

JUST FOR U.S.*

GRADES 4-5

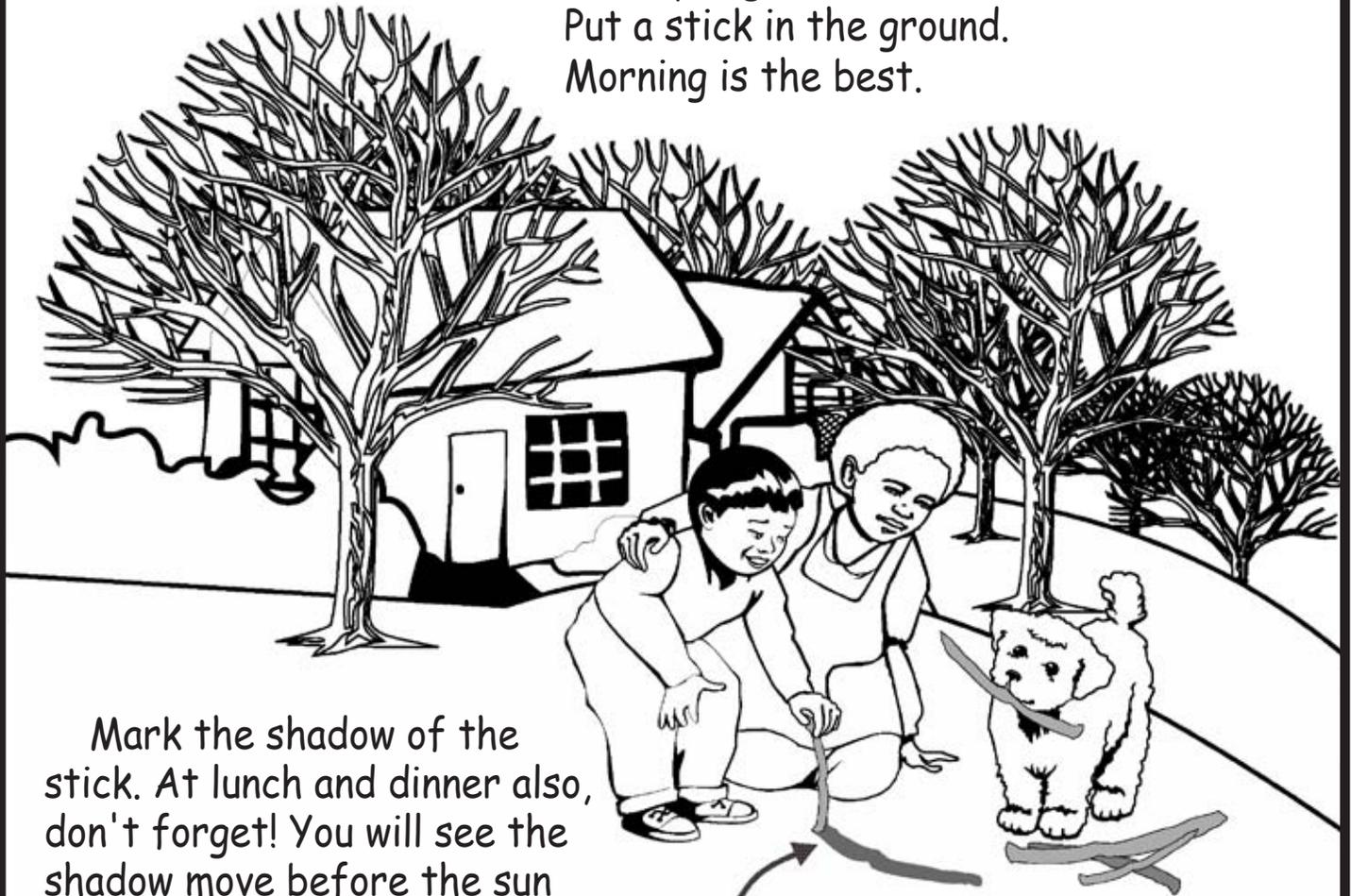
* Understanding Science

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SUN SHADOWS AND CLOCKS



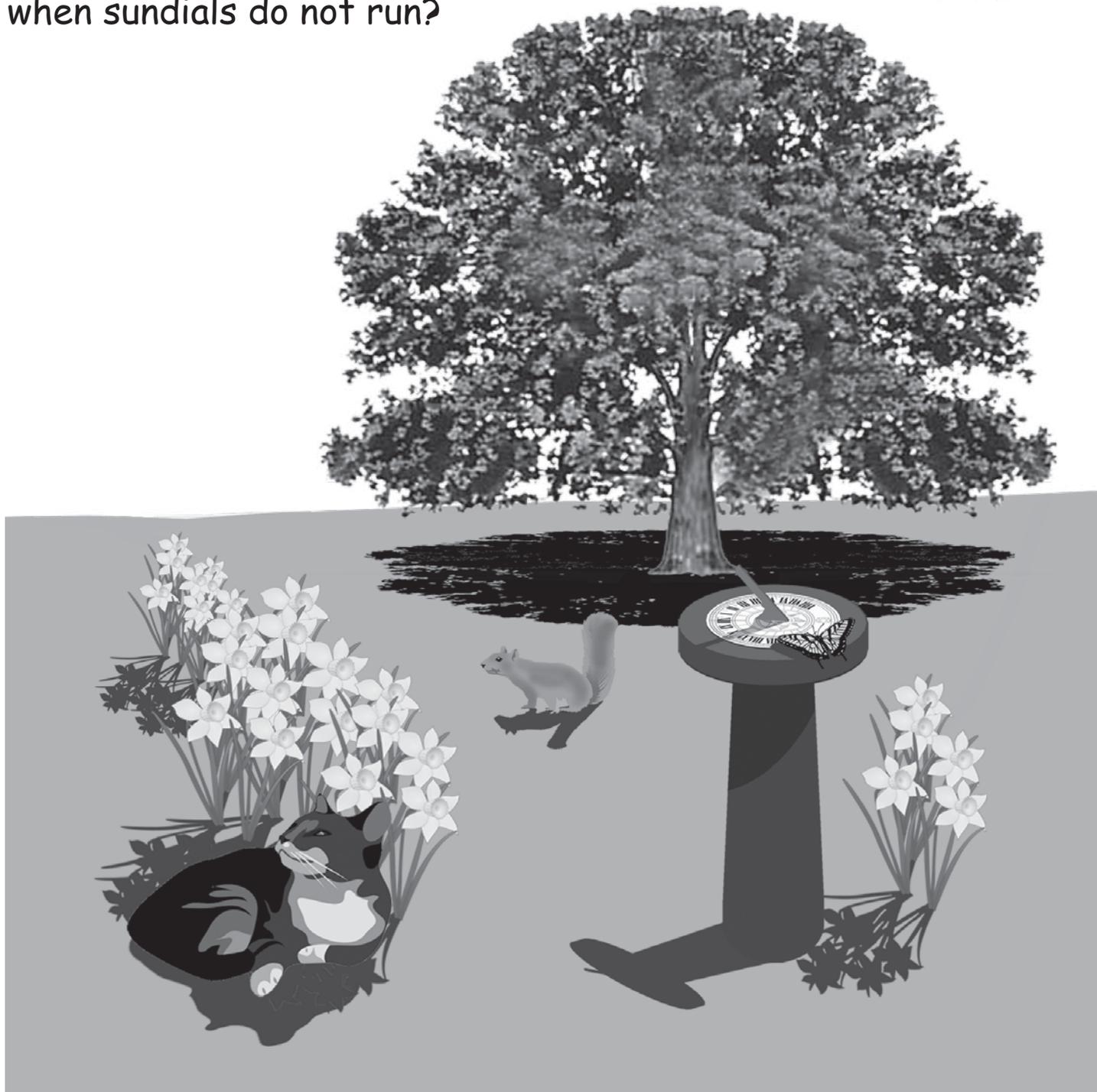
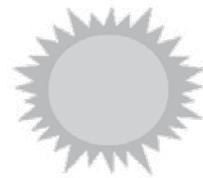
Go out on a sunny day,
after you get dressed.
