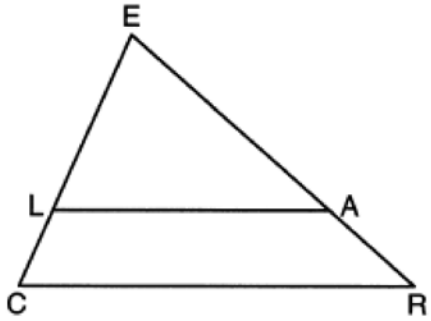
G.SRT.B.4: Side Splitter Theorem 1

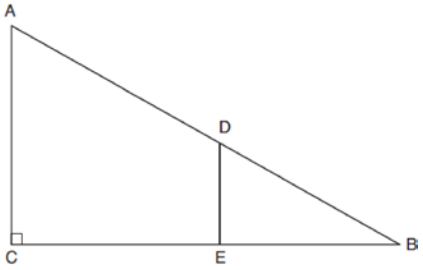
1 In the diagram below of $\triangle CER$, $\overline{LA} \parallel \overline{CR}$.



If $CL = 3.5$, $LE = 7.5$, and $EA = 9.5$, what is the length of $\overline{AR}$, to the *nearest tenth*?

1) 5.5
2) 4.4
3) 3.0
4) 2.8

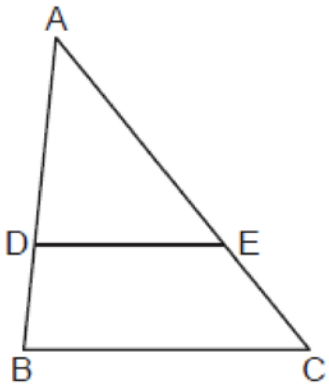
2 In right triangle ABC shown below, point D is on $\overline{AB}$ and point E is on $\overline{CB}$ such that $\overline{AC} \parallel \overline{DE}$.



If $AB = 15$, $BC = 12$, and $EC = 7$, what is the length of $\overline{BD}$?

1) 8.75
2) 6.25
3) 5
4) 4

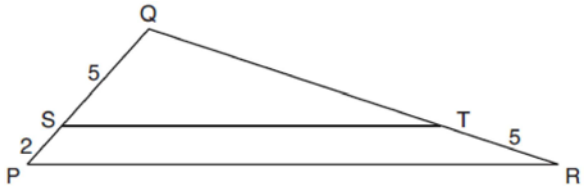
3 In triangle ABC below, D is a point on $\overline{AB}$ and E is a point on $\overline{AC}$, such that $\overline{DE} \parallel \overline{BC}$.



If $AD = 12$, $DB = 8$, and $EC = 10$, what is the length of $\overline{AC}$?

1) 15
2) 22
3) 24
4) 25

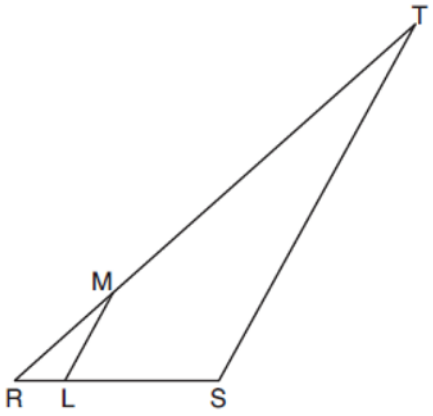
4 In the diagram below of $\triangle PQR$, $\overline{ST}$ is drawn parallel to $\overline{PR}$, $PS = 2$, $SQ = 5$, and $TR = 5$.



What is the length of $\overline{QR}$?

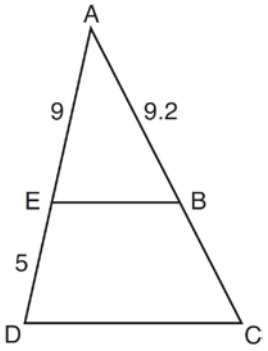
1) 7
2) 2
3) $12\frac{1}{2}$
4) $17\frac{1}{2}$

5 In the diagram below of $\triangle RST$, L is a point on $\overline{RS}$, and M is a point on $\overline{RT}$, such that $LM \parallel ST$.



