**Problem 1.** In the figure shown, $\angle A = 90°$. D and E are the points on AB and AC, respectively. $DM = EN = 2$. Find the area of triangle ABC if the area of triangle CMD is 1/5 of the area of triangle ABC, and the area of triangle BNE is 1/4 of the area of triangle ABC.

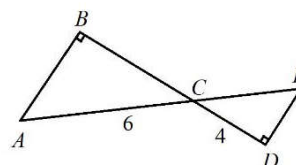(A) $4\sqrt{5}$ (B) $2\sqrt{5}$ (C) $8\sqrt{5}$ (D) 9   (E) 10
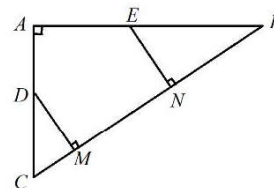
Problem 2. In the figure below, a 5-inch by 5-inch square adjoins a 16-inch by 16-inch square. What is the area of the shaded region?

(A) $\dfrac{200}{21}$ (B) $\dfrac{325}{21}$ (C) $\dfrac{245}{16}$ (D) $\dfrac{25}{2}$ (E) 12
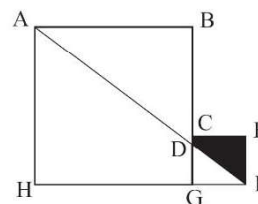
Problem 3. In the figure, $AC = 6$ cm, $CD = 4$ cm, and $DE = 3$ cm. Find the number of square centimeters in the area of the triangle ABC.

(A) $\dfrac{36}{25}$ (B) 9   (C) $\dfrac{17}{2}$ (D) $\dfrac{216}{25}$ (E) $\dfrac{25}{36}$

Problem 4. In ΔABC, line segments are drawn parallel to each of the sides dividing the triangle into six regions. The areas of three regions are shown in the figure. What is the total area of ΔABC?
(A) 144   (B) 72   (C) 64   (D) 81   (E) 70
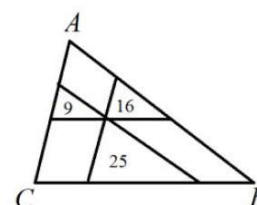
Problem 5. In ΔABC we have $AB = 2$, and $AC = 3$. I, II, and III are the squares of sides AB, BC, and CA, respectively. What is the greatest possible value of the sum of the shaded regions?
(A) 6   (B) 9   (C) 18   (D) 12   (E) 10
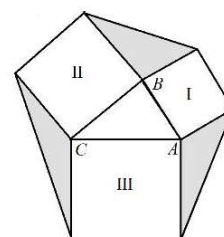
Problem 6. Point D lies on side AC of equilateral triangle ABC such that the measure of angle DBC is 45 degrees. What is the ratio of the area of triangle ADB to the area of triangle CDB? Express your answer as a common fraction in simplest radical form.

Problem 7. A triangle has sides of length 12, 17 and 25 units. What is the radius of its circumscribed circle? Express your answer as a common fraction.
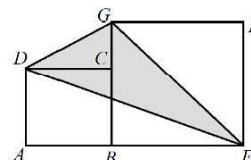(A) 85/6   (B) 79/6   (C) 69/7   (D) 89/9   (E) 15|

Problem 8. The three side lengths of a particular triangle are 2, 5 and x units, and the area of the triangle is x square units. What is the value of x? Express your answer in simplest radical form.

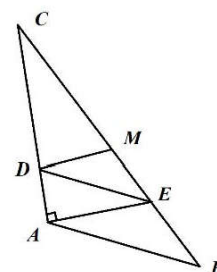**Problem 9.** Two squares are put together as shown. $FE = 20$ and $AB = 15$. Connect EG, ED, and DG. Find the shaded area.
(A) 212   (B) 262   (C) 228   (D) 200   (E) 256

Problem 10. As shown in the figure, $\triangle ABC$ is an obtuse triangle. M is the midpoint of BC. $AE \perp AC$. $MD // AE$. What is the area of $\triangle CDE$ if the area of $\triangle ABC$ is 2016?
(A) 1008   (B) 502   (C) 252   (D) 200   (E) 256