Put a stick in the ground.
Morning is the best.



Mark the shadow of the stick. At lunch and dinner also, don't forget! You will see the shadow move before the sun begins to set.

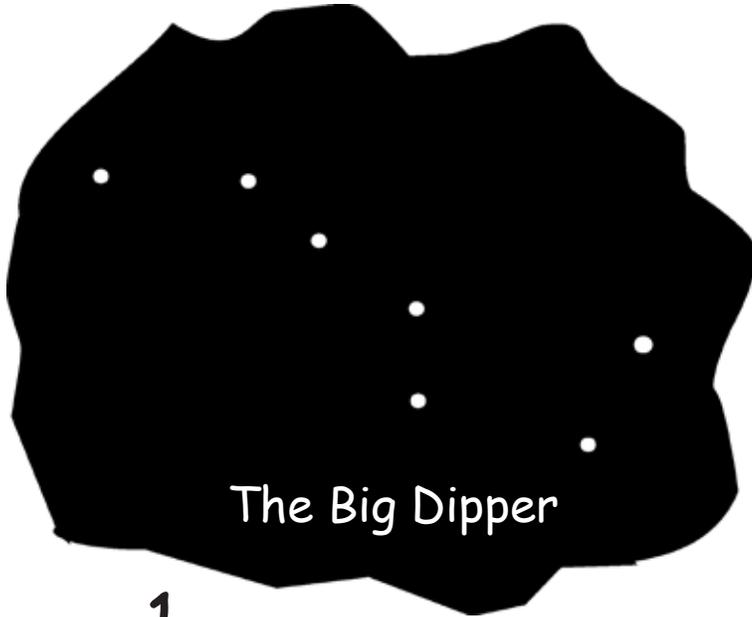
See the shadow of the stick.
Draw shadows for other things in the picture.
Color the picture.

