Geometry

Unit 3-8

Similarity

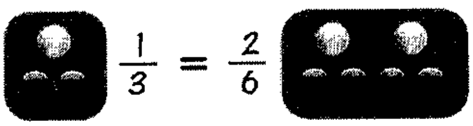
Unit 8 Lesson 1

Ratio, Proportion, and Similarity

A ratio is a comparison between two quantities.

$$\frac{a}{b}, \quad a:b, \quad a \text{ to } b$$

A proportion is when two ratios are equal.



• RULE: In a proportion, the product of the means equals the product of the extremes. (You may see this rule referred to as "cross multiply" or "cross product".)	$\frac{a}{b} \times \frac{c}{d}$ $a \bullet d = b \bullet c$

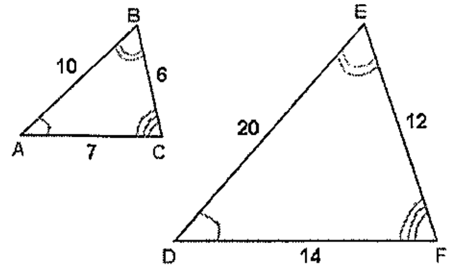
Similar means same shape (angle measure)

Definition: Two figures are **similar** if one is the image of the other under a transformation from the plane into itself that multiplies all distances by the same positive scale factor, *k*. That is to say, one figure is a **dilation** of the other.

Facts about similar triangles:	
$\angle A \cong \angle D$	$\frac{AB}{DE} = \frac{BC}{EF} = \frac{AC}{DF}$
$\angle B \cong \angle E$	
$\angle C \cong \angle F$	

Corresponding angles are CONGRUENT 1:1 ratio

Corresponding sides are PROPORTIONAL



$\Delta ABC \sim \Delta DEF$

More Information About Similar Figures

If 2 figures are similar:

- Ratio of perimeters is equal to ratio of corresponding sides
- Ratio of areas is equal to the SQUARE of the ratio of corresponding sides
- Ratio of corresponding angles is ALWAYS 1:1

Example 1:

$\triangle ABC$ is similar to $\triangle DEF$. The ratio of the length of $\overline{AB}$ to the length of $\overline{DE}$ is 3:1. Which ratio is also equal to 3:1?

1 $\frac{m\angle A}{m\angle D}$

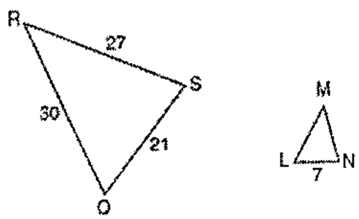
2 $\frac{m\angle B}{m\angle F}$

3 $\frac{\text{area of } \triangle ABC}{\text{area of } \triangle DEF}$

4 $\frac{\text{perimeter of } \triangle ABC}{\text{perimeter of } \triangle DEF}$

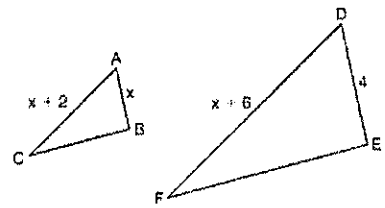
Example 2:

In the accompanying diagram, $\triangle QRS$ is similar to $\triangle LMN$, $RQ = 30$, $QS = 21$, $SR = 27$, and $LN = 7$. What is the length of $\overline{ML}$?



Example 3

In the diagram below, $\triangle ABC \sim \triangle DEF$, $DE = 4$, $AB = x$, $AC = x + 2$, and $DF = x + 6$. Determine the length of $\overline{AB}$. [Only an algebraic solution can receive full credit.]



Example 4

If $\triangle RST \sim \triangle ABC$, $m\angle A = x^2 - 8x$, $m\angle C = 4x - 5$, and $m\angle R = 5x + 30$, find $m\angle C$. [Only an algebraic solution can receive full credit.]

Example 5

The sides of a triangle are 4, 8 and 10. If the longest side of a similar triangle measures 30, find the *shortest* side.

Example 6

The sides of a pentagon are 8, 10, 12, 16, and 18. What is the length of the *longest* side of a similar pentagon whose shortest side is 12?

Example 7

The base of an isosceles triangle is 5 and its perimeter is 11. The base of a similar isosceles triangle is 10. What is the perimeter of the larger triangle?

Example 8

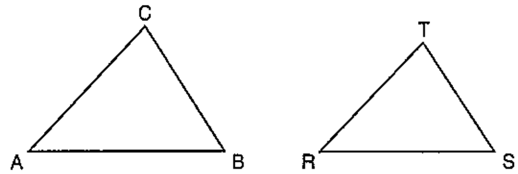
Two triangles are similar. The lengths of the sides of the smaller triangle are 3, 5, and 6, and the length of the longest side of the larger triangle is 18. What is the perimeter of the larger triangle?

Date ________

Ratio, Proportion and Similar Triangles HW

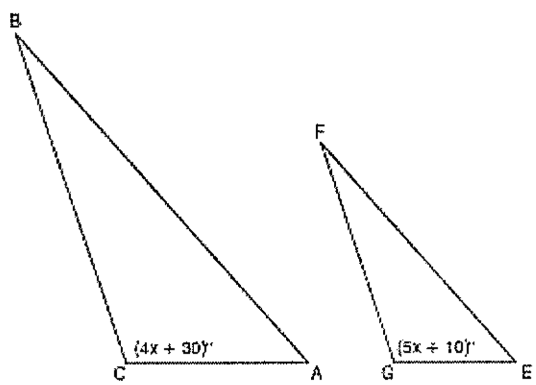
Geometry CC

1. In the diagram below, $\triangle ABC \sim \triangle RST$.
Which statement is *not* true?
   1) $\angle A \cong \angle R$
   2) $\frac{AB}{RS} = \frac{BC}{ST}$
   3) $\frac{AB}{BC} = \frac{ST}{RS}$
   4) $\frac{AB+BC+AC}{RS+ST+RT} = \frac{AB}{RS}$

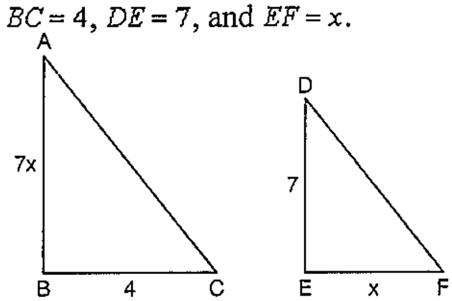


2. If $\triangle ABC \sim \triangle ZXY$, $m\angle A = 50$, and $m\angle C = 30$, what is $m\angle X$?
   1) 30
   2) 50
   3) 80
   4) 100

3. In the diagram below, $\triangle ABC \sim \triangle EFG$, $m\angle C = 4x + 30$, and $m\angle G = 5x + 10$. Determine the value of x.

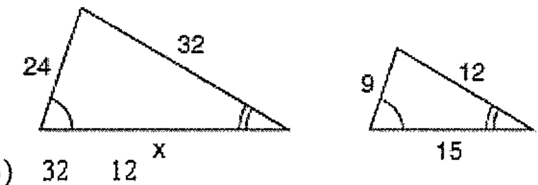


4. As shown in the diagram below, $\triangle ABC \sim \triangle DEF$, $AB = 7x$, $BC = 4$, $DE = 7$, and $EF = x$.
What is the length of $\overline{AB}$?



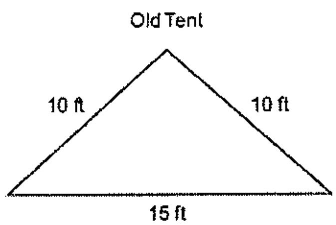
5. A triangle has sides whose lengths are 5, 12, and 13. A similar triangle could have sides with lengths of
   1) 3, 4, and 5
   2) 6, 8, and 10
   3) 7, 24, and 25
   4) 10, 24, and 26

6. The accompanying diagram shows two similar triangles. Which proportion could be used to solve for x?

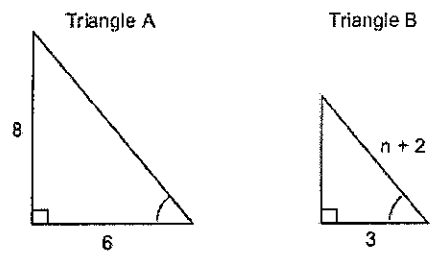


1) $\frac{x}{24} = \frac{9}{15}$
2) $\frac{24}{9} = \frac{15}{x}$
3) $\frac{32}{x} = \frac{12}{15}$
4) $\frac{32}{12} = \frac{15}{x}$

7. The Rivera family bought a new tent for camping. Their old tent had equal sides of 10 feet and a floor width of 15 feet, as shown in the accompanying diagram.
If the new tent is similar in shape to the old tent and has equal sides of 16 feet, how wide is the floor of the new tent?



