

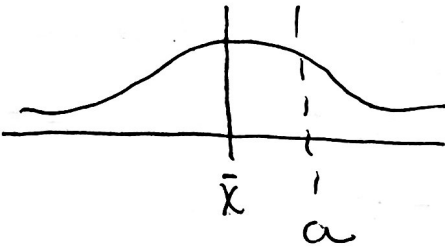
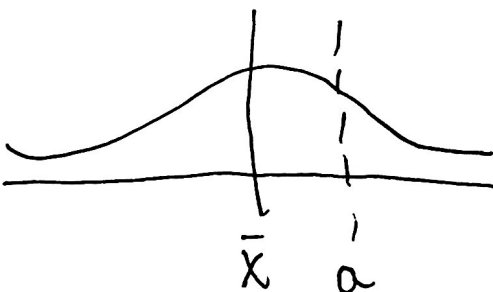
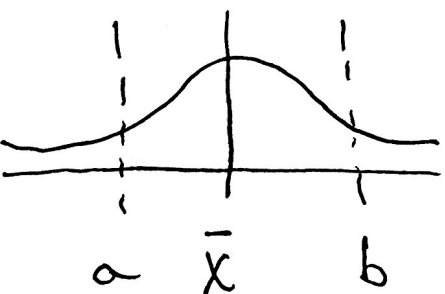
**Statistical Reasoning**  
**Normal Distribution - Z-Scores**

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Class: \_\_\_\_\_

A **z-score** is... # of standard deviations a value is from the mean.

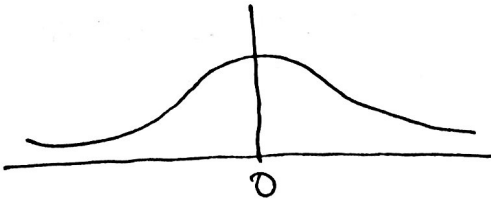
$$\frac{x - \bar{x}}{\sigma} = z - \text{score} \leftrightarrow \text{probability}$$

We can move between the **z-score** and a **probability** by using the z-table.  
 There are 4 elements to finding the **z-score**. We need to know at least 3.

<p>Scenario 1: Below the value. <math>P(x &lt; a)</math></p> 	<p>Scenario 1: <math>P(X &lt; 15)</math></p> <p>Given- Mean = 12 St dev = 2</p> <p>Need- z-score</p> $z = \frac{15 - 12}{2} = \frac{3}{2} = 1.5$ $P(X < 15) = .9332$ <p style="text-align: right;"><u>93.32%</u></p>
<p>Scenario 2: Above the value. <math>P(x &gt; a)</math></p> 	<p>Scenario 2: <math>P(X &gt; 15)</math></p> <p>Given- Mean = 12 St dev = 2</p> <p>Need- z-score</p> $z = \frac{15 - 12}{2} = \frac{3}{2} = 1.5$ $P(X > 15) = 1 - .9332$ $= 0.0668$ <p style="text-align: right;"><u>6.68%</u></p>
<p>Scenario 3: Between 2 values. <math>P(a &lt; x &lt; b)</math></p> 	<p>Scenario 3: <math>P(10 &lt; X &lt; 13)</math></p> <p>Given- Mean = 12 St dev = 2</p> <p>Need- z-scores</p> $z = \frac{13 - 12}{2} = \frac{1}{2} = 0.50$ $z = \frac{10 - 12}{2} = \frac{-2}{2} = -1.00$ $.6915 - .1587 = 0.5328$ <p style="text-align: right;"><u>53.28%</u></p>

$$z = \frac{X - \bar{X}}{\sigma}$$

Scenario 4: Find the data value given the z-score.



Scenario 4:

Given-

mean = 12

st dev = 2

z-score = 1.23

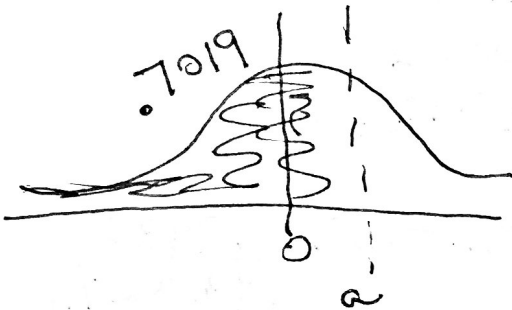
Need-  
Value

2.  $1.23 = \frac{X - 12}{2}$

$2.46 = X - 12$   
 $+12$

$X = 14.46$

Scenario 5: Find the value given the probability.



Scenario 5:

Given-

mean = 12

st dev = 2

prob = 70.19%

Need-  
z-score = 0.53

2.  $0.53 = \frac{X - 12}{2}$

$1.06 = X - 12$   
 $+12$

$X = 13.06$

Scenario 6: Find the mean given the probability.

Scenario 6:

Given-

Need-

Scenario 7: Find the SD given the probability.

Scenario 7:

Given-

Need-