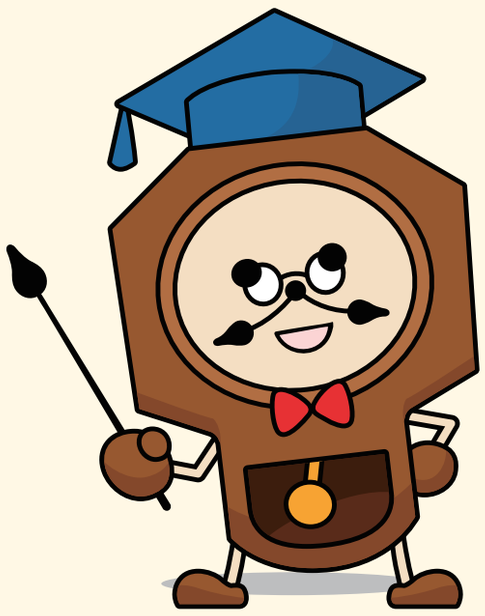
How to Make a Sundial

Supervised by
The Japan
Sundial Society

Make a spinning-top sundial and tell the time !

For Students in
Grade 3 and above.



A sundial uses the shadow of a stick to show the time.



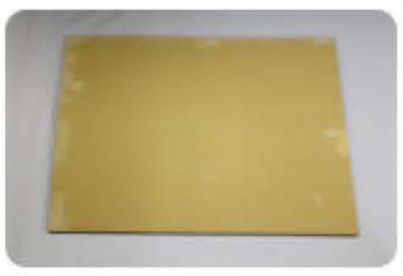
Let's see if you can make it !



Ask an adult to help with difficult steps. Be careful when using scissors and craft knives.



Things You Need



1 cardboard sheet (about 5mm thick, 50cm × 50cm)



2 pieces of thick paper (about 0.5mm thick, 30cm × 20cm)



Wrapping paper



Glue stick



Scissors



Craft knife



Ruler



Protractor



Awl



Stick



Wood glue



Vinyl tape



Compass



Clock

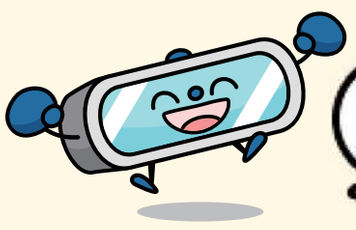


Felt-tip pen or ballpoint pen

How to Make a Sundial

Make a spinning-top sundial and tell the time !

Step 1 | Step 2 | Step 3 | Step 4 | Step 5 | Complete



Let's get started !

Tools



2 thick papers



Glue stick



Scissors



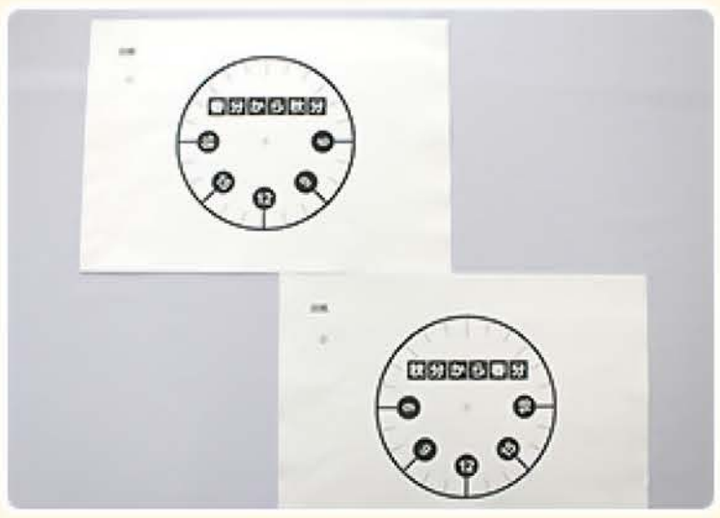
Felt-tip pen or ballpoint pen

Step 1 Dial making.