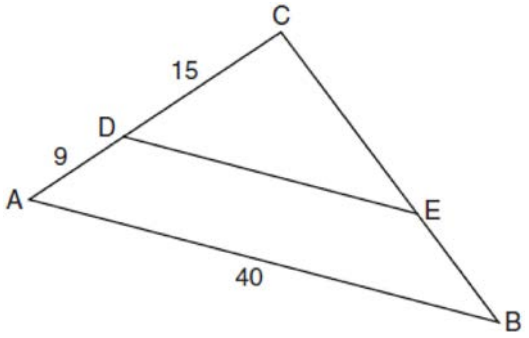
If $RL = 2$, $LS = 6$, $LM = 4$, and $ST = x + 2$, what is the length of $\overline{ST}$?
1) 10
2) 12
3) 14
4) 16

6 In the diagram of $\triangle ADC$ below, $\overline{EB} \parallel \overline{DC}$, $AE = 9$, $ED = 5$, and $AB = 9.2$.



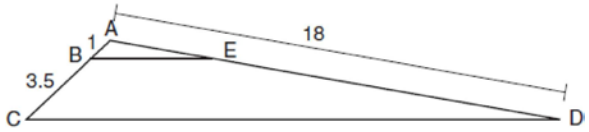
What is the length of $\overline{AC}$, to the *nearest tenth*?
1) 5.1
2) 5.2
3) 14.3
4) 14.4

7 In the diagram of $\triangle ABC$ below, $\overline{DE}$ is parallel to $\overline{AB}$, $CD = 15$, $AD = 9$, and $AB = 40$.



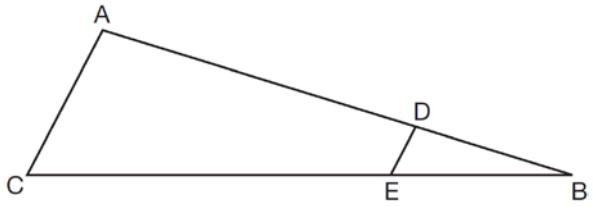
The length of $\overline{DE}$ is
1) 15
2) 24
3) 25
4) 30

8 In the diagram below, triangle ACD has points B and E on sides $\overline{AC}$ and $\overline{AD}$, respectively, such that $\overline{BE} \parallel \overline{CD}$, $AB = 1$, $BC = 3.5$, and $AD = 18$.



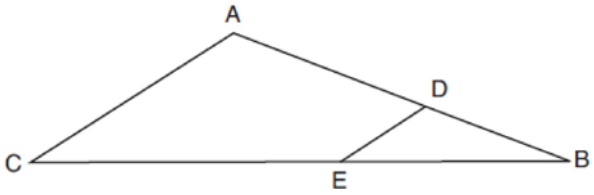
What is the length of $\overline{AE}$, to the *nearest tenth*?
1) 14.0
2) 5.1
3) 3.3
4) 4.0

9 In the diagram of $\triangle ABC$, points D and E are on $\overline{AB}$ and $\overline{CB}$, respectively, such that $\overline{AC} \parallel \overline{DE}$.



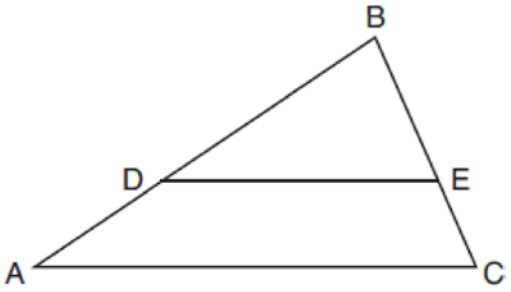
If $AD = 24$, $DB = 12$, and $DE = 4$, what is the length of $\overline{AC}$?
1) 8
2) 12
3) 16
4) 72

10 In the diagram of $\triangle ABC$ below, points D and E are on sides $\overline{AB}$ and $\overline{CB}$ respectively, such that $\overline{DE} \parallel \overline{AC}$.



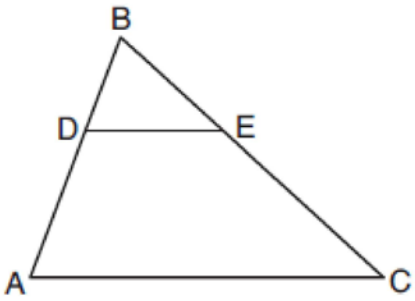
If EB is 3 more than DB, $AB = 14$, and $CB = 21$, what is the length of $\overline{AD}$?
1) 6
2) 8
3) 9
4) 12

11 In triangle ABC, points D and E are on sides $\overline{AB}$ and $\overline{BC}$, respectively, such that $\overline{DE} \parallel \overline{AC}$, and $AD:DB = 3:5$.



