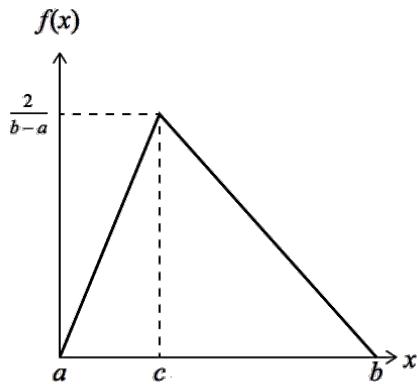


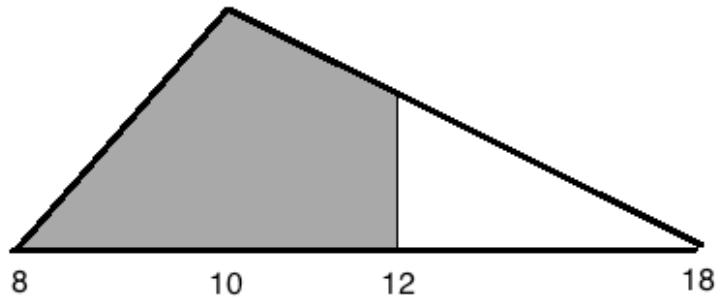
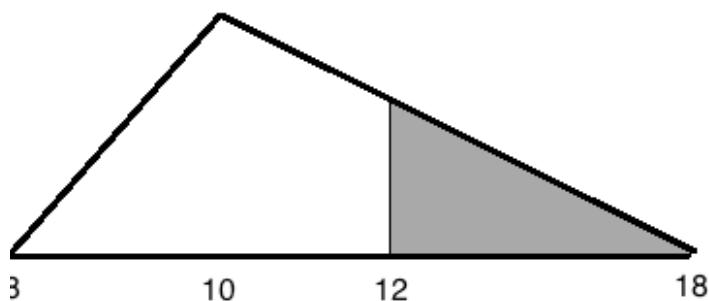
Triangular Distribution Skills practice



$$f(x) = \begin{cases} 0, & x < a \\ \frac{2(x-a)}{(b-a)(c-a)}, & a \leq x \leq c \\ \frac{2(b-x)}{(b-a)(b-c)}, & c \leq x \leq b \\ 0, & x > b \end{cases}$$

Area of a triangle = $\frac{1}{2}$ base \times height

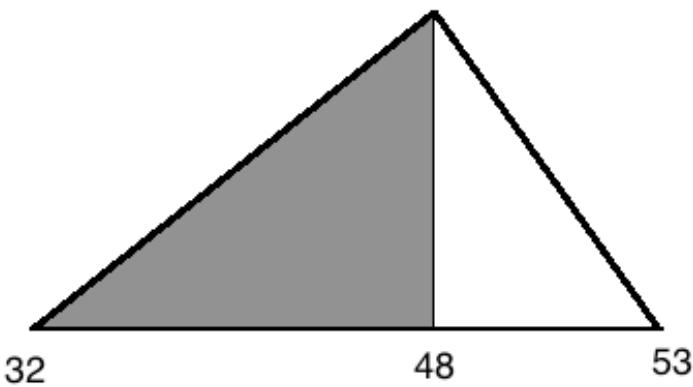
Find the shaded areas in each triangle (area = probability)



$$f(x) = \frac{2(6)}{10 \times 8} = \frac{12}{80}$$

$$\text{Area} = 1 - 0.45 = 0.55$$

$$\text{Area} = \frac{1}{2} \times 6 \times \frac{12}{80} = 0.45$$



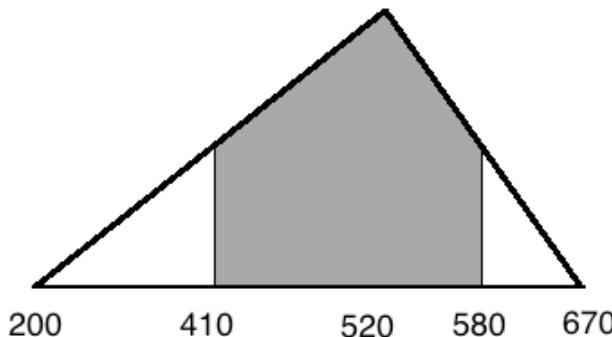
$$f(x) = \frac{2}{21}$$



$$f(x) = \frac{2(5)}{21 \times 16} = \frac{10}{336}$$

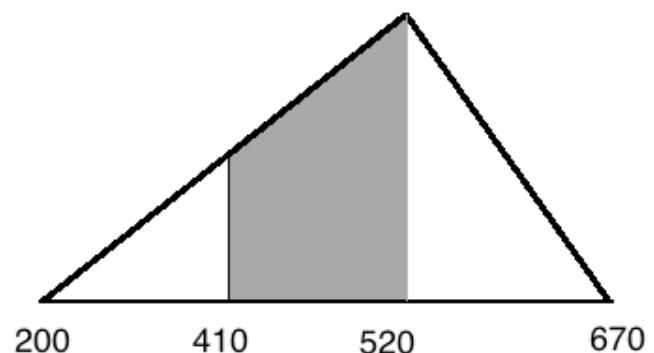
$$\text{Area} = \frac{1}{2} \times 16 \times \frac{2}{21} = 0.7619 \text{ (4sf)}$$

$$\begin{aligned}\text{Area} &= 1 - \left(\frac{1}{2} \times 5 \times \frac{10}{336} \right) \\ &= 0.9256 \text{ (4sf)}\end{aligned}$$