8. In the accompanying diagram, triangle A is similar to triangle B. Find the value of n.



9. Two triangles are similar, and the ratio of each pair of corresponding sides is 2:1. Which statement regarding the two triangles is *not* true?
1) Their areas have a ratio of 4:1.
2) Their altitudes have a ratio of 2:1.
3) Their perimeters have a ratio of 2:1.
4) Their corresponding angles have a ratio of 2:1.

10. Given $\triangle ABC \sim \triangle DEF$ such that $\frac{AB}{DE} = \frac{3}{2}$. Which statement is *not* true?
1) $\frac{BC}{EF} = \frac{3}{2}$
2) $\frac{m\angle A}{m\angle D} = \frac{3}{2}$
3) $\frac{\text{area of } \triangle ABC}{\text{area of } \triangle DEF} = \frac{9}{4}$
4) $\frac{\text{perimeter of } \triangle ABC}{\text{perimeter of } \triangle DEF} = \frac{3}{2}$

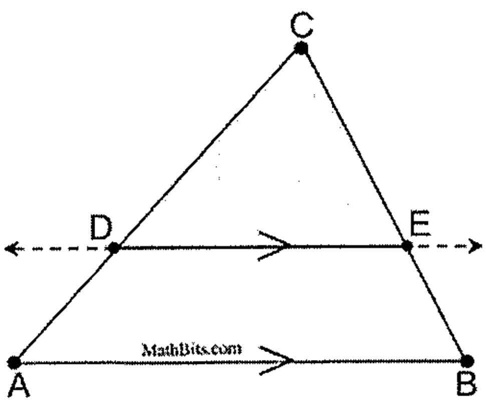
11 Which is *not* a property of all similar triangles?
1) The corresponding angles are congruent.
2) The corresponding sides are congruent.
3) The perimeters are in the same ratio as the corresponding sides.
4) The altitudes are in the same ratio as the corresponding sides.

Unit 8 Lesson 2 Overlapping Triangles

Side Splitter Theorem

The "Side Splitter" Theorem says that if a line intersects two sides of a triangle and is parallel to the third side of the triangle, it divides those two sides proportionally.

$\Delta ABC;\ \overline{DE} \parallel \overline{AB}$



Proportion involving pieces of sides

$$\frac{CD}{DA} = \frac{CE}{EB}$$

Proportions involving WHOLE sides

$$\frac{CD}{CA} = \frac{CE}{CB} \quad \text{OR} \quad \frac{DA}{CA} = \frac{EB}{CB}$$

When || sides are involved, you must use WHOLE SIDES!!!

BEWARE $$\frac{CD}{DE} = \frac{CA}{AB}$$

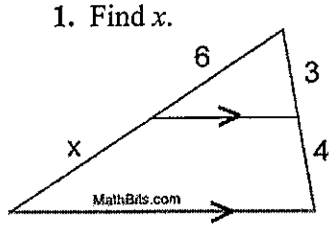
MathBitsNotebook Geometry

Side Splitter Theorem Practice

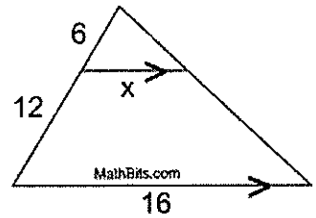
Name____

Directions: Read carefully. Please show your work.

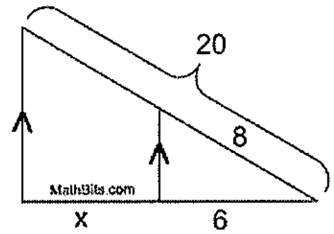
1. Find x.



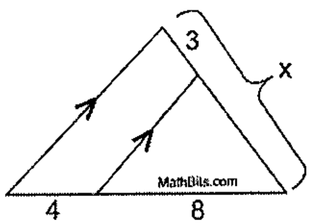
2. Find x.



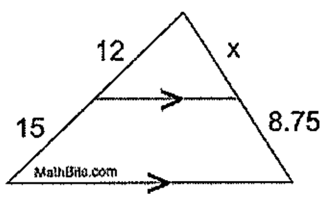
3. Find x.



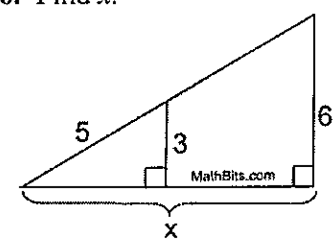
4. Find x.



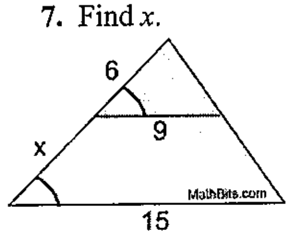
5. Find x.



6. Find x.

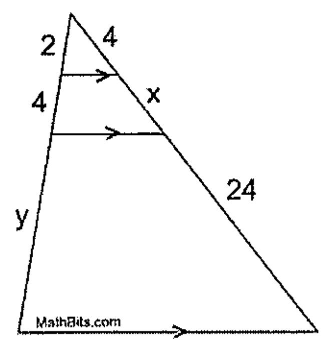


7. Find x.

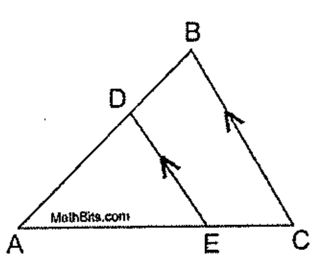


8. **a)** Find x.

b) Find y.



9. If $AB = AC$, which choice is FALSE?



(1) AD = AE

(2) DB = EC

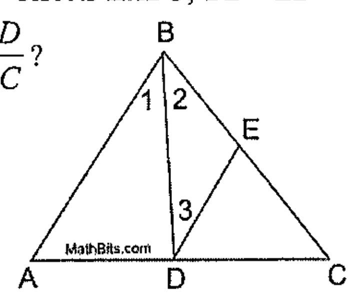
(3) $\frac{AD}{DB} = \frac{AE}{EC}$

(4) $\frac{AD}{AE} = \frac{DE}{BC}$

10. Given: $\overline{BD}$ bisects $\angle ABC$; $BE = ED$

Is $\frac{BE}{EC} = \frac{AD}{DC}$?

Explain.



ANSWERS

1.________

2.________

3.________

4.________

5.________

6.________

7.________

8.a.________

b.________

9.________

10.________

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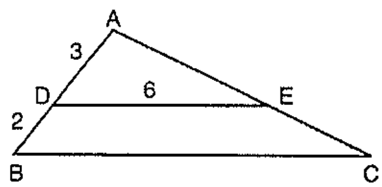
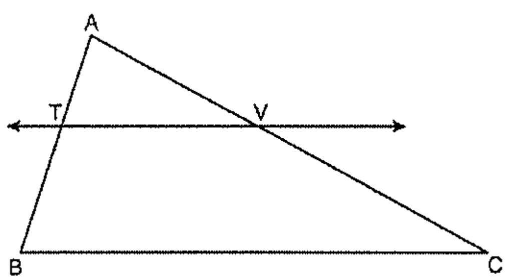
G.G.46: Side Splitter Theorem: Investigate proportions among segments of sides of the triangle, given line(s) parallel to one side and intersecting the other sides of the triangle

1 In the diagram of $\triangle ABC$ below, $\overline{DE} \parallel \overline{BC}$, $AD = 3$, $DB = 2$, and $DE = 6$.



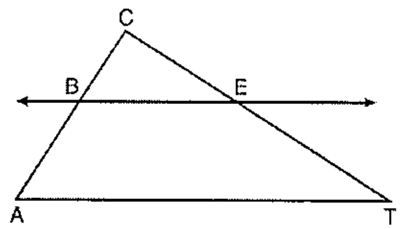
What is the length of $\overline{BC}$?
1) 12
2) 10
3) 8
4) 4

2 In the diagram below of $\triangle ABC$, $\overleftrightarrow{TV} \parallel \overline{BC}$, $AT = 5$, $TB = 7$, and $AV = 10$.



