Earth and Space

Learning Objective:
To learn about how Earth's tilt creates seasons.

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What time of year is it right now?

How do you know?

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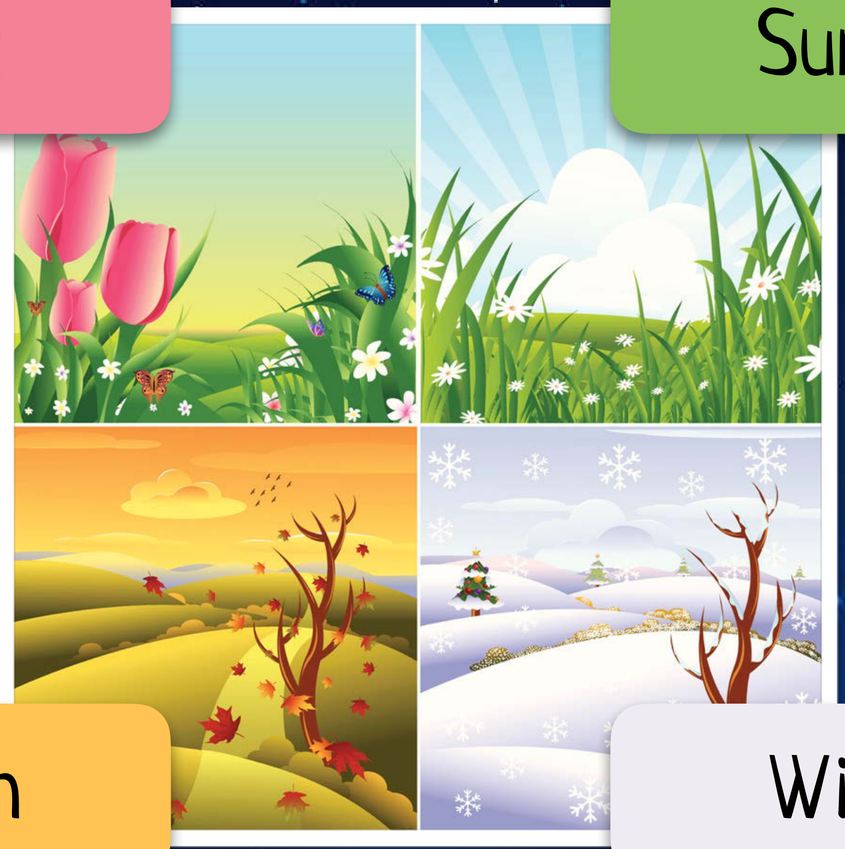
The year is split up into four seasons based on changes we experience at different times of year.

Each season is around three months long.

Spring

Summer



Autumn

Winter

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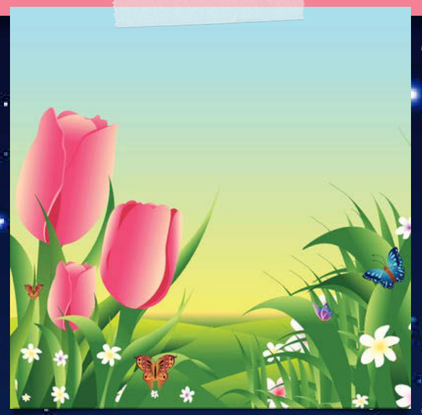
Spring



Spring in the UK is usually between March and May.
The days are slowly getting longer and the weather becomes warmer.

Plants and flowers may slowly start to grow again as there is more sunlight and less frosty weather.

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Summer

Summer in the UK is usually between June and August.

The days are long and the weather is warm. Between 20th-22nd June the longest day of the year will occur (the day with the most sunlight).

This is called the summer solstice. This day can be around 16h 38m long.

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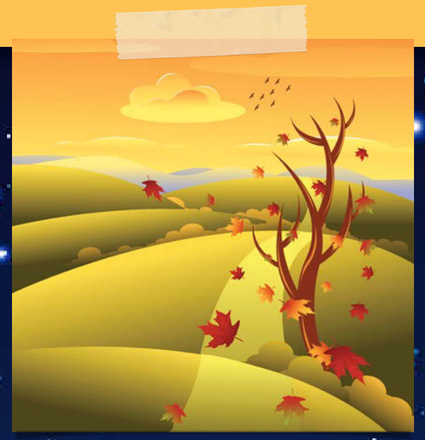
Autumn



Autumn in the UK is usually between September and November.
The days begin to get shorter and the weather begins to cool down.

Plants, like some trees, react to getting less sunlight by losing their leaves or flowers.

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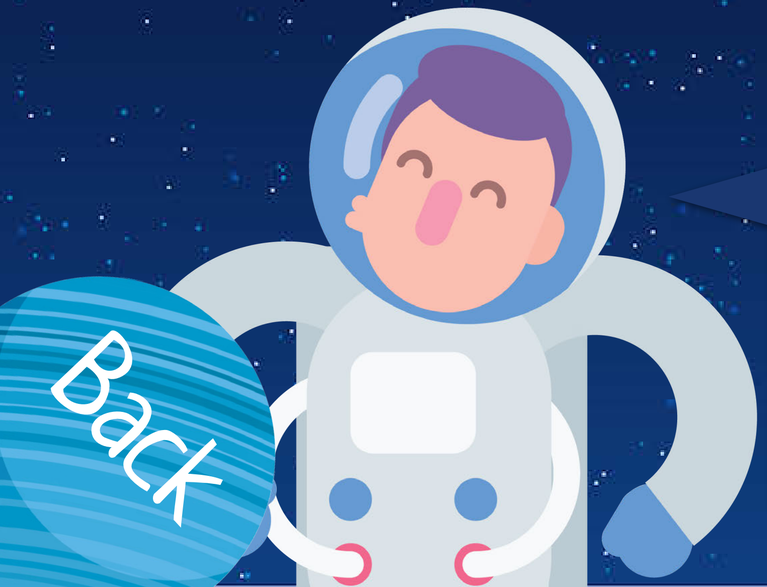
Winter

Winter in the UK is usually between December and February.
The days are short and the weather is cold.
The winter solstice (around 22nd December) is the shortest day of the year. It can be just 7h 49m long in London!



If the summer solstice is 16h 38m and the winter solstice is 7h 49m, what is the difference in time between the longest and shortest day?

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The difference would be 8h 49m.

But what causes the length of the days to change throughout the year? Is it the same thing that changes the weather between seasons?

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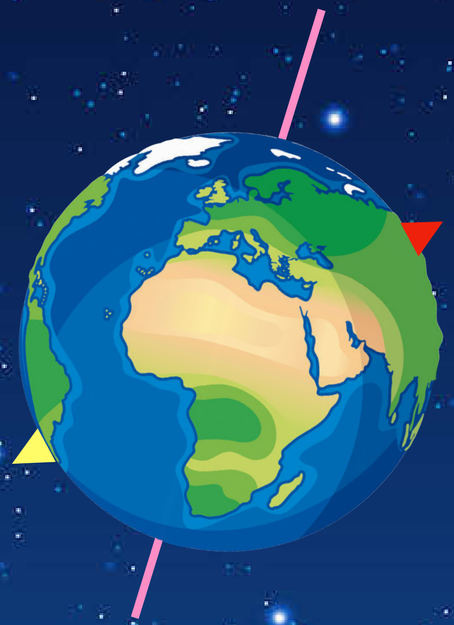
The axis that Earth rotates around is tilted by 23.5°. This means that places on the planet can be slightly tilted towards the Sun (the red triangle), or slightly tilted away from the Sun (the yellow triangle) at different times of year.



