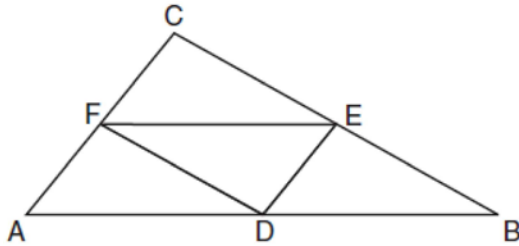


G.CO.C.10: Midsegments

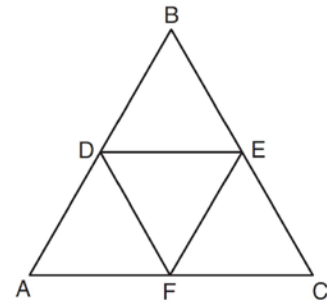
- 1 In the diagram below of $\triangle ABC$, D , E , and F are the midpoints of \overline{AB} , \overline{BC} , and \overline{CA} , respectively.



What is the ratio of the area of $\triangle CFE$ to the area of $\triangle CAB$?

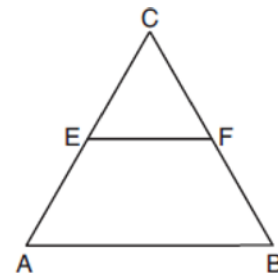
- 1) 1:1
 - 2) 1:2
 - 3) 1:3
 - 4) 1:4
- 2 The area of $\triangle TAP$ is 36 cm^2 . A second triangle, $\triangle JOE$, is formed by connecting the midpoints of each side of $\triangle TAP$. What is the area of $\triangle JOE$, in square centimeters?
- 1) 9
 - 2) 12
 - 3) 18
 - 4) 27

- 3 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} ?

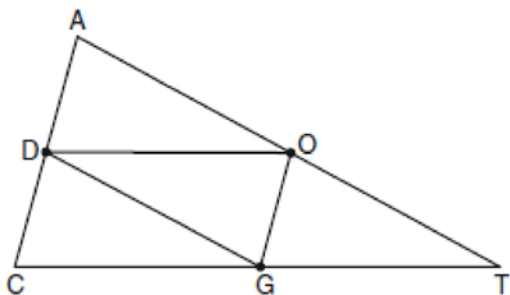
- 1) 6
 - 2) 12
 - 3) 18
 - 4) 4
- 4 In the diagram of equilateral triangle ABC shown below, E and F are the midpoints of \overline{AC} and \overline{BC} , respectively.



If $EF = 2x + 8$ and $AB = 7x - 2$, what is the perimeter of trapezoid $ABFE$?

- 1) 36
- 2) 60
- 3) 100
- 4) 120

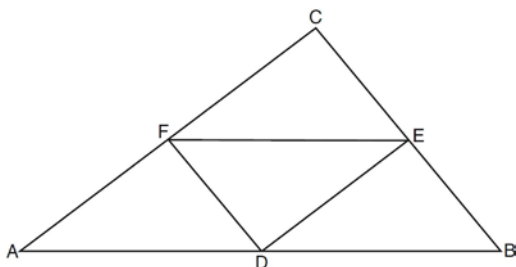
- 5 In the diagram below of $\triangle ACT$, D is the midpoint of \overline{AC} , O is the midpoint of \overline{AT} , and G is the midpoint of \overline{CT} .



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

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

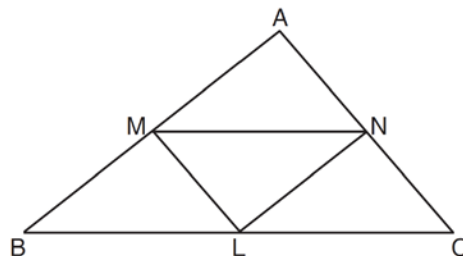
- 6 In the diagram of $\triangle ABC$ shown below, D is the midpoint of \overline{AB} , E is the midpoint of \overline{BC} , and F is the midpoint of \overline{AC} .



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

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

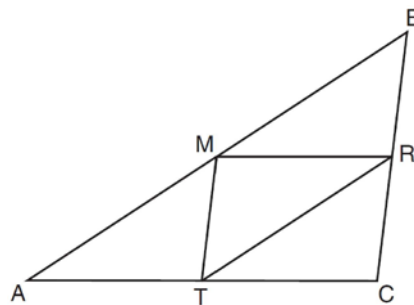
- 7 In $\triangle ABC$ shown below, L is the midpoint of \overline{BC} , M is the midpoint of \overline{AB} , and N is the midpoint of \overline{AC} .



