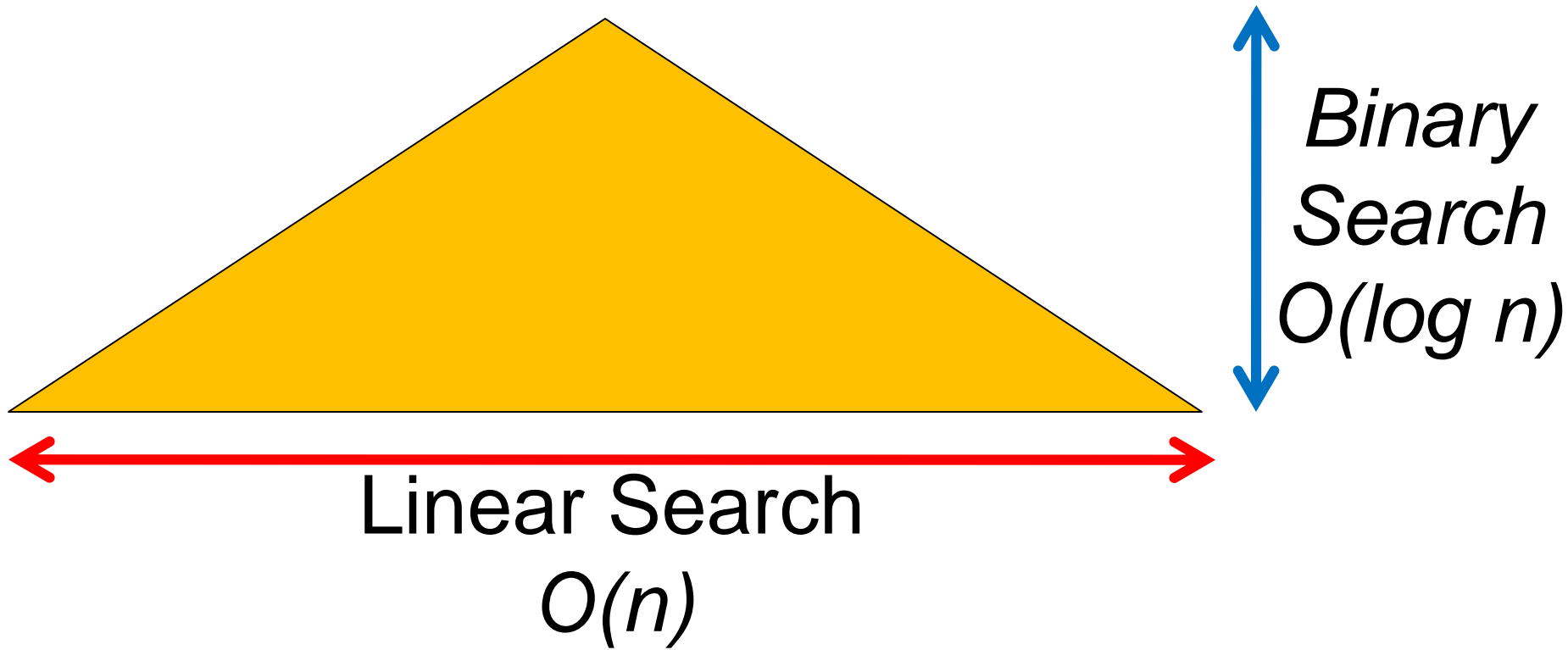# Linear vs. Binary Search

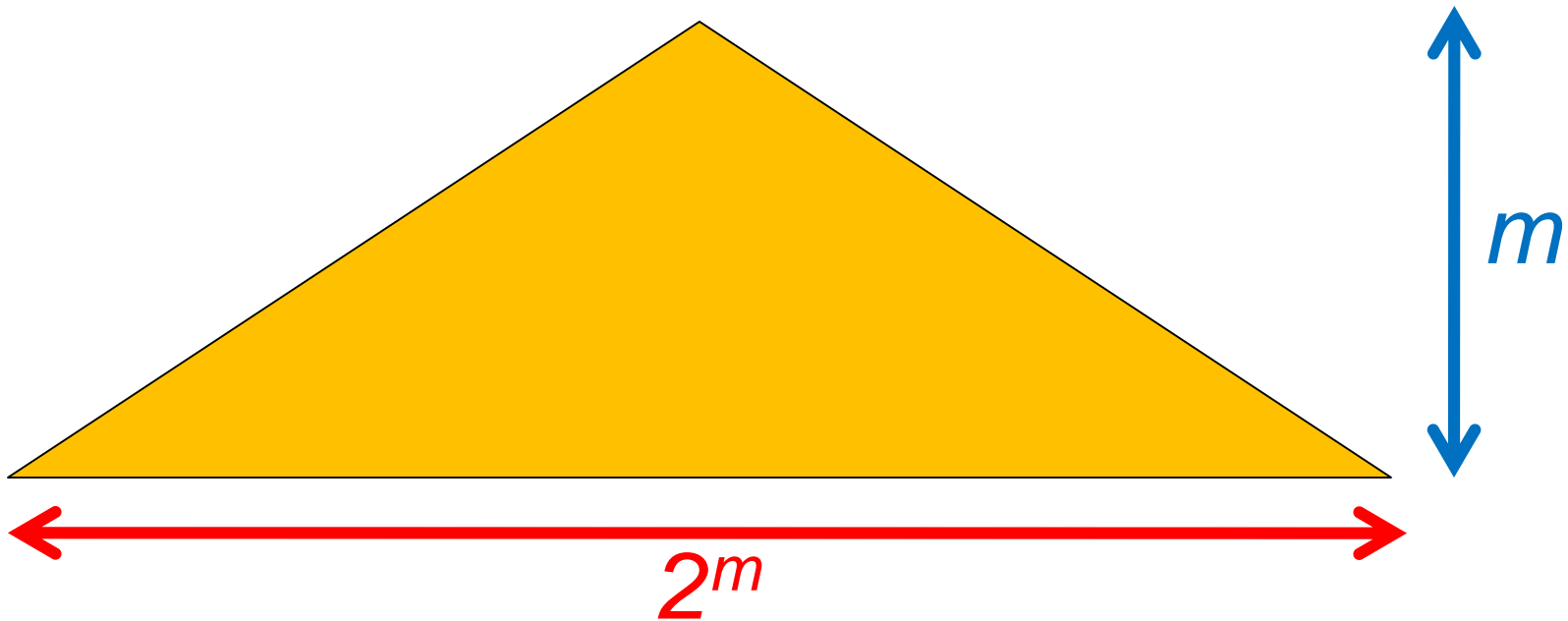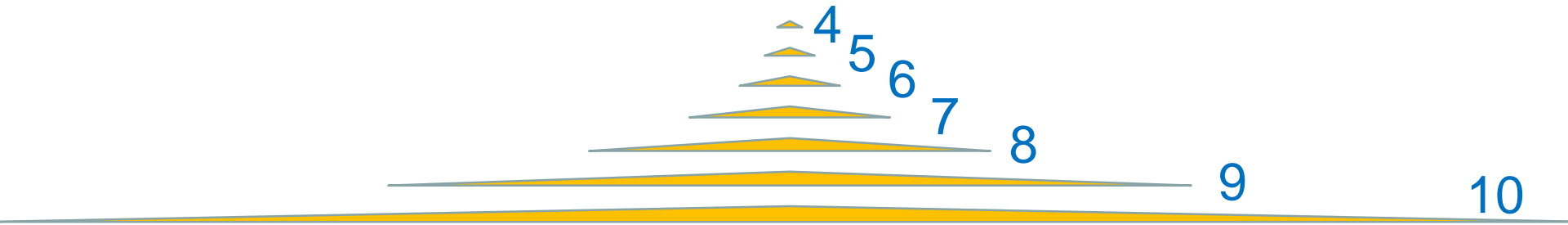*Binary Search $O(\log n)$*
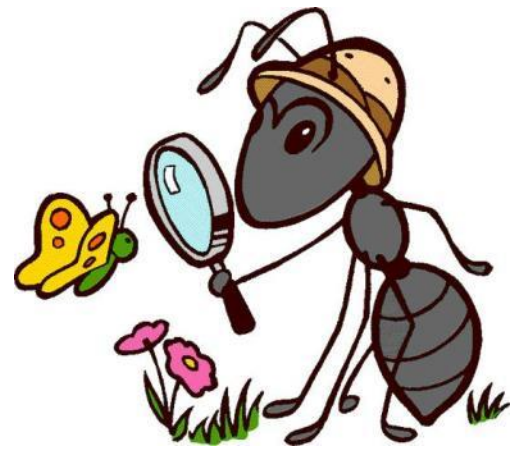
Linear Search $O(n)$

Linear vs. Binary Search?

What does it Mean in Practice?

What do you notice?

