

5.5 SOL

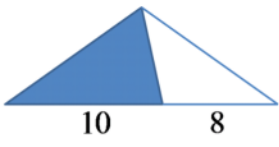
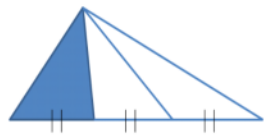
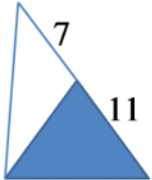
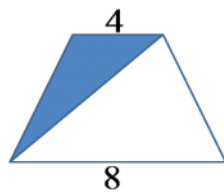
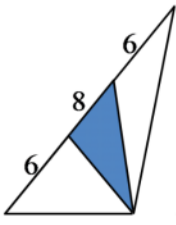
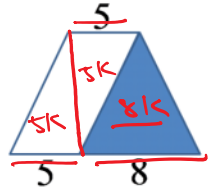
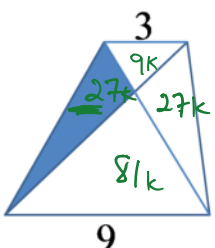
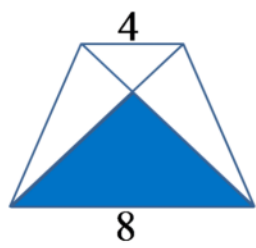
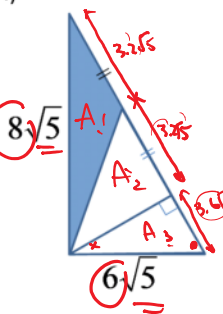
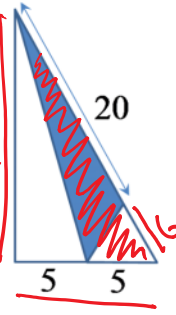
March 9, 2017 11:01 AM

Name: _____

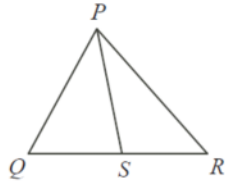
Date: _____

Math 8 Honors 5.3 Proportional Lengths and Areas of Triangles

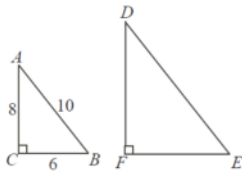
1. The area of each polygons is 120cm². Find the area of the shaded region.

<p>a)</p>  <p style="text-align: center;">10 8</p> <p style="text-align: right;">$\frac{200}{5}$</p>	<p>b)</p>  <p style="text-align: right;">40</p>
<p>c)</p>  <p style="text-align: right;">$\frac{220}{5}$</p>	<p>d)</p>  <p style="text-align: right;">40</p>
<p>e)</p>  <p style="text-align: right;">48</p>	<p>f)</p>  <p style="text-align: right;"> $5k + 5k + 8k = 120$ $18k = 120$ $k = \frac{120}{18} = \frac{20}{3}$ $Area = 8(\frac{20}{3})$ $= \frac{160}{3}$ </p>
<p>g)</p>  <p style="text-align: center;">3 9</p> <p style="text-align: right;"> $8k + 9k + 54k = 120$ $144k = 120$ $k = \frac{5}{6}$ $SHADEN = \frac{5}{6} \times 27^2$ $= \frac{45}{2} = 22.5$ </p>	<p>h)</p>  <p style="text-align: right;">$\frac{160}{5}$</p>
<p>i)</p>  <p style="text-align: right;"> $8\sqrt{5}$ $6\sqrt{5}$ $\frac{10\sqrt{5}}{6\sqrt{5}} = \frac{6\sqrt{5}}{D}$ $D(10\sqrt{5}) = 36(15)(\sqrt{5})$ $D = 3.6\sqrt{5}$ </p>	<p>j)</p>  <p style="text-align: right;"> $20k + 6k = 60$ $26k = 60$ $k = \frac{60}{26} = \frac{30}{13}$ $Area = 20(\frac{30}{13})$ $= \frac{600}{13}$ </p>

2. In $\triangle PQR$, a line segment is drawn from point P to point on side QR. If $\triangle PQS$ and $\triangle PRS$ have the same area, which of the following statements must be true?
 a) $PQ = PR$ b) $PQ = PS$ c) $RQ = PS$ **d) $QS = SR$** e) $PQ = QR$

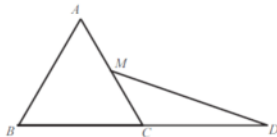


3. $\triangle ABC$ has side lengths of 6, 8, 10, as shown. Each of the sides of $\triangle ABC$ is increased by 50%, forming a new triangle $\triangle DEF$. What is the area of $\triangle DEF$?



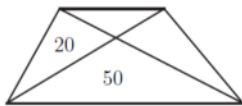
54

4. Equilateral $\triangle ABC$ has side length 2, M is the midpoint of \overline{AC} , and C is the midpoint of \overline{BD} . What is the area of $\triangle CDM$?