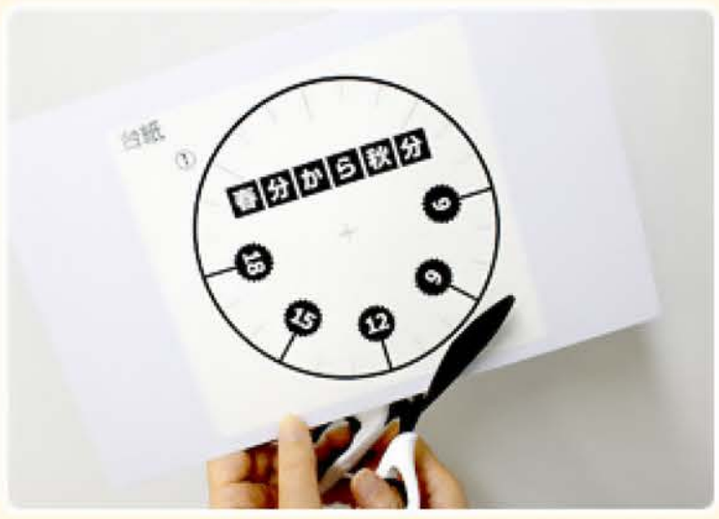
Make the clock face !







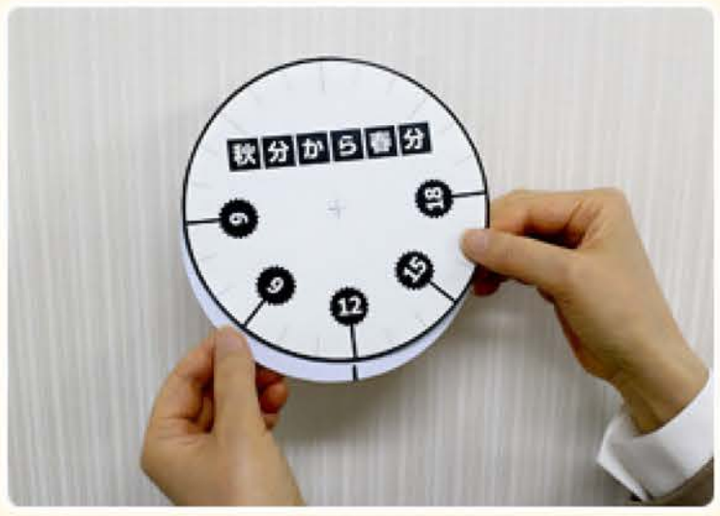
This is the important part where you read the shadow. Print Dial Sheets ① and ②.



Glue Sheet ① onto thick paper and cut along the outline.



Extend the "12" line to the back side.



Match the "12" on Sheet ② exactly and glue it in place.



Let's stick it on neatly !

How to Make a Sundial

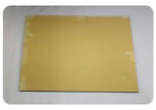
Make a spinning-top sundial and tell the time !

Step 1 | Step 2 | Step 3 | Step 4 | Step 5 | Complete



It's fun to decorate it with your own drawings !

Tools



1 cardboard sheet (about 5mm thick, 50cm × 50cm)



Craft knife



Ruler



Protractor



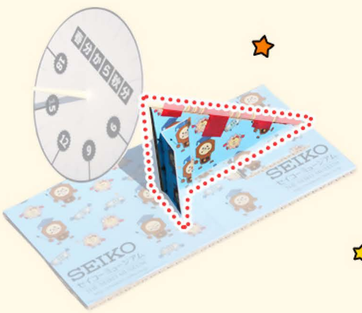
Wrapping paper

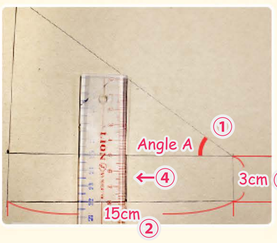


Felt-tip pen or ballpoint pen

Step 2 Make the support.

It's fun !





Let's make the support by cardboard.
①For Angle A, use the latitude from the below.
②The base length : 15cm
③The leg length : 3cm
④Draw a line divides the leg into 2 equal parts.



It's important to adjust it to the latitude of your observation location !