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

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

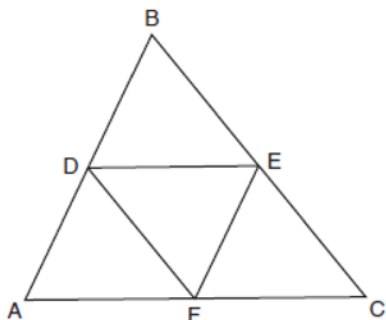
- 8 As shown in the diagram below, M , R , and T are midpoints of the sides of $\triangle ABC$.



If $AB = 18$, $AC = 14$, and $BC = 10$, what is the perimeter of quadrilateral $ACRM$?

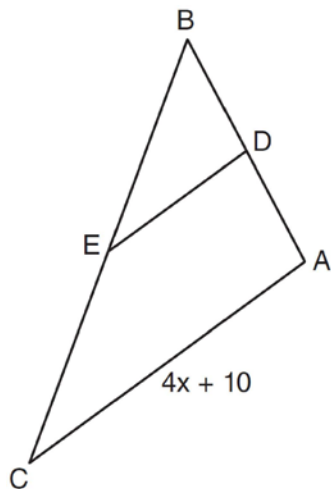
- 1) 35
- 2) 32
- 3) 24
- 4) 21

- 9 In the diagram below, \overline{DE} , \overline{DF} , and \overline{EF} are midsegments of $\triangle ABC$.



The perimeter of quadrilateral $ADEF$ is equivalent to

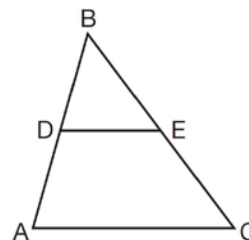
- 1) $AB + BC + AC$
 - 2) $\frac{1}{2}AB + \frac{1}{2}AC$
 - 3) $2AB + 2AC$
 - 4) $AB + AC$
- 10 In the diagram below of $\triangle ABC$, D is the midpoint of \overline{AB} , and E is the midpoint of \overline{BC} .



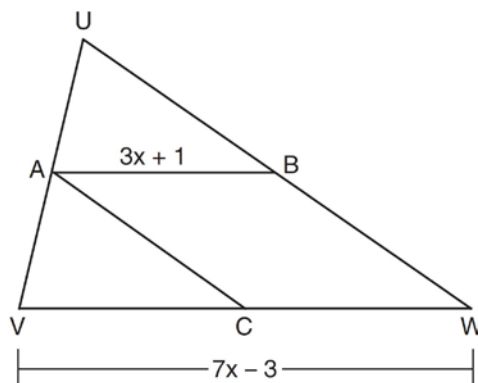
If $AC = 4x + 10$, which expression represents DE ?

- 1) $x + 2.5$
- 2) $2x + 5$
- 3) $2x + 10$
- 4) $8x + 20$

- 11 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 ?



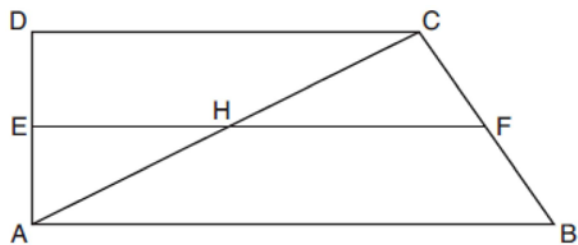
- 1) 6
 - 2) 7
 - 3) 9
 - 4) 12
- 12 In the diagram of $\triangle UVW$ below, A is the midpoint of \overline{UV} , B is the midpoint of \overline{UW} , C is the midpoint of \overline{VW} , and \overline{AB} and \overline{AC} are drawn.



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

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

- 13 In quadrilateral $ABCD$ below, $\overline{AB} \parallel \overline{CD}$, and E , H , and F are the midpoints of \overline{AD} , \overline{AC} , and \overline{BC} , respectively.

