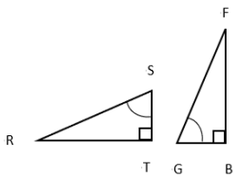
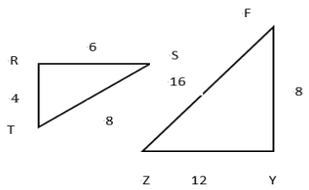
MTAP SATURDAY PROGRAM IN MATHEMATICS GRADE 9 SESSION 5
SIMILARITY OF TRIANGLES/RIGHT TRIANGLES

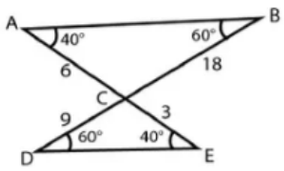
A. Determine if each pair of triangles is similar. If the triangles are similar, complete the similarity statement and tell which similarity postulate or theorem is used.

1. 

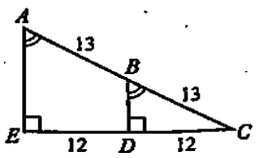
△RST ~ △ _____

2. 

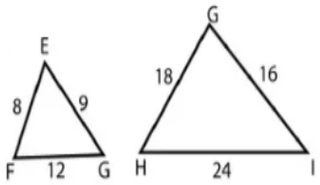
△RTS ~ △ _____

3. 

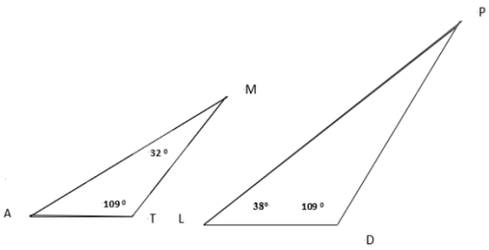
△ACB ~△ _____

4. 

△CBD ~△ _____

5. 

△FEG ~△ _____

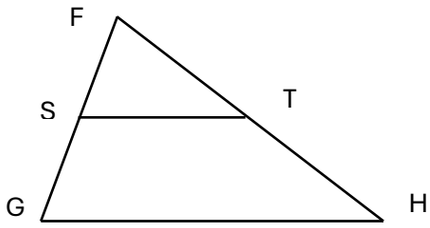
6. 

△MTA ~△ _____

B. Solve for the value of x in each of the following equations.

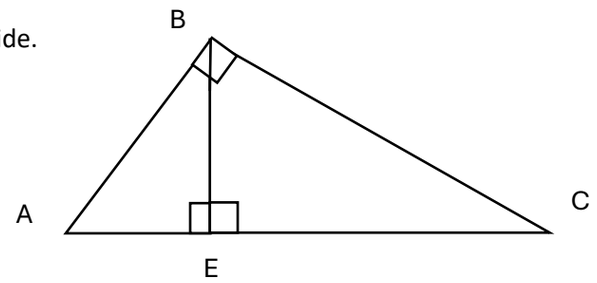
1. $\frac{12-x}{x}=\frac{16}{8}$
2. $\frac{10+x}{x}=\frac{6}{2}$
3. $\frac{20-x}{x}=\frac{6}{4}$
4. $\frac{x+8}{x}=\frac{15}{5}$

C. Find the missing lengths using the Basic Proportionality Theorem. Given: Triangle FHG, Segment ST|| HG.



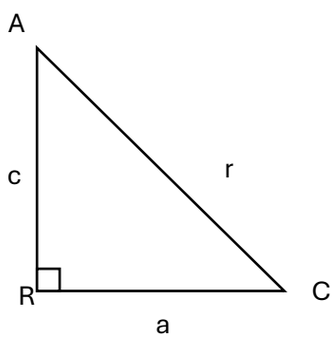
1. $FS=8, FG=20, FH=15, find\ FT.$
2. $FS=6, FT=5, FG=12, find\ FH.$
3. $FS=6, GS=9, FT=5, find\ HT.$
4. $FS=22.5, FT=15, HT=4.5, find\ GS.$
5. $GS=5, FS=10, HT=6, find\ FT.$
6. $FG=36, HT=14, FT=7, find\ GS.$
7. $GS=3, FS=7, TH=3x, FT=x+24, find\ x.$

D. Use the given right triangle to find the length of its side.
Given: right triangle ABC with altitude BE.



1. $If\ AE=4, EC=16, what\ is\ BE?$
2. $If\ BE=3, AE=2, what\ is\ EC?$
3. $If\ AE=2, EC=9, what\ is\ BE?$
4. $If\ BE=10, CE=8, what\ is\ AB?$
5. $If\ AE=5, CE=15, what\ is\ BC?$
6. $If\ AC=8, AE=5, what\ is\ BC?$
7. $If\ BE=9, AE=2, what\ is\ EC?$

