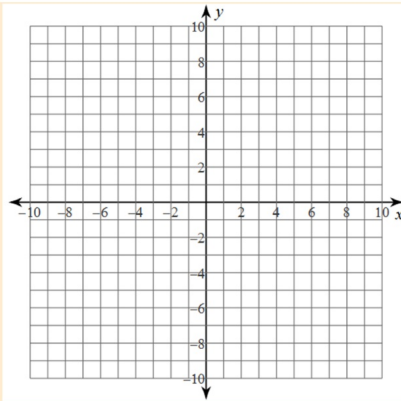
Exercises...

8D #1-3, 4 (classify the triangle!)

4

4 A(3, 1), B(2, -4), and C(7, -5) are three points in the Cartesian plane.

- a Find the gradient of: i [AB] ii [BC].
- b What can be said about [AB] and [BC]?
- c Classify triangle ABC.



8D #1-3, 4 (classify the triangle!)

SOLUTIONS

D

PARALLEL AND PERPENDICULAR LINES

EXERCISE 8D

- 1** a $\frac{3}{5}$ b $-\frac{5}{3}$ c 6 d $-\frac{1}{6}$
- 2** a $-\frac{5}{4}$ b -3 c $\frac{7}{3}$ d $-\frac{1}{2}$ e $\frac{1}{11}$
f undefined g 0 h $\frac{2}{3}$
- 3** a i $\frac{2}{3}$ ii -1 iii $\frac{2}{3}$ iv $\frac{11}{9}$ v $\frac{1}{9}$ vi 1
b i [AB] and [CD] ii [BC] and [BD]
- 4** a i 5 ii $-\frac{1}{5}$ b perpendicular c right angled at B