Math
Released Item 2019

Geometry

Equation of Line for Base of
Trapezoid
VF657676

Anchor Set
A1–A12

With Annotations

Prompt

The longer base of a trapezoid has endpoints of $(-2, -4)$ and $(4, 0)$. The shorter base contains the point $(3, 1)$.

Write an equation of the line that contains the shorter base of the trapezoid. Provide valid mathematical reasoning and calculations to explain how you derived your equation.

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Rubric

Score	Description
	#6 VF657676 Rubric

3	Student response includes each of the following 3 elements:
	
	• **Computation component = 1 point**
	    ○ Correct equation of the line
	
	Sample Student Response: $y = \frac{2}{3}x - 1$ or any equivalent equation of the line is acceptable, for example:
	
	$$(y - 1) = \frac{2}{3}(x - 3).$$
	
	• **Computation component = 1 point**
	    ○ Valid description about the shorter base of the trapezoid
	
	Sample Student Response:
	
	    The student explains that the shorter base of a trapezoid is parallel to the longer base of the trapezoid, and therefore must have the same slope as the longer base. This implies that the student calculates the slope of the longer base.
	
	• **Computation component = 1 point**
	    ○ Valid description of how the student created his or her equation
	
	Notes:
	
	• Student must mention at least one of the formulas to receive credit.
	• Parts should be scored independently. An error in one part but used correctly in another part should earn full credit on the second part.

2	Student response includes 2 of the 3 elements.
1	Student response includes 1 of the 3 elements.
0	The response is incorrect or irrelevant.

The longer base of a trapezoid has endpoints of $(-2, -4)$ and $(4, 0)$. The shorter base contains the point $(3, 1)$.

Write an equation of the line that contains the shorter base of the trapezoid. Provide valid mathematical reasoning and calculations to explain how you derived your equation.

Since the bases of a trapezoid are parallel, they would have the same slope on a graph. To find the slope of the smaller base, you would first have to find the slope of the longer base.

$(-2, -4)$ and $(4, 0)$

$$\frac{0-(-4)}{4-(-2)}$$

$$\frac{0+4}{4+2}$$

$$\frac{4}{6}$$

$$\frac{2}{3}$$

After solving for the slope, we find that it is $\frac{2}{3}$

Using the slope and the point on the shorter base $(3, 1)$ we can find the $y-intercept$, by substituting for the equation in $slope-intercept$ form.

$y = \frac{2}{3}x + b$

$1 = \frac{2}{3}(3) + b$

$1 = 2 + b$

$-1 = b$

The equation of the line that contains the shorter base is:

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

Annotation

Anchor Paper 1
Score Point 3
This response receives full credit. The student includes the three required elements.

- The student writes a correct equation of the line that contains the shorter base of the trapezoid (y = 2/3 X - 1).

- The reasoning component part 1 is correct. The student explains that the shorter base is parallel to the longer base, and therefore has the same slope (Since the bases of a trapezoid are parallel, they would have the same slope on a graph).

- The reasoning component part 2 is correct. The student explains how to create the equation (To find the slope of the smaller base, you would first have to find the slope of the longer base. Using the slope and the point on the shorter base (3,1) we can find the y – intercept, by substituting for the equation of in slope – intercept form). Once the slope and y-intercept are determined, the equation of the line can be written.

The longer base of a trapezoid has endpoints of $(-2, -4)$ and $(4, 0)$. The shorter base contains the point $(3, 1)$.

Write an equation of the line that contains the shorter base of the trapezoid. Provide valid mathematical reasoning and calculations to explain how you derived your equation.

The equation of the line containing the shorter base is $y = \frac{2}{3} x - 1$

Since the bases are parallel to each other, I found the slope of the line containing the larger base and then plugged the slope and the coordinate on the smaller base into the slope intercept form to solve for the y intercept.

Annotation

Anchor Paper 2
Score Point 3
This response receives full credit. The student includes the three required elements.

- The student writes a correct equation of the line that contains the shorter base of the trapezoid (y = 2/3 X - 1).

- The reasoning component part 1 is correct (Since the bases are parallel to each other, I found the slope of the line containing the larger base and then plugged the slope and the coordinate on the smaller base). The student explains that the shorter base is parallel to the longer base and recognizes that the slope of each base is also equal.