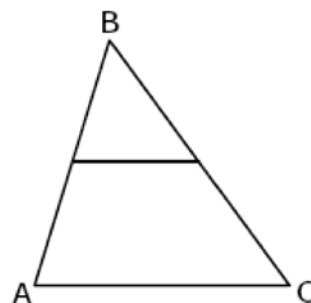


If $AB = 24$, $CD = 18$, and $AH = 10$, then FH is

- 1) 9
 - 2) 10
 - 3) 12
 - 4) 21
- 14 In $\triangle ABC$, M is the midpoint of \overline{AB} and N is the midpoint of \overline{AC} . If $MN = x + 13$ and $BC = 5x - 1$, what is the length of MN ?

- 1) 3.5
- 2) 9
- 3) 16.5
- 4) 22

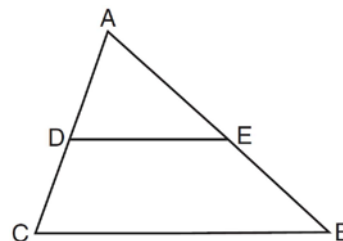
- 15 In $\triangle ABC$ below, \overline{DE} is a midsegment, and $\overline{BD} \cong \overline{DE}$.



Which statement is always true?

- 1) $\triangle ABC$ is isosceles
- 2) $\triangle ABC$ is scalene
- 3) $\overline{BD} \cong \overline{BE}$
- 4) $\overline{DA} \cong \overline{EC}$

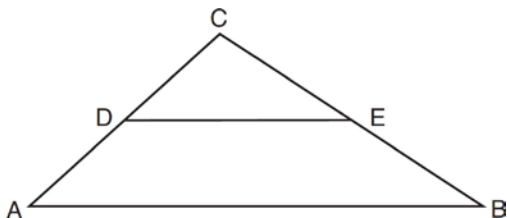
- 16 Triangle ABC is shown in the diagram below.



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

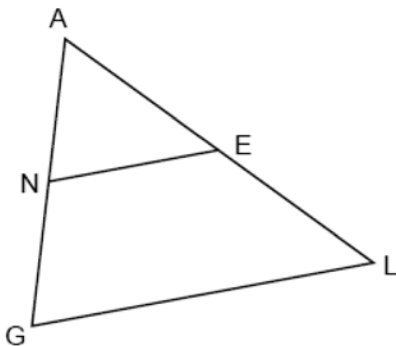
- 1) $DE = \frac{1}{2} CB$
- 2) $\overline{DE} \parallel \overline{CB}$
- 3) $\frac{AD}{DC} = \frac{DE}{CB}$
- 4) $\triangle ABC \sim \triangle AED$

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



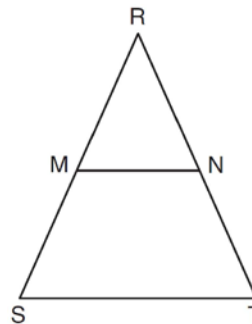
Which statement is *not* true?

- 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 $\triangle CAB$
- 18 In $\triangle AGL$ below, N and E are the midpoints of \overline{AG} and \overline{AL} , respectively, \overline{NE} is drawn.

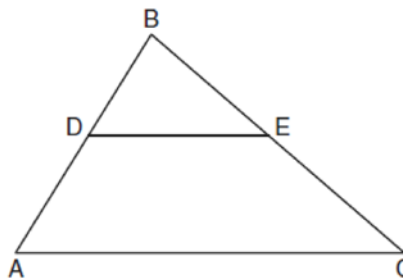


If $NE = 15$ and $GL = 3x - 12$, determine and state the value of x .

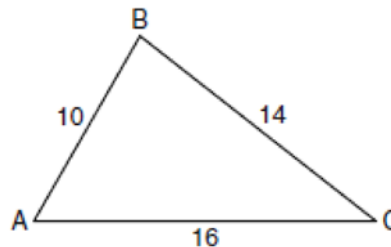
- 19 In isosceles triangle RST shown below, $\overline{RS} \cong \overline{RT}$, M and N are midpoints of \overline{RS} and \overline{RT} , respectively, and \overline{MN} is drawn. If $MN = 3.5$ and the perimeter of $\triangle RST$ is 25, determine and state the length of \overline{NT} .



