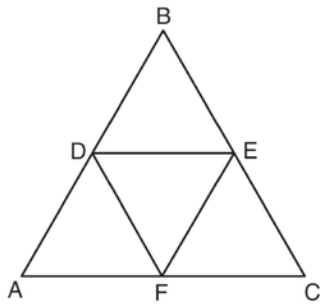


G.G.42: Midsegments: Investigate, justify, and apply theorems about geometric relationships, based on properties of the segment joining the midpoints of two sides of the triangle

- 1 If the midpoints of the sides of a triangle are connected, the area of the triangle formed is what part of the area of the original triangle?

- 1) $\frac{1}{4}$
- 2) $\frac{1}{3}$
- 3) $\frac{3}{8}$
- 4) $\frac{1}{2}$

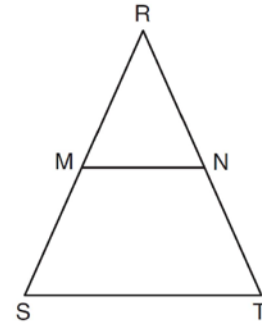
- 2 In the diagram below, the vertices of $\triangle DEF$ are the midpoints of the sides of equilateral triangle ABC , and the perimeter of $\triangle ABC$ is 36 cm.



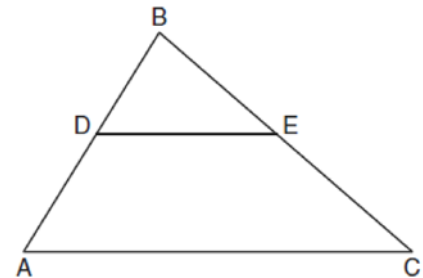
What is the length, in centimeters, of \overline{EF} ?

- 1) 6
- 2) 12
- 3) 18
- 4) 4

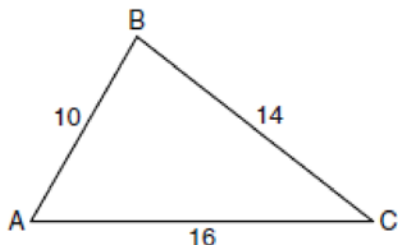
- 3 In isosceles triangle RST shown below, $\overline{RS} \cong \overline{RT}$, M and N are midpoints of \overline{RS} and \overline{RT} , respectively, and \overline{MN} is drawn. If $MN = 3.5$ and the perimeter of $\triangle RST$ is 25, determine and state the length of \overline{NT} .



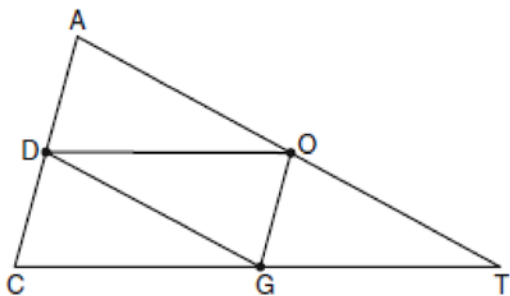
- 4 In the diagram below of $\triangle ABC$, \overline{DE} is a midsegment of $\triangle ABC$, $DE = 7$, $AB = 10$, and $BC = 13$. Find the perimeter of $\triangle ABC$.



- 5 In the diagram of $\triangle ABC$ below, $AB = 10$, $BC = 14$, and $AC = 16$. Find the perimeter of the triangle formed by connecting the midpoints of the sides of $\triangle ABC$.



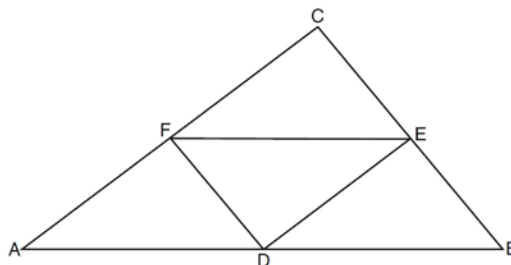
- 6 In the diagram below of $\triangle ACT$, D is the midpoint of \overline{AC} , O is the midpoint of \overline{AT} , and G is the midpoint of \overline{CT} .



If $AC = 10$, $AT = 18$, and $CT = 22$, what is the perimeter of parallelogram $CDOG$?

- 1) 21
- 2) 25
- 3) 32
- 4) 40

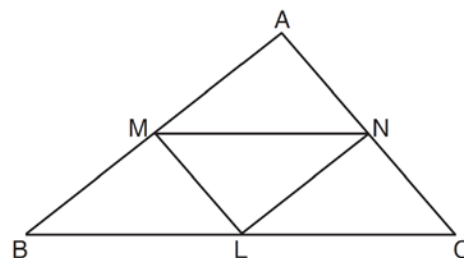
- 7 In the diagram of $\triangle ABC$ shown below, D is the midpoint of \overline{AB} , E is the midpoint of \overline{BC} , and F is the midpoint of \overline{AC} .