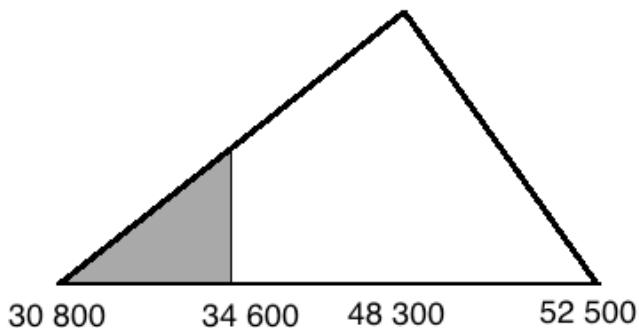
$$\begin{aligned}f(x_1) &= \frac{2(210)}{470 \times 320} = \frac{420}{150400} \\ f(x_2) &= \frac{2(90)}{470 \times 250} = \frac{180}{117500}\end{aligned}$$

$$\begin{aligned}\text{Area} &= 1 - \left(\frac{1}{2} \times 210 \times \frac{420}{150400} \right) \\ &\quad - \left(\frac{1}{2} \times 90 \times \frac{180}{117500} \right) = 0.6378 \text{ (4sf)}\end{aligned}$$



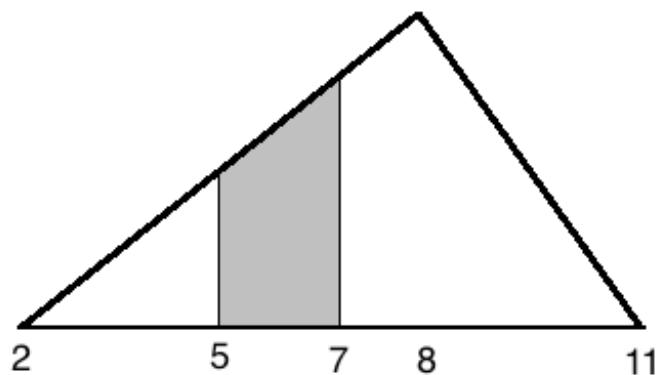
$$\begin{aligned}f(x_1) &= \frac{2(210)}{470 \times 320} = \frac{420}{150400} \\ f(x_2) &= \frac{2}{470}\end{aligned}$$

$$\begin{aligned}\text{Area} &= \left(\frac{1}{2} \times 320 \times \frac{2}{470} \right) \\ &\quad - \left(\frac{1}{2} \times 210 \times \frac{420}{150400} \right) = 0.3876 \text{ (4sf)}\end{aligned}$$



$$f(x) = \frac{2(3800)}{21700 \times 17500} = \frac{76}{3797500}$$

Area = $\left(\frac{1}{2} \times 3800 \times \frac{76}{3797500}\right) = 0.0380$



$$f(x_1) = \frac{2(3)}{9 \times 6} = \frac{6}{54}$$

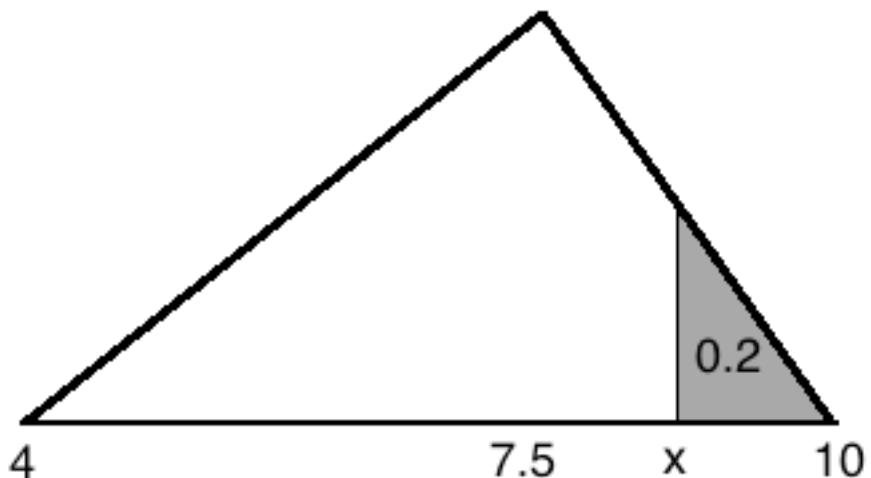
$$f(x_2) = \frac{2(5)}{9 \times 6} = \frac{10}{54}$$

$$\text{Area} = \left(\frac{1}{2} \times 5 \times \frac{10}{54}\right) - \left(\frac{1}{2} \times 3 \times \frac{6}{54}\right)$$

$$= 0.2963$$

Extension: Can you calculate the value of x? (Excellence)

Hints: 0.2 is an area. Perhaps consider similar triangles.



Formula approach

$$\text{Area} = \frac{1}{2} b h = 0.2$$

$$\frac{1}{2} \times (10 - x) \times \frac{2(10 - x)}{6 \times 2.5} = 0.2$$

$$\frac{(10 - x)^2}{15} = 0.2$$

$$(10 - x)^2 = 3$$

$$10 - x = \sqrt{3}$$

$$10 - \sqrt{3} = x = 8.27 \text{ (2d.p.)}$$

Similar Triangles Approach.

Large triangle has base of 2.5, height of $\frac{2}{6}$, therefore area of $\frac{5}{12}$

$0.2 \div \frac{5}{12}$ means the **area** scale factor is $\frac{12}{25}$

Length scale factor is square root of area scale factor

Width of triangle is $2.5 \times \sqrt{\frac{12}{25}}$

Subtract this from 10 to get $x = 8.27$

