

Lightning Fast

Sound may seem fast, but compared to *light*, it's incredibly slow.

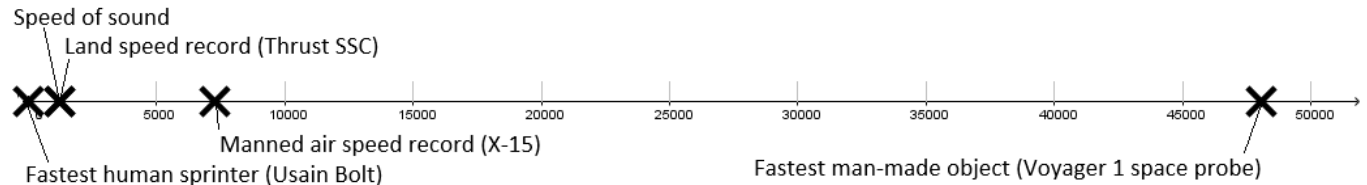
As a result, in a thunderstorm we see the lightning flash almost instantly, but usually *hear* the sound (thunder) a few seconds later.

Sound travels 340 metres per second.

Light travels 300,000,000 metres per second.



The scale below shows a few fast things, for comparison:



To include the speed of *light* on the scale above, we would need the scale to be 3 or 4 kilometres long! Voyager I goes 5,000 times faster than a man can run. *Light* travels 20,000 times faster than Voyager I.

1. It is possible to see the lightning from a thunderstorm 30,000 metres away.

How long would the light from this thunderstorm take to reach you?

You may find this table helpful:

1 second	300,000,000 metres
?	30,000 metres

2. It is sometimes possible to hear the thunder from a thunderstorm 17,000 metres away.

How long would the sound from this thunderstorm take to reach you?

You may find this table helpful:

1 second	340 metres
?	170 metres
?	17,000 metres

3. By measuring how long the thunder takes to reach us after we see the lightning we can calculate how far away the thunderstorm is*.

Complete this table:

Time (seconds)	Distance (metres)
1	340
2	
3	
4	
5	
10	
20	

4. While watching a distant thunderstorm, I see two lightning strikes, exactly 1 minute apart.

For the first strike, thunder followed after 30 seconds.

For the second, thunder followed after 10 seconds.

Assuming the storm is travelling directly towards me:

a) How fast is it moving, in metres per minute?

b) If there was a third strike, exactly one minute after the second, how long should I expect to wait before hearing the thunder?

* Because light travels so incredibly quickly, we can safely ignore the time it takes to reach us.

Lightning Fast SOLUTIONS

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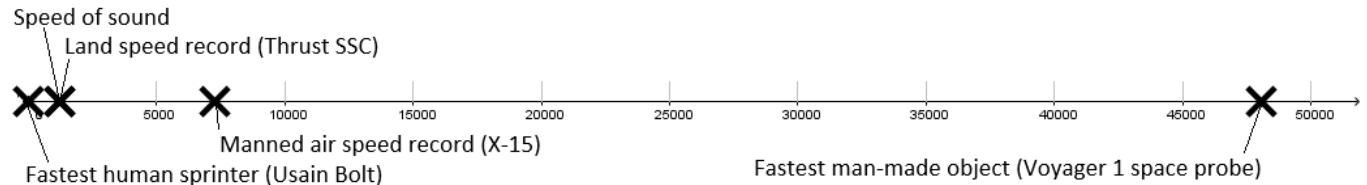
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- It is possible to see the lightning from a thunderstorm 30,000 metres away. How long would the light from this thunderstorm take to reach you?

You may find this table helpful:

1 second	300,000,000 metres	
0.001 seconds	300,000 metres	(1000 times closer)

- It is sometimes possible to hear the thunder from a thunderstorm 17,000 metres away. How long would the sound from this thunderstorm take to reach you?

You may find this table helpful:

1 second	340 metres	
0.5 seconds	170 metres	(half the time)
50 seconds	17,000 metres	(100 times further away)

- By measuring how long the thunder takes to reach us after we see the lightning we can calculate how far away the thunderstorm is*.

Complete this table:

Time (seconds)	Distance (metres)
1	340
2	680
3	1020
4	1360
5	1700
10	3400
20	6800

- While watching a distant thunderstorm, I see two lightning strikes, exactly 1 minute apart. For the first strike, thunder followed after 30 seconds. For the second, thunder followed after 10 seconds.

Assuming the storm is travelling directly towards me:

- How fast is it moving, in metres per minute?

30 seconds \Rightarrow 10200m away

10 seconds \Rightarrow 3400m away

Storm has travelled 6800m in 1 minute:

6800 metres per minute

- If there was a third strike, exactly one minute after the second, how long should I expect to wait before hearing the thunder?

After another minute, the storm has passed:

3400m beyond you \Rightarrow 10 seconds again

* Because light travels so incredibly quickly, we can safely ignore the time it takes to reach us.