2023 MCAS Sample Student Work and Scoring Guide

Grade 10 Mathematics
Question 6: Constructed-Response

Reporting Category: Geometry
Standards: GEO.G-GPE.B.5 - Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point).
MI.G-GPE.B.5 - Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point).
Item Description: Given a line graphed on a coordinate plane, determine its slope, create an equation of a parallel line, determine whether another line is parallel, and create an equation of a perpendicular line passing through a given point.
Calculator: Not allowed

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Scoring Guide
*Select a score point in the table below to view the sample student response.*

Score*	Description
4A	The student response demonstrates an exemplary understanding of the Geometry concepts involved in proving the slope criteria for parallel and perpendicular lines and using them to solve geometric problems. The student calculates the slope of a graphed line, creates an equation of a line parallel to it, analyzes a different line, and creates an equation of a line perpendicular to it, which passes through a given point.
4B	
3	The student response demonstrates a good understanding of the Geometry concepts involved in proving the slope criteria for parallel and perpendicular lines and using them to solve geometric problems. Although there is significant evidence that the student was able to recognize and apply the concepts involved, some aspect of the response is flawed. As a result, the response merits 3 points.
2	The student response demonstrates a fair understanding of the Geometry concepts involved in proving the slope criteria for parallel and perpendicular lines and using them to solve geometric problems. While some aspects of the task are completed correctly, others are not. The mixed evidence provided by the student merits 2 points.
1	The student response demonstrates a minimal understanding of the Geometry concepts involved in proving the slope criteria for parallel and perpendicular lines and using them to solve geometric problems.
0	The student response contains insufficient evidence of an understanding of the Geometry concepts involved in proving the slope criteria for parallel and perpendicular lines and using them to solve geometric problems. As a result, the response does not merit any points.

*Letters are used to distinguish between sample student responses that earned the same score (e.g., 4A and 4B).

Score Point 4A

This question has four parts.
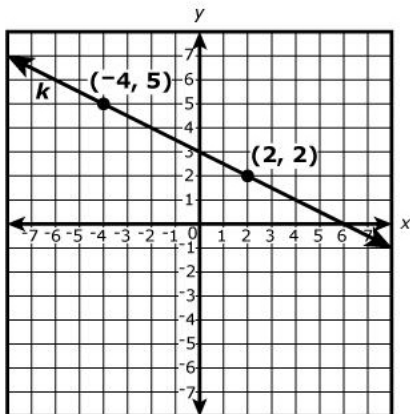
Line k is shown on this coordinate plane.

Part A

What is the slope of line k? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

slope $= (y_2 - y_1))/(x_2 - x_1)$

slope $= \frac{(5-2)}{(-4-2)} = \frac{3}{-6} = -\frac{1}{2}$

Part B

Line p is parallel to line k. The y-intercept of line p is the point $(0, -4)$. Create an equation that represents line p.

Enter your equation in the space provided.

$y = mx + b$

$y = -\frac{1}{2}x - 4$

Part C

Line r passes through the points $(-2, 1)$ and $(1, 0)$.

Is line r parallel to line k? Explain your reasoning.

Enter your answer and your explanation in the space provided.

slope r = $\frac{(0-1)}{(1+2)} = -\frac{1}{3}$

Line r is not parrallel to line k becuase they have different slopes

Part D

Line s is **perpendicular** to line k. Line s passes through the point $(5, -2)$. Create an equation that represents line s.

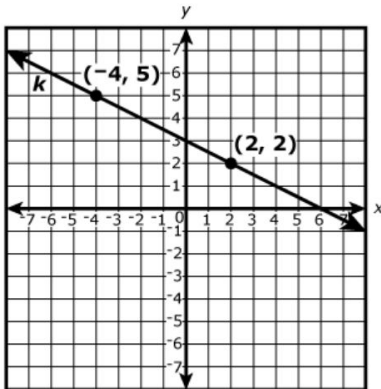Enter your equation in the space provided.

slope s = 2

$y + 2 = 2(x - 5)$

$y + 2 = 2x - 10$

$y = 2x - 12$

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Score Point 4B

This question has four parts.

Line k is shown on this coordinate plane.

Part A

What is the slope of line k? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

$$m = \frac{(y_2 - y_1)}{(x_2 - x_1)} = \frac{(2-5)}{(2-(-4))} = \frac{-3}{6} = -\frac{1}{2}$$

Part B

Line p is parallel to line k. The y-intercept of line p is the point $(0, -4)$. Create an equation that represents line p.

Enter your equation in the space provided.

$$y = -\frac{1}{2}x - 4$$

Part C

Line r passes through the points $(-2, 1)$ and $(1, 0)$.

Is line r parallel to line k? Explain your reasoning.

Enter your answer and your explanation in the space provided.

No, because using the slope formula proves the slope of line r is $\frac{-1}{3}$ and the slope of line k is $\frac{-1}{2}$. For two lines to be parallel, they must have the same slope. Because the slopes of the two lines are different, they are not parallel.

Part D

Line s is **perpendicular** to line k. Line s passes through the point $(5, -2)$. Create an equation that represents line s.
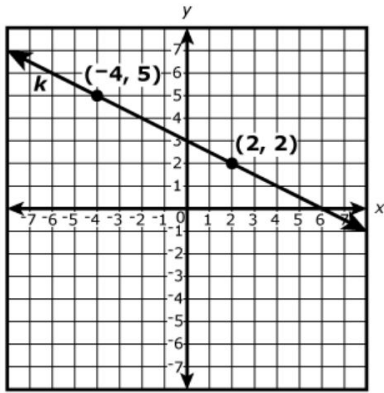
Enter your equation in the space provided.

$$y = 2x - 12$$

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Score Point 3

This question has four parts.