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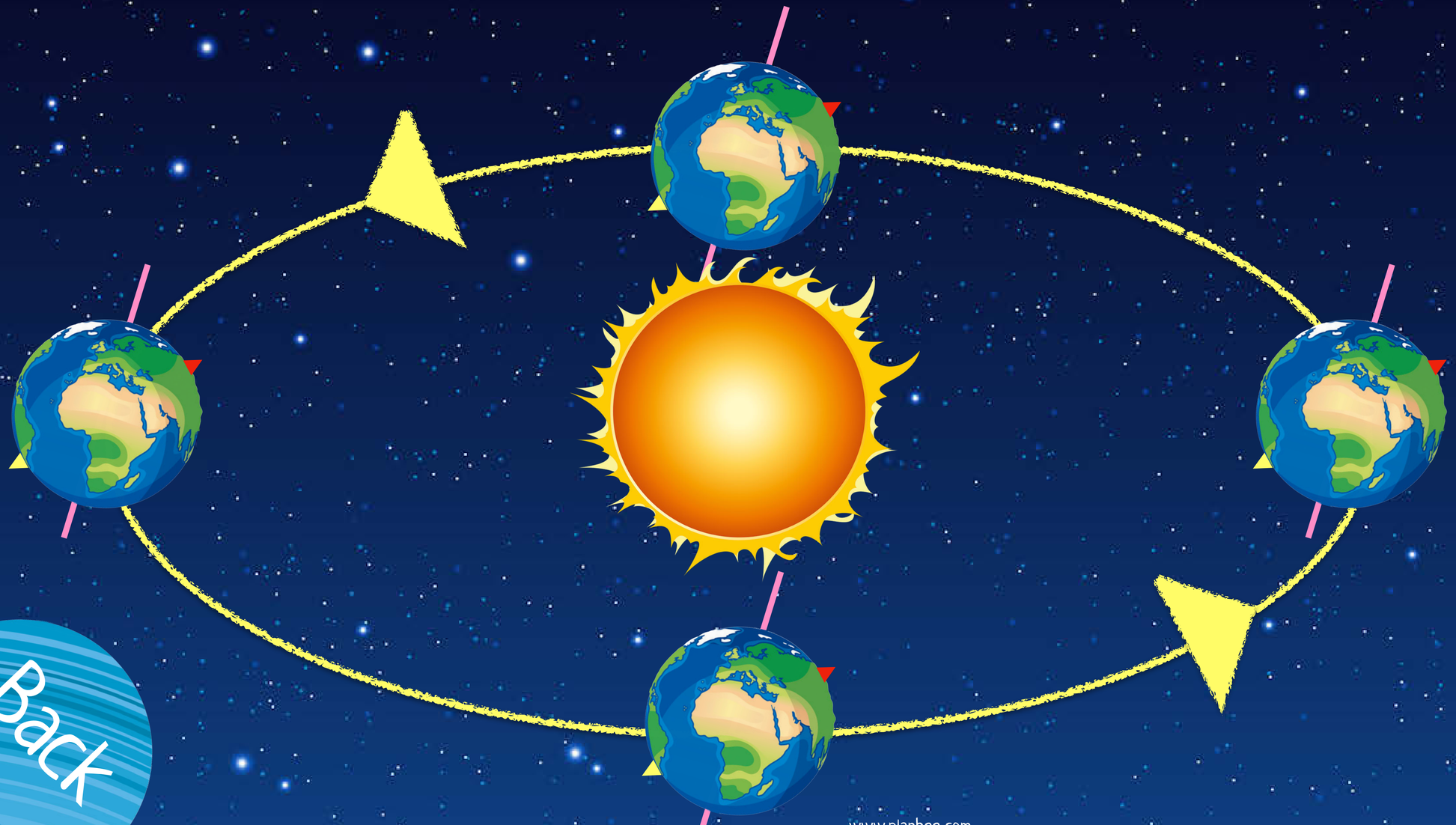
As Earth orbits the Sun, the tilt in the axis changes how much a location is tilted towards or away from the Sun.



Remember: Earth is still rotating once every 24 hours.

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When a part of the planet is tilted towards the Sun, it will receive more sunlight and be in the lit part of the planet for longer as it rotates.

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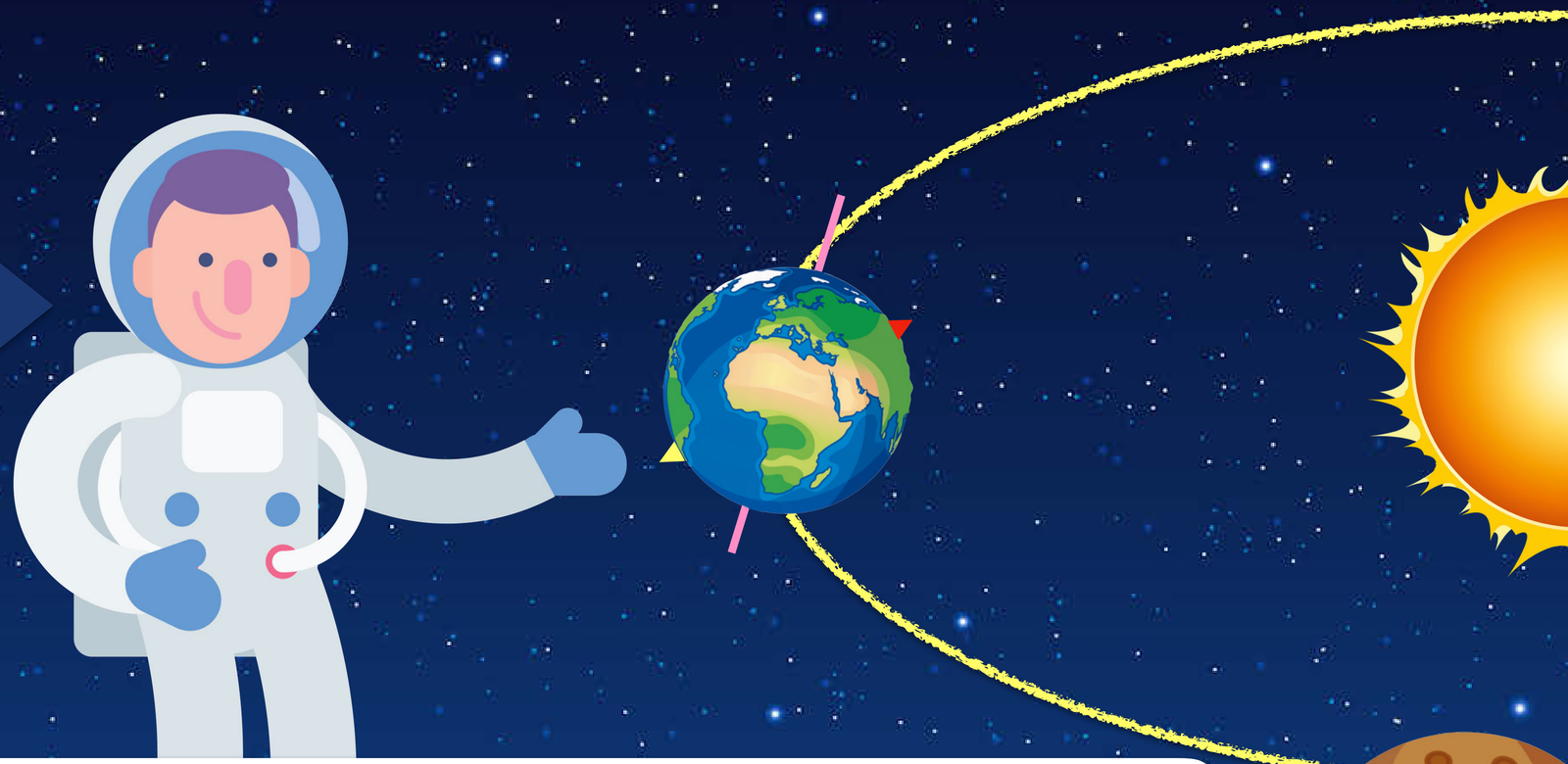
When tilted towards the Sun, the location will experience summer!

This diagram shows the Northern Hemisphere (which the red triangle's in) in summer. What season will it be in the Southern Hemisphere (yellow triangle)?



hemisphere noun: half of a sphere. Earth is split into the Northern Hemisphere and Southern Hemisphere by the equator.