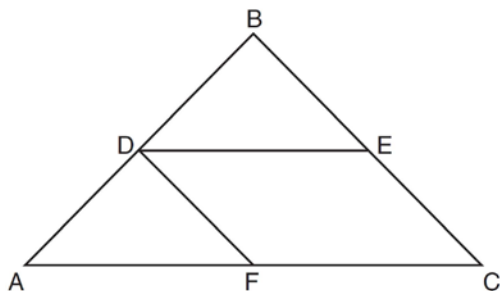
- 20 In the diagram below of $\triangle ABC$, \overline{DE} is a midsegment of $\triangle ABC$, $DE = 7$, $AB = 10$, and $BC = 13$. Find the perimeter of $\triangle ABC$.



- 21 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 $\triangle ABC$.



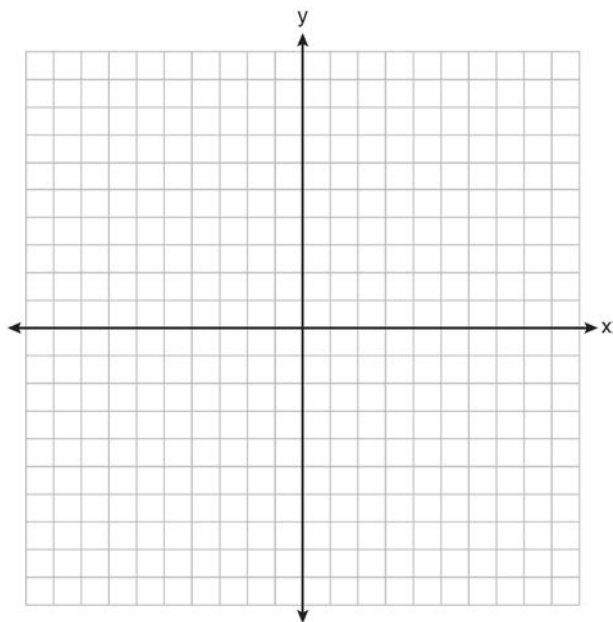
- 22 In the diagram below of $\triangle ABC$, \overline{DE} and \overline{DF} are midsegments.



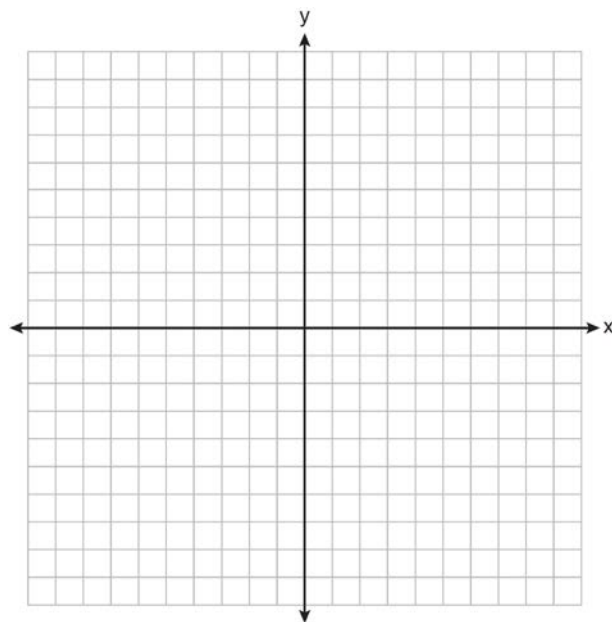
(Not drawn to scale)

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

- 23 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} . Explain why $\overline{GH} \parallel \overline{DE}$.



- 24 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.CO.C.10: Midsegments **Answer Section**

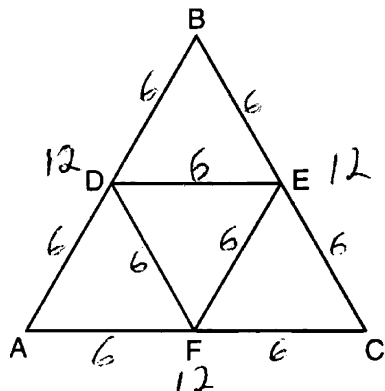
1 ANS: 4 REF: 081716geo

2 ANS: 1

$$\frac{36}{4} = 9$$

REF: 012321geo

3 ANS: 1



REF: 081003ge

4 ANS: 3

$2(2x + 8) = 7x - 2$ $AB = 7(6) - 2 = 40$. Since \overline{EF} is a midsegment, $EF = \frac{40}{2} = 20$. Since $\triangle ABC$ is equilateral,

