

Geometry: Trapezoid Midsegment Theorem

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DIRECTIONS

MN is the midsegment of trapezoid ABCD, connecting the midpoints of the legs. Apply the Midsegment Theorem: $MN = (b_1 + b_2) / 2$. Show all work.

1 Find MN:

$$b_1 = 7, \quad b_2 = 15$$

Answer: _____

2 Find MN:

$$b_1 = 5, \quad b_2 = 23$$

Answer: _____

3 Find b2:

$$MN = 13, \quad b_1 = 9$$

Answer: _____

4 Find b1:

$$MN = 16, \quad b_2 = 10$$

Answer: _____

5 Solve for x and find MN:

$$MN = x + 5, \quad b_1 = 2x + 2, \quad b_2 = x - 2$$

Answer: _____

6 Solve for x and find MN:

$$MN = 3x - 1, \quad b_1 = 4x + 2, \quad b_2 = x + 4$$

Answer: _____

7 Solve for x. Find b1 and b2:

$$MN = 12, \quad b_1 = 3x - 4, \quad b_2 = x + 4$$

Answer: _____

8 Solve for x. Find MN, b1, and b2:

$$MN = 3x + 2, \quad b_1 = 5x - 4, \quad b_2 = 2x + 6$$

Answer: _____



Answer Key & Solutions

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TEACHER NOTES

Midsegment Theorem: $MN = (b_1 + b_2)/2$, or equivalently $2 \cdot MN = b_1 + b_2$. MN is parallel to both bases.
To find a missing base: $b_2 = 2 \cdot MN - b_1$.

1 Find MN:

$$b_1 = 7, \quad b_2 = 15$$

$$= \quad MN = 11$$

$$MN = (b_1 + b_2)/2 = (7 + 15)/2 = 11.$$

2 Find MN:

$$b_1 = 5, \quad b_2 = 23$$

$$= \quad MN = 14$$

$$MN = (5 + 23)/2 = 14.$$

3 Find b_2 :

$$MN = 13, \quad b_1 = 9$$

$$= \quad b_2 = 17$$

$$13 = (9 + b_2)/2 \rightarrow 26 = 9 + b_2 \rightarrow b_2 = 17.$$

4 Find b_1 :

$$MN = 16, \quad b_2 = 10$$

$$= \quad b_1 = 22$$

$$16 = (b_1 + 10)/2 \rightarrow 32 = b_1 + 10 \rightarrow b_1 = 22.$$

5 Solve for x and find MN:

$$MN = x + 5, \quad b_1 = 2x + 2, \quad b_2 = x - 2$$

$$= \quad x = 10, \quad MN = 15$$

$$x + 5 = (2x + 2 + x - 2)/2 = 3x/2 \rightarrow 2x + 10 = 3x \rightarrow x = 10. \quad MN = 15.$$

6 Solve for x and find MN:

$$MN = 3x - 1, \quad b_1 = 4x + 2, \quad b_2 = x + 4$$

$$= \quad x = 8, \quad MN = 23$$

$$3x - 1 = (4x + 2 + x + 4)/2 = (5x + 6)/2 \rightarrow 6x - 2 = 5x + 6 \rightarrow x = 8. \quad MN = 23.$$

7 Solve for x . Find b_1 and b_2 :

$$MN = 12, \quad b_1 = 3x - 4, \quad b_2 = x + 4$$

$$= \quad x = 6, \quad b_1 = 14, \quad b_2 = 10$$

$$12 = (3x - 4 + x + 4)/2 = 4x/2 = 2x \rightarrow x = 6. \quad b_1 = 14, \quad b_2 = 10.$$

$$\text{Check: } (14 + 10)/2 = 12 \checkmark$$

8 Solve for x . Find MN, b_1 , and b_2 :

$$MN = 3x + 2, \quad b_1 = 5x - 4, \quad b_2 = 2x + 6$$

$$= \quad x = 2, \quad MN = 8, \quad b_1 = 6, \quad b_2 = 10$$

$$3x + 2 = (5x - 4 + 2x + 6)/2 = (7x + 2)/2 \rightarrow 6x + 4 = 7x + 2 \rightarrow x = 2.$$

$$\text{Check: } (6 + 10)/2 = 8 \checkmark$$