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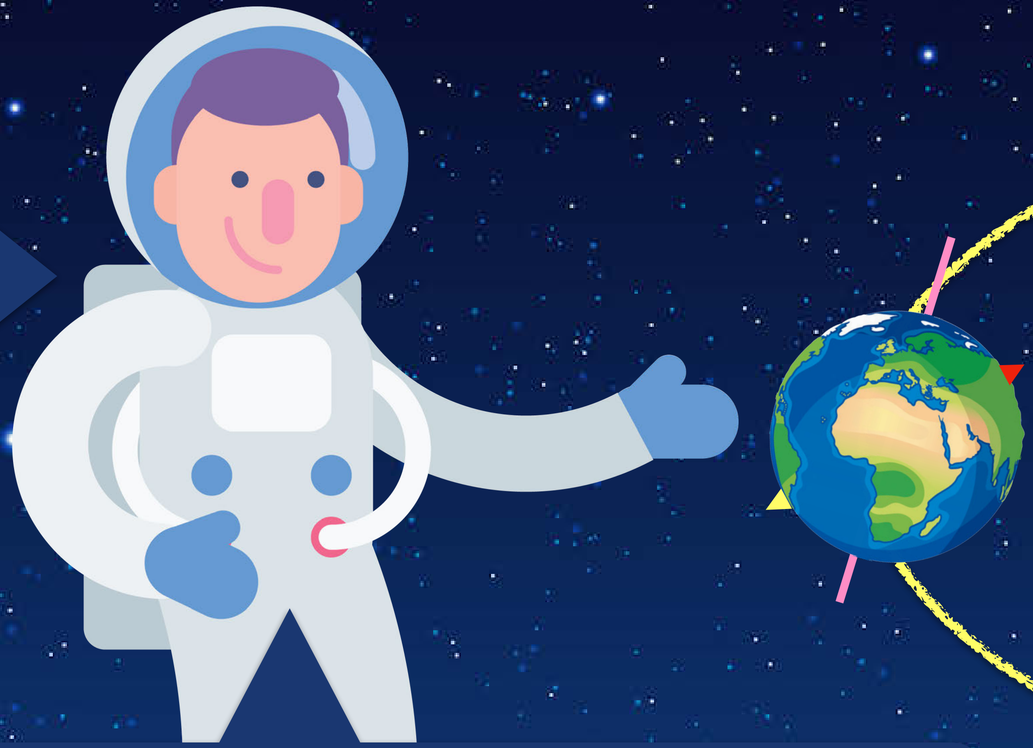
When tilted away from the Sun, the location will experience winter!

This diagram is showing the Southern Hemisphere in winter! It is tilted away from the Sun.



What will it be like in the Southern Hemisphere at this point in Earth's orbit?

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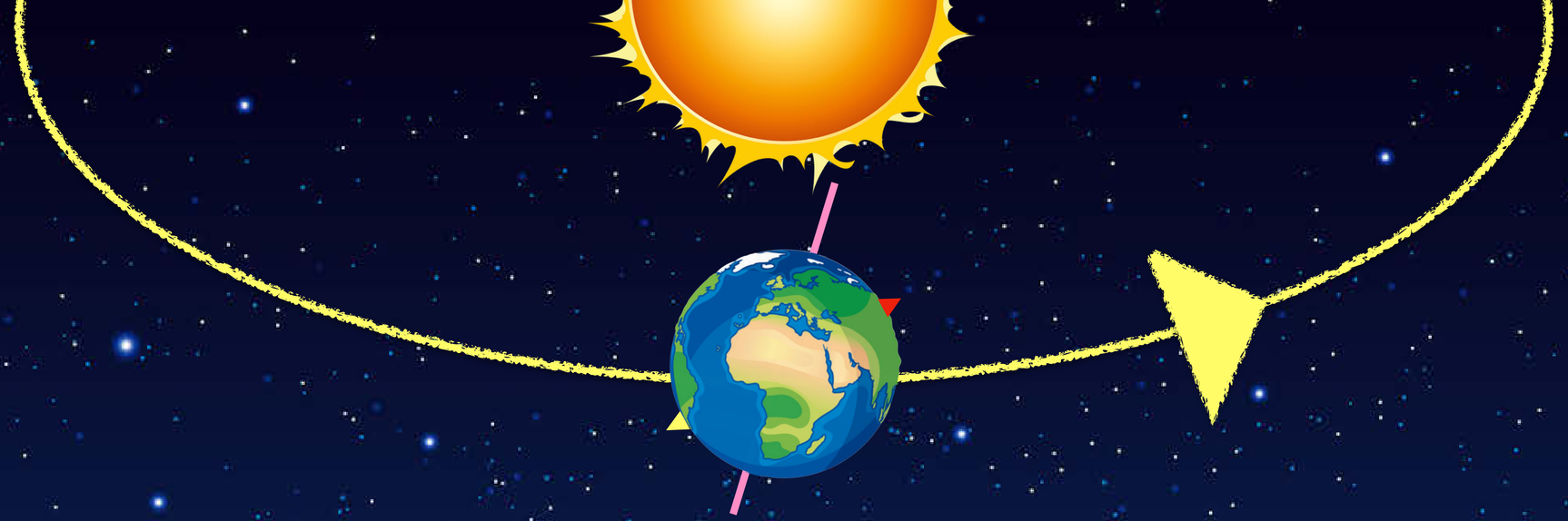

At certain points in Earth's orbit, neither the Northern or Southern Hemisphere is particularly tilted towards or away from the Sun.

Which season will the Northern Hemisphere be experiencing at the point in the diagram above?

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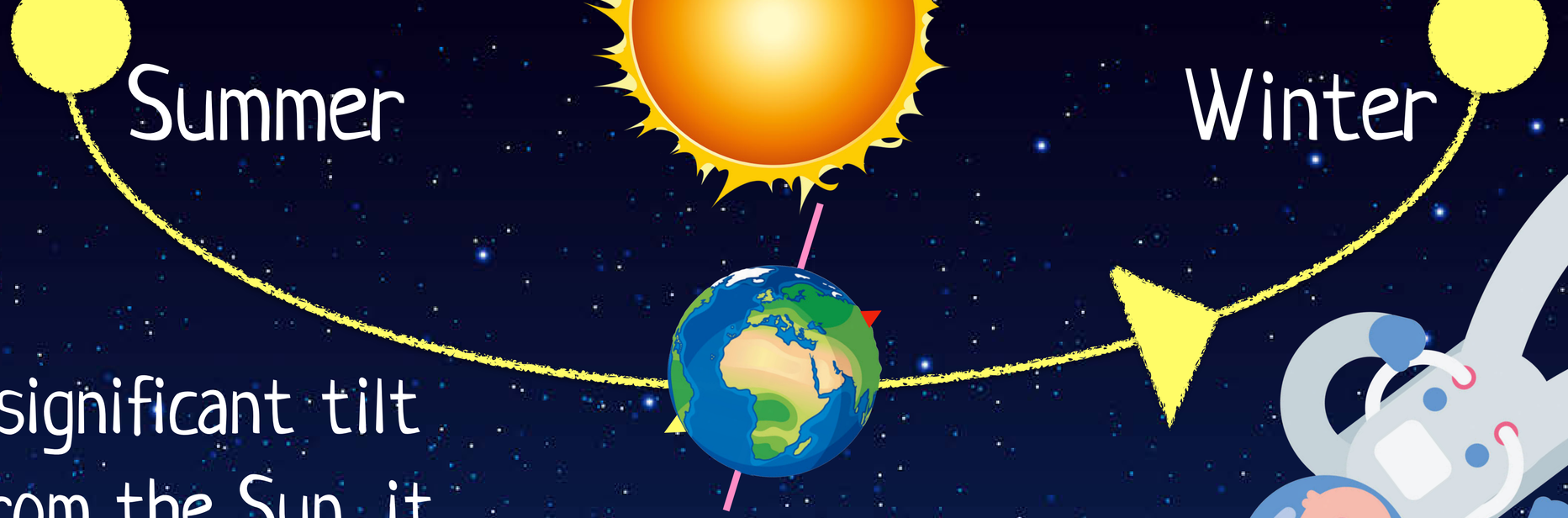

When there is no significant tilt towards or away from the Sun, it will either be spring or autumn.

In the diagram above, the Northern Hemisphere will be in autumn. It is moving from a point in Earth's orbit where it was tilted towards the Sun (summer), to a point where it will be tilting away from the Sun (winter).
It will be the opposite (spring) for the Southern Hemisphere.