Latitude of the prefectual Capital (Angle A)

Sapporo 43°	Aomori 39°	Morioka 39°	Sendai 38°	Akita 39°	Yamagata 38°	Fukushima 37°
Mito 36°	Utsunomiya 36°	Maebashi 36°	Saitama 35°	Chiba 35°	Tokyo 35°	Yokohama 35°
Niigata 37°	Toyama 36°	Kanazawa 36°	Fukui 36°	Kofu 35°	Nagano 36°	Gifu 35°
Shizuoka 35°	Nagoya 35°	Tsu 34°	Otsu 35°	Kyoto 35°	Osaka 34°	Kobe 34°
Nara 34°	Wakayama 34°	Tottori 35°	Matsue 35°	Okayama 34°	Hiroshima 34°	Yamaguchi 34°
Tokushima 34°	Takamatsu 34°	Matsuyama 33°	Kochi 33°	Fukuoka 33°	Saga 33°	Nagasaki 32°
Kumamoto 32°	Oita 33°	Miyazaki 31°	Kagoshima 31°	Naha 26°		



Cut the cardboard as shown. Cut wrapping paper in the same shape.



Glue the wrapping paper onto the cardboard. Draw lines on the legs.



Cut slits in the center of the legs.



Make small cuts so the legs can bend easily.



Fold the legs in opposite directions.

Be careful with the craft knife !

How to Make a Sundial

Make a spinning-top sundial and tell the time !

Step 1 | Step 2 | Step 3 | Step 4 | Step 5 | Complete



Ask an adult for help with the hard part !