Problem 11. As shown in the figure, the area of triangle ABC is 18. Points D, E, and F are on sides AB, BC and AC respectively, and $AD = 4$, $DB = 5$. Find the area of triangle ABE if triangles ABE and quadrilateral $DBEF$ have the same areas.
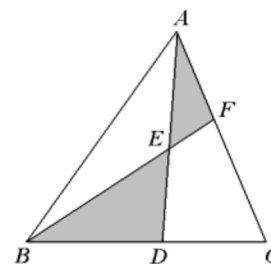(A) 10   (B) 5   (C) 9/5   (D) 2   (E) 6
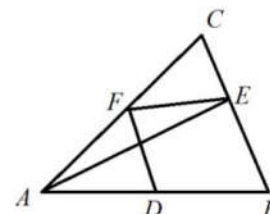
Problem 12. As shown in the figure, $BC = CE$，$AD = CD$. Find the area triangle CDE if the area of triangle ABC is 200.
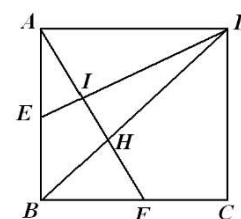(A) 100   (B) 102   (C) 152   (D) 120   (E) 125
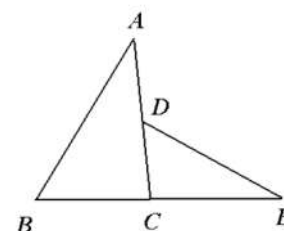
Problem 13. As shown in the figure, $S_{\triangle ABC} = 120$，$AE = ED$, and $AF = \dfrac{1}{2}FC$. Find the shaded area.

(A) 20 (B) 24 (C) 30 (D) 36 (E) 40

Problem 14. (AMC) If *ABCD* is a 2 × 2 square, *E* is the midpoint of $\overline{AB}$, *F* is the midpoint of $\overline{BC}$, $\overline{AF}$ and $\overline{DE}$ intersect at *I*, and $\overline{BD}$ and $\overline{AF}$ intersect at *H*, then the area of quadrilateral *BEIH* is
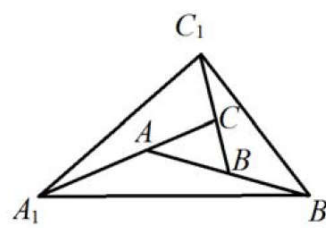(A) $\frac{1}{3}$ (B) $\frac{2}{5}$ (C) $\frac{7}{15}$ (D) $\frac{8}{15}$ (E) $\frac{3}{5}$

Problem 15. Triangle *ABC* in the figure has area 1. Points A_1, B_1, and C_1, all distinct from *A*, *B*, and *C*, are on the extensions of sides *CA*, *AB,* and *BC*,

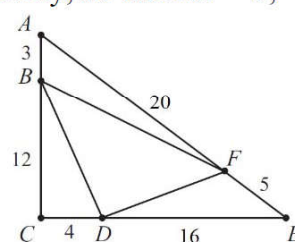respectively, and $AA_1 = 2CA$, $BB_1 = 2AB$, , $CC_1 = 2BC$. Find the area of $\Delta A_1B_1C_1$.
(A) 16 (B) 17 (C) 15 (D) 12 (E) 19

**Problem 16.** In right triangle ΔACE, we have $AC = 15$, $CE = 20$, and $EA = 25$. Points *B*, *D*, and *F* are located on *AC*, *CE*, and *EA*, respectively, so that $AB = 3$, $CD = 4$, and $EF = 5$. What is the ratio of the area of ΔBDF to that of ΔACE?
(A) $\frac{13}{25}$ (B) $\frac{12}{29}$ (C) $\frac{13}{30}$ (D) $\frac{39}{76}$ (E) $\frac{1}{2}$