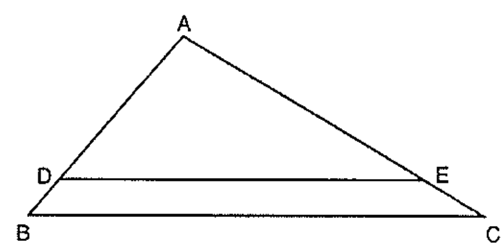
What is the length of $\overline{VC}$?
1) $3\frac{1}{2}$
2) $7\frac{1}{7}$
3) 14
4) 24

3 In the diagram below of $\triangle ACT$, $\overleftrightarrow{BE} \parallel \overline{AT}$.



If $CB = 3$, $CA = 10$, and $CE = 6$, what is the length of $\overline{ET}$?
1) 5
2) 14
3) 20
4) 26

4 In the diagram of $\triangle ABC$ shown below, $\overline{DE} \parallel \overline{BC}$.

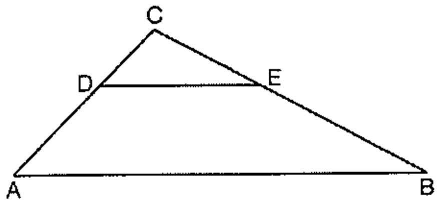


If $AB = 10$, $AD = 8$, and $AE = 12$, what is the length of $\overline{EC}$?
1) 6
2) 2
3) 3
4) 15

9

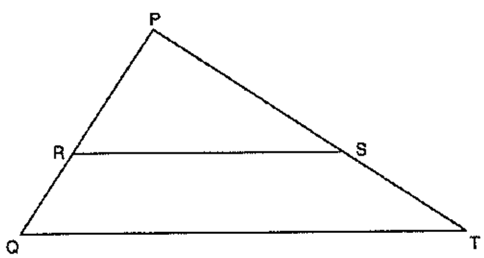
Name: ________________________

5 In the diagram of $\triangle ABC$ below, $\overline{DE} \parallel \overline{AB}$.



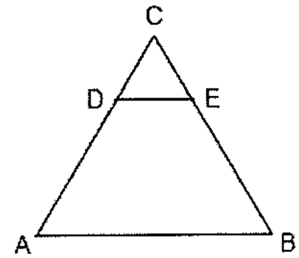
If $CD = 4$, $CA = 10$, $CE = x + 2$, and $EB = 4x - 7$, what is the length of $\overline{CE}$?
1) 10
2) 8
3) 6
4) 4

6 Triangle PQT with $\overline{RS} \parallel \overline{QT}$ is shown below.



If $PR = 12$, $RQ = 8$, and $PS = 21$, what is the length of $\overline{PT}$?
1) 14
2) 17
3) 35
4) 38

7 In the accompanying diagram of equilateral triangle ABC, $DE = 5$ and $\overline{DE} \parallel \overline{AB}$.



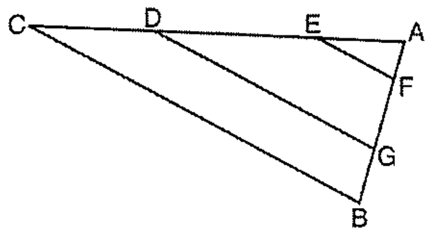
If AB is three times as long as DE, what is the perimeter of quadrilateral $ABED$?
1) 20
2) 30
3) 35
4) 40

8 In $\triangle ABC$, point D is on $\overline{AB}$, and point E is on $\overline{BC}$ such that $\overline{DE} \parallel \overline{AC}$. If $DB = 2$, $DA = 7$, and $DE = 3$, what is the length of $\overline{AC}$?
1) 8
2) 9
3) 10.5
4) 13.5

10

Name: ________________________

9 In the diagram below of $\triangle ABC$, with $\overline{CDEA}$ and $\overline{BGFA}$, $\overline{EF} \parallel \overline{DG} \parallel \overline{CB}$.



Which statement is *false*?

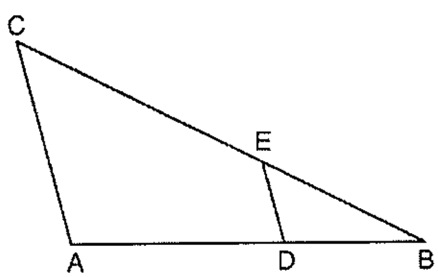
1) $\frac{AC}{AD} = \frac{AB}{AG}$

2) $\frac{AE}{AF} = \frac{AC}{AB}$

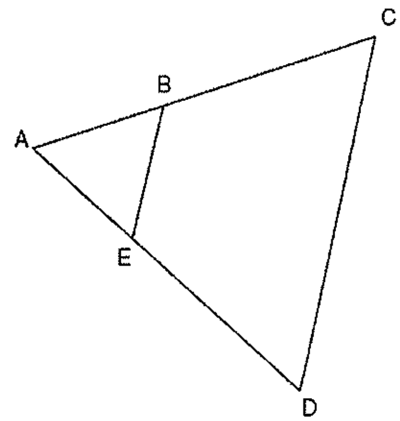
3) $\frac{AE}{AD} = \frac{EC}{AC}$

4) $\frac{BG}{BA} = \frac{CD}{CA}$

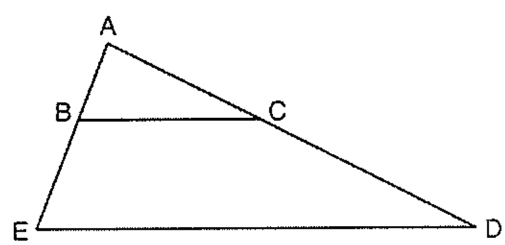
10 In the diagram below of $\triangle ABC$, D is a point on $\overline{AB}$, E is a point on $\overline{BC}$, $\overline{AC} \parallel \overline{DE}$, $CE = 25$ inches, $AD = 18$ inches, and $DB = 12$ inches. Find, to the *nearest tenth of an inch*, the length of $\overline{EB}$.



11 In the diagram below of $\triangle ACD$, E is a point on $\overline{AD}$ and B is a point on $\overline{AC}$, such that $\overline{EB} \parallel \overline{DC}$. If $AE = 3$, $ED = 6$, and $DC = 15$, find the length of $\overline{EB}$.



12 In the diagram below of $\triangle ADE$, B is a point on $\overline{AE}$ and C is a point on $\overline{AD}$ such that $\overline{BC} \parallel \overline{ED}$, $AC = x - 3$, $BE = 20$, $AB = 16$, and $AD = 2x + 2$. Find the length of $\overline{AC}$.



Unit 8 Lesson 3 Proportions in a Right Triangle (Altitude to Hypotenuse)

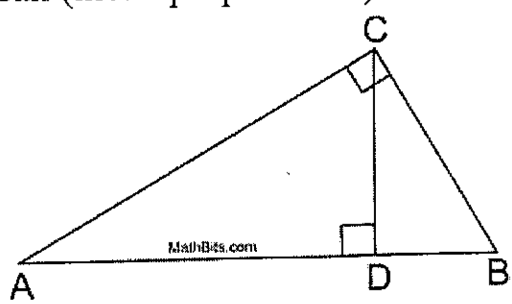
Definition: The **mean proportional, or geometric mean,** of two positive numbers a and b is the positive number x such that $\frac{a}{x} = \frac{x}{b}$.

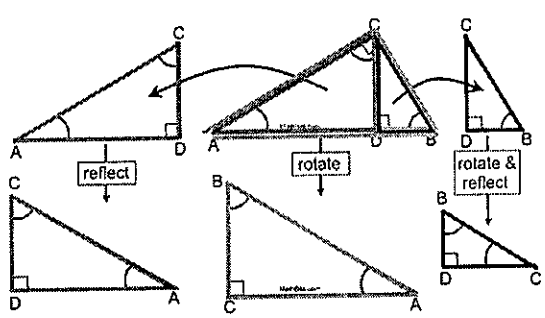
Notice that the x value appears TWICE in the "means" positions of the proportion.

Mean Proportional or Geometric Mean	$\frac{a}{x} = \frac{x}{b}$ In a "mean proportional", or "geometric mean", both "means" (x) are the exact same value.

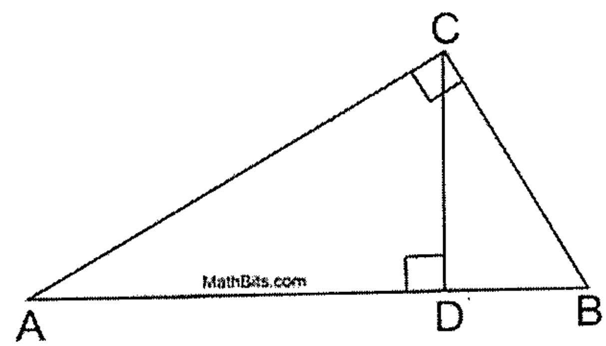
Example: What is the mean proportional between 2 and 8?