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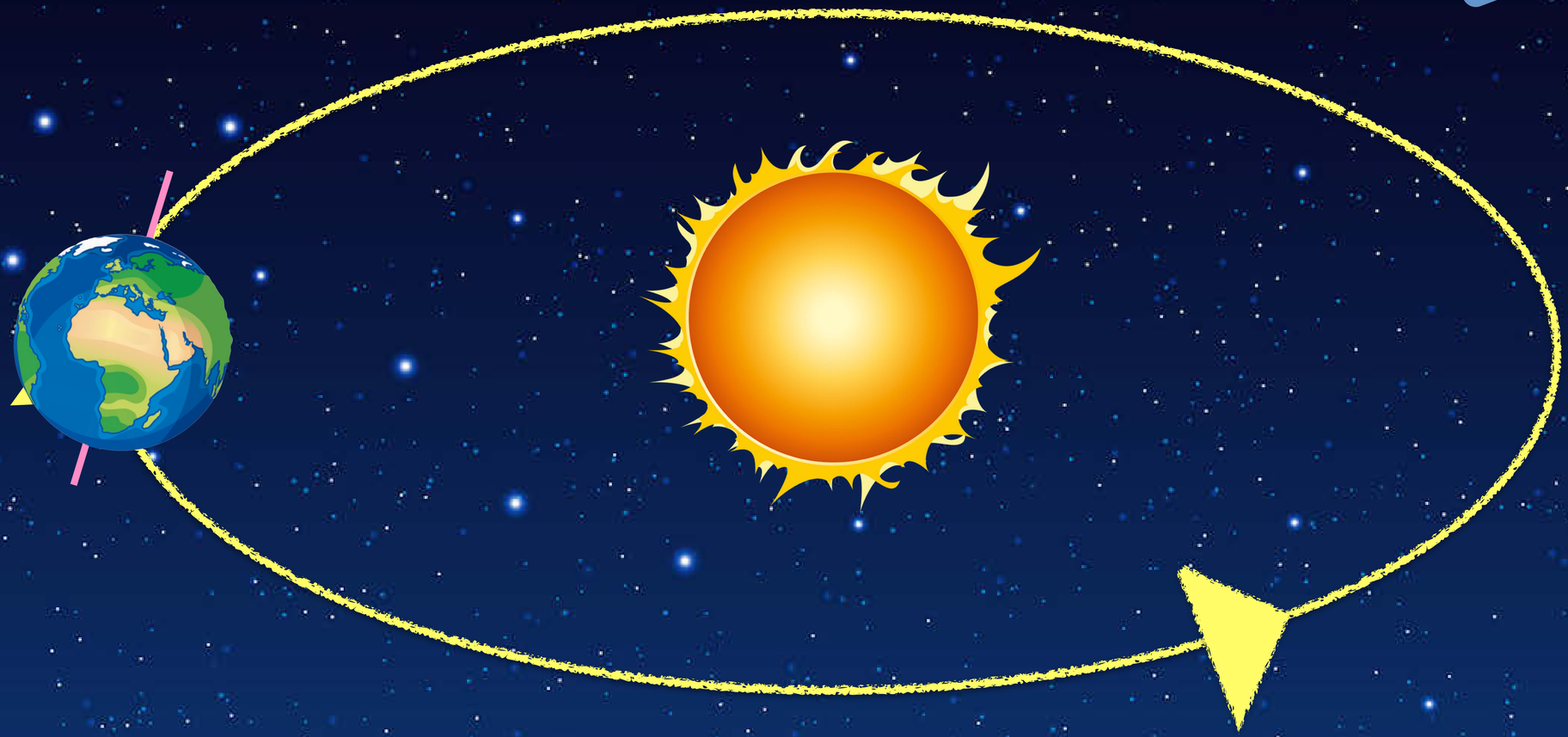

Which season will it be for the Southern Hemisphere in this diagram?

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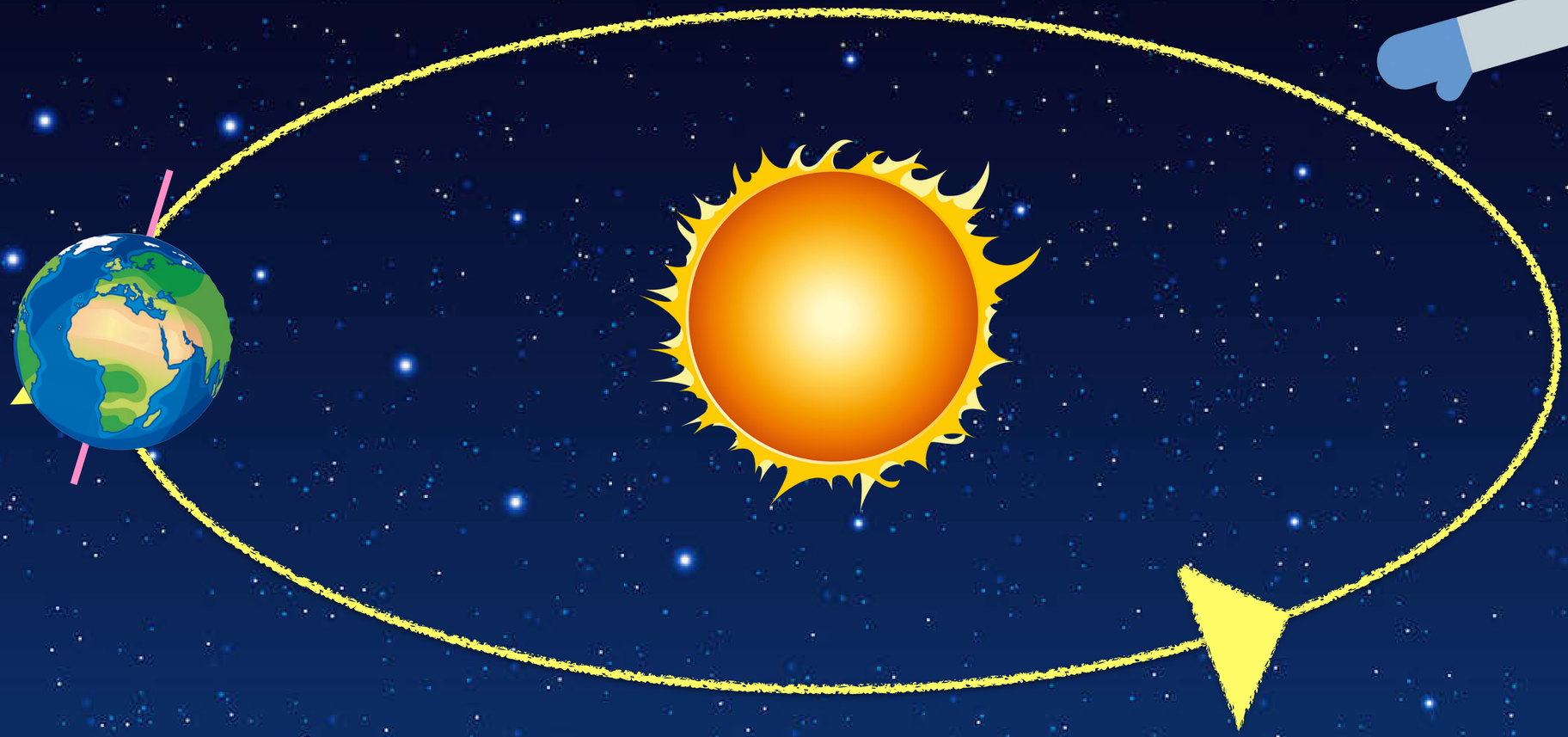

It would be winter for the Southern Hemisphere in this diagram. It is tilted away from the Sun.