Tools



Stick



Awl



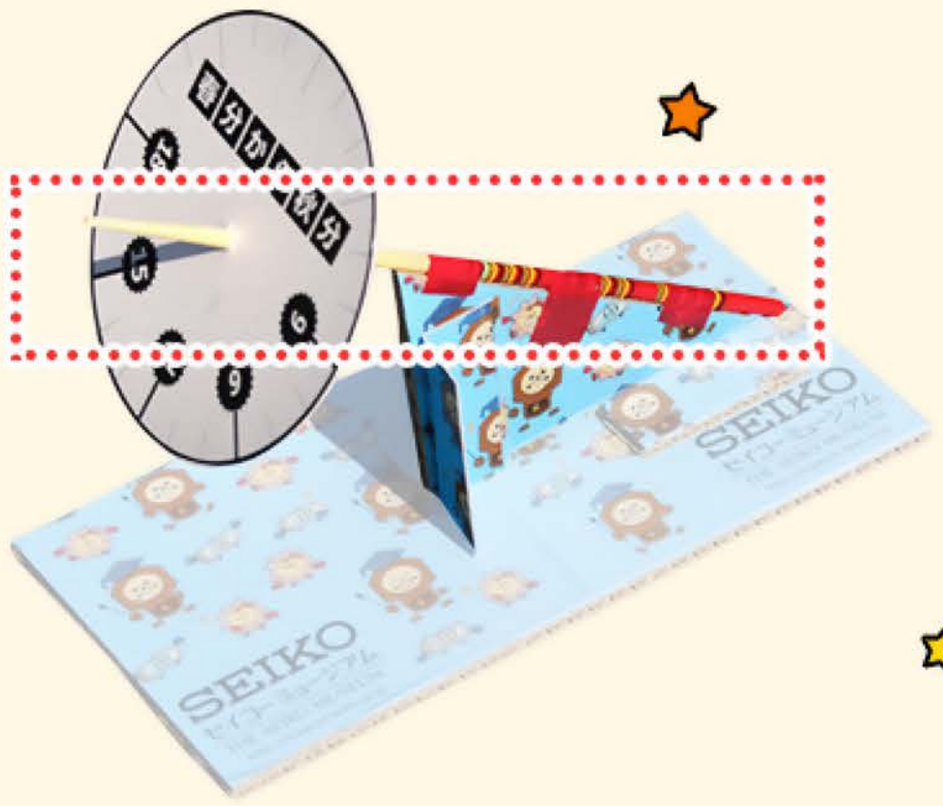
Wood glue

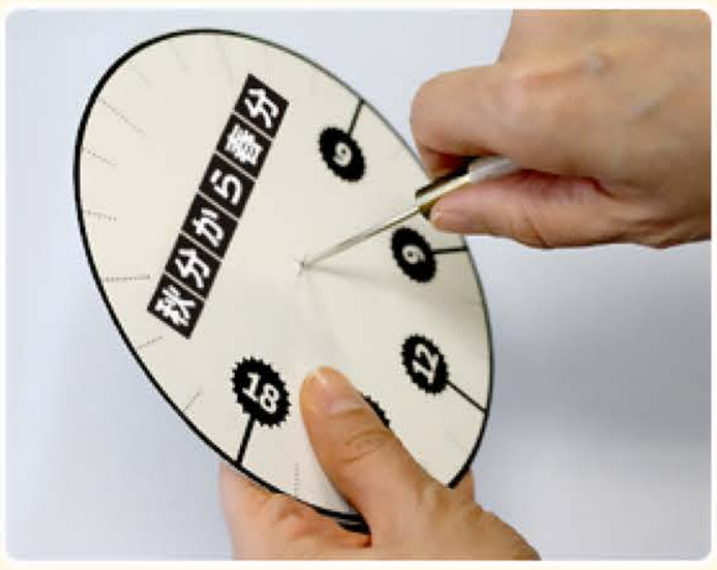


Vinyl tape

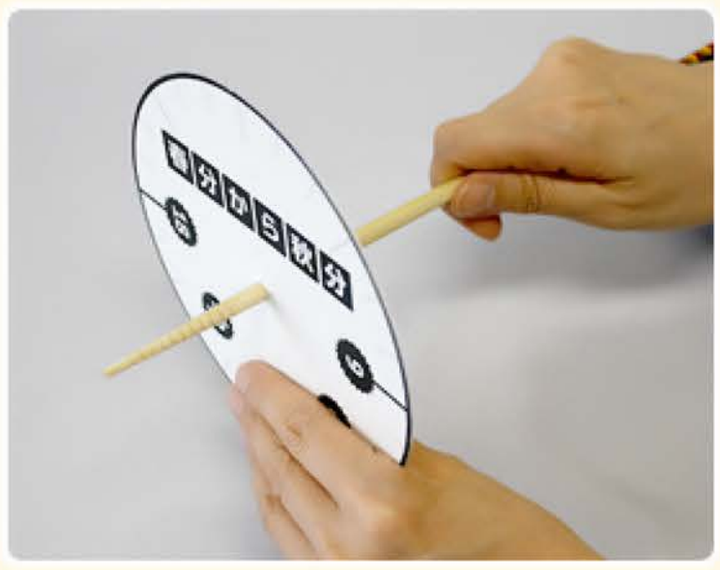
Step 3 Attach the clock face to the support.

Fix it completely !





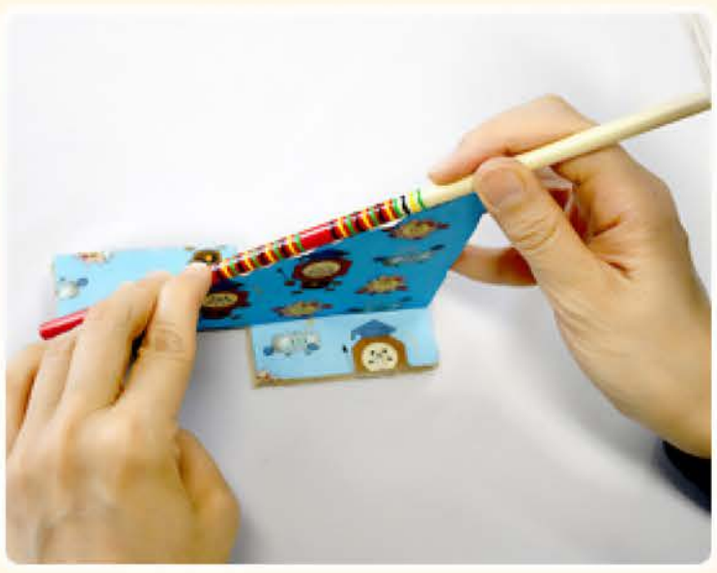
Make a hole in the center of the clock face with the awl.



