Similarities – Parallel Lines & Proportional Parts

In the figure, $\overleftrightarrow{YA} \parallel \overleftrightarrow{OE} \parallel \overleftrightarrow{BR}$. Complete each statement.
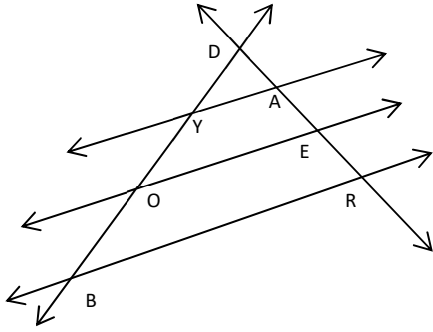
#1) $\dfrac{YO}{OB} = \dfrac{AE}{ER}$

#2) $\dfrac{YB}{OB} = \dfrac{AR}{ER}$
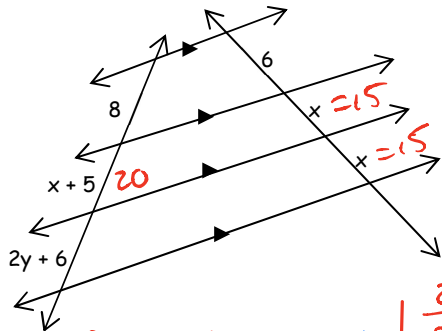
#3) $\dfrac{AR}{AE} = \dfrac{YB}{YO}$

#4) $\dfrac{DY}{YO} = \dfrac{DA}{AE}$

#5) $\dfrac{DR}{AR} = \dfrac{DB}{YB}$

#6) $\dfrac{DE}{AE} = \dfrac{DO}{YO}$

Find the value of x and y.

#7)

$x = 15$ $x = 15$

$x (x+5) \cdot \dfrac{8}{x+5} = \dfrac{6}{x} \cdot (x+5)$

$8x = 6x + 30$
$2x = 30$
$x = 15$

$\dfrac{20}{2y+6} = \dfrac{15}{15}$

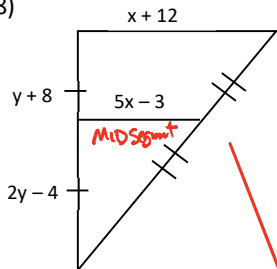$\dfrac{20}{2y+6} = 1$

$20 = 2y + 6$
$14 = 2y$
$7 = y$

#8)

MIDSEGMENT

$2 \cdot \; 2 \cdot \; 2 \cdot$
$5x - 3 = \frac{1}{2}(x+12)$

$10x - 6 = x + 12$
$9x - 6 = 12$
$9x = 18$
$x = 2$

$y + 8 = 2y - 4$
$8 = y - 4$
$12 = y$

#9)
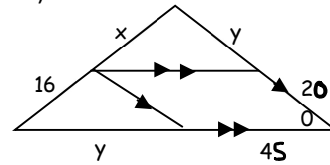
$16 \cdot 20 \; \dfrac{x}{16} = \dfrac{y}{20} \; 16 \cdot 20$

$20x = 16y$
$20\left(\dfrac{720}{y}\right) = 16y$
$\dfrac{14400}{y} = 16y$
$14{,}400 = 16y^2$
$900 = y^2$
$\pm 30 = y , \; y \neq -30, \text{ so } y = 30$

$45y \; \dfrac{16}{y} = \dfrac{x}{45} \; 45y$

$720 = xy$
$\dfrac{720}{y} = x$
$\dfrac{720}{30} = x$
$24 = x$

Using the figure, determine the value of x that would make $\overline{PQ} \parallel \overline{DF}$ under each set of conditions.

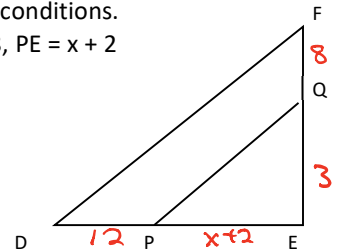#10) EQ = 3, DP = 12, QF = 8, PE = x + 2

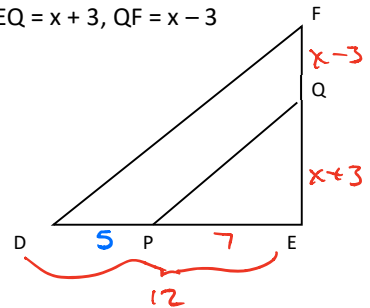$\dfrac{x+2}{3} = \dfrac{12}{8}$

$2(8) \; \dfrac{x+2}{8} = \dfrac{3}{2} \; 7(3)$

$2x + 4 = 9$
$2x = 5$
$x = 5/2$

#11) DE = 12, PE = 7, EQ = x + 3, QF = x − 3

$5(7) \; \dfrac{x+3}{7} = \dfrac{x-3}{5} \; 5(7)$

$5x + 15 = 7x - 21$
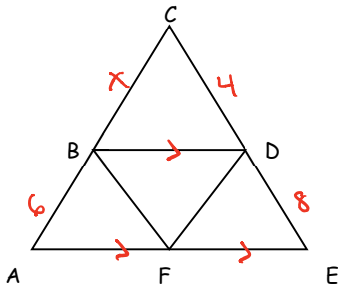$15 = 2x - 21$
$36 = 2x$
$18 = x$

Using the figure, determine the value of x under each set of conditons.