Geometric Mean (mean proportional) in a RIGHT TRIANGLE

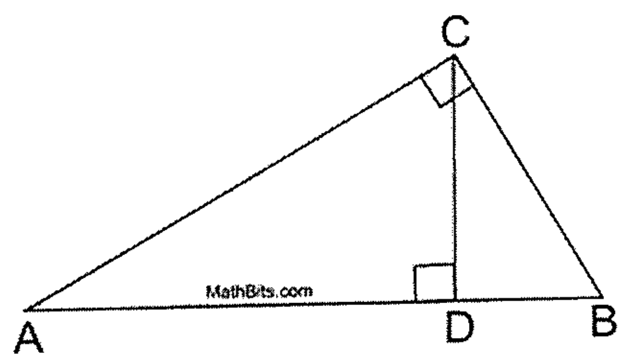




THEOREM: The **leg** of a right triangle is the **mean proportional** between the hypotenuse and the projection of the leg on the hypotenuse.



THEOREM: The **altitude** to the hypotenuse of a right triangle is the **mean proportional** between the segments into which it divides the hypotenuse.

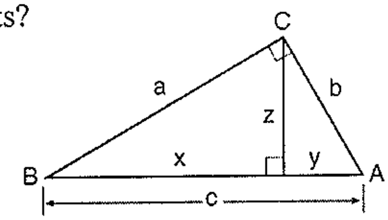


Date ______________ Geometry CC

Proportions in a Right Triangle (Altitude to Hypotenuse)

$$\frac{H}{L} = \frac{L}{S} \quad \text{OR} \quad \frac{S_1}{A} = \frac{A}{S_2}$$

1 In the diagram below of right triangle ABC, an altitude is drawn to the hypotenuse $\overline{AB}$.
Which proportion would always represent a correct relationship of the segments?



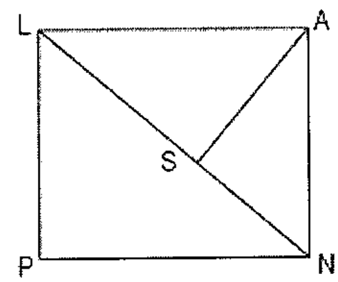
1) $\frac{c}{z} = \frac{z}{y}$

2) $\frac{c}{a} = \frac{a}{y}$

3) $\frac{x}{z} = \frac{z}{y}$

4) $\frac{y}{b} = \frac{b}{x}$

2 The accompanying diagram shows part of the architectural plans for a structural support of a building.
$PLAN$ is a rectangle and $\overline{AS} \perp \overline{LN}$.
Which equation can be used to find the length of $\overline{AS}$?



1) $\frac{LS}{AS} = \frac{AS}{SN}$

2) $\frac{AN}{LN} = \frac{AS}{LS}$

3) $\frac{AS}{SN} = \frac{AS}{LS}$

4) $\frac{AS}{LS} = \frac{LS}{SN}$

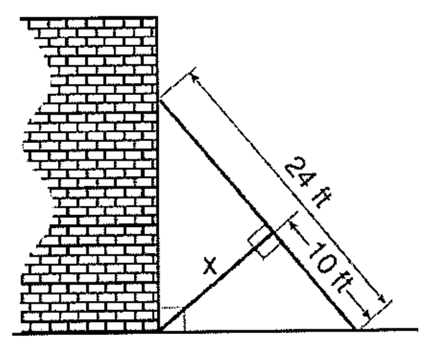
3 The accompanying diagram shows a 24-foot ladder leaning against a building. A steel brace extends from the ladder to the point where the building meets the ground. The brace forms a right angle with the ladder.
If the steel brace is connected to the ladder at a point that is 10 feet from the foot of the ladder, which equation can be used to find the length, x, of the steel brace?

1) $\frac{10}{x} = \frac{x}{14}$

2) $\frac{10}{x} = \frac{x}{24}$

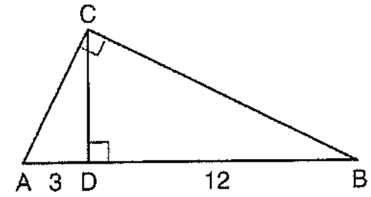
3) $10^2 + x^2 = 14^2$

4) $10^2 + x^2 = 24^2$



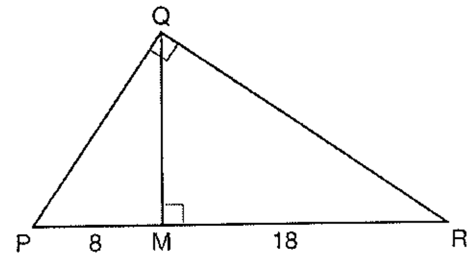
4 In the diagram below of right triangle ABC, altitude $\overline{CD}$ is drawn to hypotenuse $\overline{AB}$. If $AD = 3$ and $DB = 12$, what is the length of altitude $\overline{CD}$?

1) 6
2) $6\sqrt{5}$
3) 3
4) $3\sqrt{5}$



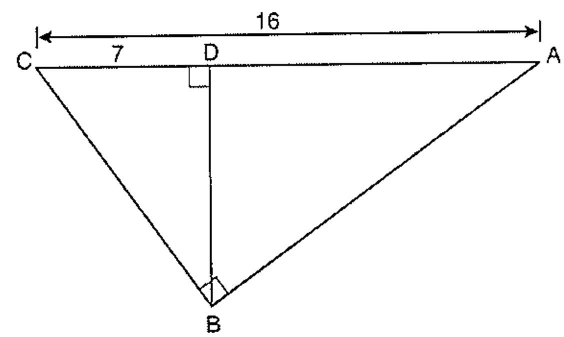
5 In the diagram below, $\overline{QM}$ is an altitude of right triangle PQR, $PM = 8$, and $RM = 18$. What is the length of $\overline{QM}$?

1) 20
2) 16
3) 12
4) 10



6 In the diagram below of right triangle ABC, altitude $\overline{BD}$ is drawn to hypotenuse $\overline{AC}$, $AC = 16$, and $CD = 7$. What is the length of $\overline{BD}$?

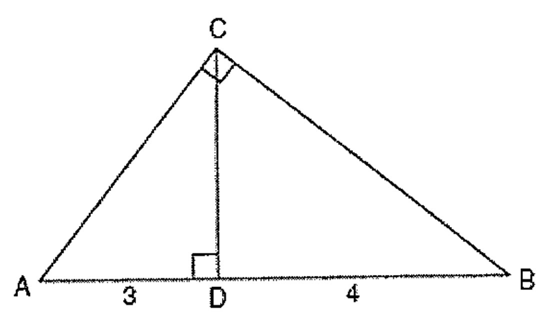
1) $3\sqrt{7}$
2) $4\sqrt{7}$
3) $7\sqrt{3}$
4) 12



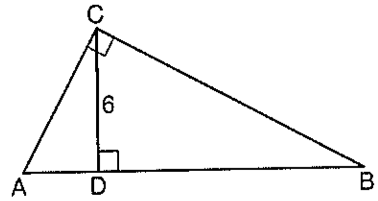
7 In ΔPQR, $\angle PRQ$ is a right angle and $\overline{RT}$ is drawn perpendicular to hypotenuse $\overline{PQ}$. If $PT = x$, $RT = 6$, and $TQ = 4x$, what is the length of $\overline{PQ}$?

1) 9
2) 12
3) 3
4) 15

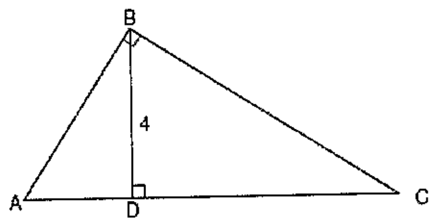
8 In the diagram below of right triangle ACB, altitude $\overline{CD}$ intersects $\overline{AB}$ at D. If $AD = 3$ and $DB = 4$, find the length of $\overline{CD}$ in simplest radical form.



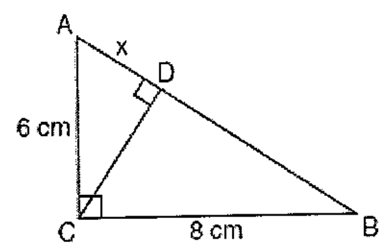
9 In right triangle ABC below, $\overline{CD}$ is the altitude to hypotenuse $\overline{AB}$. If $CD = 6$ and the ratio of AD to AB is 1:5, determine and state the length of $\overline{BD}$. [Only an algebraic solution can receive full credit.]