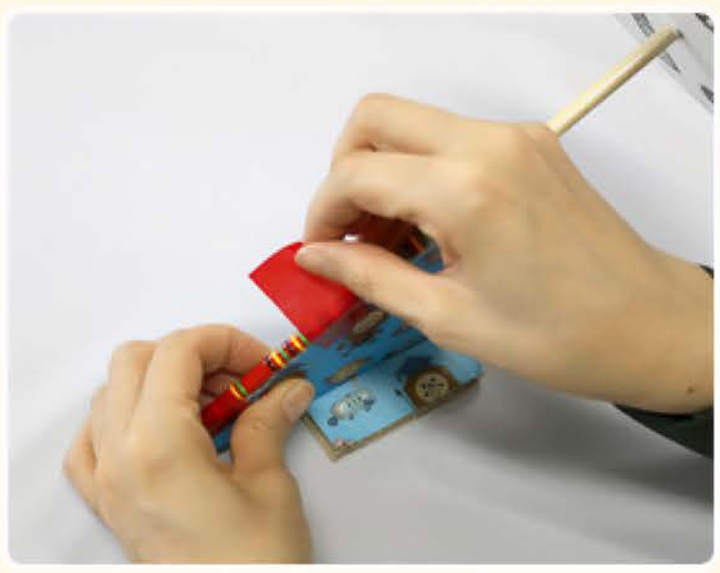
Push the stick through from the back.
Leave about 8 cm of the stick sticking out.



Put glue on the stick.



Attach the stick and clock face to the support.



Secure with vinyl tape.

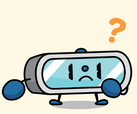
Be careful with the Awl.

Ask an adult for help with the hard part !

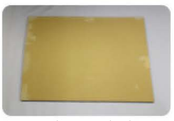
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Make a spinning-top sundial and tell the time !

Step 1 | Step 2 | Step 3 | **Step 4** | Step 5 | Complete



Tools


1 cardboard sheet (about 5mm thick, 50cm × 50cm)


Wrapping paper


2 thick papers


Craft knife


Ruler


Glue stick


Wood glue


Felt-tip pen or ballpoint pen

Step 4 Attach the support to the base.

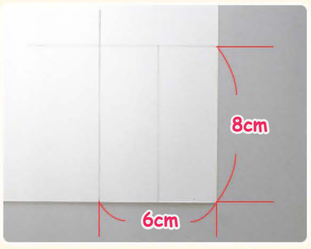




Cut cardboard to 30cm × 15cm. Cover it with wrapping paper. Draw a center line.


Put glue on the support legs.


Attach the support to the base.



Make a reinforcing piece from thick paper (6cm ×8 cm).


Cover both sides with wrapping paper.


Draw a center line and cut a slit.


Fold it and glue it in place.



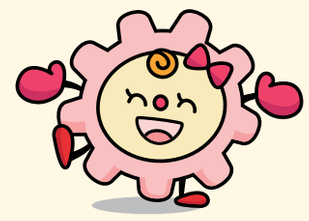


How to Make a Sundial

Make a spinning-top sundial and tell the time !

Step 1 | Step 2 | Step 3 | Step 4 | **Step 5** | Complete

Let's sync it up !