$$4x + 16 = 7x - 2$$

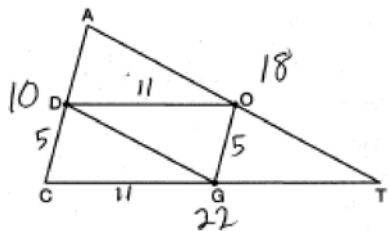
$$18 = 3x$$

$$6 = x$$

$$AE = BF = \frac{40}{2} = 20. \quad 40 + 20 + 20 + 20 = 100$$

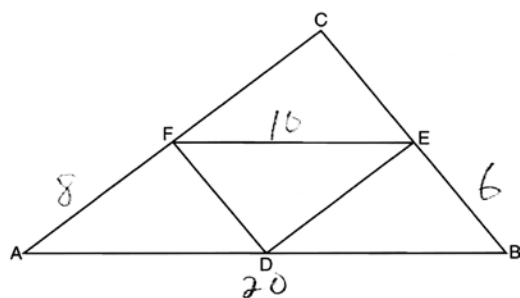
REF: 061923geo

5 ANS: 3



REF: 080920ge

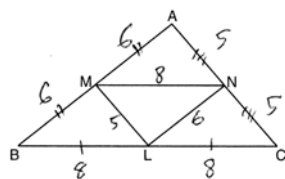
6 ANS: 4



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

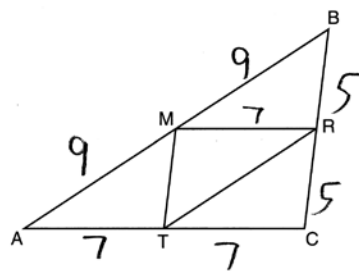
REF: 061211ge

7 ANS: 1



REF: 011413ge

8 ANS: 1



$$7 + 7 + 5 + 7 + 9 = 35$$

REF: 011611ge

9 ANS: 4

REF: 011704geo

10 ANS: 2

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

REF: 011103ge

11 ANS: 3

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

$$3x = 27$$

$$x = 9$$

REF: 061311ge

12 ANS: 3

REF: 081320ge

13 ANS: 3

$$\frac{1}{2} \times 24 = 12$$

REF: 012009geo

14 ANS: 4

$$2(x + 13) = 5x - 1 \quad MN = 9 + 13 = 22$$

$$2x + 26 = 5x - 1$$

$$27 = 3x$$

$$x = 9$$

REF: 062322geo

15 ANS: 1

REF: 012512geo

16 ANS: 3

REF: 011311ge

17 ANS: 3

REF: 081227ge

18 ANS:

$$2(15) = 3x - 12$$

$$30 = 3x - 12$$

$$42 = 3x$$

$$14 = x$$

REF: 082429geo

19 ANS:

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

$$2x = 18$$

$$x = 9$$

REF: 081531ge

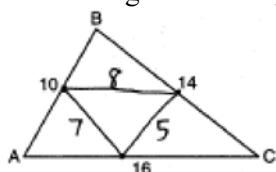
20 ANS:

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

REF: 061030ge

21 ANS:

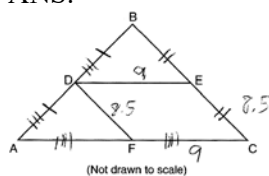
20. The sides of the triangle formed by connecting the midpoints are half the sides of the original triangle.



$$5 + 7 + 8 = 20.$$

REF: 060929ge

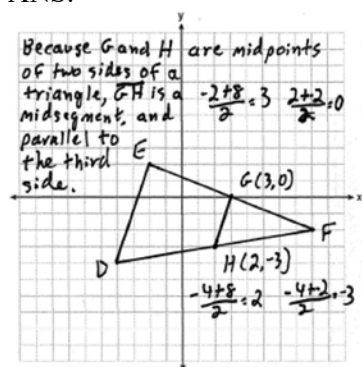
22 ANS:



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

REF: 081430ge

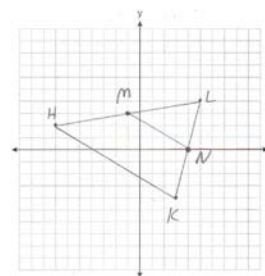
23 ANS:



REF: fall0835ge

24 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