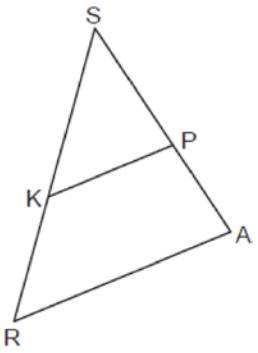
If $DB = 6.3$ and $AC = 9.4$, what is the length of DE, to the *nearest tenth*?
1) 3.8
2) 5.6
3) 5.9
4) 15.7

12 In the diagram below of $\triangle ABC$, D is a point on $\overline{BA}$, E is a point on $\overline{BC}$, and $\overline{DE}$ is drawn.



If $BD = 5$, $DA = 12$, and $BE = 7$, what is the length of $\overline{BC}$ so that $\overline{AC} \parallel \overline{DE}$?
1) 23.8
2) 16.8
3) 15.6
4) 8.6

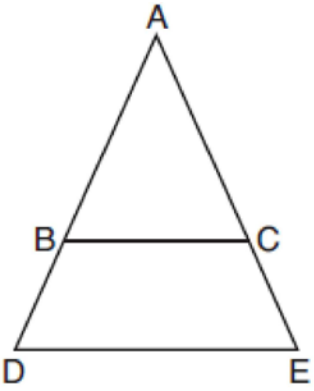
13 In the diagram of $\triangle SRA$ below, $\overline{KP}$ is drawn such that $\angle SKP \cong \angle SRA$.



If $SK = 10$, $SP = 8$, and $PA = 6$, what is the length of $\overline{KR}$, to the *nearest tenth*?

1) 4.8
2) 7.5
3) 8.0
4) 13.3

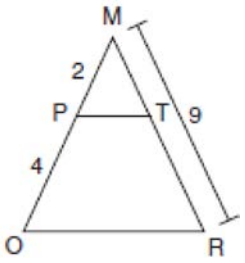
14 In the diagram below, $\overline{BC}$ connects points B and C on the congruent sides of isosceles triangle ADE, such that $\triangle ABC$ is isosceles with vertex angle A.



If $AB = 10$, $BD = 5$, and $DE = 12$, what is the length of $\overline{BC}$?

1) 6
2) 7
3) 8
4) 9

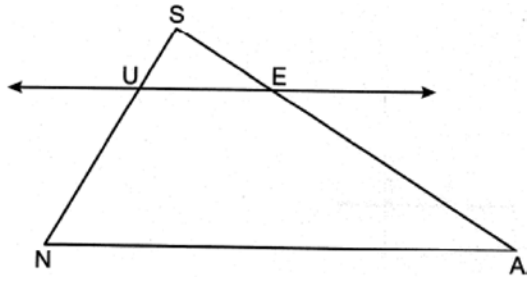
15 Given $\triangle MRO$ shown below, with trapezoid $PTRO$, $MR = 9$, $MP = 2$, and $PO = 4$.



What is the length of $\overline{TR}$?

1) 4.5
2) 5
3) 3
4) 6

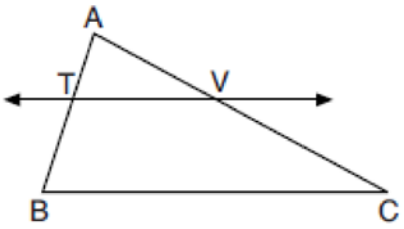
16 In $\triangle SNA$ below, $\overleftrightarrow{UE} \parallel \overline{NA}$.



If $SU = 3$, $SN = 11$, and $EA = 13$, what is the length of $\overline{SE}$, to the *nearest tenth*?

1) 2.5
2) 3.5
3) 4.9
4) 17.9

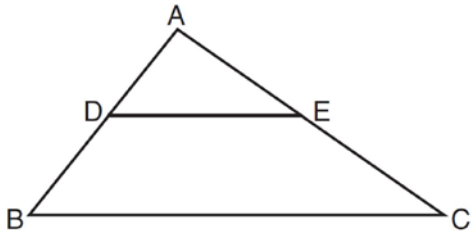
17 In the diagram below of $\triangle ABC$, $\overline{TV}$ intersects $\overline{AB}$ and $\overline{AC}$ at points T and V respectively, and $m\angle ATV = m\angle ABC$.