Tools



Clock

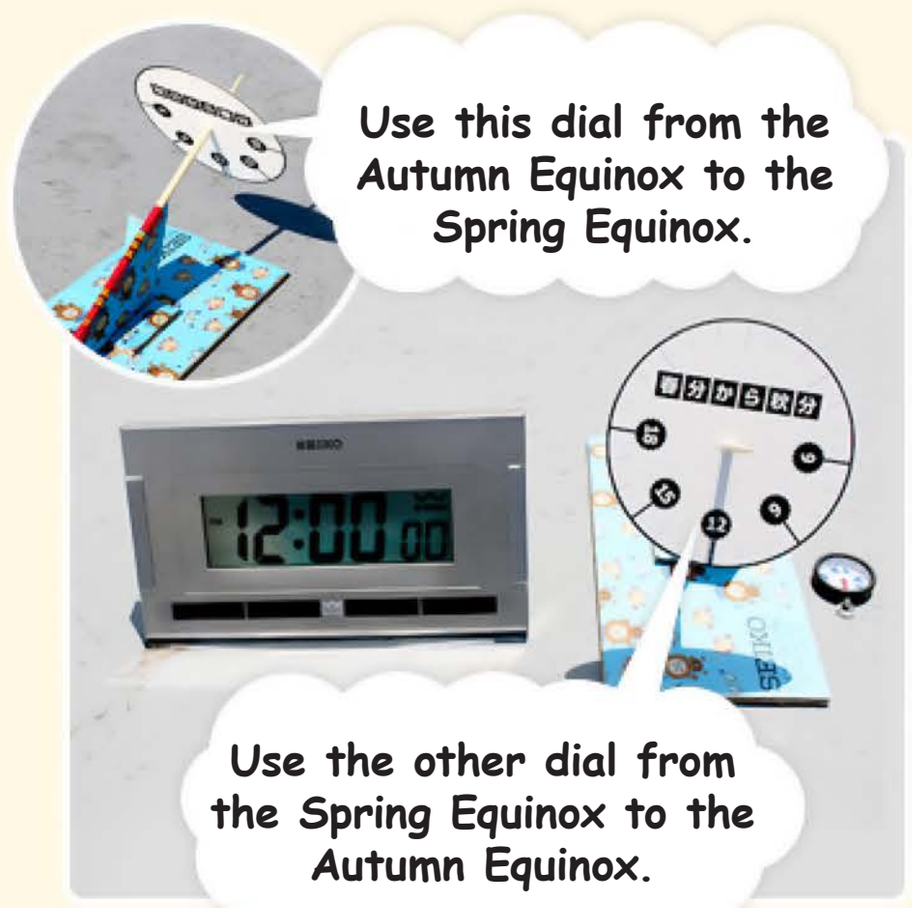


Compass

Step 5 Sync it up !



Place the sundial on a flat surface.
Use a compass to point the center line toward true north.
The stick should also point north.



Turn the dial until the stick's shadow matches the correct time on your clock.

Match the compass needle to the stick !



Did it work ?

The dial face changes with seasons.



How to Make a Sundial

Make a spinning-top sundial and tell the time !

Step 1 | Step 2 | Step 3 | Step 4 | Step 5 | Complete

If the shadow shows the correct time later,
your sundial works!

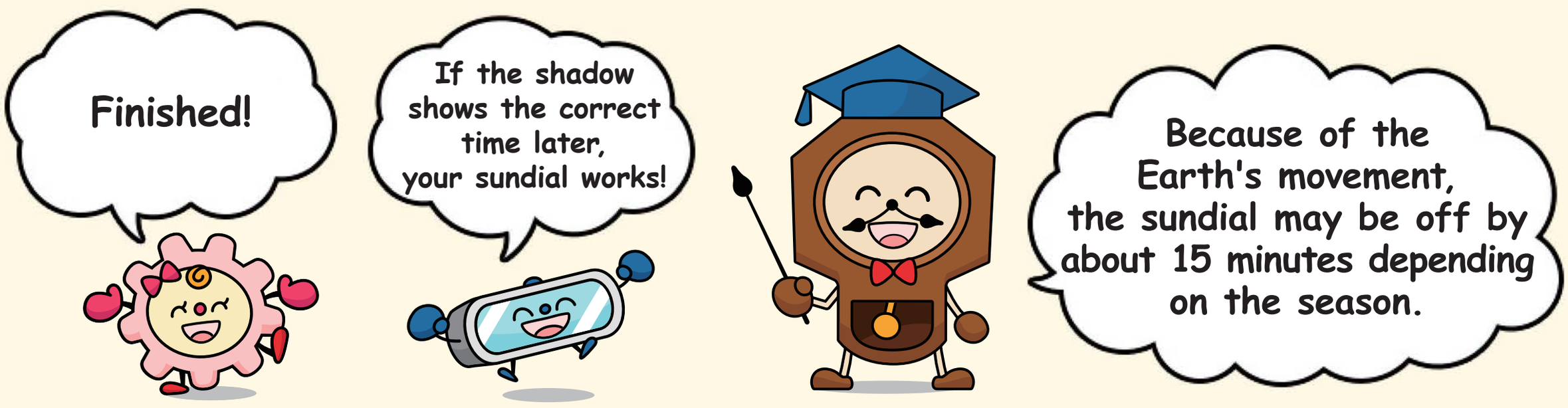
Your spinning-top sundial is complete !