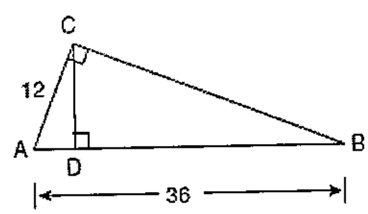
10 The drawing for a right triangular roof truss, represented by $\triangle ABC$, is shown in the accompanying diagram. If $\angle ABC$ is a right angle, altitude $BD = 4$ meters, and $\overline{DC}$ is 6 meters longer than $\overline{AD}$, find the length of base $\overline{AC}$ in meters.



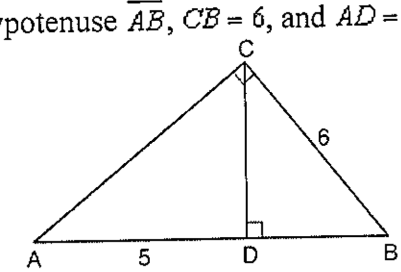
11 In the diagram below, the length of the legs $\overline{AC}$ and $\overline{BC}$ of right triangle ABC are 6 cm and 8 cm, respectively. Altitude $\overline{CD}$ is drawn to the hypotenuse of $\triangle ABC$.
What is the length of $\overline{AD}$ to the *nearest tenth of a centimeter*?
1) 3.6
2) 6.0
3) 6.4
4) 4.0



12 In the diagram below of right triangle ACB, altitude $\overline{CD}$ is drawn to hypotenuse $\overline{AB}$.
If $AB = 36$ and $AC = 12$, what is the length of $\overline{AD}$?
1) 32
2) 6
3) 3
4) 4

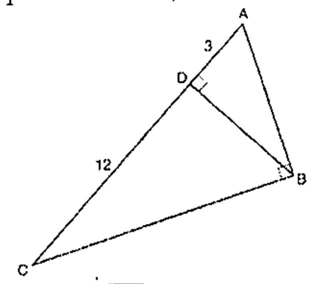


13 In the diagram below of right triangle ABC, $\overline{CD}$ is the altitude to hypotenuse $\overline{AB}$, $CB = 6$, and $AD = 5$.
What is the length of $\overline{BD}$?
1) 5
2) 9
3) 3
4) 4



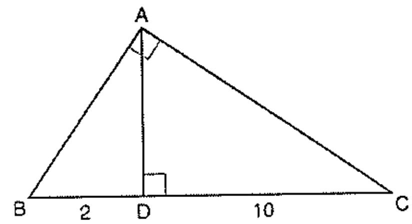
14 In right triangle ABC shown in the diagram below, altitude $\overline{BD}$ is drawn to hypotenuse $\overline{AC}$, $CD = 12$, and $AD = 3$.
What is the length of $\overline{AB}$?

1) $5\sqrt{3}$
2) 6
3) $3\sqrt{5}$
4) 9



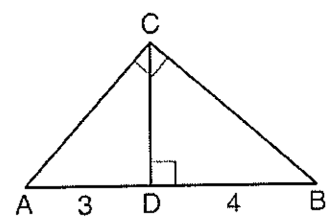
15 Triangle ABC shown below is a right triangle with altitude $\overline{AD}$ drawn to the hypotenuse $\overline{BC}$.
If $BD = 2$ and $DC = 10$, what is the length of $\overline{AB}$?

1) $2\sqrt{2}$
2) $2\sqrt{5}$
3) $2\sqrt{6}$
4) $2\sqrt{30}$

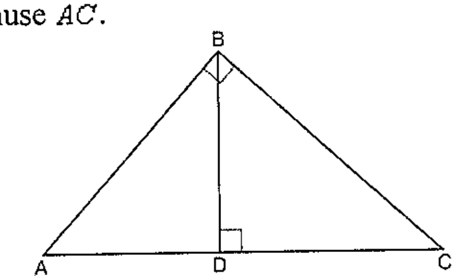


16 In the diagram below of right triangle ABC, $\overline{CD}$ is the altitude to hypotenuse $\overline{AB}$, $AD = 3$, and $DB = 4$.
What is the length of $\overline{CB}$?

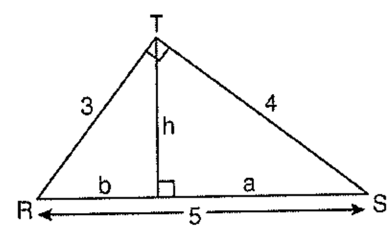
1) $2\sqrt{3}$
2) $\sqrt{21}$
3) $2\sqrt{7}$
4) $4\sqrt{3}$



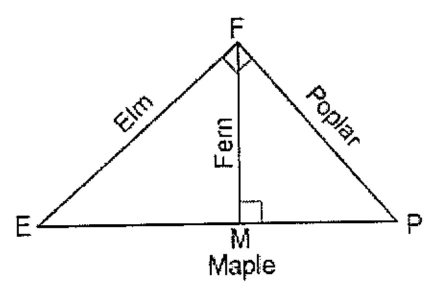
17 In right triangle ABC shown below, altitude $\overline{BD}$ is drawn to hypotenuse $\overline{AC}$.
If $AD = 8$ and $DC = 10$, determine and state the length of $\overline{AB}$.



18 In the diagram below, $\triangle RST$ is a $3-4-5$ right triangle. The altitude, h, to the hypotenuse has been drawn. Determine the length of h.



19 Four streets in a town are illustrated in the accompanying diagram. If the distance on Poplar Street from F to P is 12 miles and the distance on Maple Street from E to M is 10 miles, find the distance on Maple Street, in miles, from M to P.



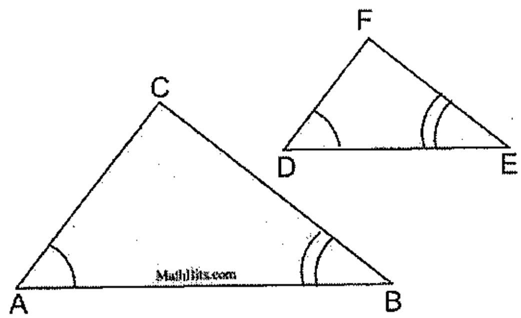
17

Unit 8 Lesson 4: Proving that Triangles are Similar

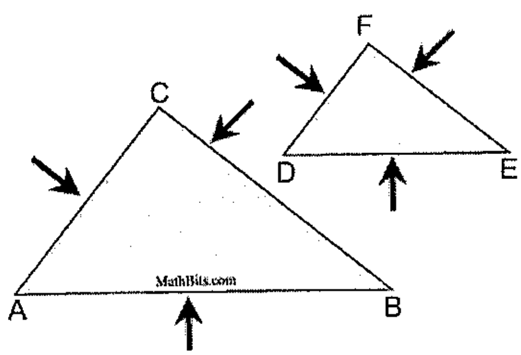
Reminder: Two triangles are similar if and only if the corresponding sides are in proportion and the corresponding angles are congruent.

There are three accepted methods for proving triangles similar:

AA To prove two triangles are similar, it is sufficient to show that two angles of one triangle are congruent to the two corresponding angles of the other triangle.

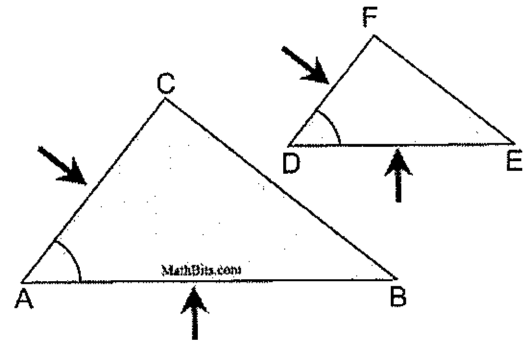


SSS To prove two triangles are similar, it is sufficient to show that the three sets of corresponding sides are in proportion.



SAS

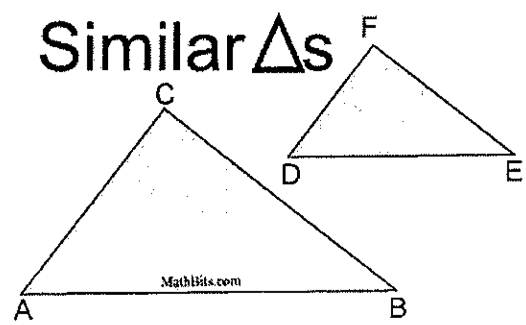
To prove two triangles are similar, it is sufficient to show that two sets of corresponding sides are in proportion and the angles they include are congruent.



