

Goal: Students will interpret a timeline table to extract information about a solar storm using time addition and subtraction skills.

<i>Day</i>	<i>Time</i>	<i>What Happened</i>
Tuesday	4:50 PM	Gas eruption on Sun
Thursday	3:36 AM	Plasma storm reaches Earth.
Thursday	5:20 AM	Storm at maximum intensity.
Thursday	5:35 AM	Auroral power at maximum.
Thursday	11:29 AM	Aurora power at minimum.
Thursday	2:45 PM	Space conditions normal

1) How much time passed between the solar gas eruption and its detection near Earth?

Answer: There are various ways to do this problem. You want to subtract the final time from the initial time so: (Tuesday 4:50 PM) – (Thursday, 3:36 AM) = (Thursday – Tuesday) + (3:36 AM – 4:50 PM) = 48 hrs – (4:50PM – 3:36AM) = 48h – 13h 14m = **34hours and 46minutes.**

2) How long after the plasma storm reached Earth did the aurora reach their maximum power?

Answer: Storm arrived at 3:36 AM. Aurora at maximum at 5:35AM. Difference in time is 1 hour and 59 minutes.

3) How long did the storm last near Earth from the time the plasma was detected, to the time when space conditions returned to normal?

Answer: On Thursday, the storm started at 3:36 AM and ended at 2:45 PM, so the storm effects at Earth lasted from 03:36 to 14:45 so the difference is 14:45 – 03:36 = 11 hours and (45-36 =) 9 minutes.

Extra for Experts!

If the Earth is 150 million kilometers from the sun, how fast did the storm travel from the Sun in kilometers per hour? How long will the trip to Pluto take if Pluto is 40 times farther away from the sun than Earth?

Answer: The answer to Problem 1 is 34hours and 46minutes, which in decimal form is $34 + (46/60) = 34.8$ hours with rounding. The speed is therefore 150 million km/34.8 hours or 4.3 million km/h. The trip to Pluto would take 40×34.8 hours = 1,392 hours or about 58 days. Note, the Space Shuttle is our fastest manned spacecraft and travels at 44,000 km/h so it would take about $58 \times (4.3 \text{ million}/44,000) = 5668$ days to make this trip, which equals 15.5 years!!!! Of course, the Space Shuttle will be out of fuel and supplies within a week.