If $AT = 4$, $BC = 18$, $TB = 5$, and $AV = 6$, what is the perimeter of quadrilateral $TBCV$?

1) 38.5
2) 39.5
3) 40.5
4) 44.9

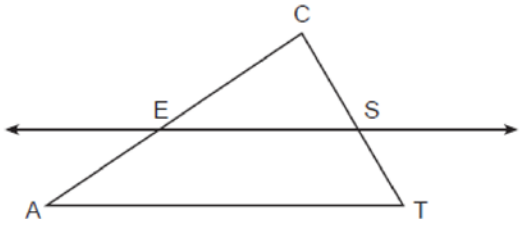
18 In the diagram below, $\triangle ABC \sim \triangle ADE$.



Which measurements are justified by this similarity?

1) $AD = 3$, $AB = 6$, $AE = 4$, and $AC = 12$
2) $AD = 5$, $AB = 8$, $AE = 7$, and $AC = 10$
3) $AD = 3$, $AB = 9$, $AE = 5$, and $AC = 10$
4) $AD = 2$, $AB = 6$, $AE = 5$, and $AC = 15$

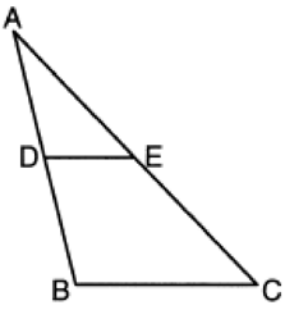
19 In the diagram below of $\triangle ACT$, $\overleftrightarrow{ES}$ is drawn parallel to $\overline{AT}$ such that E is on $\overline{CA}$ and S is on $\overline{CT}$.



Which statement is always true?

1) $\frac{CE}{CA} = \frac{CS}{ST}$
2) $\frac{CE}{ES} = \frac{EA}{AT}$
3) $\frac{CE}{EA} = \frac{CS}{ST}$
4) $\frac{CE}{ST} = \frac{EA}{CS}$

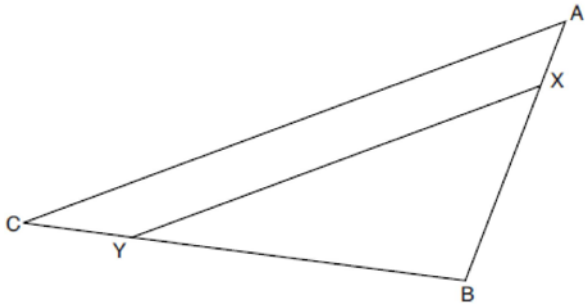
20 In $\triangle ABC$ below, $\overline{DE}$ is drawn such that D and E are on $\overline{AB}$ and $\overline{AC}$, respectively.



If $\overline{DE} \parallel \overline{BC}$, which equation will always be true?

1) $\frac{AD}{DE} = \frac{DB}{BC}$
2) $\frac{AD}{DE} = \frac{AB}{BC}$
3) $\frac{AD}{BC} = \frac{DE}{DB}$
4) $\frac{AD}{BC} = \frac{DE}{AB}$

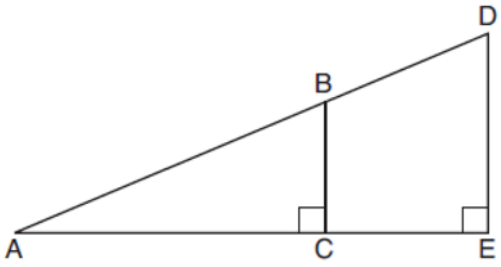
21 The diagram below shows triangle ABC with point X on side $\overline{AB}$ and point Y on side $\overline{CB}$.



Which information is sufficient to prove that $\triangle BXY \sim \triangle BAC$?

1) $\angle B$ is a right angle.
2) $\overline{XY}$ is parallel to $\overline{AC}$.
3) $\triangle ABC$ is isosceles.
4) $\overline{AX} \cong \overline{CY}$

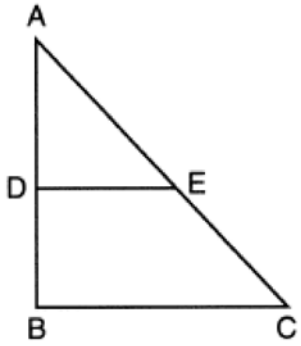
22 In the diagram below of right triangle AED, $\overline{BC} \parallel \overline{DE}$.



Which statement is always true?