Once the triangles are similar ...

the remaining sets of angles will be congruent and the remaining corresponding sides will be in proportion. Just be sure the triangles are similar before using the following theorem.

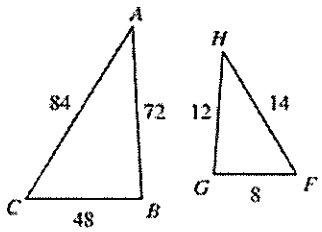
Similar $\triangle$s



$$\frac{AB}{DE}=\frac{AC}{DF}=\frac{BC}{EF}$$

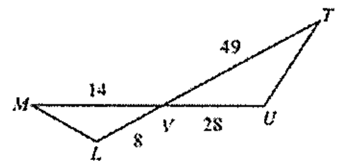
State if the triangles in each pair are similar. If so, state how you know they are similar and complete the similarity statement.

1)



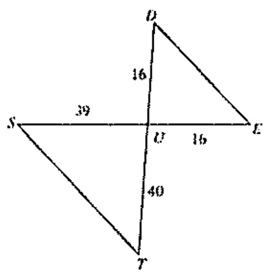
$\Delta CBA \sim$ ______

2)



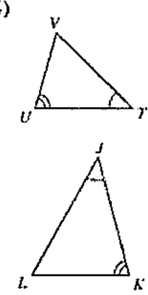
$\Delta VUT \sim$ ______

3)



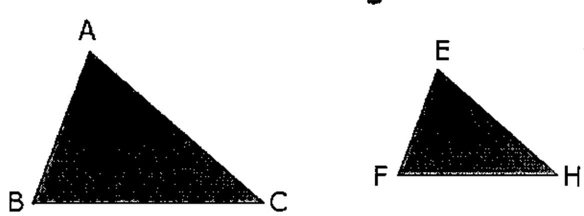
$\Delta UTS \sim$ ______

4)



$\Delta JKL \sim$ ______

Similar Triangle Proof Notes



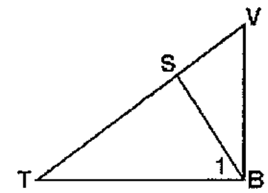
Last Few STEPS!

Statement	Reason
$\Delta ABC \sim \Delta EFH$	AA ≅ AA
$\frac{AB}{EF} = \frac{AC}{EH}$	Corresponding sides of similar triangles are in proportion
$AB \cdot EH = EF \cdot AC$	**In a Proportion, the product of the means = the product of the extremes.**

Example 5

Type I

AA



Given: $\overline{BS} \perp \overline{TV}$

$\angle 1 \cong \angle V$

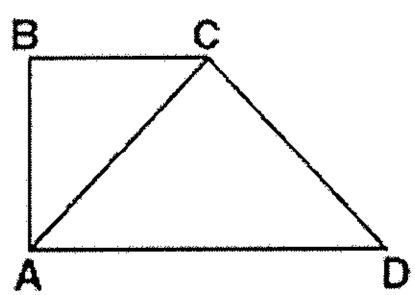
Prove: $\triangle TSB \sim \triangle BSV$

Example 6

Type II

Corresponding Sides of Similar Triangles are Proportional

Given:



Given: $\overline{AC} \perp \overline{CD}$

$\overline{AB} \perp \overline{BC}$

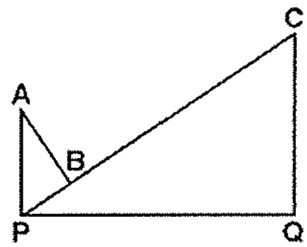
$\overline{AC}$ bisects < BAD

Prove: $\frac{AD}{AC} = \frac{AC}{AB}$

Example 7

Type III

"In a proportion, the product of the means = the product of the extremes."



Given: $\overline{AP} \parallel \overline{CQ}$
$\overline{CQ} \perp \overline{PQ}$
$\overline{AB} \perp \overline{PC}$

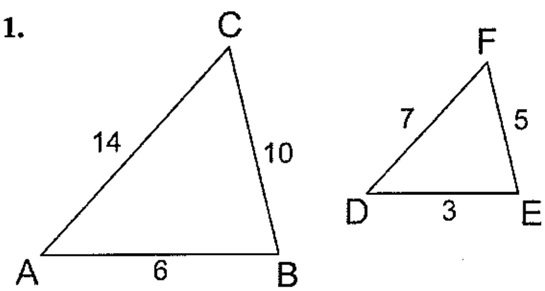
Prove: $AP \cdot QC = PB \cdot PC$

Identifying Similar Triangles

Name______________________________

Directions: Examine the two triangles seen in each problem. Circle YES or NO to indicate whether the triangles are similar. Give a supporting reason as to why your answer is correct.

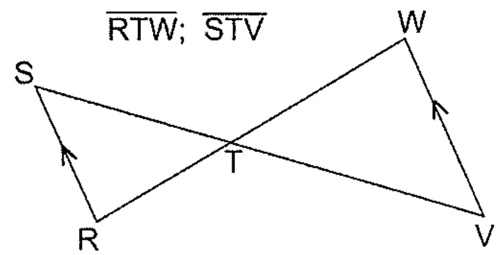
1.



YES or NO

Explain:

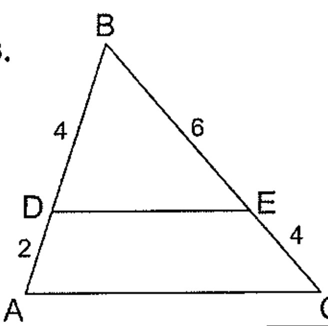
2.



YES or NO

Explain:

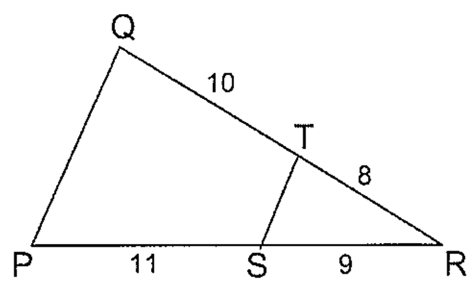
3.



YES or NO

Explain:

4.



YES or NO

Explain:

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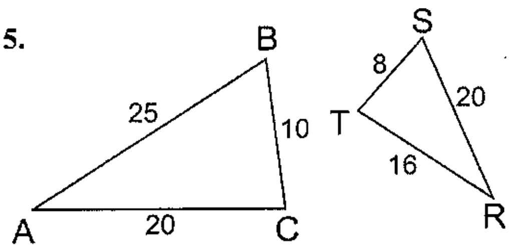
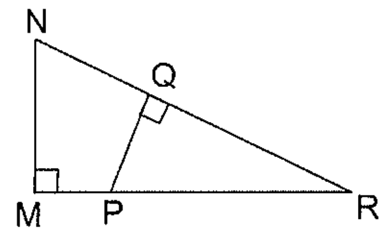
5.



YES or NO

Explain:

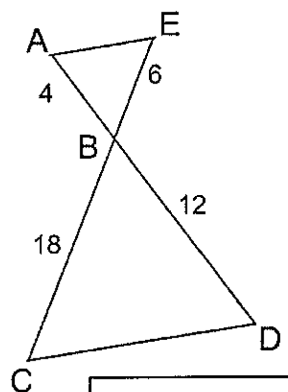
6.



YES or NO

Explain:

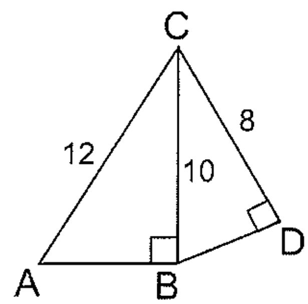
7.



YES or NO

Explain:

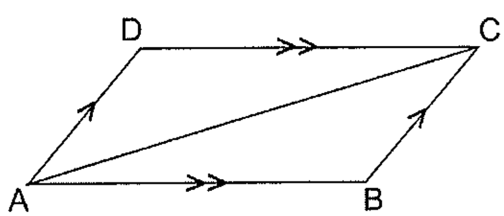
8.



YES or NO

Explain:

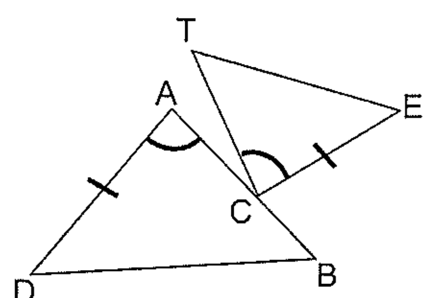
9.