Line k is shown on this coordinate plane.

Part A

What is the slope of line k? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

the slope of the line is $-\frac{1}{2}$ how i go this is by lookg at the point $(-4,5)$ and $(-2,4)$ and did rise over run which got me $-\frac{1}{2}$.

Part B

Line p is parallel to line k. The y-intercept of line p is the point $(0, -4)$. Create an equation that represents line p.

Enter your equation in the space provided.

$y = -\frac{1}{2}x - 4$

Part C

Line r passes through the points $(-2, 1)$ and $(1, 0)$.

Is line r parallel to line k? Explain your reasoning.

Enter your answer and your explanation in the space provided.

no the lines are not parelell becaie the slope isnt no the same for both lines

Part D

Line s is **perpendicular** to line k. Line s passes through the point $(5, -2)$. Create an equation that represents line s.
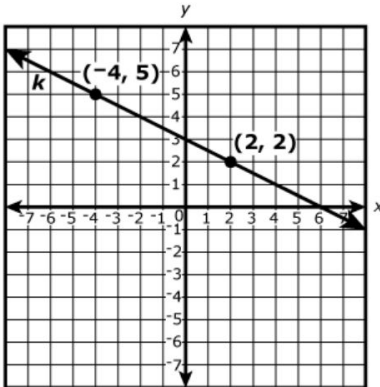
Enter your equation in the space provided.

$y = -\frac{1}{2}x + 1$

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Score Point 2

This question has four parts.

Line k is shown on this coordinate plane.

Part A

What is the slope of line k? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

$-\frac{3}{6}$ because the rise is going down 3 so it turns into a -3, and the run is from -4 to 2 so it turns into a 6. It is also negative because it is a downward slope. Making the slope of line K - $\frac{3}{6}$

Part B

Line p is parallel to line k. The y-intercept of line p is the point $(0, -4)$. Create an equation that represents line p.

Enter your equation in the space provided.

$$y = -\frac{3}{6} - 4$$

Part C

Line r passes through the points $(-2, 1)$ and $(1, 0)$.

Is line r parallel to line k? Explain your reasoning.

Enter your answer and your explanation in the space provided.

Line r is not parallel to like k. Because line r slope is not the same as line k making it not parallel to line k

Part D

Line s is **perpendicular** to line k. Line s passes through the point $(5, -2)$. Create an equation that represents line s.
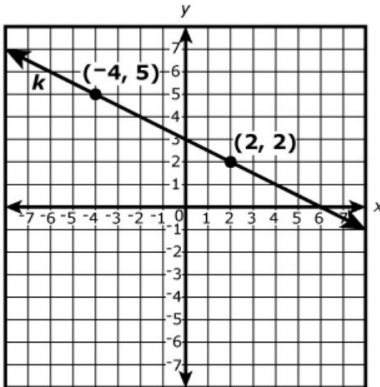
Enter your equation in the space provided.

$$y = 5x - 2$$

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Score Point 1

This question has four parts.

Line k is shown on this coordinate plane.

Part A

What is the slope of line k? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

> y = mx + b
>
> $m = \frac{y^2 - y^1}{x^2 - x^1} = \frac{2-5}{2+4} = \frac{-3}{6} = \frac{-1}{2}$

Part B

Line p is parallel to line k. The y-intercept of line p is the point $(0, -4)$. Create an equation that represents line p.

Enter your equation in the space provided.

> $y = \frac{-1}{2} - 4$

Part C

Line r passes through the points $(-2, 1)$ and $(1, 0)$.

Is line r parallel to line k? Explain your reasoning.

Enter your answer and your explanation in the space provided.

> yes because the lines do not intersect with each other

Part D

Line s is **perpendicular** to line k. Line s passes through the point $(5, -2)$. Create an equation that represents line s.
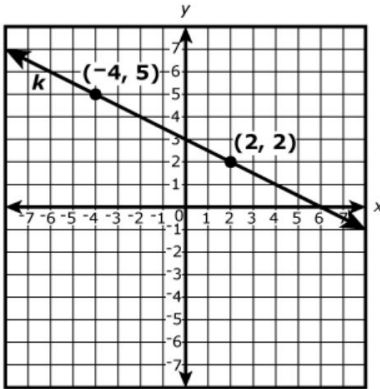
Enter your equation in the space provided.

> y = 1x + 3

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Score Point 0

This question has four parts.

Line k is shown on this coordinate plane.

Part A

What is the slope of line k? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

> The slope is $\frac{1}{2}$. From point $(-4,5)$ I counted down 1 then moved to the right 2 and I got myself to point $(-2,4)$.

Part B

Line p is parallel to line k. The y-intercept of line p is the point $(0,-4)$. Create an equation that represents line p.

Enter your equation in the space provided.

> $y = -2x - 4$

Part C

Line r passes through the points $(-2,1)$ and $(1,0)$.

Is line r parallel to line k? Explain your reasoning.

Enter your answer and your explanation in the space provided.

> $y = 3 - 2$

Part D

Line s is **perpendicular** to line k. Line s passes through the point $(5,-2)$. Create an equation that represents line s.

Enter your equation in the space provided.

> $y = -7 + 5$

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