1) $\frac{AC}{BC} = \frac{DE}{AE}$
2) $\frac{AB}{AD} = \frac{BC}{DE}$
3) $\frac{AC}{CE} = \frac{BC}{DE}$
4) $\frac{DE}{BC} = \frac{DB}{AB}$

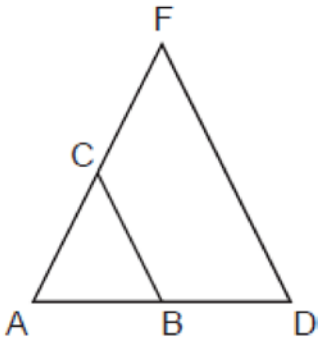
23 In triangle ABC below, D is a point on $\overline{AB}$ and E is a point on $\overline{AC}$, such that $\overline{DE} \parallel \overline{BC}$.



Which statement is always true?

1) $\angle ADE$ and $\angle ABC$ are right angles.
2) $\triangle ADE \sim \triangle ABC$
3) $DE = \frac{1}{2} BC$
4) $\overline{AD} \cong \overline{DB}$

24 Triangle ADF is drawn and $\overline{BC} \parallel \overline{DF}$.



Which statement must be true?

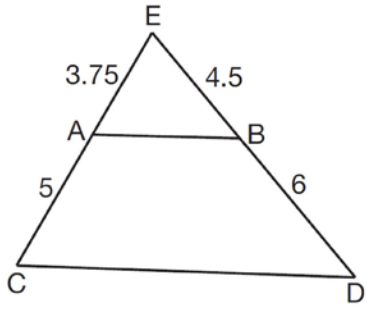
1) $\frac{AB}{BC} = \frac{BD}{DF}$

2) $BC = \frac{1}{2}DF$

3) $AB : AD = AC : CF$

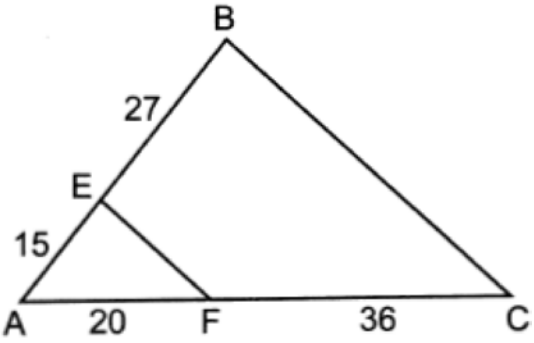
4) $\angle ACB \cong \angle AFD$

25 In $\triangle CED$ as shown below, points A and B are located on sides $\overline{CE}$ and $\overline{ED}$, respectively. Line segment AB is drawn such that $AE = 3.75$, $AC = 5$, $EB = 4.5$, and $BD = 6$.



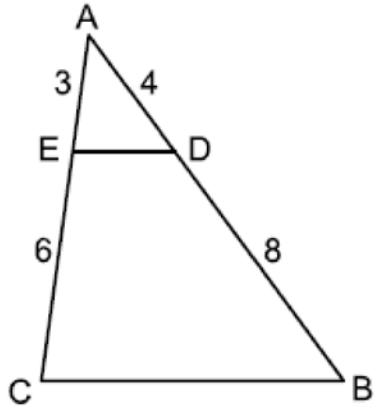
Explain why $\overline{AB}$ is parallel to $\overline{CD}$.

26 In the diagram below, $AE = 15$, $EB = 27$, $AF = 20$, and $FC = 36$.



Explain why $\overline{EF} \parallel \overline{BC}$.

27 In $\triangle ABC$ below, $\overline{DE}$ is drawn such that $AD = 4$, $DB = 8$, $AE = 3$, and $EC = 6$.



Explain why $\triangle ADE \sim \triangle ABC$.

