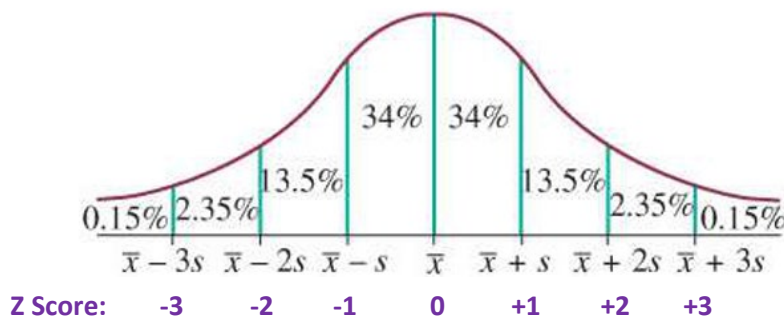


## Z-Score - Worksheet



### Variables

$Z$  = standard score  
 $x$  = actual score  
 $\bar{x}$  = mean score  
 $s_x$  = standard deviation

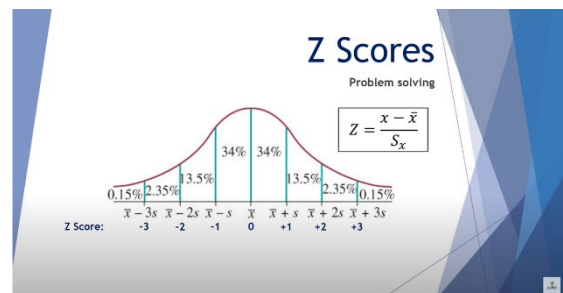
### Equations

$$Z = \frac{x - \bar{x}}{s_x}$$

$$x = (Z \times s_x) + \bar{x}$$

### Key Words

- "Normal distribution"
- "Bell shaped"
- "Z-Score"
- "Standardised Score"



### Reference

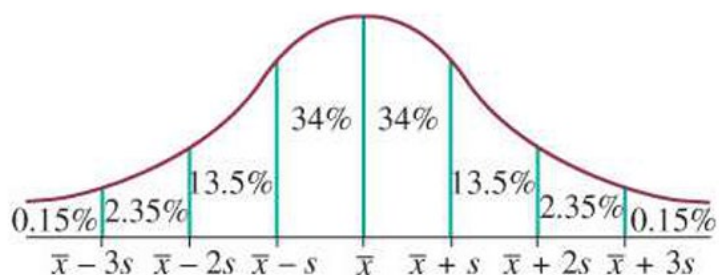
- Juddy Productions: Z Scores(Watch video for solutions)

### Example 1

A VCE maths class sits a test with a mean score of 80 marks and a standard deviation of 5 marks. The distribution is approximately normally distributed

James achieves a score of 90 marks. What is his Z score?

$Z =$   
 $\bar{x} =$   
 $s_x =$   
 $x =$

$$Z = \frac{x - \bar{x}}{s_x}$$


### Example 2

The height of all Year 10 students is approximately normally distributed. The mean height for the year level was 168 cm and the standard deviation was found to be 8 cm.

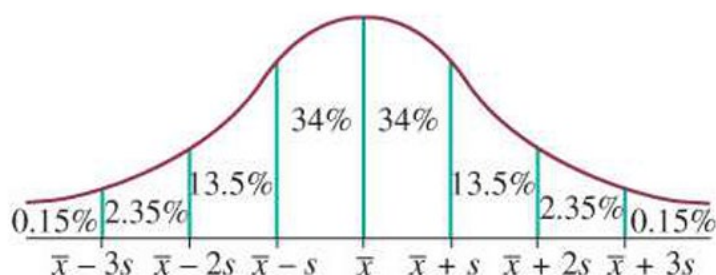
Lisa has a height of 144 cm. What is her height expressed as a Z score?

$$Z = \frac{x - \bar{x}}{s_x}$$

$\bar{x} =$

$s_x =$

$x =$



### Example 3

The lengths of a particular type of ant is approximately normally distributed with a mean length of 4.8 mm and a standard deviation of 1.2 mm

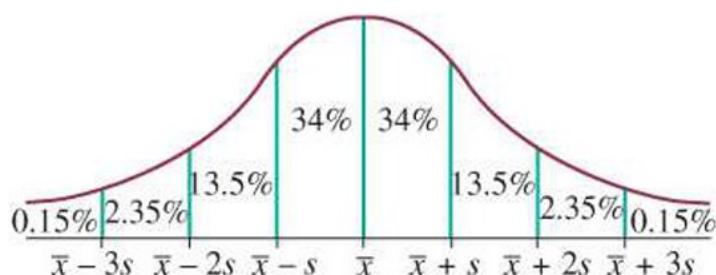
One particular ant has a length of 6.8 mm. What is the standardised ant length (ie. Z score)? Express your answer to 2 decimal places

$$Z = \frac{x - \bar{x}}{s_x}$$

$\bar{x} =$

$s_x =$

$x =$



### Example 4

The lengths of a particular type of ant is approximately normally distributed with a mean length of 4.8 mm and a standard deviation of 1.2 mm

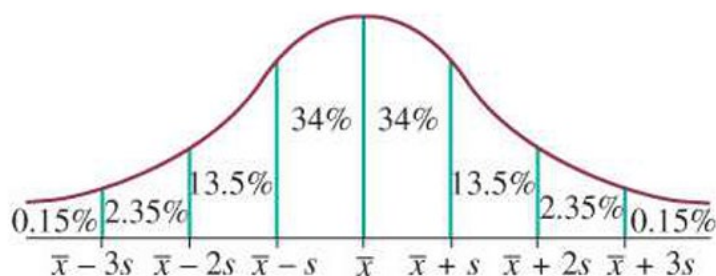
A standardised ant length of  $z = -0.5$  corresponds to what actual ant length?

$$Z = \frac{x - \bar{x}}{s_x}$$

$\bar{x} =$

$s_x =$

$x =$



**Example 5**

A class of students sat a Biology test and a Legal Studies test. Each test had a possible maximum score of 100 marks. The table below shows the mean and standard deviation of the marks obtained in these tests.

	Subject	
	Biology	Legal Studies
Class mean	54	78
Class standard deviation	15	5

The class marks in each subject are approximately normally distributed.  
Sashi obtained a mark of 81 in the Biology test.

What mark would Sashi need to obtain on the Legal Studies test to achieve the same standard score for both Legal Studies and Biology?

Biology	Legal Studies
$Z =$ $\bar{x} =$ $s_x =$ $x =$	$Z =$ $\bar{x} =$ $s_x =$ $x =$
<b>Step.1</b> Calculate the Z score for Sashi's Biology test  $Z = \frac{x - \bar{x}}{s_x}$	<b>Step.2</b> Calculate Sashi's "actual score" for her Legal Studies test to achieve the same Z score as Biology.  $Z = \frac{x - \bar{x}}{s_x}$