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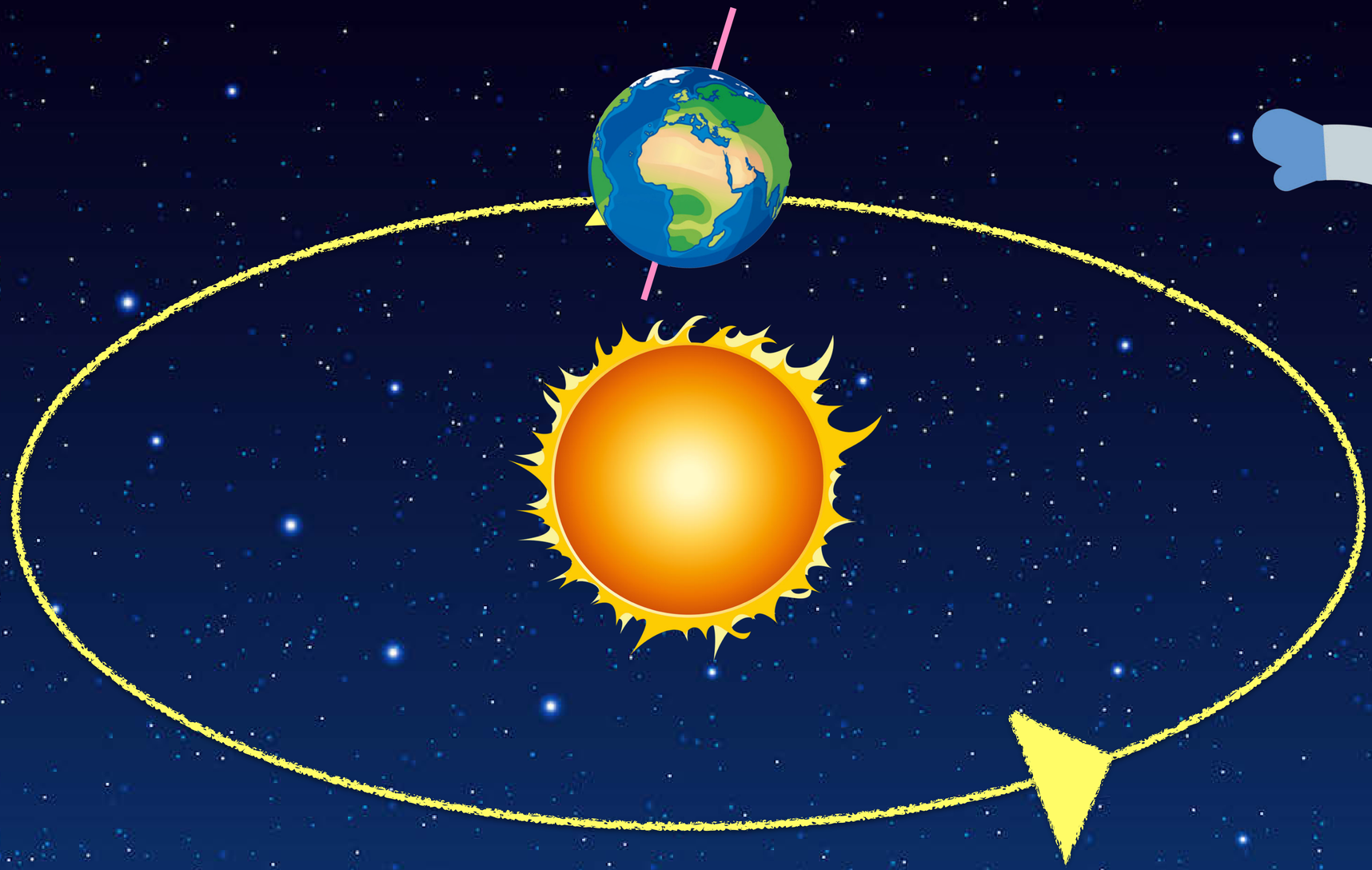

Which season will it be for the Southern Hemisphere in this diagram?

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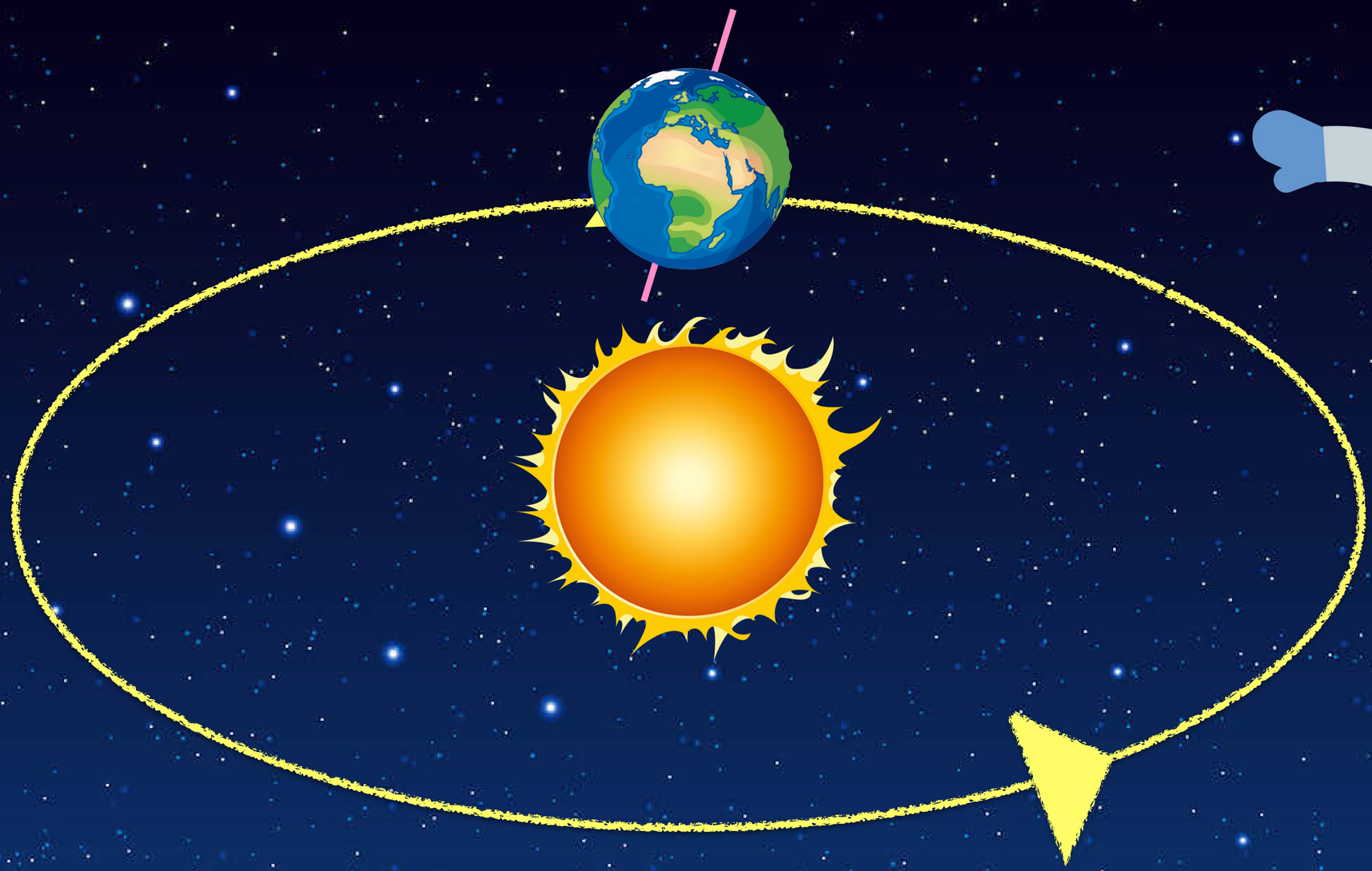

It would be autumn! It's neither tilted towards, or away from the Sun and is moving towards the winter.

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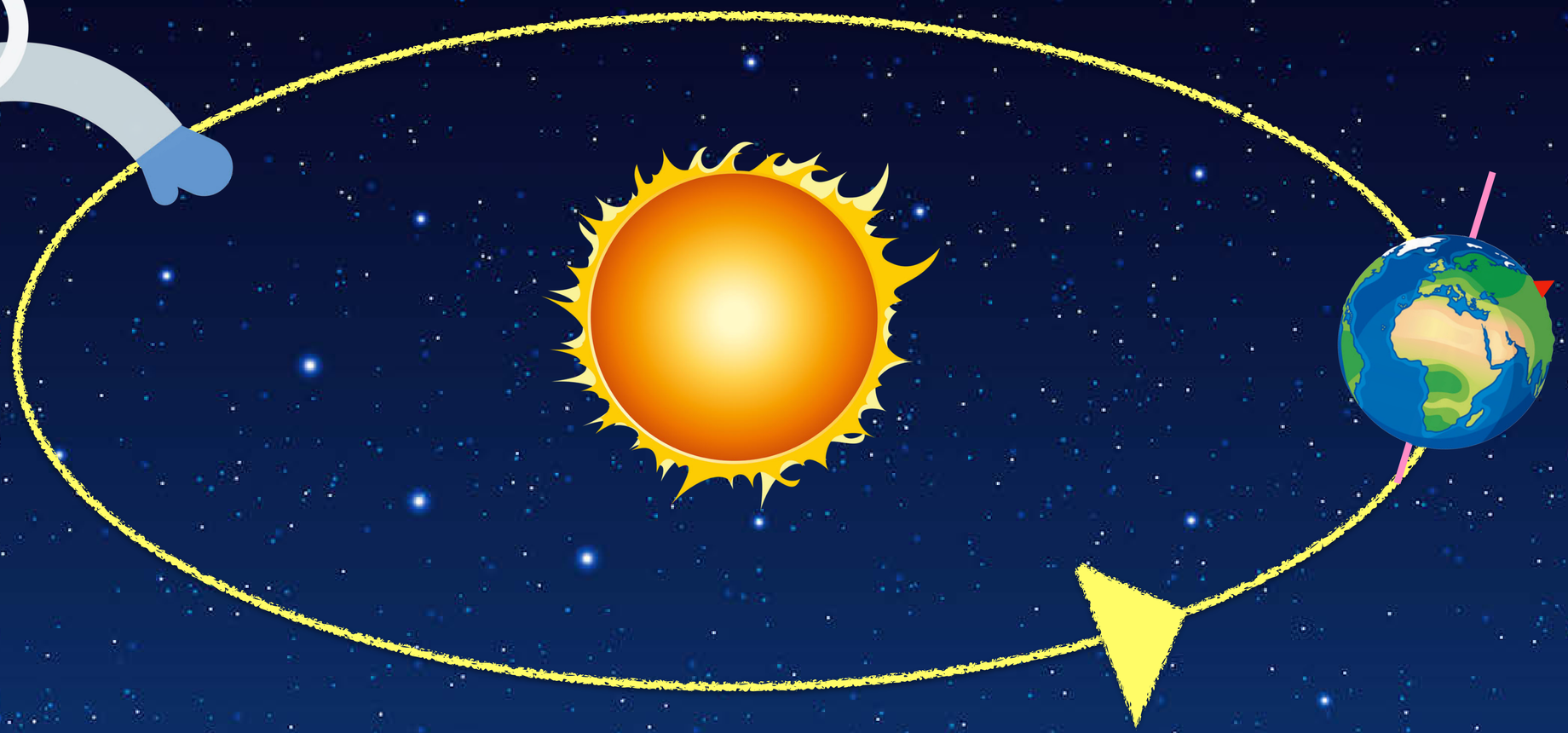