YES or NO

Explain:

10.



YES or NO

Explain:

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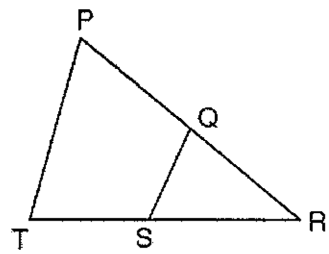
G.G.44: Similarity Proofs: Establish similarity of triangles, using the following theorems: AA, SAS, and SSS

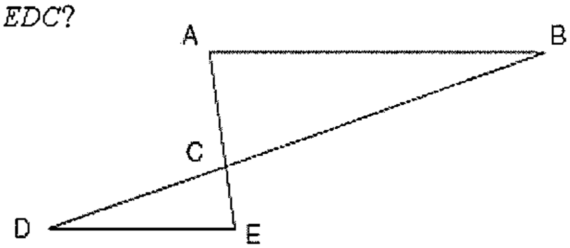
1 In the diagram below of ΔPRT, Q is a point on $\overline{PR}$, S is a point on $\overline{TR}$, $\overline{QS}$ is drawn, and $\angle RPT \cong \angle RSQ$. Which reason justifies the conclusion that $\Delta PRT \sim \Delta SRQ$?

1) AA
2) ASA
3) SAS
4) SSS



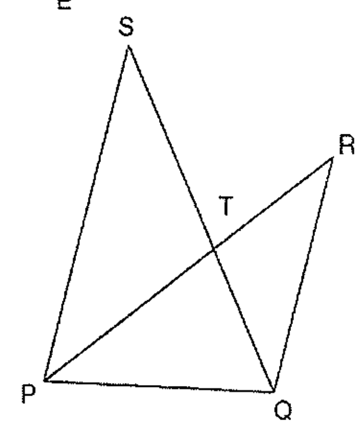
2 In the diagram of ΔABC and ΔEDC below, $\overline{AE}$ and $\overline{BD}$ intersect at C, and $\angle CAB \cong \angle CED$. Which method can be used to show that ΔABC must be similar to ΔEDC?

1) SAS
2) AA
3) SSS
4) HL



3 In the diagram below, $\overline{SQ}$ and $\overline{PR}$ intersect at T, $\overline{PQ}$ is drawn, and $\overline{PS} \parallel \overline{QR}$. What technique can be used to prove that $\Delta PST \sim \Delta RQT$?

1) SAS
2) SSS
3) ASA
4) AA

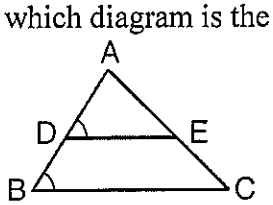


4 In triangles ABC and DEF, $AB = 4$, $AC = 5$, $DE = 8$, $DF = 10$, and $\angle A \cong \angle D$. Which method could be used to prove $\Delta ABC \sim \Delta DEF$?

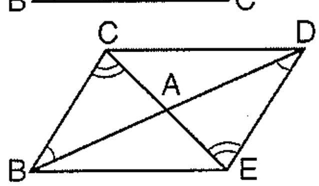
1) AA
2) SAS
3) SSS
4) ASA

5 For which diagram is the statement $\Delta ABC \sim \Delta ADE$ *not* always true??

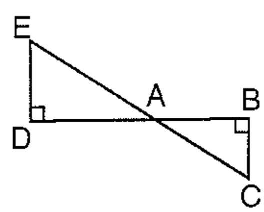
1)



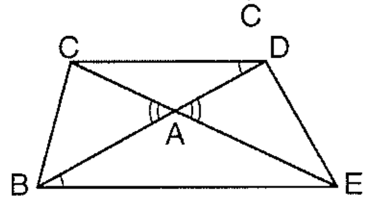
2)



3)



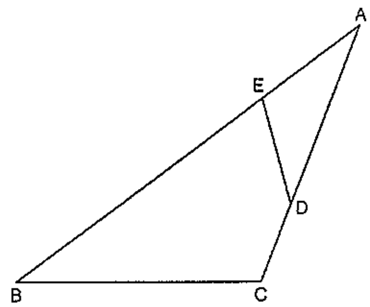
4)



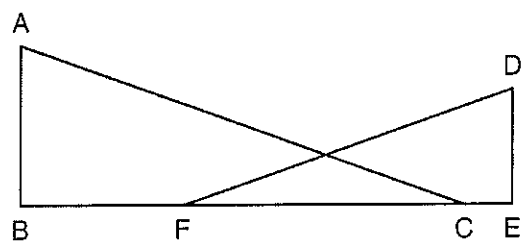
6 In $\triangle ABC$ and $\triangle DEF$, $\frac{AC}{DF} = \frac{CB}{FE}$. Which additional information would prove $\triangle ABC \sim \triangle DEF$?

1) $AC = DF$
2) $CB = FE$
3) $\angle ACB \cong \angle DFE$
4) $\angle BAC \cong \angle EDF$

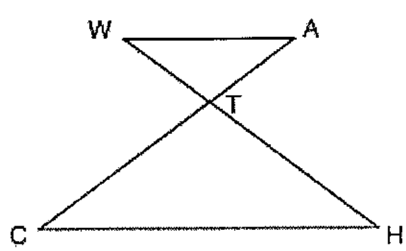
7 The diagram below shows $\triangle ABC$, with $\overline{AEB}$, $\overline{ADC}$, and $\angle ACB \cong \angle AED$. Prove that $\triangle ABC$ is similar to $\triangle ADE$.



8 In the diagram below, $\overline{BFCE}$, $\overline{AB} \perp \overline{BE}$, $\overline{DE} \perp \overline{BE}$, and $\angle BFD \cong \angle ECA$. Prove that $\triangle ABC \sim \triangle DEF$.



9 In the accompanying diagram, $\overline{WA} \parallel \overline{CH}$ and $\overline{WH}$ and $\overline{AC}$ intersect at point T. Prove that $(WT)(CT) = (HT)(AT)$.



Name: ______________________________

Date ____________ Geometry CC

Similarity REVIEW

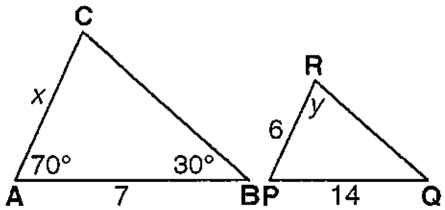
1) Solve for x: $\frac{x}{x-2} = \frac{10}{x+1}$

2) Two angles of one triangle have measures of 30° and 80° and two angles of another triangle have measures of 70° and 30°. The two triangles are similar. **TRUE FALSE**

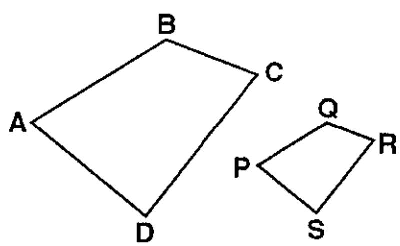
A) False B) True

Question 3 refers to the following:

If ΔABC ~ ΔPQR, find the value of x and *y*.

3) 

Question 4 refers to the following:



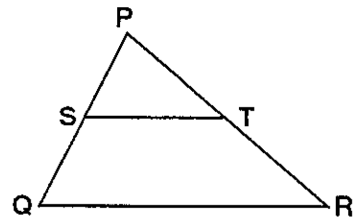
4) If quadrilateral ABCD ~ quadrilateral PQRS, DC = x + 3, BC = *x* - 1, SR = 5, and QR = 4, then find the value of *x*.

---

5) The sides of a triangle have lengths 3, 5, and 7. In a similar triangle, the shortest side has length x - 3, and the longest side has length *x* + 5. Find the value of *x*.

6) In triangle ABC, D is a point on $\overline{AB}$ and E is a point on $\overline{AC}$ such that $\overline{DE} \parallel \overline{BC}$. If AD = 2, DB = x - 1, AE = *x*, and EC = *x* + 2, find AE.

Question 7 refers to the following:



7) If $\overline{ST} \parallel \overline{QR}$, PS = 4, SQ = 2, and TR = 3, find PT.