G.SRT.B.4: Side Splitter Theorem 1
Answer Section

1 ANS: 2

$$\frac{7.5}{3.5} = \frac{9.5}{x}$$

$$x \approx 4.4$$

REF: 012303geo

2 ANS: 2

$$\frac{x}{15} = \frac{5}{12}$$

$$x = 6.25$$

REF: 011906geo

3 ANS: 4

$$\frac{x}{10} = \frac{12}{8} \quad 15 + 10 = 25$$

$$x = 15$$

REF: 082314geo

4 ANS: 4

$$\frac{5}{7} = \frac{x}{x+5} \quad 12\frac{1}{2} + 5 = 17\frac{1}{2}$$

$$5x + 25 = 7x$$

$$2x = 25$$

$$x = 12\frac{1}{2}$$

REF: 061821geo

5 ANS: 4

$$\frac{2}{4} = \frac{8}{x+2} \quad 14 + 2 = 16$$

$$2x + 4 = 32$$

$$x = 14$$

REF: 012024geo

6 ANS: 3

$\frac{9}{5} = \frac{9.2}{x}$ $5.1 + 9.2 = 14.3$

$9x = 46$

$x \approx 5.1$

REF: 061511geo

7 ANS: 3

$\frac{24}{40} = \frac{15}{x}$

$24x = 600$

$x = 25$

REF: 011813geo

8 ANS: 4

$\frac{1}{3.5} = \frac{x}{18 - x}$

$3.5x = 18 - x$

$4.5x = 18$

$x = 4$

REF: 081707geo

9 ANS: 2

$\frac{12}{4} = \frac{36}{x}$

$12x = 144$

$x = 12$

REF: 061621geo

10 ANS: 2

$\frac{x}{x+3} = \frac{14}{21}$ $14 - 6 = 8$

$21x = 14x + 42$

$7x = 42$

$x = 6$

REF: 081812geo

11 ANS: 3

$\frac{x}{6.3} = \frac{3}{5}$ $\frac{y}{9.4} = \frac{6.3}{6.3 + 3.78}$

$x = 3.78$ $y \approx 5.9$

REF: 081816geo

12 ANS: 1

$5x = 12 \cdot 7$ $16.8 + 7 = 23.8$

$5x = 84$

$x = 16.8$

REF: 061911geo

13 ANS: 2

$\frac{10}{x} = \frac{8}{6}$

$8x = 60$

$x = 7.5$

REF: 012402geo

14 ANS: 3

$\frac{10}{x} = \frac{15}{12}$

$x = 8$

REF: 081918geo

15 ANS: 4

$\frac{2}{4} = \frac{9 - x}{x}$

$36 - 4x = 2x$

$x = 6$

REF: 061705geo

16 ANS: 3

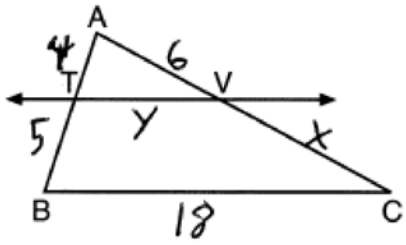
$\frac{x}{13} = \frac{3}{8}$

$8x = 39$

$x \approx 4.9$

REF: 082405geo

17 ANS: 4



$\frac{4}{5} = \frac{6}{x}$ $\frac{4}{9} = \frac{y}{18}$ $5 + 18 + 7.5 + 8 = 38.5$

$x = 7.5$ $y = 8$

REF: 082222geo

18 ANS: 4

$\frac{2}{6} = \frac{5}{15}$

REF: 081517geo

19 ANS: 3 REF: 062307geo

20 ANS: 2

$\triangle ACB \sim \triangle AED$

REF: 012308geo

21 ANS: 2

If (2) is true, $\angle ACB \cong \angle XYB$ and $\angle CAB \cong \angle YXB$.

REF: 082202geo

22 ANS: 2

$\triangle ACB \sim \triangle AED$

REF: 061811geo

23 ANS: 2

$\angle ADE \cong \angle ABC$ and $\angle AED \cong \angle ACB$

REF: 062214geo

24 ANS: 4 REF: 062321geo

25 ANS:

$\frac{3.75}{5} = \frac{4.5}{6}$ $\overline{AB}$ is parallel to $\overline{CD}$ because $\overline{AB}$ divides the sides proportionately.

$39.375 = 39.375$

REF: 061627geo

26 ANS:

$\frac{15}{27} = \frac{20}{36}$ $\overline{EF}$ is parallel to $\overline{BC}$ because $\overline{EF}$ divides the sides proportionately.

$540 = 540$

REF: 062431geo

27 ANS:

Because $\overline{DE}$ divides $\overline{AC}$ and $\overline{AB}$ proportionally $\left(\frac{3}{6} = \frac{4}{8}\right)$, $\overline{DE}$ is a side splitter and $\overline{ED} \parallel \overline{CB}$. Therefore $\angle AED \cong \angle ACB$ and $\angle ADE \cong \angle ABC$ as corresponding angles. $\triangle ADE \sim \triangle ABC$ by AA.

REF: 012529geo