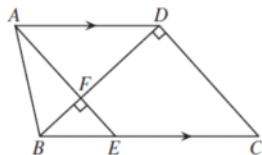
$\frac{\sqrt{3}}{2}$

5. In the trapezoid below, lines that look parallel are parallel. The trapezoid is divided into four regions by its diagonals. The areas of two of these regions are 50cm^2 and 20cm^2 , indicated. What is the area of the entire trapezoid?



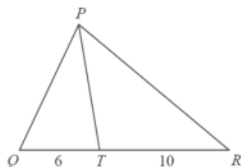
98

6. In trapezoid ABCD, AD is parallel to BC. Also, BD is perpendicular to DC. The point F is chosen on line BD so that AF is perpendicular to BD. AF is extended to meet BC at point E. If $AB=41$, $AD=50$ and $BF=9$, what is the area of quadrilateral FECD?



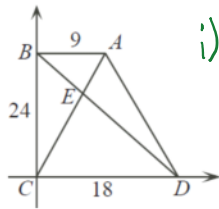
960cm^2

7. In $\triangle PQR$, Point T is on side QR such that $QT = 6$ and $TR = 10$. Explain why the ratio of the area of $\triangle PQT$ to the area of $\triangle PTR$ is 3:5.



The sidelength ratio is 3:5, and the perpendicular height is the same, so the area ratio is also 3:5

8. In the diagram, $\angle ABC = \angle BDC = 90^\circ$. Also, $AB = 9$, $BC = 24$, and $CD = 18$. The diagonals AC and BD of quadrilateral $ABCD$ meet at E .
- i) Determine the area of quadrilateral $ABCD$ ii) Show that the ratio of side $DE : EB$ is $2 : 1$.
- iii) Determine the area of triangle DEC . iv) Determine the area of triangle DAE .



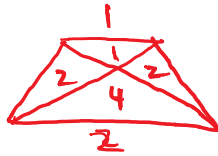
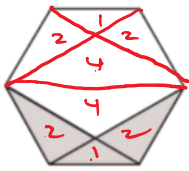
i) $27 \times 12 = 324$

ii) The base of $\triangle AEB$ is half of CD . So side lengths and height of $\triangle AEB$ are all $\frac{1}{2}$ of $\triangle CED$

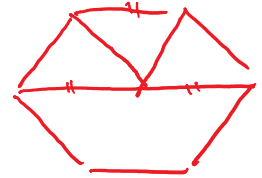
iii) 144

iv) 72

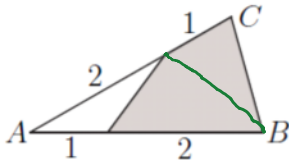
9. The figure below is a regular hexagon with area 1. Express the area of the shaded region as a common fraction.



$\therefore \frac{5}{18} =$

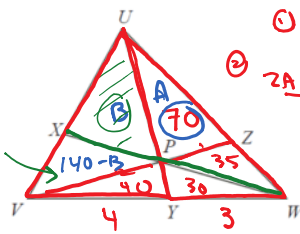


10. What fraction of $\triangle ABC$ is shaded?



$\frac{7}{9}$

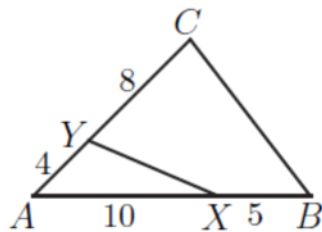
11. In the diagram, points "X", "Y", and "Z" are on the sides of $\triangle UVW$, as shown. Line segments UY , VZ and WX intersect at P . Point Y is on VW such that the ratio of sides $VY : YW$ is equal to $4 : 3$. If $\triangle PYW$ has an area of 30 and $\triangle PZW$ has an area of 35, determine the area of $\triangle UXP$.



① $B + C = 2A$
 ② $\frac{2A + 40}{4} : \frac{A + 65}{3}$
 $6A + 120 = 4A + 260$
 $2A = 140$
 $A = 70$

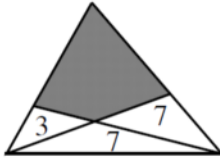
③ $B : 105$
 $\frac{140 - B}{3} = \frac{70}{4}$
 $70B = 105(140) - 105(B)$
 $175B = 105(140)$
 $B = \frac{105(140)}{175}$
 $B = 84$

12. In the diagram, $AX = 10$, $XB = 5$, $AY = 4$, and $YC = 8$. What is the ratio of the area of $\triangle AXY$ to the area of $\triangle ABC$? Express your answer as a common fraction.



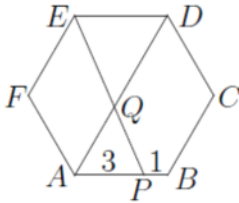
$\frac{2}{9}$

13. A triangle is partitioned into three triangles and a quadrilateral by drawing two lines from vertices to their opposite sides. The areas of the three triangles are 3, 7, and 7, as shown. What is the area of the shaded quadrilateral?



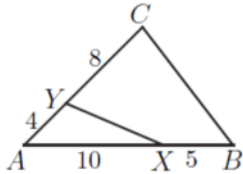
$$\underline{\underline{18}}$$

14. The figure $ABCDEF$ below is a regular hexagon, and point P lies on side AB , with $AP = 3\text{cm}$ and $PB = 1\text{cm}$. Line PE meets AD at Q . What is the ratio of the area of quadrilateral $AQEF$ to the area of hexagon $ABCDEF$? Express your answer as a common fraction.