Problem 17. In ΔABC points *D* and *E* lie on *BC* and *AC*, respectively. Suppose that *AD* and *BE* intersect at T so that $AT/DT = 3$ and $BT/ET = 4$. What is the value of *AE/EC*?
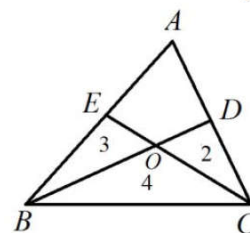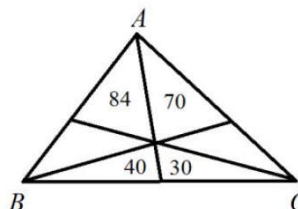(A) $\frac{11}{5}$ (B) $\frac{12}{5}$ (C) $\frac{13}{5}$ (D) $\frac{4}{3}$ (E) $\frac{5}{2}$
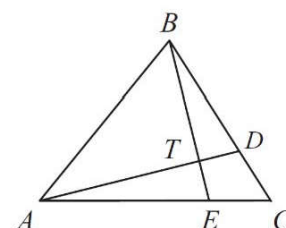
Problem 18. As shown in the figure, Δ *ABC* is divided into three smaller triangles and one quadrilateral. The areas of three triangles are as indicated. Find the area of quadrilateral *ADOE*.

(A) $\dfrac{39}{5}$　(B) $\dfrac{21}{5}$　(C) $\dfrac{18}{5}$　(D) 8　(E) $\dfrac{63}{10}$

Problem 19. As shown in the figure, Δ*ABC* is divided into six smaller triangles by lines drawn from the vertices through a common interior point. The areas of four of these triangles are as indicated. Find the area Δ*ABC*.
(A) 316　(B) 317　(C) 315　(D) 312　(E) 319

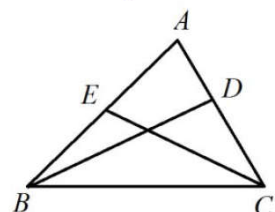**Problem 20.** As shown in the figure, *D* and *F* are points on *AC* and *BC*, respectively of Δ*ABC*. *AF* and *BD* meet at *E*. *AD* : *DC* = 1 : 2 . *BE* =*ED*. Find the value of *BF* : *FC*.

(A) $\dfrac{3}{5}$　(B) $\dfrac{2}{5}$　(C) $\dfrac{1}{5}$　(D) $\dfrac{1}{3}$　(E) $\dfrac{3}{10}$
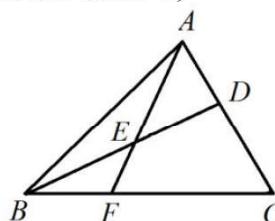
Problem 21. As shown in the figure, *E* and *D* are points on *AB* and *AC*, respectively. Δ*ABC* is divided into three smaller triangles and one quadrilateral. *AE* : *BE* =2. *AD* : *DC* = 1 : 2. Find the area of the quadrilateral *AEFD* if the area of Δ*ABC* is 42.
(A) 16　(B) 14　(C) 13　(D) 12　(E) 19

Problem 22. As shown in the figure, *E* and *D* are points on *AB* and *AC*, respectively. Δ*ABC* is divided into three smaller triangles and one quadrilateral. *AE* = *EB*. *AD* : *DC* = 1 : 2. Find the area of the quadrilateral *AEFD* if the area of Δ*ABC* is 90.
(A) 21　(B) 24　(C) 23　(D) 22　(E) 19
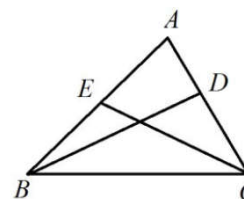
Problem 23. In the figure shown, *ABCD* is a parallelogram. *O* is the intersection of *AC* and *BD*. *E* is a point on the extension of *AB*. Connect *OE* to meet *BC* at *F*. *AB* = 5, *AD* = 4, and *BE* = 3. What is the length of *BF*?
(A) 17/11　(B) 14/11　(C) 15/11　(D) 13/11　(E) 12/11