Searching with Ants

Place items 1 cm apart
- Horizontally
- Vertically

Ant walks 1cm/s

m *sec*

2^m *sec*
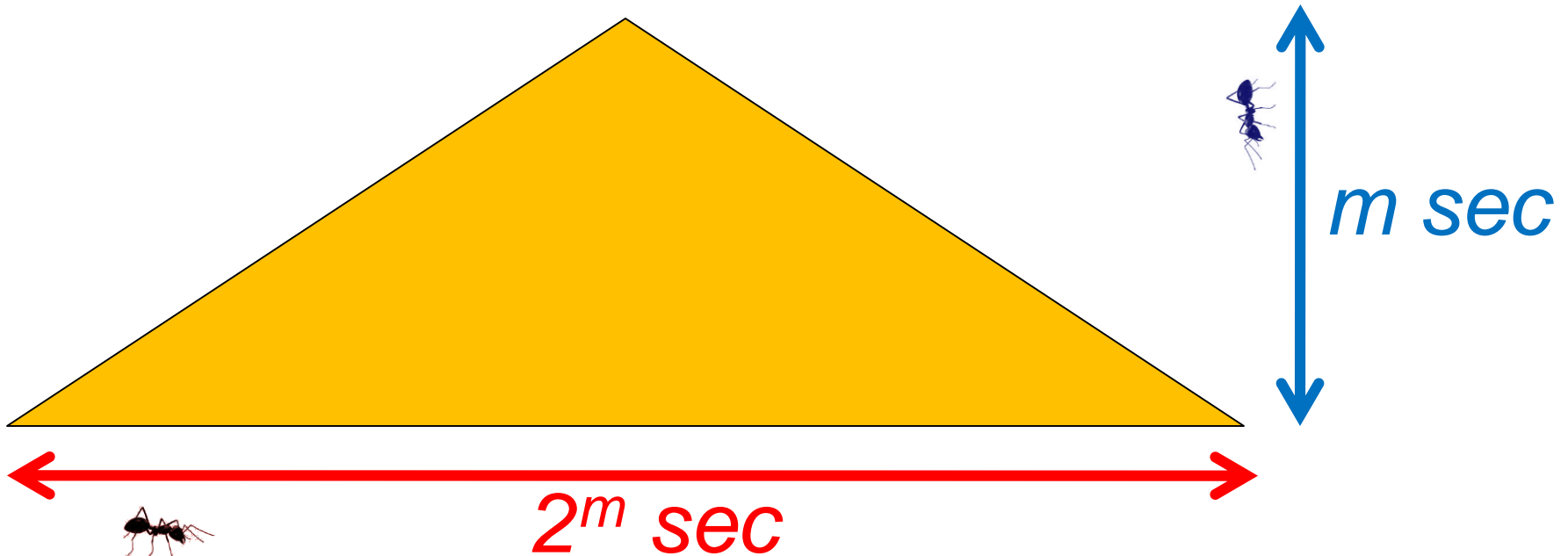
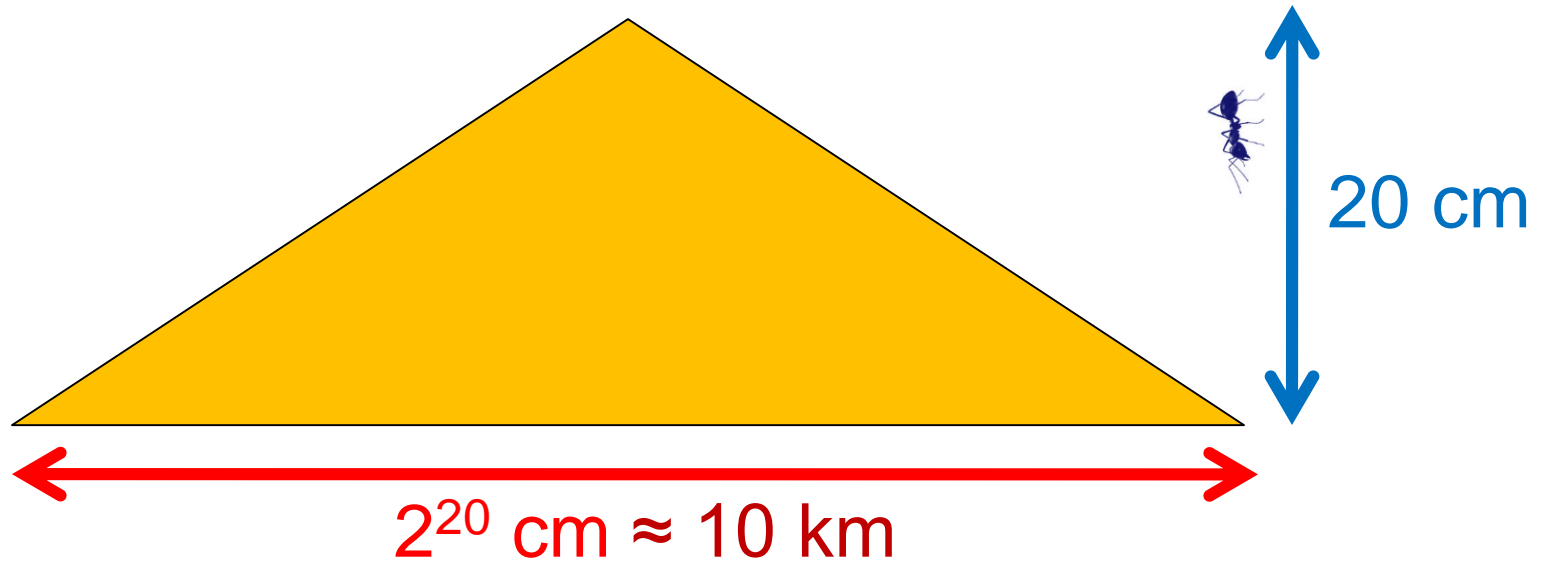# Searching 1000 items with Ants