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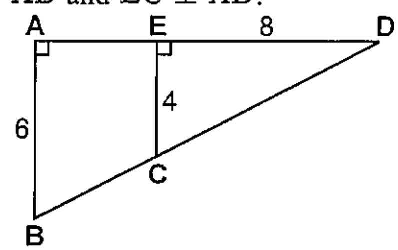
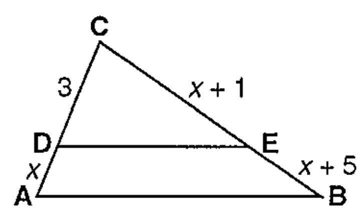
8) In the accompanying diagram of ΔABD, $\overline{AB} \perp \overline{AD}$ and $\overline{EC} \perp \overline{AD}$.



If AB = 6, EC = 4, and ED = 8, find AE.

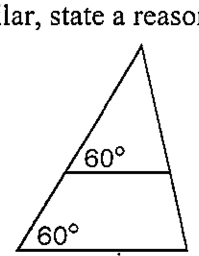
Question 9 refers to the following:

In ΔABC, find x given that $\overline{DE} \parallel \overline{AB}$.

9) 

Questions 10 through 14 refer to the following:

Determine whether the two triangles are similar and, if they are similar, state a reason.

10) 

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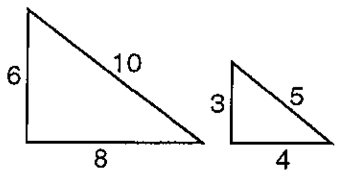
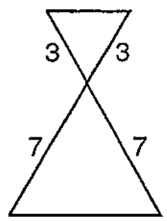
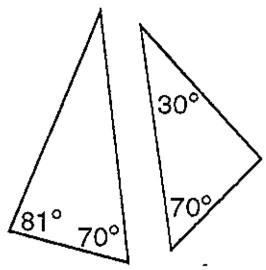
11)



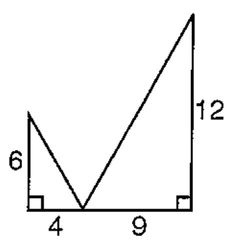
12)



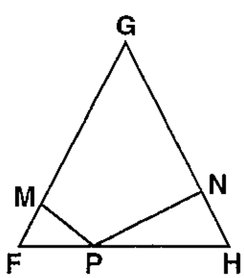
13)



14)



15)



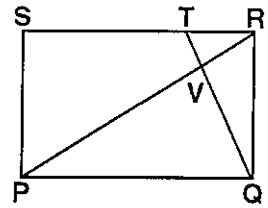
Given: In ΔFGH, $\overline{FG} \cong \overline{GH}$

$\overline{PM} \perp \overline{FG}$

$\overline{PN} \perp \overline{GH}$

Prove: $\frac{FM}{NH} = \frac{FP}{PH}$

16)



Given: PQRS is a rectangle

$\overline{PR} \perp \overline{TQ}$

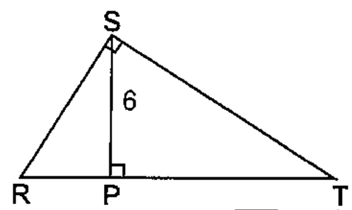
Prove:

(a) $\Delta TVR \sim \Delta PVQ$

(b) $\frac{PV}{VR} = \frac{VQ}{TV}$

(c) $PV \cdot TV = VQ \cdot VR$

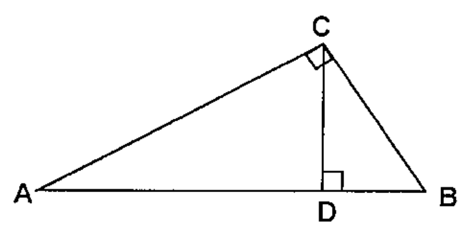
17) In the accompanying diagram, ΔRST is a right triangle and $\overline{SP}$ is the altitude to hypotenuse $\overline{RT}$.



If SP = 6 and the lengths of $\overline{RP}$ and $\overline{PT}$ are in the ratio 1:4, what is the length of $\overline{RP}$?

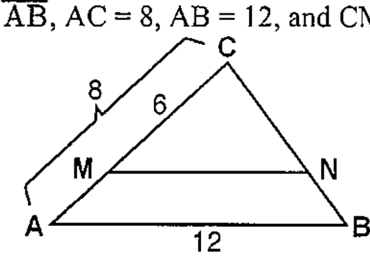
A) 9 B) 3 C) 15 D) 12

18) In the accompanying diagram of right triangle ABC, $\overline{CD}$ is drawn perpendicular to hypotenuse $\overline{AB}$.



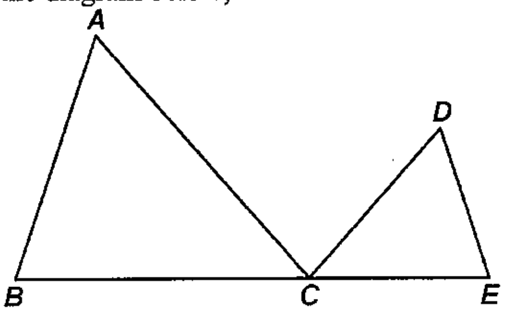
If AB = 16 and DB = 4, find BC.

19) In the accompanying diagram of ΔABC, $\overline{MN} \parallel \overline{AB}$, AC = 8, AB = 12, and CM = 6.



Find the length of $\overline{MN}$.

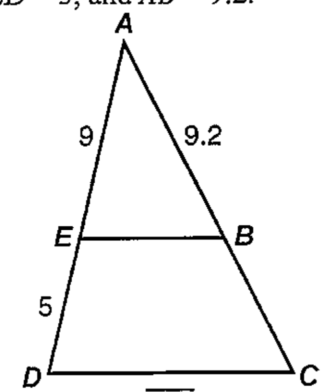
20) In the diagram below, $\triangle ABC \sim \triangle DEC$.



If $AC = 12$, $DC = 7$, $DE = 5$, and the perimeter of $\triangle ABC$ is 30, what is the perimeter of $\triangle DEC$?

A) 17.5 B) 14.0 C) 14.8 D) 12.5

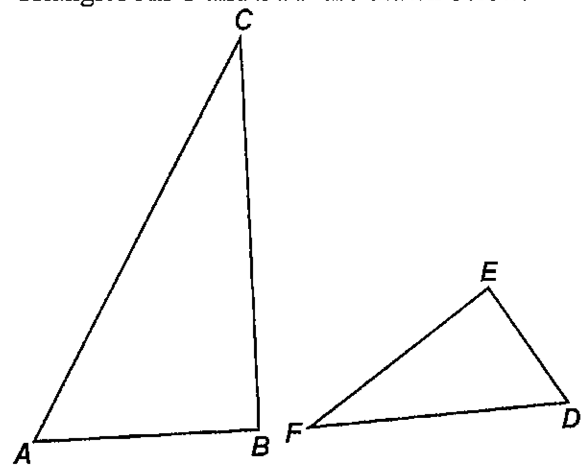
21) In the diagram of $\triangle ADC$ below, $\overline{EB} \parallel \overline{DC}$, $AE = 9$, $ED = 5$, and $AB = 9.2$.



What is the length of $\overline{AC}$, to the nearest tenth?

A) 14.3 B) 5.1 C) 5.2 D) 14.4

22) Triangles ABC and DEF are drawn below.

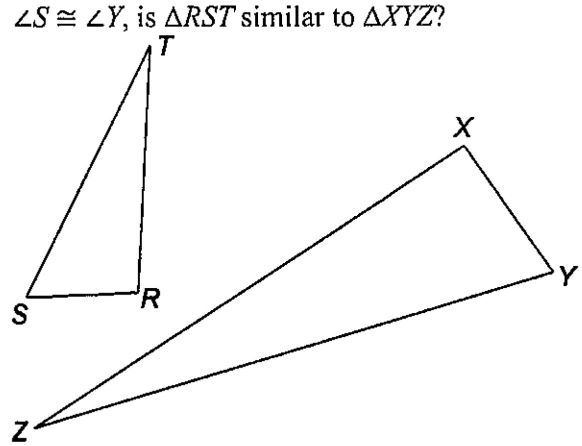


If $AB = 9$, $BC = 15$, $DE = 6$, $EF = 10$, and $\angle B \cong \angle E$, which statement is true?

A) $\angle CAB \cong \angle DEF$ B) $\frac{AB}{CB} = \frac{FE}{DE}$

C) $\frac{AB}{DE} = \frac{FE}{CB}$ D) $\triangle ABC \sim \triangle DEF$

23) Triangles RST and XYZ are drawn below. If $RS = 6$, $ST = 14$, $XY = 9$, $YZ = 21$, and $\angle S \cong \angle Y$, is $\triangle RST$ similar to $\triangle XYZ$?



Answer: __________

Justify your answer.

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