If $AB = 20$, $BC = 12$, and $AC = 16$, what is the perimeter of trapezoid $ABEF$?

- 1) 24
- 2) 36
- 3) 40
- 4) 44

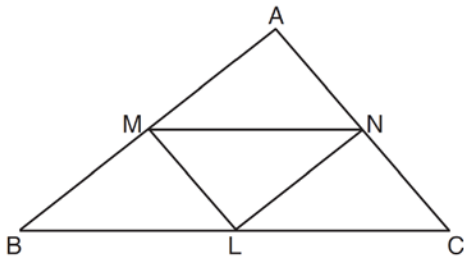
- 8 In $\triangle ABC$ shown below, L is the midpoint of \overline{BC} , M is the midpoint of \overline{AB} , and N is the midpoint of \overline{AC} .



If $MN = 8$, $ML = 5$, and $NL = 6$, the perimeter of trapezoid $BMNC$ is

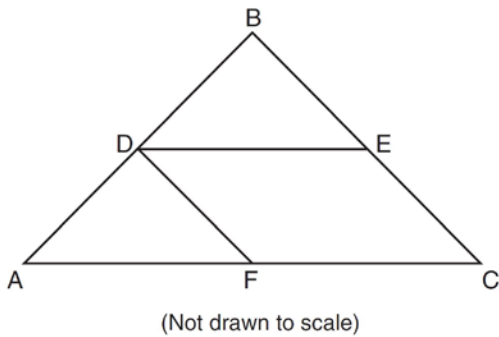
- 1) 35
- 2) 31
- 3) 28
- 4) 26

- 9 In $\triangle ABC$ shown below, L is the midpoint of \overline{BC} , M is the midpoint of \overline{AB} , and N is the midpoint of \overline{AC} .



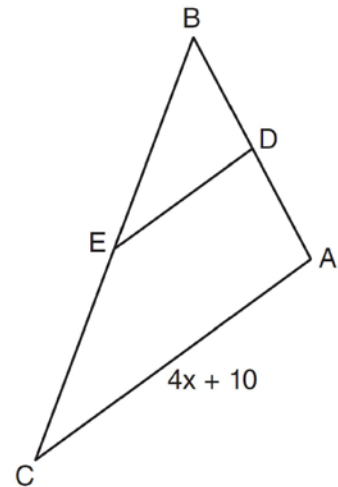
If $MN = 8$, $ML = 5$, and $NL = 6$, the perimeter of trapezoid $BMNC$ is

- 1) 26
 - 2) 28
 - 3) 30
 - 4) 35
- 10 In the diagram below of $\triangle ABC$, \overline{DE} and \overline{DF} are midsegments.



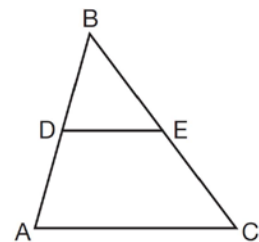
If $DE = 9$, and $BC = 17$, determine and state the perimeter of quadrilateral $FDEC$.

- 11 In the diagram below of $\triangle ABC$, D is the midpoint of \overline{AB} , and E is the midpoint of \overline{BC} .



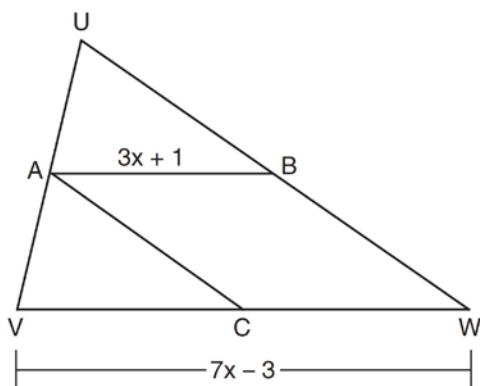
If $AC = 4x + 10$, which expression represents DE ?

- 1) $x + 2.5$
 - 2) $2x + 5$
 - 3) $2x + 10$
 - 4) $8x + 20$
- 12 In $\triangle ABC$, D is the midpoint of \overline{AB} and E is the midpoint of \overline{BC} . If $AC = 3x - 15$ and $DE = 6$, what is the value of x ?



- 1) 6
- 2) 7
- 3) 9
- 4) 12

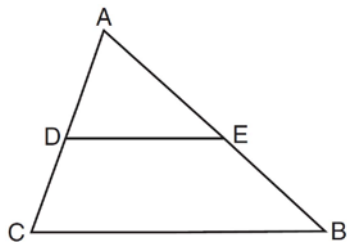
- 13 In the diagram of $\triangle UVW$ below, A is the midpoint of \overline{UV} , B is the midpoint of \overline{UW} , C is the midpoint of \overline{VW} , and \overline{AB} and \overline{AC} are drawn.