2^{10} cm ≈ 10 m

17 minutes

10 seconds

1 Million Items

2^{20} cm ≈ 10 km

20 cm

12 days

2 Billion

31 cm

2^{31} cm ≈ 20,000 km

63 years

35 Billion Items

2^{35} cm ≈ 376,289 km

35 cm

To the Sun

44 cm

2^{44} cm ≈ 149,600,000 km

To the Next Star

62 cm

2^{62} cm ≈ 4.24 light-years

Proxima Centauri

To the Next Galaxy

74 cm

2^{74} cm ≈ 25,000 light-years

Canis Major Dwarf
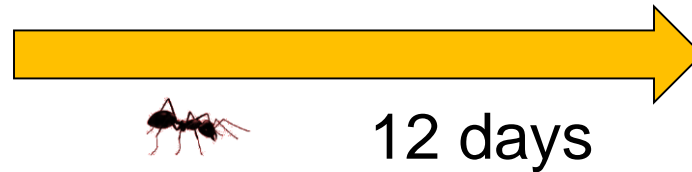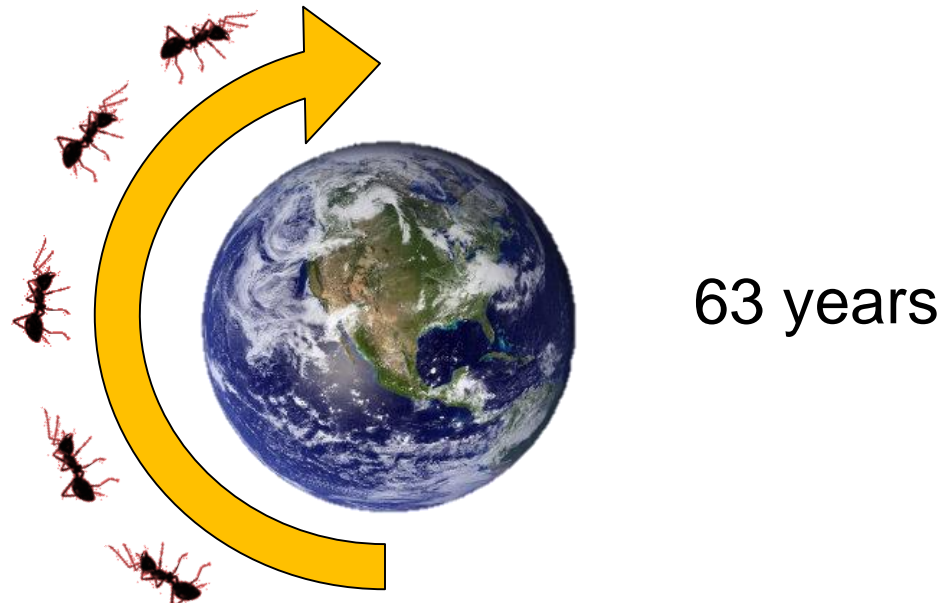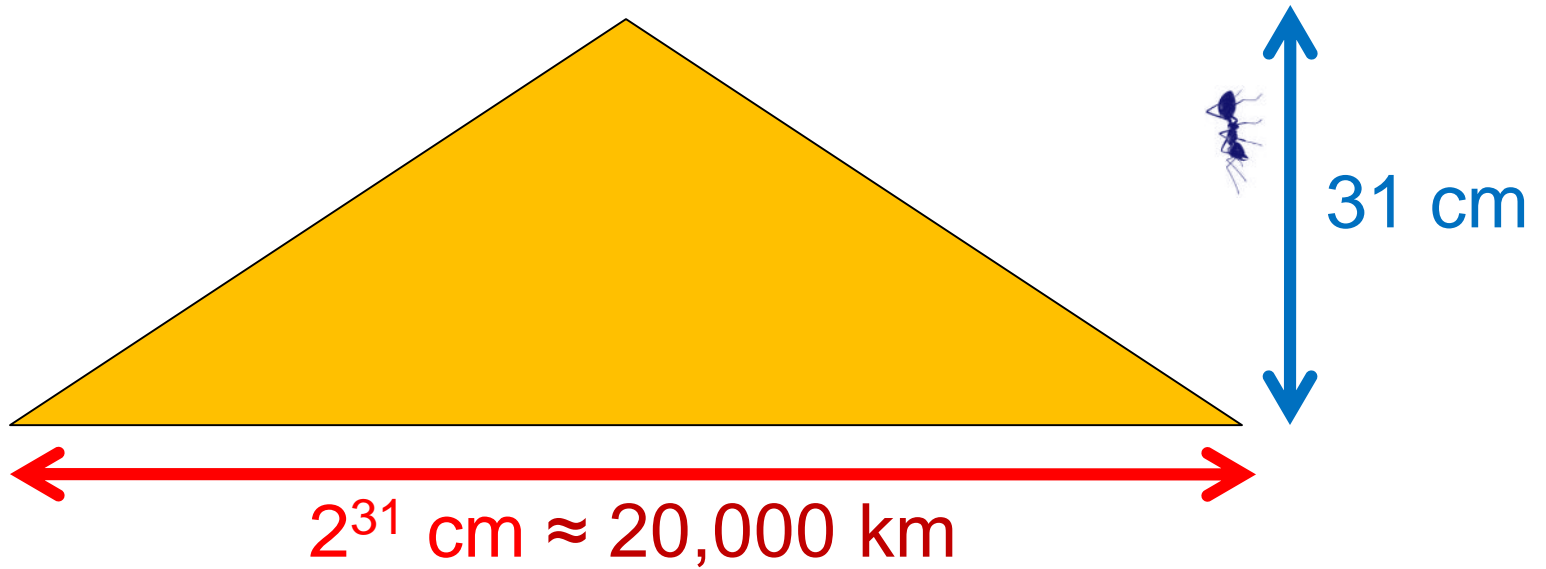