Which season is it for the Northern Hemisphere?

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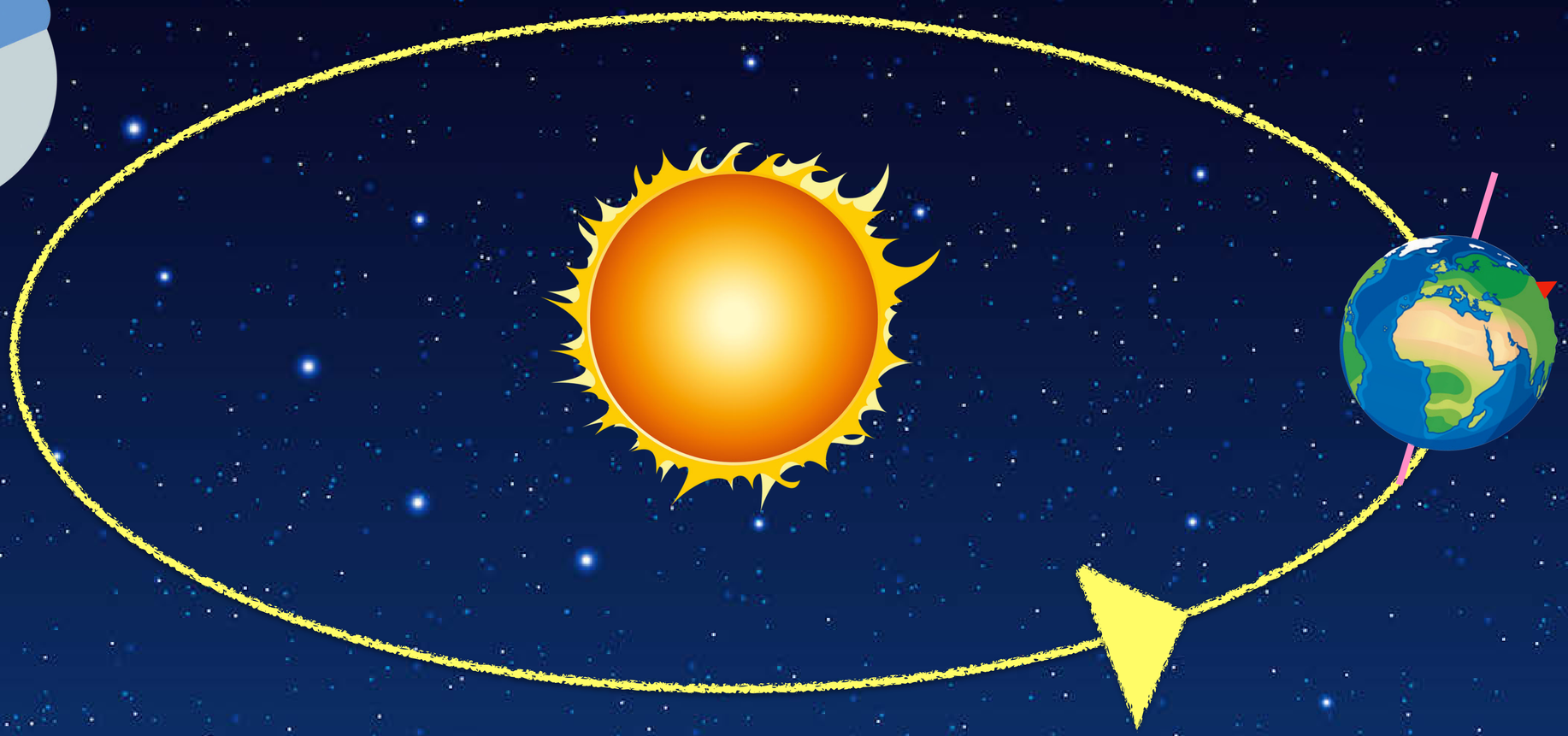

It's winter for the Northern Hemisphere. It's tilted away from the Sun.

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What if Earth's axis had no tilt? Who do you agree with?

We would only have winter and summer.

We would have random seasons throughout the year.

We wouldn't have any seasons at all.

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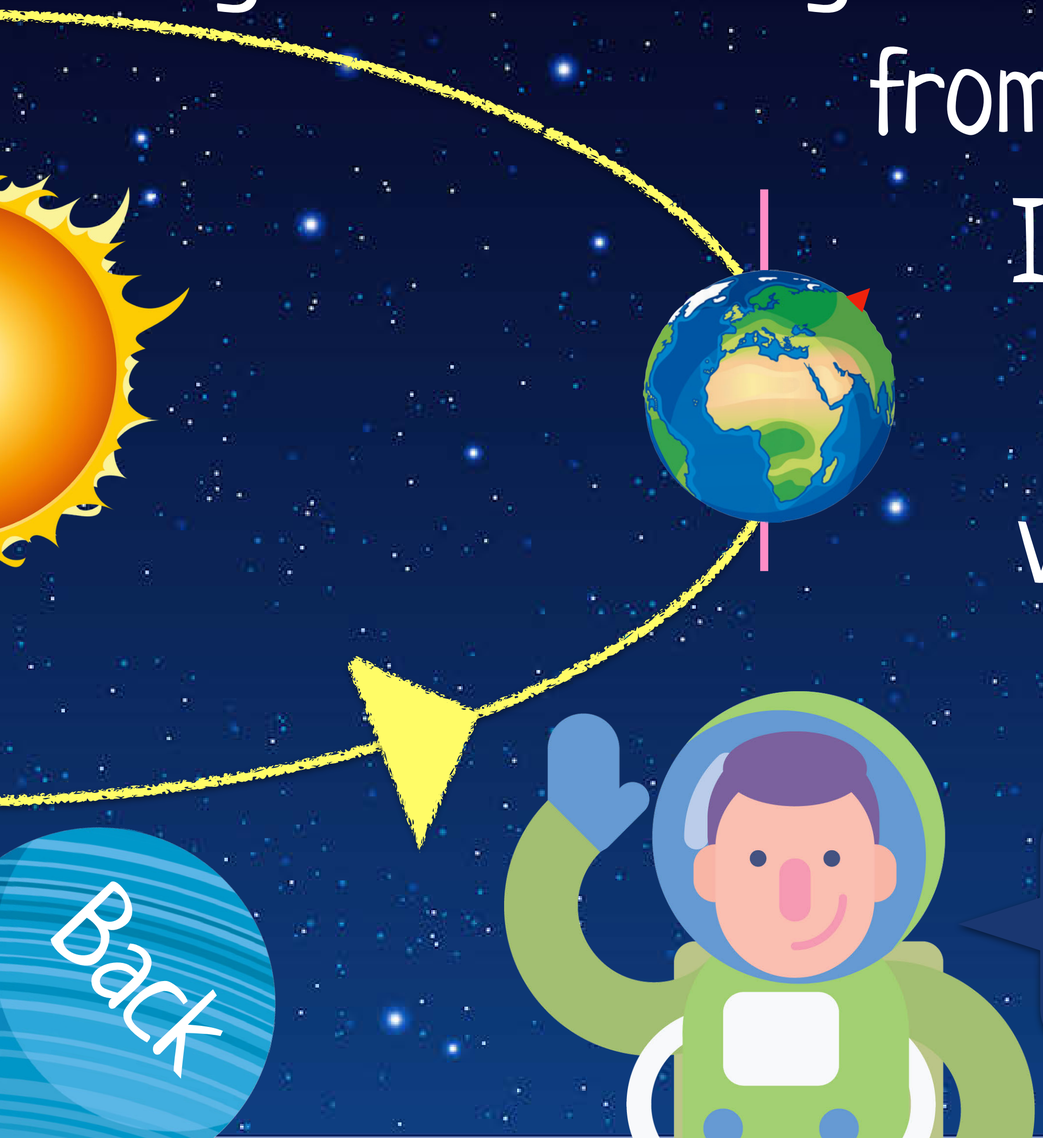
If Earth's axis had no tilt, there would not be any significant change in a location's tilt towards or away from the Sun as Earth orbits it.