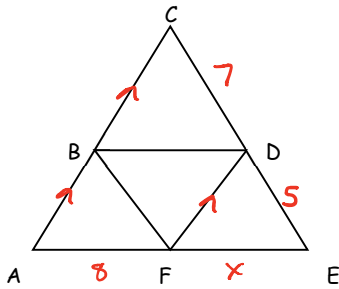**#12)** $\overline{BD} \parallel \overline{AE}$, AB = 6, DE = 8, DC = 4, BC = x

$\dfrac{x}{6} = \dfrac{4}{8}$
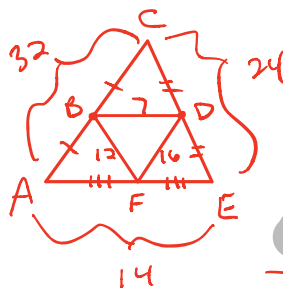
$6 \cdot \dfrac{x}{6} = \dfrac{1}{2} \cdot 6$

$x = 3$

#13) $\overline{AC} \parallel \overline{DF}$, DC = 7, DE = 5, FA = 8, FE = x

$8 \cdot \dfrac{x}{8} = \dfrac{5}{7} \cdot 8$

$x = \dfrac{40}{7}$

#14) If B, D, and F are the midpoints of sides $\overline{CA}$, $\overline{CE}$, and $\overline{AE}$ respectively, BD = 7, BF = 12, and DF = 16, find the perimeter of ΔACE. What is the ratio of the perimeter of ΔBDF to the perimeter of ΔAEC?

MIDSegment $= \dfrac{1}{2} (3^{rd} \text{ side})$

$P_{\Delta ACE} = 32 + 24 + 14$

$P_{\Delta ACE} = 70$

$P_{\Delta BDF} = 12 + 7 + 16$

$P_{\Delta BDF} = 35$

RATIO $= \dfrac{P_{\Delta BDF}}{P_{\Delta AEC}} = \dfrac{35}{70} = \dfrac{1}{2}$

#15) If B, D, and F are the midpoints of sides $\overline{CA}$, $\overline{CE}$, and $\overline{AE}$ respectively in ΔACE, BD = 8, CA = 10, and DE = 4, find DF, AE, and BF.
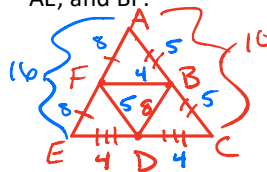
MIDSegment $= \dfrac{1}{2} (3^{rd} \text{ side})$
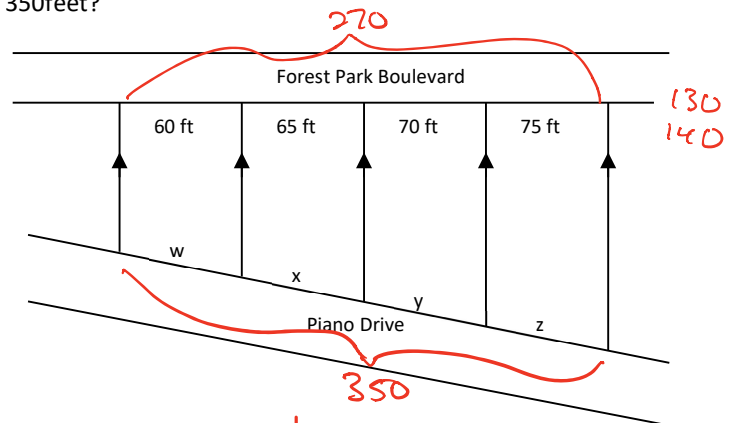

$DF = 5$
$AE = 16$
$BF = 4$

#16) In Forest Park, the home lots are laid out as shown. What is the individual frontage of each lot on Piano Drive if the total frontage on the drive for the five lots is known to be 350feet?

$\dfrac{w}{60} = \dfrac{350}{270}$

$(60)\dfrac{w}{60} = \dfrac{35}{27}(60)$

$w = \dfrac{2100}{27}$

$w \approx 77.8 \text{ ft}$

$\dfrac{x}{65} = \dfrac{35}{27}$

$x = \dfrac{35(65)}{27}$

$x = \dfrac{2275}{27}$

$x \approx 84.3 \text{ ft}$

$\dfrac{y}{70} = \dfrac{35}{27}$

$y = \dfrac{35(70)}{27}$

$y = \dfrac{2450}{27}$

$y \approx 90.7 \text{ ft}$

$\dfrac{z}{75} = \dfrac{35}{27}$

$z = \dfrac{35(75)}{27}$

$z = \dfrac{2625}{27}$

$z \approx 97.2 \text{ ft}$

#1) ER   #2) AR   #3) AR
#4) AE   #5) AR   #6) DE
#7) (15, 7)   #8) (2, 12)   #9) (24, 30)
#10) 2.5   #11) 18   #12) 3
#13) $\dfrac{40}{7}$ #14) Perimeter ΔAEC = 70, $\dfrac{Perimeter\ \Delta BDF}{Perimeter\ \Delta AEC} = \dfrac{1}{2}$
#15)   DF = 5, AE = 16, BF = 4
#16)   w ≈ 77.8 ft, x ≈ 84.3 ft, y ≈ 90.7 ft, z ≈ 97.2