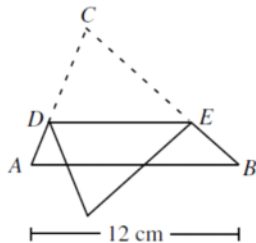
$$\frac{35}{96}$$

15. In the diagram below, $AX = 10$, $XB = 5$, $AY = 4$, and $YC = 8$. What is the ratio of the area of $\triangle AXY$ to the area of $\triangle ABC$? Express your answer as a common fraction.



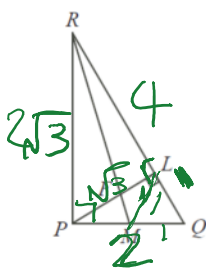
$$\frac{2}{9}$$

16. The base of a triangular piece of paper ABC is 12cm long. The paper is folded down over the base, with crease DE parallel to the base of the paper. The area of the triangle that projects below the base is 16% that of the area of the triangle ABC . What is the length of DE , in cm .



$$12 \times \frac{2}{5} = \frac{24}{5}$$

17. In the diagram, $\triangle PQR$ is right angled at P and has $PQ=2$ and $PR = 2\sqrt{3}$. Altitude PL intersects median RM at F . What is the length of PF ?



$1, 2, \sqrt{3}$ triangle

$$\angle QP = 60^\circ$$

$$\angle PRL = 30^\circ$$

$\triangle PLQ$ similar to $\triangle PRQ$.

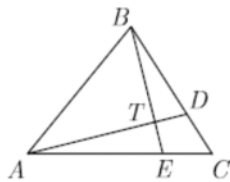
$\frac{PQ}{2}$ because RM is median.



$\triangle RPF$ similar to $\triangle PLQ$

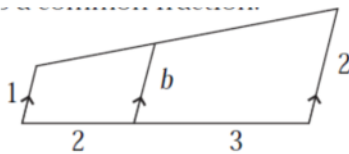
$$\sqrt{3} - \frac{1}{3}$$

18. Similar Triangles In $\triangle ABC$ points D and E lie on \overline{BC} and \overline{AC} , respectively. If \overline{AD} and \overline{BE} intersect at T so that $\frac{AT}{DT} = 3$ and $\frac{BT}{ET} = 4$, what is $\frac{CD}{BD}$?



$$\frac{4}{11}$$

19. Lines that look parallel in the picture are parallel. Express "b", the length of the middle line segment as a common fraction.

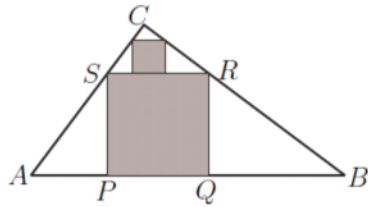


$$\frac{7}{5}$$

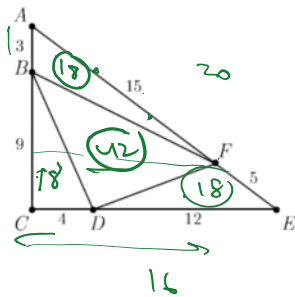
20.

21. Triangle ABC is right-angled at C, with AC = 3 and BC = 4. The large shaded square PQRS is scribed in $\triangle ABC$ with P and Q on AB. The small shaded square is inscribed in $\triangle SRC$, with one side along SR. What is the ratio of the side of the small shaded square to the side of the large shaded square? Express your answer as a common fraction.

$$\frac{12}{37}$$



22. In right triangle ACE , we have $AC = 12$, $CE = 16$, and $EA = 20$. Points B , D , and F are located on \overline{AC} , \overline{CE} , and \overline{EA} , respectively, so that $AB=3$, $CD=4$, and $EF=5$. What is the ratio of the area of $\triangle BDF$ to that of $\triangle ACE$?



$$\frac{16(12)}{2} = 96$$

$$8 \times 12 = 96$$

$$- 18(3) = 54$$

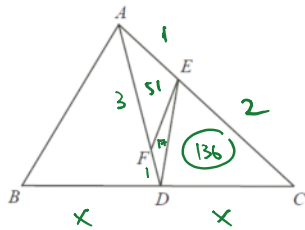
$$\frac{54}{42} = 1.2857$$

$$\frac{96}{54} = 1.7777$$

$$\frac{96}{54} = 1.7777$$

42 = 96
~~6~~ × 7 = ~~8~~ × 2
7 : 16

23. In $\triangle ABC$, point D is the midpoint of side BC . Point E is on AC such that the ratio of sides $AE : EC$ is $1:2$. Point F is on AD such that the ratio of sides $AF : FD$ is $3 : 1$. If the area of $\triangle DEF$ is 17, determine the area of $\triangle ABC$.



$$\frac{66}{66} = 1$$

$$\frac{136}{66} = 2.06$$

$$\frac{68}{6} = 11.33$$

$$\frac{360}{48} = 7.5$$

$$\frac{408}{17} = 24$$