Seek times of four disk scheduling algorithms

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The head is at track 53.
The track requests queue is: 98, 183, 37, 122, 14, 124, 65, 67

FCFS: 53, 98, 183, 37, 122, 14, 124, 65, 67

```
N[Sqrt[98 - 53] + Sqrt[183 - 98] + Sqrt[183 - 37] + Sqrt[122 - 37] +
  Sqrt[122 - 14] + Sqrt[124 - 14] + Sqrt[124 - 65] + Sqrt[67 - 65]]
```

```
67.2
```

SSTF: 53, 65, 67, 37, 14, 98, 122, 124, 183

```
N[Sqrt[65 - 53] + Sqrt[67 - 65] + Sqrt[67 - 37] + Sqrt[37 - 14] +
  Sqrt[98 - 14] + Sqrt[122 - 98] + Sqrt[124 - 122] + Sqrt[183 - 124]]
```

```
38.3
```

SCAN (LOOK): 53, 37, 14, 65, 67, 98, 122, 124, 183

```
N[Sqrt[53 - 37] + Sqrt[37 - 14] + Sqrt[65 - 14] + Sqrt[67 - 65] +
  Sqrt[98 - 67] + Sqrt[122 - 98] + Sqrt[124 - 122] + Sqrt[183 - 124]]
```

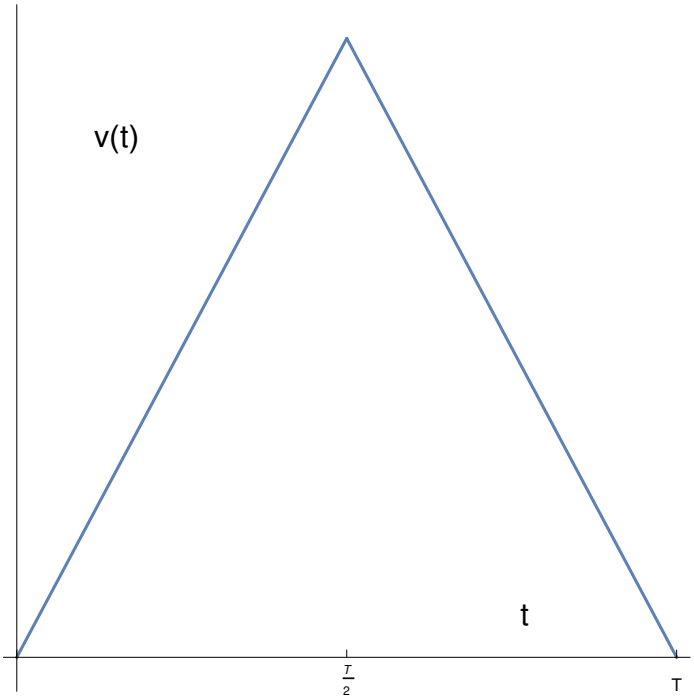
```
36.9
```

C - SCAN (LOOK): 53, 65, 98, 122, 124, 183, 14, 37

```
N[Sqrt[65 - 53] + Sqrt[67 - 65] + Sqrt[98 - 67] + Sqrt[122 - 98] +
  Sqrt[124 - 122] + Sqrt[183 - 124] + Sqrt[183 - 14] + Sqrt[37 - 14]]
```

```
42.2
```

Below is a derivation of the formula $T(D) = \beta\sqrt{D}$ for time of head's travel between tracks of distance D.



T - time of travel between the source and destination track

α - the maximum acceleration

-α - the maximum deceleration

$$v(t) = \alpha t \quad \text{for} \quad 0 \le t \le \frac{T}{2}$$

$$v(t) = v\left(\frac{T}{2}\right) - \alpha\left(t - \frac{T}{2}\right) \quad \text{for} \quad \frac{T}{2} \le t \le T$$

D - distance between the source and destination track

$$D = \int_0^T v(t)\,dt = \frac{1}{2} \times T \times v\left(\frac{T}{2}\right) = \frac{1}{2} \times T \times \frac{\alpha T}{2} = \frac{\alpha}{4} T^2$$

$$T = \frac{2}{\sqrt{\alpha}} \sqrt{D} = \beta \sqrt{D}$$

Therefore, the seek time is proportional to $\sqrt{D}$.