It would always be like autumn/spring in each location and the weather and length of the days wouldn't vary much.



"We wouldn't have any seasons at all."
Well done if you agreed with me!

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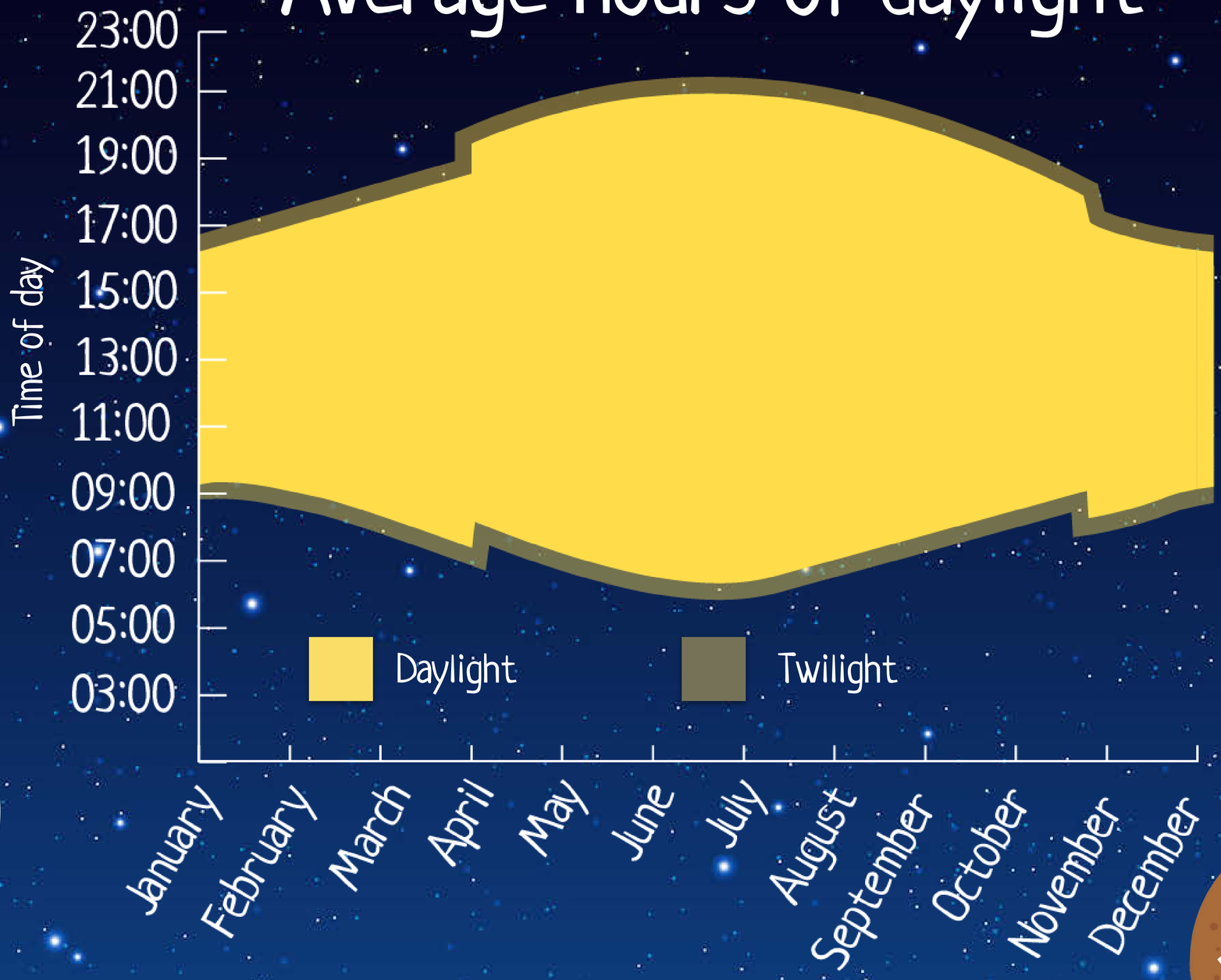
Plenary

This graph shows the length of days in the UK throughout the year.
What do you notice?

Average hours of daylight



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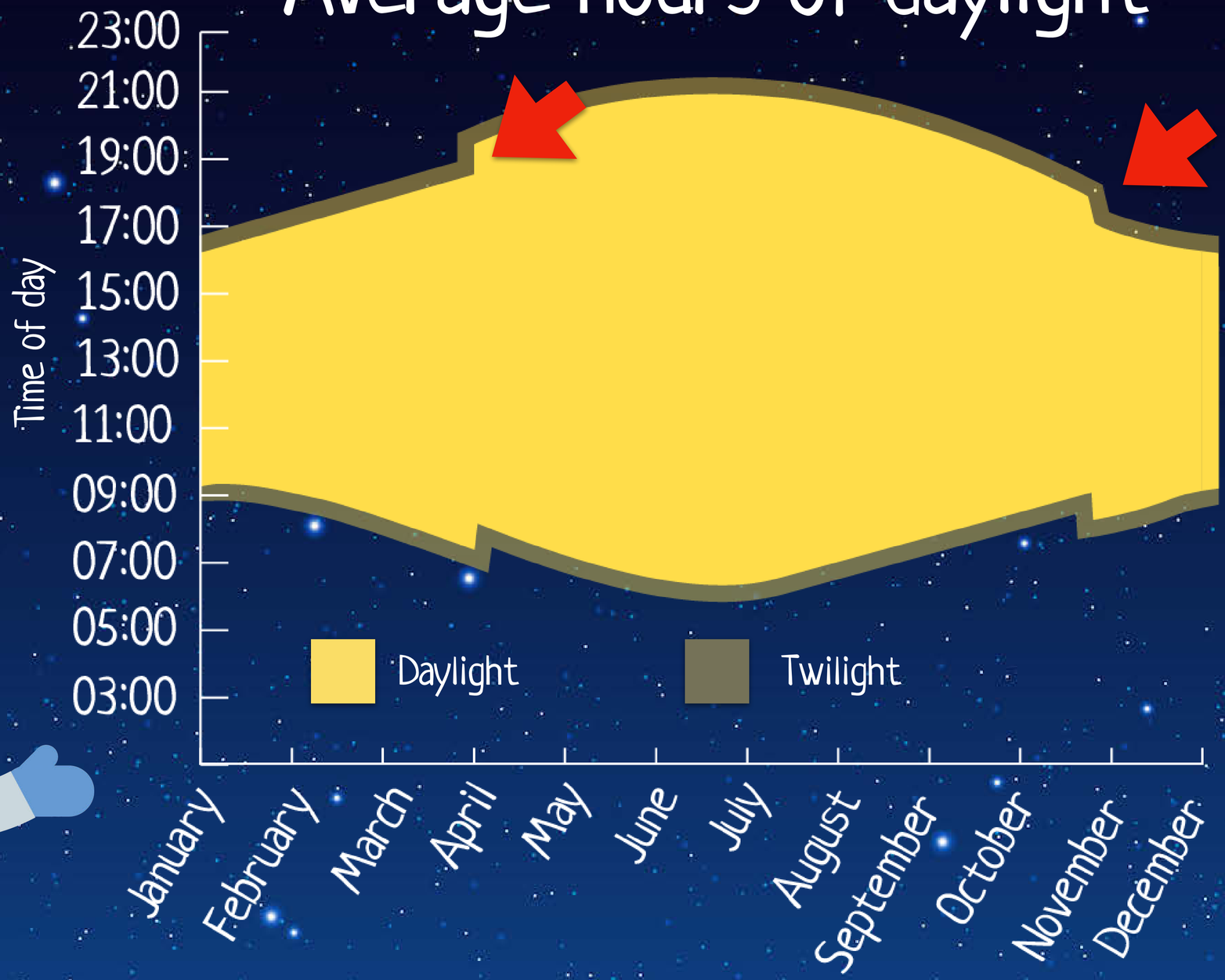
Plenary

The days are shorter in the winter months compared with the summer.