If $VW = 7x - 3$ and $AB = 3x + 1$, what is the length of \overline{VC} ?

- 1) 5
- 2) 13
- 3) 16
- 4) 32

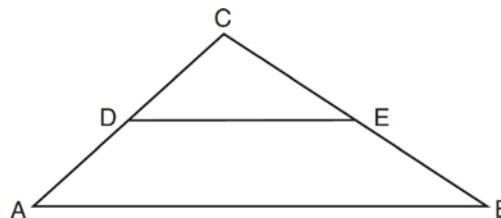
- 14 Triangle ABC is shown in the diagram below.



If \overline{DE} joins the midpoints of \overline{ADC} and \overline{AEB} , which statement is *not* true?

- 1) $DE = \frac{1}{2} CB$
- 2) $\overline{DE} \parallel \overline{CB}$
- 3) $\frac{AD}{DC} = \frac{DE}{CB}$
- 4) $\triangle ABC \sim \triangle AED$

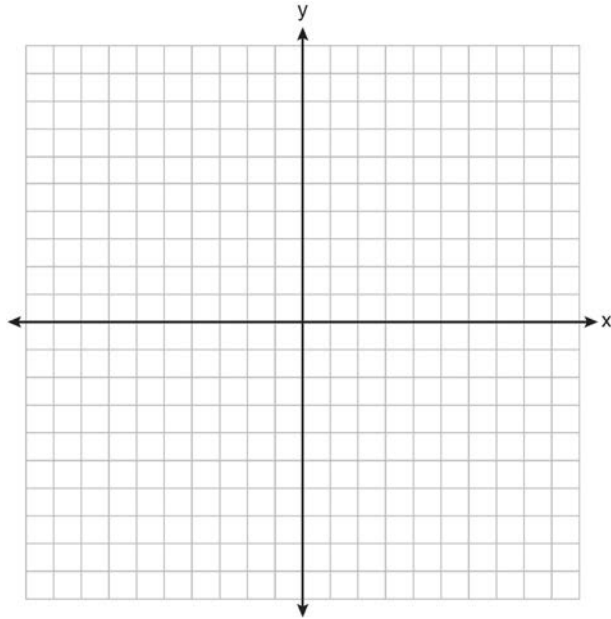
- 15 In the diagram below, \overline{DE} joins the midpoints of two sides of $\triangle ABC$.



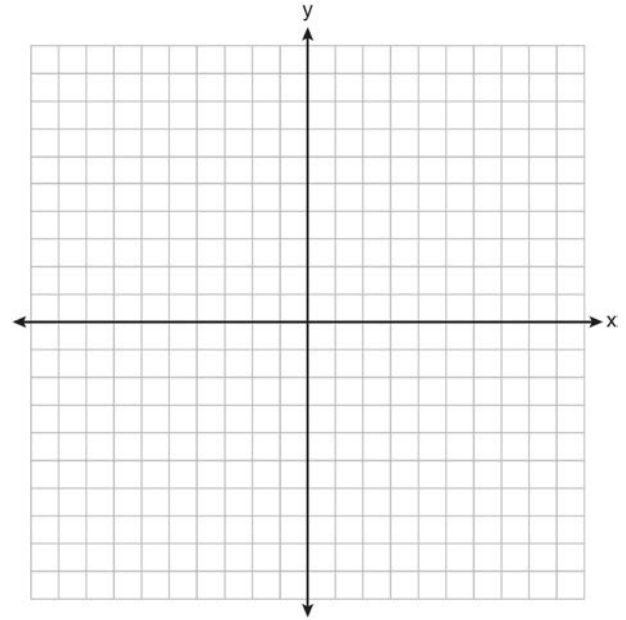
Which statement is *not* true?

- 1) $CE = \frac{1}{2} CB$
- 2) $DE = \frac{1}{2} AB$
- 3) area of $\triangle CDE = \frac{1}{2}$ area of $\triangle CAB$
- 4) perimeter of $\triangle CDE = \frac{1}{2}$ perimeter of $\triangle CAB$

- 16 On the set of axes below, graph and label $\triangle DEF$ with vertices at $D(-4,-4)$, $E(-2,2)$, and $F(8,-2)$. If G is the midpoint of \overline{EF} and H is the midpoint of \overline{DF} , state the coordinates of G and H and label \overline{GH} each point on your graph. Explain why $\overline{GH} \parallel \overline{DE}$.