- The reasoning component part 2 is correct. The student explains how to create the equation (I found the slope of the line containing the larger base and then plugged the slope and the coordinate on the smaller base into the slope intercept form to solve for the y-intercept). Once the slope and y-intercept are determined, the equation of the line can be written.

The longer base of a trapezoid has endpoints of $(-2, -4)$ and $(4, 0)$. The shorter base contains the point $(3, 1)$.

Write an equation of the line that contains the shorter base of the trapezoid. Provide valid mathematical reasoning and calculations to explain how you derived your equation.

The two bases are parallel.
Longer base equation:
$slope = \frac{4}{6} = \frac{2}{3}$
$0 = \frac{2}{3}(4) + b$
$b = -\frac{8}{3}$

Shorter base equation:
$y = \frac{2}{3}x + b$
$1 = \frac{2}{3}(3) + b$
$-1 = b$
$y = \frac{2}{3}x - 1$

Annotation

Anchor Paper 3
Score Point 3
This response receives full credit. The student includes the three required elements.

- The student writes a correct equation of the line that contains the shorter base of the trapezoid (y = 2/3 X - 1).

- The reasoning component part 1 is correct (The two bases are parallel). The student also finds the slope for the longer base and substitutes it correctly into the equation for the shorter base.

- The reasoning component part 2 is correct. The student shows how to find the y-intercept by using the slope of the larger base along with the given point (3, 1) in slope intercept form (Shorter base equation: y = 2/3 X + b, 1 + 2/3 (3) + b, -1 = b).

The longer base of a trapezoid has endpoints of $(-2, -4)$ and $(4, 0)$. The shorter base contains the point $(3, 1)$.

Write an equation of the line that contains the shorter base of the trapezoid. Provide valid mathematical reasoning and calculations to explain how you derived your equation.

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

The two bases of a trapezoid are parallel, which means they have the same slope. The slope of the longer base was $\frac{2}{3}$ which means the slope of the shorter base has to be $\frac{2}{3}$. I drew this line on graph paper and it intersected the $y - axis$ at -1.

Annotation

Anchor Paper 4
Score Point 2
This response receives partial credit. The student includes two of the three required elements.

- The student writes a correct equation of the line that contains the shorter base of the trapezoid (y = 2/3 X - 1).

- The reasoning component part 1 is correct (The two bases are parallel, which mean they have the same slope).

The reasoning component part 2 is incomplete. It lacks mathematical reasoning and no calculations are provided. The rubric says that the student must mention (or use) at least one of the formulas to receive credit for the reasoning part 2. None of the straight line formulas or the slope formula is mentioned or used (I drew this line on graph paper and it intersected the y-axis at -1). Using graph paper can only be valid if the reasoning is explained in detail. For example: "I drew this line on graph paper by plotting the given point (3, 1) and then using rise over run (2 over 3) to determine the line. I found it intersected the y-axis at y = -1."

The longer base of a trapezoid has endpoints of $(-2, -4)$ and $(4, 0)$. The shorter base contains the point $(3, 1)$.

Write an equation of the line that contains the shorter base of the trapezoid. Provide valid mathematical reasoning and calculations to explain how you derived your equation.

$$\frac{(^-4-0)}{(^-2-4)} = m$$

$$m = \frac{2}{3}$$

$$1 = \frac{2}{3}(3) + b$$

$$b = {}^-1$$

$$y = \frac{2}{3}x + {}^-1$$

Annotation

Anchor Paper 5
Score Point 2
This response receives partial credit. The student includes two of the three required elements.

- The student writes a correct equation of the line that contains the shorter base of the trapezoid (y = 2/3 X + -1).

- The reasoning component part 2 is correct. Both the slope formula and the slope intercept form are used correctly to find the slope and the y-intercept (m = 2/3, b = -1).

The reasoning component part 1 is missing. There is no explanation that the shorter base of a trapezoid is parallel to the longer base of the trapezoid and therefore must have the same slope as the longer base.

The longer base of a trapezoid has endpoints of $(-2, -4)$ and $(4, 0)$. The shorter base contains the point $(3, 1)$.

Write an equation of the line that contains the shorter base of the trapezoid. Provide valid mathematical reasoning and calculations to explain how you derived your equation.

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

I used the formula to find slope and then solved for b which equaled -1

Annotation

Anchor Paper 6
Score Point 2
This response receives partial credit. The student includes two of the three required elements.

