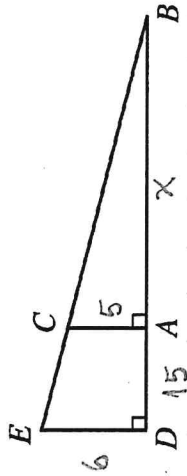


11. To measure the distance between points A and B on two opposite sides of a canyon, a man takes the following measurements: $AC = 5$ m, $DE = 6$ m, and $AD = 15$ m. What is the distance between the sides of the canyon?



Note that $\triangle DEB \sim \triangle ACB$

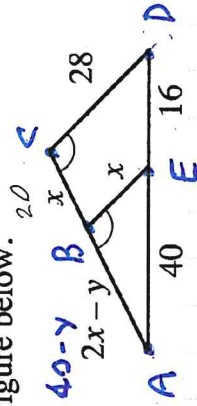
$$\text{So that } \frac{DE}{AC} = \frac{EB}{CB} = \frac{DB}{AB}$$

Let $AB = x$ then $DB = 15 + x$

$$\text{and } \frac{6}{5} = \frac{15+x}{x} \Rightarrow 6x = 75 + 5x$$

$$\Rightarrow x = 75 \quad \text{Distance } \boxed{75\text{m}}$$

15. Find the value of each variable in the figure below.



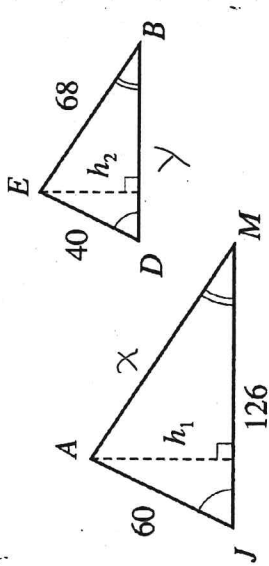
Note that $\triangle ACD \sim \triangle ABE$

$$\text{So that } \frac{AD}{AB} = \frac{CD}{BE} = \frac{AC}{AE}$$

$$\text{So } \frac{28}{x} = \frac{56}{40} = \frac{7}{5} \Rightarrow 7x = 5 \cdot 28 \Rightarrow \boxed{x = 20}$$

$$\text{And } \frac{60-y}{40-y} = \frac{7}{5} \Rightarrow \boxed{y = -10}$$

For Exercises 18 and 19, use the triangles shown below.



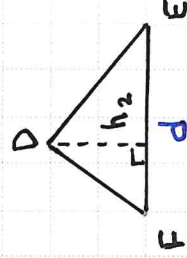
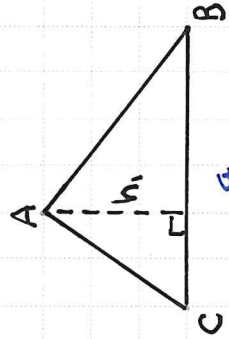
18. a) Find the missing side lengths.
 b) Find the ratio of the perimeter of ΔJAM to the perimeter of ΔDEB .

$$a) \text{ So } \frac{3}{2} = \frac{126}{y} = 3y = 2 \cdot 126 \Rightarrow y = 2 \cdot 42 = \boxed{84}$$

$$x = \boxed{102}$$

$$b) \frac{\text{Perim}(\Delta JAM)}{\text{Perim}(\Delta DEB)} = \frac{60 + \cancel{84} + 126}{40 + 68 + \cancel{84}} = \frac{102}{192} = \frac{3}{2}$$

20. Suppose that $\Delta ABC \sim \Delta DEF$ and let h_1 be the altitude from A and h_2 be the altitude from D. Find the ratio of the area of ΔABC to the area of ΔDEF in terms of a and d .



$$A = \frac{1}{2}bh$$

$$\frac{\text{Area}(\Delta ABC)}{\text{Area}(\Delta DEF)} = \frac{\frac{1}{2}a \cdot h_1}{\frac{1}{2}d \cdot h_2} = \frac{a \cdot h_1}{d \cdot h_2} = \frac{a}{d} \cdot \frac{h_1}{h_2} = \frac{a}{d} \cdot \frac{a}{d} = \left(\frac{a}{d}\right)^2$$

Note that $\Delta JAM \sim \Delta DEB$

$$\text{So that } \frac{JA}{DE} = \frac{JM}{DB} = \frac{AM}{EB}$$

Let $x = AM$ and $y = DB$

$$\text{Then } \frac{60}{40} = \frac{3}{2} = \frac{126}{y} = \frac{x}{68}$$