Average hours of daylight



What do you think these notches in the graph are?

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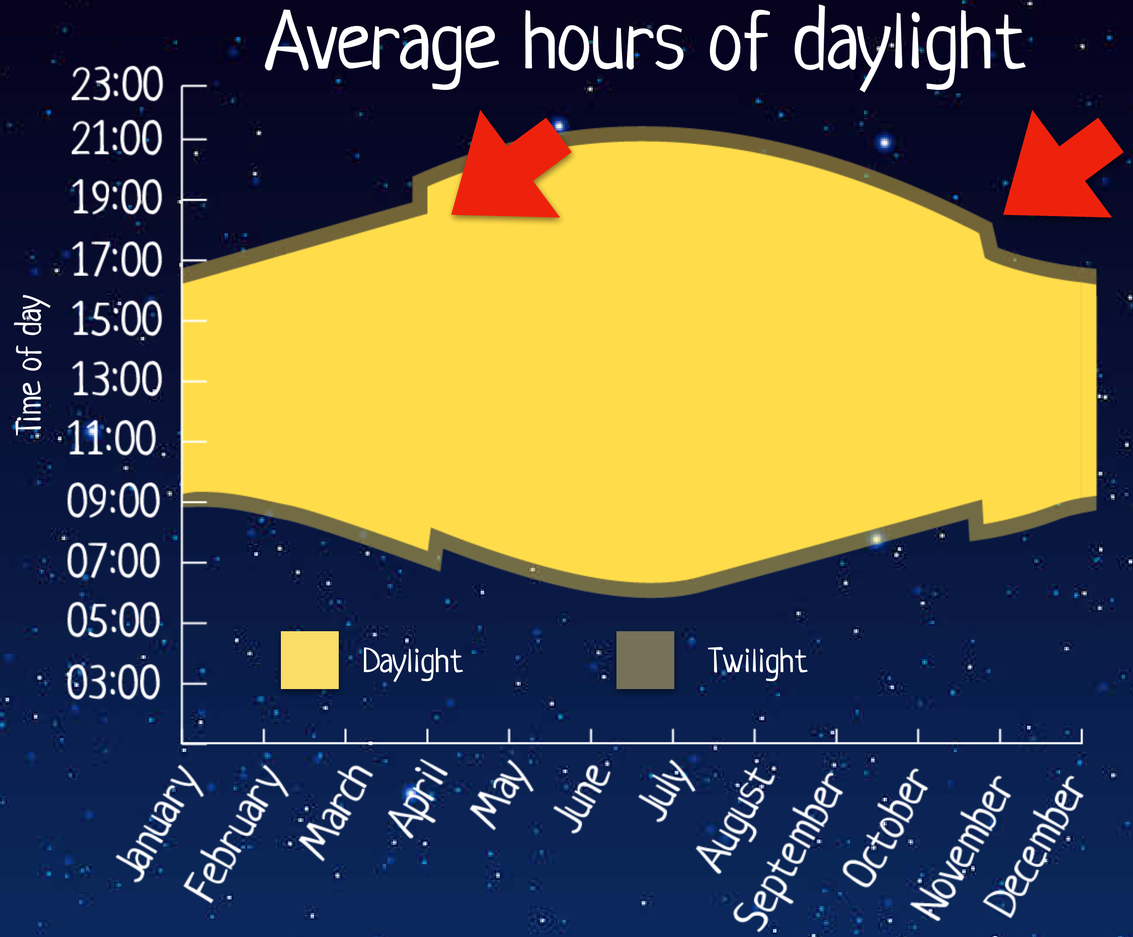
Plenary

These notches show the practice of Daylight Savings Time (DST).



This is where the whole country will move their clocks forward one hour at the end of March and backwards one hour at the end of October.

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Plenary

Because the days are longer in the summer months, DST is used to make the most of the daylight.
During the winter, when we do not use DST, we call it Standard Time.

Many electronic devices change the time automatically for us at 2am.

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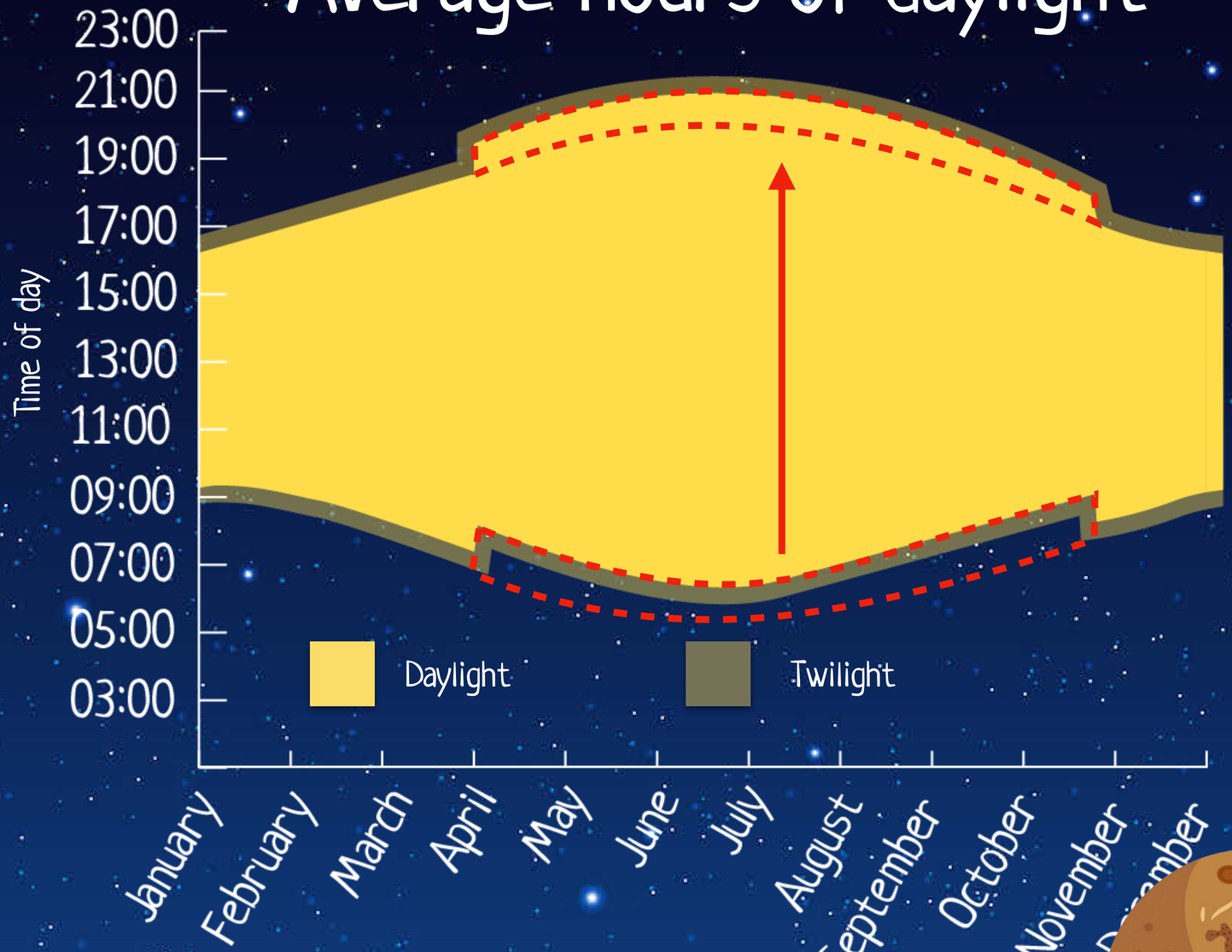
Plenary

Putting the clocks forward one hour for summer means there will be more daylight in the evening (19:00–20:00), when people leave work and school. This is instead of having an extra hour of sunlight in the early morning (05:00–06:00) when most people will be sleeping.

Average hours of daylight



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Plenary

Not all countries use DST. It is used mostly in places which are further away from the equator. This can mean that some countries switch between timezones depending if they are in DST or not.

DST used

DST no longer used

DST has never been used

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