- The student writes a correct equation of the line that contains the shorter base of the trapezoid ($y = 2/3 X - 1$).

- The reasoning component part 2 is correct. The student explains how to create the equation (I used the formula to find slope and then solved for b which equaled -1).

The reasoning component part 1 is missing. There is no explanation that the shorter base of a trapezoid is parallel to the longer base of the trapezoid and therefore must have the same slope as the longer base.

The longer base of a trapezoid has endpoints of $(-2, -4)$ and $(4, 0)$. The shorter base contains the point $(3, 1)$.

Write an equation of the line that contains the shorter base of the trapezoid. Provide valid mathematical reasoning and calculations to explain how you derived your equation.

I found that the slope was $\frac{2}{3}$ so I plugged it in to $y = mx + b$ and found b and got my equation of

$$y = \left(\frac{2}{3x}\right) - 1$$

Annotation

Anchor Paper 7
Score Point 1
This response receives partial credit. The student includes one of the three required elements.

- The reasoning component part 2 is correct. The student explains how to create the equation using the slope intercept form (I found that the slope was 2/3 so I plugged it in to y = mx +b and found b and got my equation. . .)

The equation is written incorrectly (y = (2/3x) -1). It is incorrect for the variable (x) to be in the denominator. The reasoning component part 1 is missing. There is no explanation that the shorter base of a trapezoid is parallel to the longer base of the trapezoid and therefore must have the same slope as the longer base.

The longer base of a trapezoid has endpoints of $(-2, -4)$ and $(4, 0)$. The shorter base contains the point $(3, 1)$.

Write an equation of the line that contains the shorter base of the trapezoid. Provide valid mathematical reasoning and calculations to explain how you derived your equation.

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

Annotation

Anchor Paper 8
Score Point 1
This response receives partial credit. The student includes one of the three required elements.

- The student writes a correct equation of the line that contains the shorter base of the trapezoid (y = 2/3 X - 1).

There is no mathematical reasoning or any calculations provided.

The longer base of a trapezoid has endpoints of $(-2, -4)$ and $(4, 0)$. The shorter base contains the point $(3, 1)$.

Write an equation of the line that contains the shorter base of the trapezoid. Provide valid mathematical reasoning and calculations to explain how you derived your equation.

The shorter base of the trapeziod will be parallel to the $longer$ side

Annotation

The longer base of a trapezoid has endpoints of $(-2, -4)$ and $(4, 0)$. The shorter base contains the point $(3, 1)$.

Write an equation of the line that contains the shorter base of the trapezoid. Provide valid mathematical reasoning and calculations to explain how you derived your equation.

$y = \frac{2}{3} x + 1$

Annotation

The longer base of a trapezoid has endpoints of $(-2, -4)$ and $(4, 0)$. The shorter base contains the point $(3, 1)$.

Write an equation of the line that contains the shorter base of the trapezoid. Provide valid mathematical reasoning and calculations to explain how you derived your equation.

$(-1, 0)$ would be the coordinantes due to the slopes being equivelent

Annotation

Anchor Paper 11
Score Point 0
This response receives no credit. The student includes none of the three required elements.

There is no equation of the line provided. The student gives the coordinates for the y-intercept, but that was not the question. The reasoning is incomplete; there is no basis given for the slopes being equivalent.

The longer base of a trapezoid has endpoints of $(-2, -4)$ and $(4, 0)$. The shorter base contains the point $(3, 1)$.

Write an equation of the line that contains the shorter base of the trapezoid. Provide valid mathematical reasoning and calculations to explain how you derived your equation.

$$\sqrt{(0 - (-4)) + (4 - (-2))}$$
$$\square = 7.2$$

I used distance formula

Annotation

Anchor Paper 12
Score Point 0
This response receives no credit. The student includes none of the three required elements.

There is no equation of a line provided. The mathematical reasoning is incorrect (I used the distance formula).

Practice Set
P1–P10
No Annotations Included

The longer base of a trapezoid has endpoints of $(-2, -4)$ and $(4, 0)$. The shorter base contains the point $(3, 1)$.

Write an equation of the line that contains the shorter base of the trapezoid. Provide valid mathematical reasoning and calculations to explain how you derived your equation.