E. Given the right triangle, find the length of its sides.
Given: right triangle ARC and r as the hypotenuse.



1. $If\ a=4\ and\ c=3, what\ is\ r?$
2. $If\ r=15\ and\ c=12, what\ is\ a?$
3. $If\ a=\sqrt{3}\ and\ c=1, what\ is\ r?$
4. $If\ c=16\ and\ r=20, what\ is\ a?$
5. $If\ r=13\ and\ a=12, what\ is\ c?$
6. $If\ c=4\ and\ r=4\sqrt{2}, what\ is\ a?$

F. Find the length of the missing side in each special right triangle. $30°-60°-90°$

1. c = 10, a = __, b = __
2. a = $2\sqrt{3}$, b = 2, c = ___
4. c = 6, a = 3, b=__
5. a = 6, c = 12, b =__
7. c = 18, a = 9, b = __
8. b = $3\sqrt{3}$, c = 6, a = __

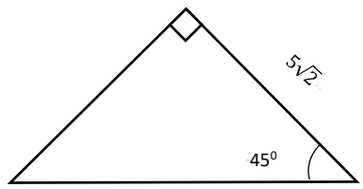
3. b = $5\sqrt{3}$, a = __, c = __ 6. a = $8\sqrt{3}$, b = 8, c = __ 9. a = 5, b = __, c = __

G. Find the length of the missing side in each special right triangle. $45° - 45° - 90°$

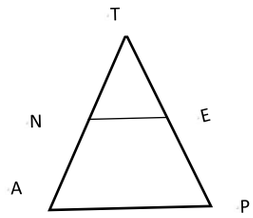
1. a = 7, b = __, c = __ 4. b = 10, a = 10, c =__ 7. a = __, b = $4\sqrt{2}$, c = __
2. c = $5\sqrt{2}$, a = __, b = ___ 5. a = 6, c = __, b =__ 8. b = __, c = $16\sqrt{2}$, a = 16
3. a = $3\sqrt{2}$, c = __, b = __ 6. c = 14, a = __, b = __ 9. a = $9\sqrt{2}$, b = __, c = __

Solve the following.

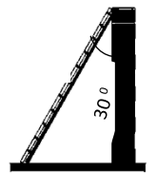
1. The sketch of triangular lot is shown below. Find the area of the lot.



2. In triangle *TAP*, *N* is the midpoint of *TA* and *E* is the midpoint of *TP*. If $NE = 3t - 2$ and $AP = 4t + 4, find$ NE $and\ AP$

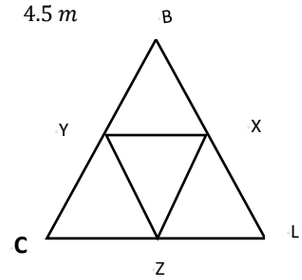


3. A ladder leans against a wall, makes an angle 30˚with the wall. How long is the ladder if its foot is 4.5 m from the wall?



$4.5\ m$

4. In triangle *LBC* at the right, *X*, *Y*, and *Z* are the midpoints of L*B*, *BC*, and *CL*, respectively. Find the perimeter of triangle *XYZ* when $LB = 12\ meters$, $BC = 11\ meters$, and $LC = 3\ meters$.



5. A line parallel to side *AB* of a triangle *ABC* intersects *AC* at *D* and *BC* at *E*. If $DC = 15$, $AD = 5$, and $EC = 18$, find *BE*.
6. In triangle ABC, *D* is a point on *AB*, *E* is a point on *AC*, and *DE* is drawn. If $AB = 8, AC = 12, DB = 3, and\ EC = 4, is$ DE BC?
7. Liam is fishing on a small boat. His fishing hook is 12 feet below him, and a fish is swimming at the same depth as the hook, 15 feet away. How far away is Liam from the fish?
8. A kite at the end of a 25 feet line is 10 feet behind the runner. How high is the kite?
9. The areas of two similar triangles are 25 cm^2 and 81 cm^2. Find the ratio of a pair of corresponding sides.
10. The corresponding sides of two similar triangles are 7cm and 8cm. What is the ratio of their corresponding areas?

Challenge!

1. A right triangle has legs **a** and **b** and hypothenuse **c**. Prove that the altitude **h** to the hypothenuse is $\boldsymbol{h = \frac{ab}{c}}$**.**
2. The legs of a right triangle are $\sqrt{5}$ and $\sqrt{11}$. Find the length of the altitude to the hypothenuse.
3. A triangle has angles $60°$ and $45°$. If the opposite side of $45°$ angle has length of 10 cm, what is the length of the side opposite of $60°$?

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