Use this side from the Spring Equinox to the Autumn Equinox.

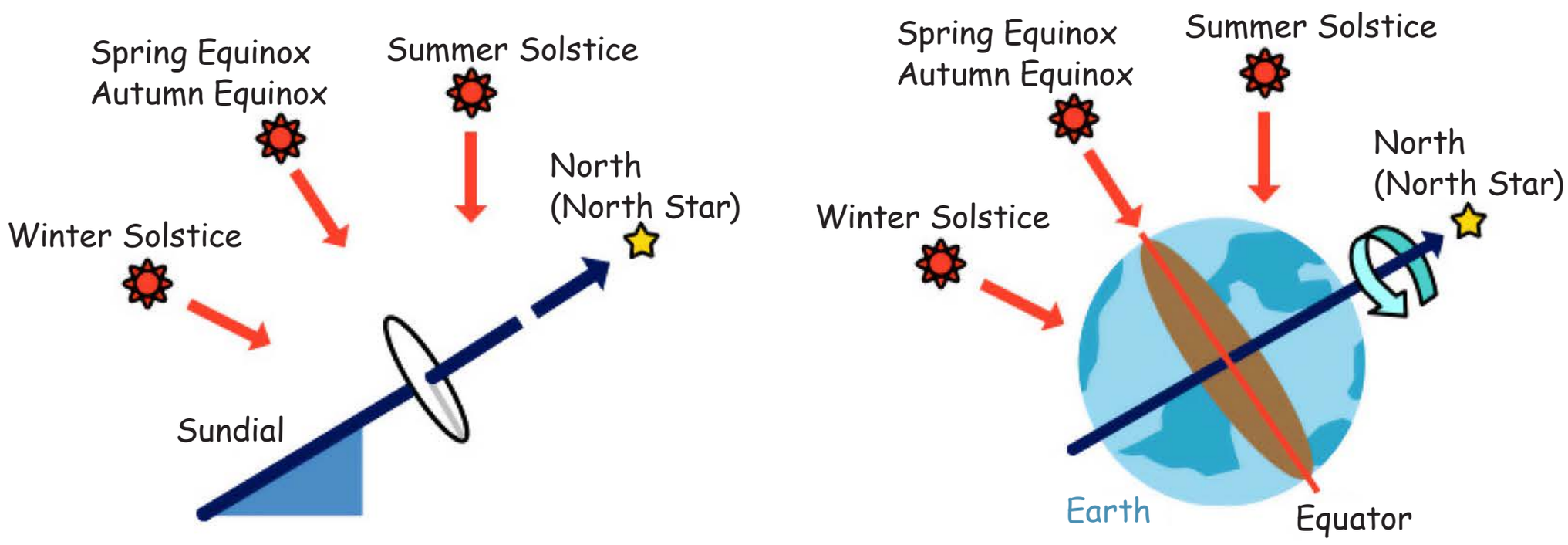


Use this side from the Autumn Equinox to the Spring Equinox.

Point the stick toward the north star.
The number where the shadow falls shows the time.