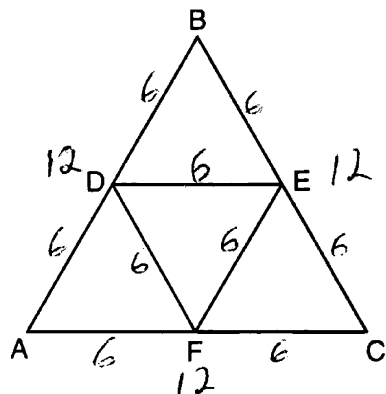
- 17 Triangle HKL has vertices $H(-7,2)$, $K(3,-4)$, and $L(5,4)$. The midpoint of \overline{HL} is M and the midpoint of \overline{LK} is N . Determine and state the coordinates of points M and N . Justify the statement: \overline{MN} is parallel to \overline{HK} . [The use of the set of axes below is optional.]



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

1 ANS: 1 REF: 010521a

2 ANS: 1



REF: 081003ge

3 ANS:

$$2x + 7 = 25 \quad NT = 4.5$$

$$2x = 18$$

$$x = 9$$

REF: 081531ge

4 ANS:

37. Since \overline{DE} is a midsegment, $AC = 14$. $10 + 13 + 14 = 37$

REF: 061030ge

5 ANS:

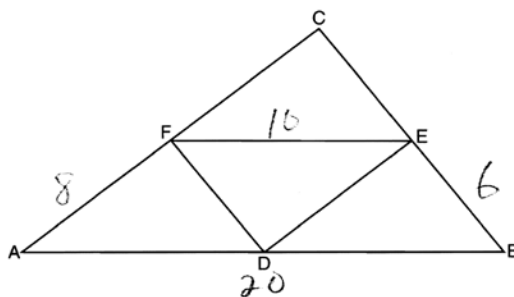
20

REF: 060929ge

6 ANS: 3

REF: 080920ge

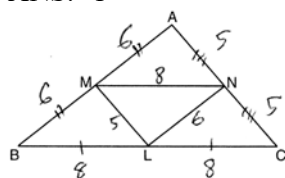
7 ANS: 4



$$20 + 8 + 10 + 6 = 44.$$

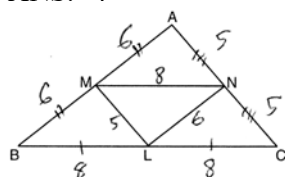
REF: 061211ge

8 ANS: 1



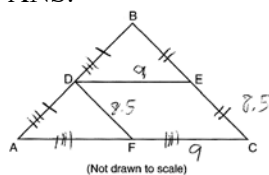
REF: 011413ge

9 ANS: 4



REF: 061520ge

10 ANS:



$$8.5 + 9 + 8.5 + 9 = 35$$

REF: 081430ge

11 ANS: 2

$$\frac{4x + 10}{2} = 2x + 5$$

REF: 011103ge

12 ANS: 3

$$3x - 15 = 2(6)$$

$$3x = 27$$

$$x = 9$$

REF: 061311ge

13 ANS: 3

REF: 081320ge

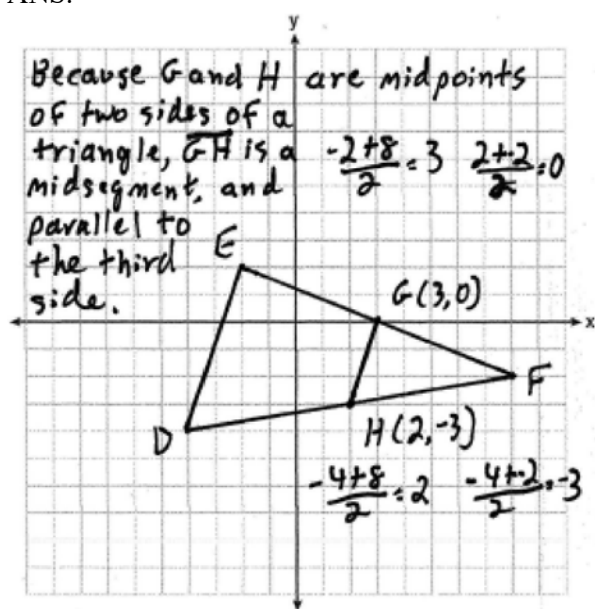
14 ANS: 3

REF: 011311ge

15 ANS: 3

REF: 081227ge

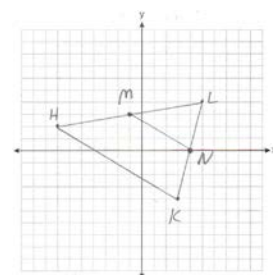
16 ANS:



REF: fall0835ge

17 ANS:

$$M\left(\frac{-7+5}{2}, \frac{2+4}{2}\right) = M(-1, 3). \quad N\left(\frac{3+5}{2}, \frac{-4+4}{2}\right) = N(4, 0). \quad \overline{MN} \text{ is a midsegment.}$$



REF: 011237ge