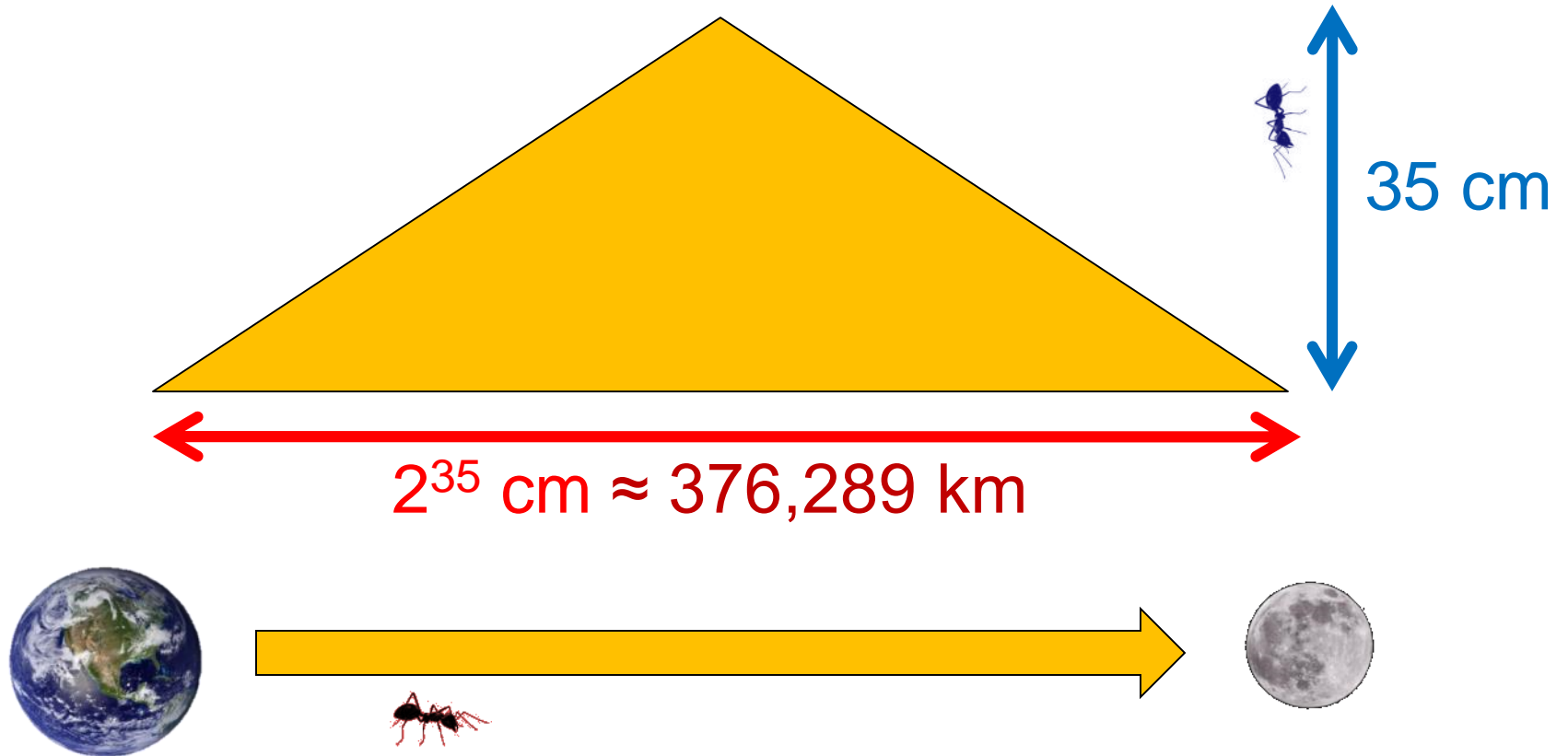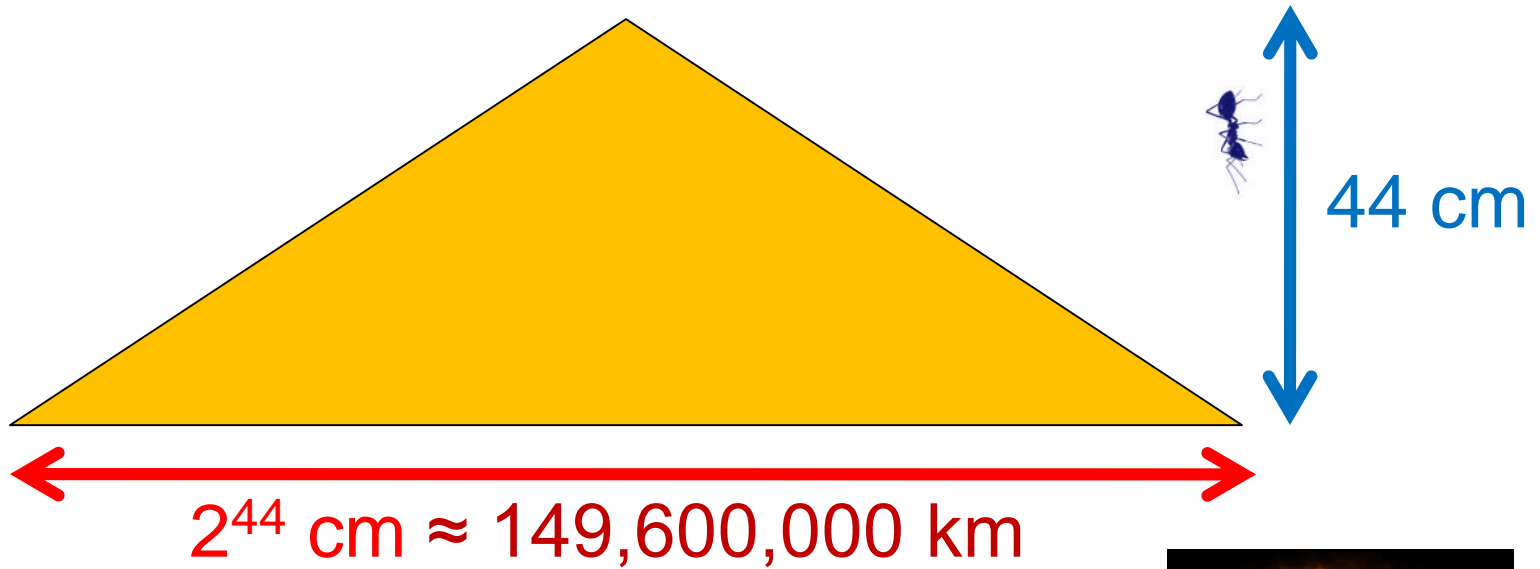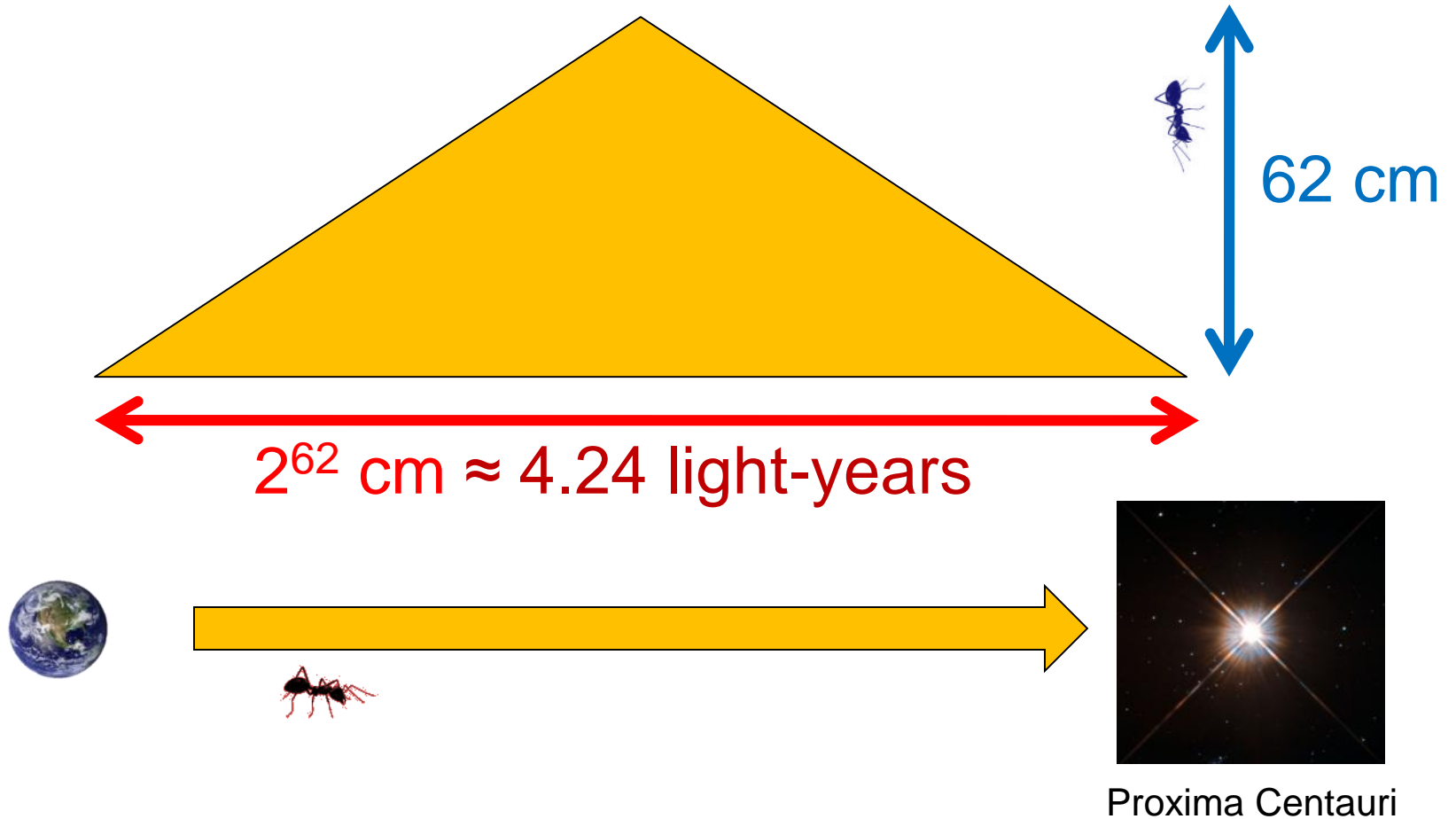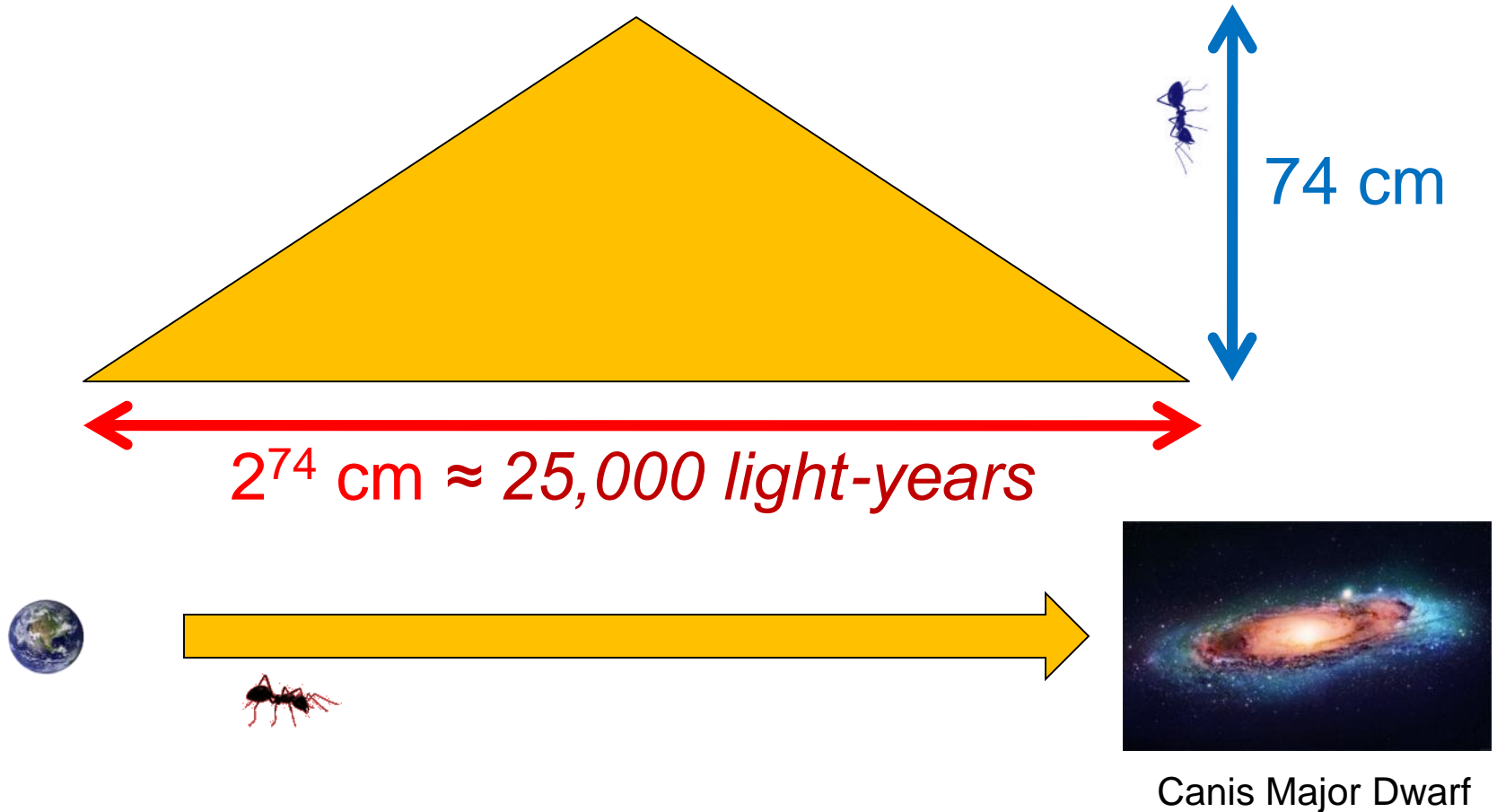
The Observable Universe

