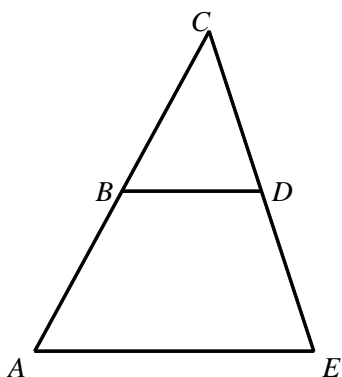


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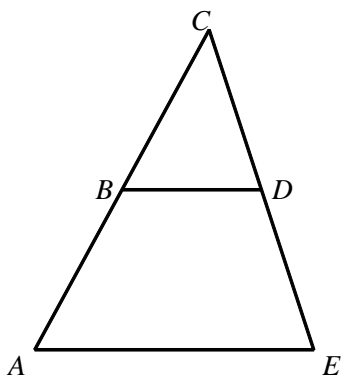
P.I. G.G.42: Investigate, justify, and apply theorems about geometric relationships, based on the properties of the line segment joining the midpoints of two sides of the triangle

1. Solve for x given $BD = \frac{5}{2}x + 3$ and $AE = 6x + 4$. Assume B is the midpoint of \overline{AC} and D is the midpoint of \overline{CE} .



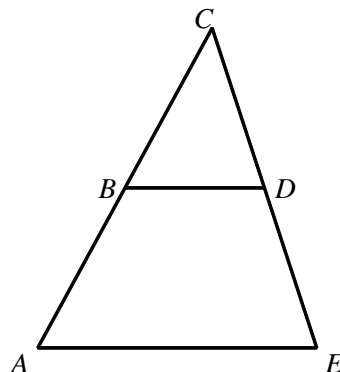
- [A] 2 [B] $\frac{2}{9}$ [C] $-\frac{1}{2}$ [D] $-\frac{9}{2}$

2. Solve for x given $BD = \frac{7}{2}x + 2$ and $AE = 3x + 6$. Assume B is the midpoint of \overline{AC} and D is the midpoint of \overline{CE} .

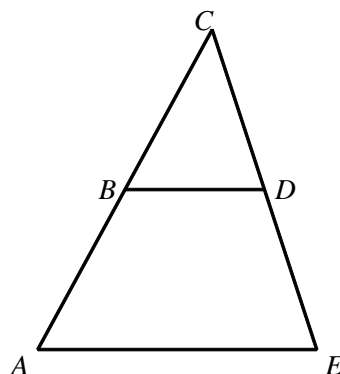


- [A] $\frac{7}{2}$ [B] $\frac{1}{2}$ [C] $-\frac{2}{7}$ [D] -2

3. Solve for x given $BD = 5x + 2$ and $AE = 9x + 6$. Assume B is the midpoint of \overline{AC} and D is the midpoint of \overline{CE} .

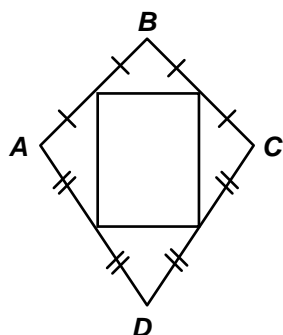


4. Solve for x given $BD = 4x + 2$ and $AE = 6x + 8$. Assume B is the midpoint of \overline{AC} and D is the midpoint of \overline{CE} .



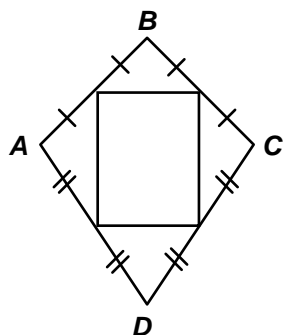
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5. Find the area of the rectangle if $\overline{AC} = 11$ and $\overline{BD} = 22$.



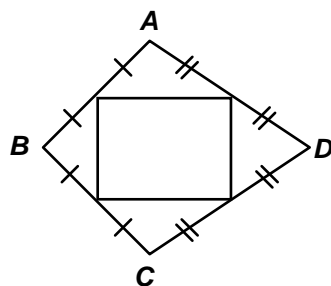
[A] 121 [B] 33 [C] 242 [D] 60.5

6. Find the area of the rectangle if $\overline{AC} = 15$ and $\overline{BD} = 24$.

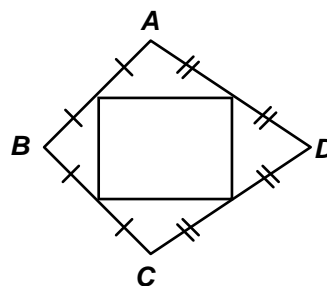


[A] 39 [B] 360 [C] 180 [D] 90

7. Find the area of the rectangle if $AC = 14$ and $BD = 30$.

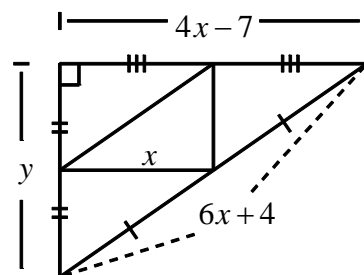


8. Find the area of the rectangle if $AC = 16$ and $BD = 24$.



9. The vertices of a triangle are $A(-3, 2)$, $B(3, 4)$, and $C(1, -6)$. Find the coordinates of S , the midpoint of \overline{AB} , and T , the midpoint of \overline{BC} . Verify that $ST = \frac{1}{2} AC$ and that $\overline{ST} \parallel \overline{AC}$.

10. Find the values of x and y .



- [A] $x = 3\frac{1}{2}$, $y = 25$
 [B] $x = 3\frac{1}{2}$, $y = 12\frac{1}{2}$
 [C] $x = 3\frac{1}{2}$, $y = 24$
 [D] none of the above

[1] A

[2] B

[3] 2

[4] 2

[5] D

[6] D

[7] 105

[8] 96

$S(0, 3)$ and $T(2, -1); -1$

$$ST = \sqrt{2^2 + (-4)^2} = \sqrt{20} = 2\sqrt{5} \text{ and}$$

$$AC = \sqrt{(-4)^2 + (-8)^2} = \sqrt{80} = 4\sqrt{5}, \text{ so}$$

$$ST = \frac{1}{2} AC; \text{ slope of } \overline{ST} = \frac{4}{-2} = -2 \text{ and}$$

[9] slope of $\overline{AC} = \frac{-8}{4} = -2$, so $\overline{ST} \parallel \overline{AC}$.

[10] C