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

the bases of a trapezoid are always parallel meaning they will have the same slope. The slope of the longer base is $\frac{2}{3}$

so the slope of the shorter base is also that, the you put the slope and the coordinate $(3, 1)$

into point slope form getting the equation.

The longer base of a trapezoid has endpoints of $(-2, -4)$ and $(4, 0)$. The shorter base contains the point $(3, 1)$.

Write an equation of the line that contains the shorter base of the trapezoid. Provide valid mathematical reasoning and calculations to explain how you derived your equation.

The slope of the longer base of the $trapezoid$ is $\frac{2}{3}$

By definition of a trapezoid, the two bases are parallel, therefore the slope of the shorter base is also $\frac{2}{3}$

Equation of the line that contains the shorter base is $y = \frac{2x}{3} - 1$

The longer base of a trapezoid has endpoints of $(-2, -4)$ and $(4, 0)$. The shorter base contains the point $(3, 1)$.

Write an equation of the line that contains the shorter base of the trapezoid. Provide valid mathematical reasoning and calculations to explain how you derived your equation.

$y = 2x - 5$ I got this because I know what x and y are so I tried some equations to see if it worked *or* matched the points.

The longer base of a trapezoid has endpoints of $(-2, -4)$ and $(4, 0)$. The shorter base contains the point $(3, 1)$.

Write an equation of the line that contains the shorter base of the trapezoid. Provide valid mathematical reasoning and calculations to explain how you derived your equation.

The equation that I solved for was $\frac{2}{3} x - 1 = y$. I knew that $base$ 1 and base 2 would be parallel, so I used the same slope of $\frac{2}{3}$. After plugging the ordered pair of 3,1 into the equation to find b, the equation came out as shown at the top.

The longer base of a trapezoid has endpoints of $(-2, -4)$ and $(4, 0)$. The shorter base contains the point $(3, 1)$.

Write an equation of the line that contains the shorter base of the trapezoid. Provide valid mathematical reasoning and calculations to explain how you derived your equation.

$$y = \frac{4}{6} x - 1$$

The longer base of a trapezoid has endpoints of $(-2, -4)$ and $(4, 0)$. The shorter base contains the point $(3, 1)$.

Write an equation of the line that contains the shorter base of the trapezoid. Provide valid mathematical reasoning and calculations to explain how you derived your equation.

In a trapezoid, the bases must be parallel so they must have the same slope. The slope of the longer base is $\frac{2}{3}$ so the slope of the shorter base must be $\frac{2}{3}$

The longer base of a trapezoid has endpoints of $(-2, -4)$ and $(4, 0)$. The shorter base contains the point $(3, 1)$.

Write an equation of the line that contains the shorter base of the trapezoid. Provide valid mathematical reasoning and calculations to explain how you derived your equation.

$y = \frac{2}{3} x - 1$ i got this answer by using the slope formula to get the slope then i plugged it into the equation to get my final result

The longer base of a trapezoid has endpoints of $(-2, -4)$ and $(4, 0)$. The shorter base contains the point $(3, 1)$.

Write an equation of the line that contains the shorter base of the trapezoid. Provide valid mathematical reasoning and calculations to explain how you derived your equation.

$\frac{2}{3}$ is the slope of the line of the longer base

$\frac{1}{3}$ is the slope of the shorter base because you divide the original slope of the longer base by 2

The longer base of a trapezoid has endpoints of $(-2, -4)$ and $(4, 0)$. The shorter base contains the point $(3, 1)$.

Write an equation of the line that contains the shorter base of the trapezoid. Provide valid mathematical reasoning and calculations to explain how you derived your equation.

The bases must be parallel so they would have the same slope.

$$m = \frac{0 - (-4)}{4 - (-2)}$$

$$m = \frac{2}{3}$$

Using that slope and the point that the shorter base goes through

$$y - 1 = \frac{2}{3}(x - 3)$$

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

The longer base of a trapezoid has endpoints of $(-2, -4)$ and $(4, 0)$. The shorter base contains the point $(3, 1)$.

Write an equation of the line that contains the shorter base of the trapezoid. Provide valid mathematical reasoning and calculations to explain how you derived your equation.

$y = (^-3 \div 2)x$
bases must be parallel and have the same slope since a trapezoid has 1 set of parallel lines

Practice Set

Paper	Score
P1	3
P2	2
P3	0
P4	3
P5	1
P6	1
P7	2
P8	0
P9	3
P10	1