96 cm

2^{96} cm ≈ *92 billion light-years*
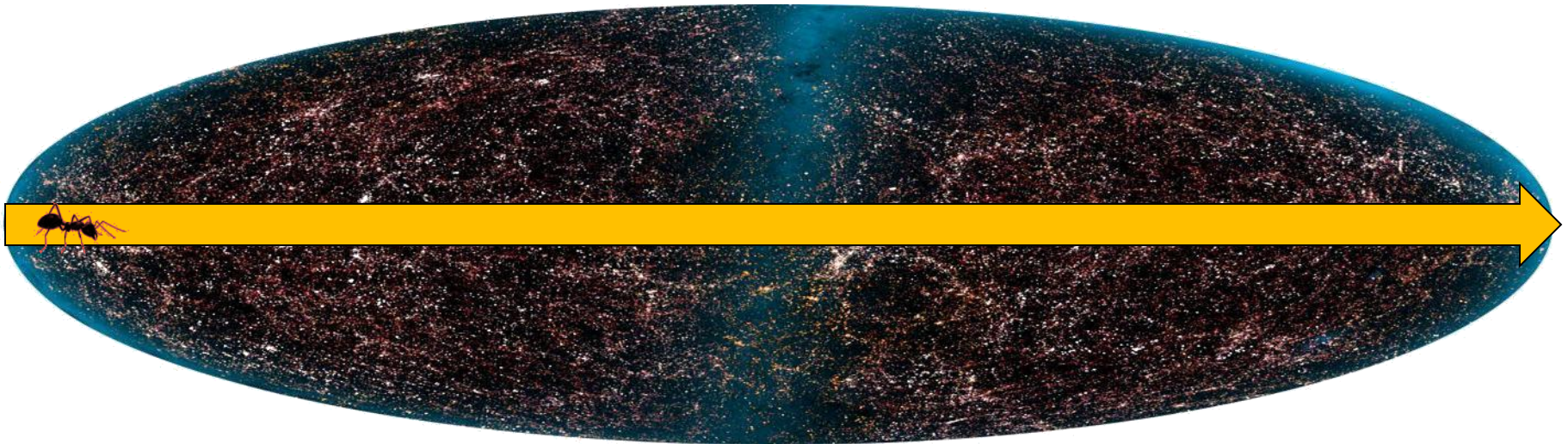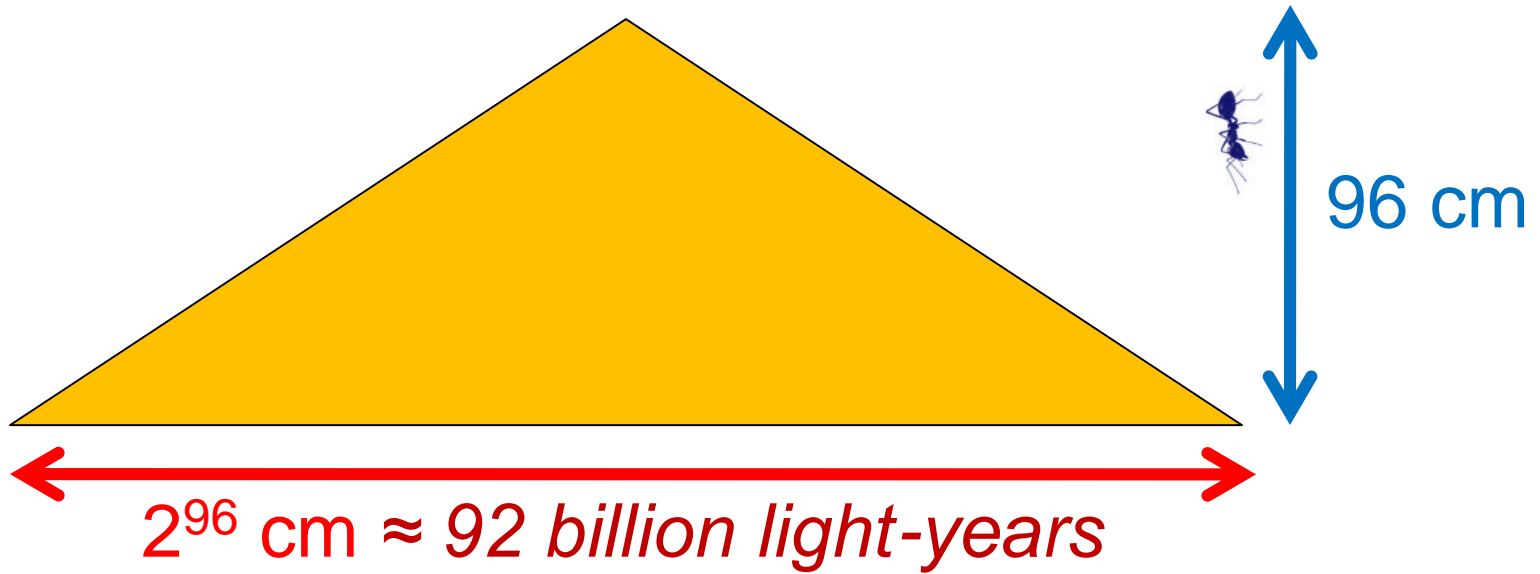
All the Atoms in the Universe

265 cm

10^{80} cm