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current_x = 2
rate = 0.01 # Learning rate
precision = 0.000001 # This tells us when to stop the algorithm
delta_x = 1
max_iterations = 10000 # Maximum number of iterations
iteration_counter = 0

# dy/dx of eqn = 2*(x+3)
def slope(x):
    return 2*(x+3)

def value_y(x):
    return (x+3)**2
y = []
x = []
y.append(value_y(current_x))
x.append(current_x)

while delta_x > precision and iteration_counter < max_iterations:
    previous_x = current_x
    current_x = previous_x - rate * slope(previous_x)
    y.append(value_y(current_x))
    x.append(current_x)
    delta_x = abs(previous_x - current_x)
    print(f"Iteration {iteration_counter+1}")
    iteration_counter += 1
    print(f"X = {current_x}")

print(f"Local Minima occurs at: {current_x}")

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Iteration 1
X = 1.9
Iteration 2
X = 1.8019999999999998
Iteration 3
X = 1.70596
Iteration 4
X = 1.6118408
Iteration 5
X = 1.519603984
Iteration 6
X = 1.42921190432
Iteration 7
X = 1.3406276662336
Iteration 8
X = 1.253815112908928
Iteration 9
X = 1.1687388106507495
Iteration 10

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X = 1.0853640344377344
Iteration 11
X = 1.0036567537489798
Iteration 12
X = 0.9235836186740002
Iteration 13
X = 0.8451119463005202
Iteration 14
X = 0.7682097073745098
Iteration 15
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Iteration 16
X = 0.6189886029624792
Iteration 17
X = 0.5466088309032295
Iteration 18
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Iteration 19
X = 0.40616312119946163
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Iteration 21
X = 0.27127906159996296
Iteration 22
X = 0.2058534803679637
Iteration 23
X = 0.14173641076060442
Iteration 24
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Iteration 33
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Iteration 34
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Iteration 59
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Iteration 571
X = -2.999951128099859
Local Minima occurs at: -2.999951128099859
```

```
import matplotlib.pyplot as plt

plt.scatter(x,y)
plt.xlabel('x-values')
plt.ylabel('y-values')
```



```
plt.title('y=(x+3)^2')  
plt.show()
```

