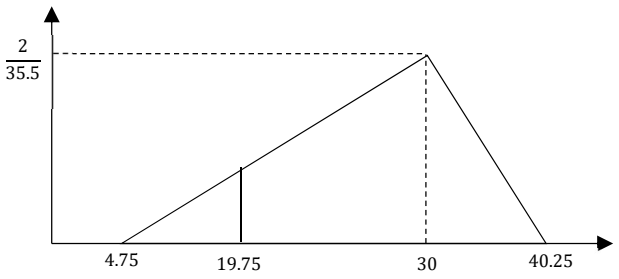
Part 5.2: Triangular Distribution

Exactly the same principle applies to the triangular distribution. Let's look at an example…

Example
The amount of petrol in my tank is always between 5 L and 40 L. It normally has approximately 30 L in it. I only know the amount of petrol to the nearest 0.5 L. What is the probability there is less than 20 L in my tank?

Answer
Again, we need to think about the largest number that rounds to 5 L and the smallest number that rounds to 40 L… in this case a = 4.75 and b = 40.25. Because our modal value is in the middle we don't need to round this, it will still stay as 30. The probability there is less than 20 L in the tank means that the dial would need to display 19.5 L, so any numbers smaller than 19.75 would display this, so x = 19.75. If we draw a diagram we get:



Doing the calculations height = $\frac{2(19.75-4.75)}{(40.25-4.75)(30-4.75)} = \frac{240}{7171}$

Probability = $\frac{1}{2}$ × base × height = $\frac{1}{2} \times 15 \times \frac{240}{7171} = 0.251\ (3sf)$

Exercise 5.2

1. The number of biscuits in a jumbo packet is always between 35 and 42, but it is most likely to be 38. What is the probability there are:
    a. Less than 37 biscuits?
    b. More than 39 biscuits?
    c. Between 37 and 39 biscuits inclusive?
    d. Exactly 38 biscuits?
2. The amount of water in a glass is between 120 mL and 160 mL measured to the nearest mL. Based on looking at it I think there is 130 mL in it. What is the probability there is:
    a. More than 150 mL in the glass?
    b. Less than 125 mL in the glass?
    c. Between 125 mL and 150 mL in the glass inclusive?
    d. An amount of water that measures to be 125 mL?
3. The number of pages in a legal document is known to be between 10 and 20, but is most likely to be 13. Calculate the probability there are:
    a. More than 18 pages in the document.
    b. Less than 12 pages in the document.
    c. Less than 10 pages in the document.
    d. Between 13 and 18 pages inclusive.
4. The number of pearls on a necklace is somewhere between 45 and 60, the most common number of pearls is 50. What is the probability there are:
    a. Less than 50 pearls on the necklace?
    b. More than 50 pearls on the necklace?
    c. Exactly 50 pearls on the necklace?
    d. Between 53 and 55 pearls inclusive on the necklace?