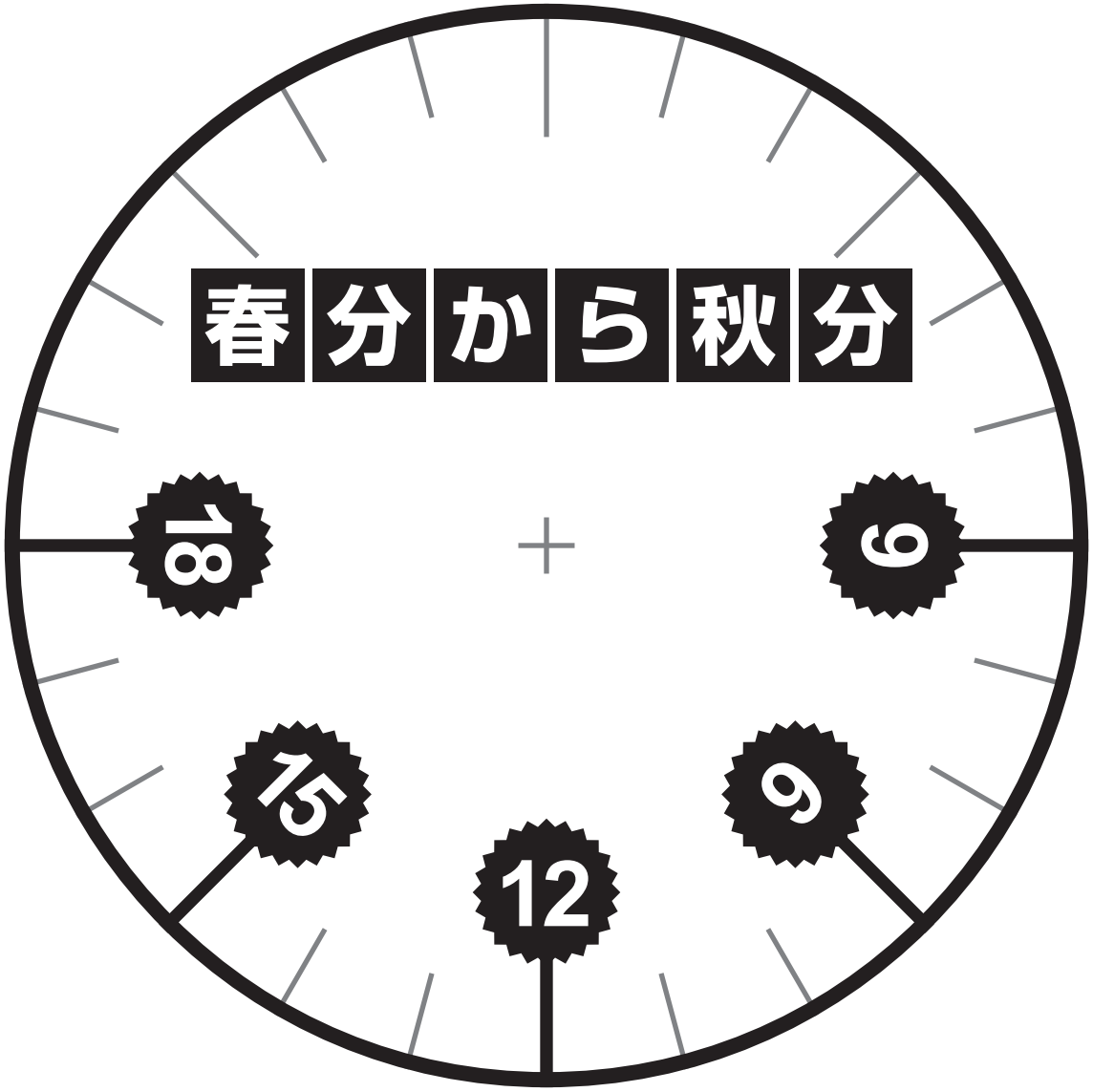
What is the Equation of Time?
The Earth moves around the Sun and is tilted.
Because of this, the Sun does not seem to move across the sky at exactly the same speed every day.
This small difference is called the Equation of Time.



The sundial stick points north,
making it parallel to the Earth's axis.
The dial becomes parallel to the Earth's equator.
That is why different sides of the
dial are used in different seasons.

台紙

①



台紙

②