Before there were clocks to tell time, people used shadows and sun. What about night or cloudy days, when sundials do not run?



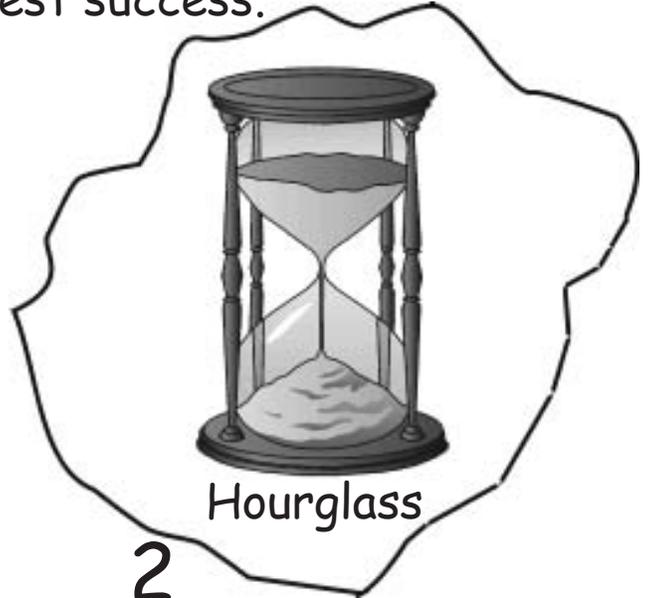
The shadow moves because the earth is turning. People used to think the sun was moving. Now we know that the earth turning changes where the sun is in the sky. This moves the shadow.

People used stars when nights were clear.
Cloudy days were still a big mess.
More inventions were built to tell time.
Clocks are the biggest success.



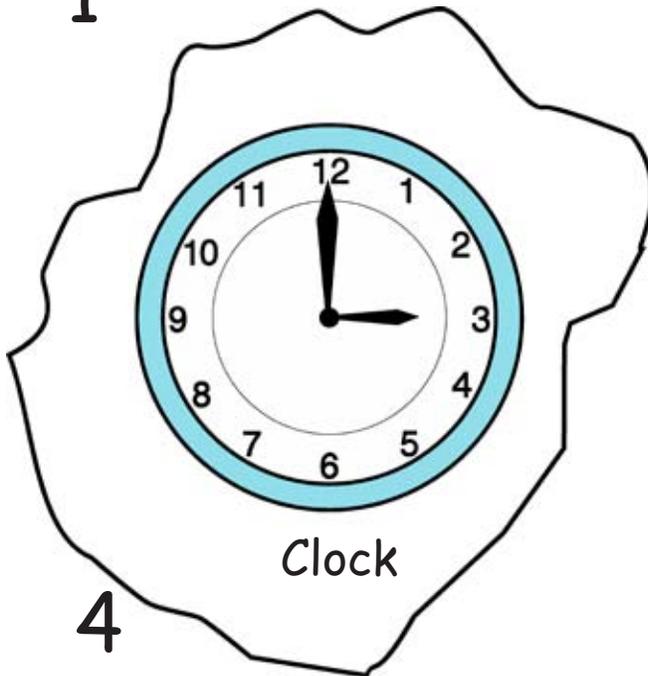
The Big Dipper

1



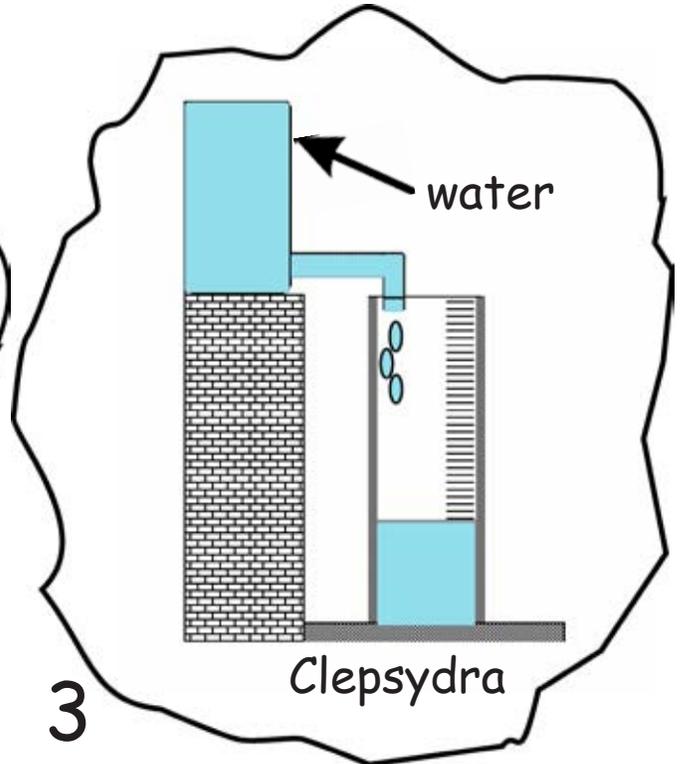
Hourglass

2



Clock

4

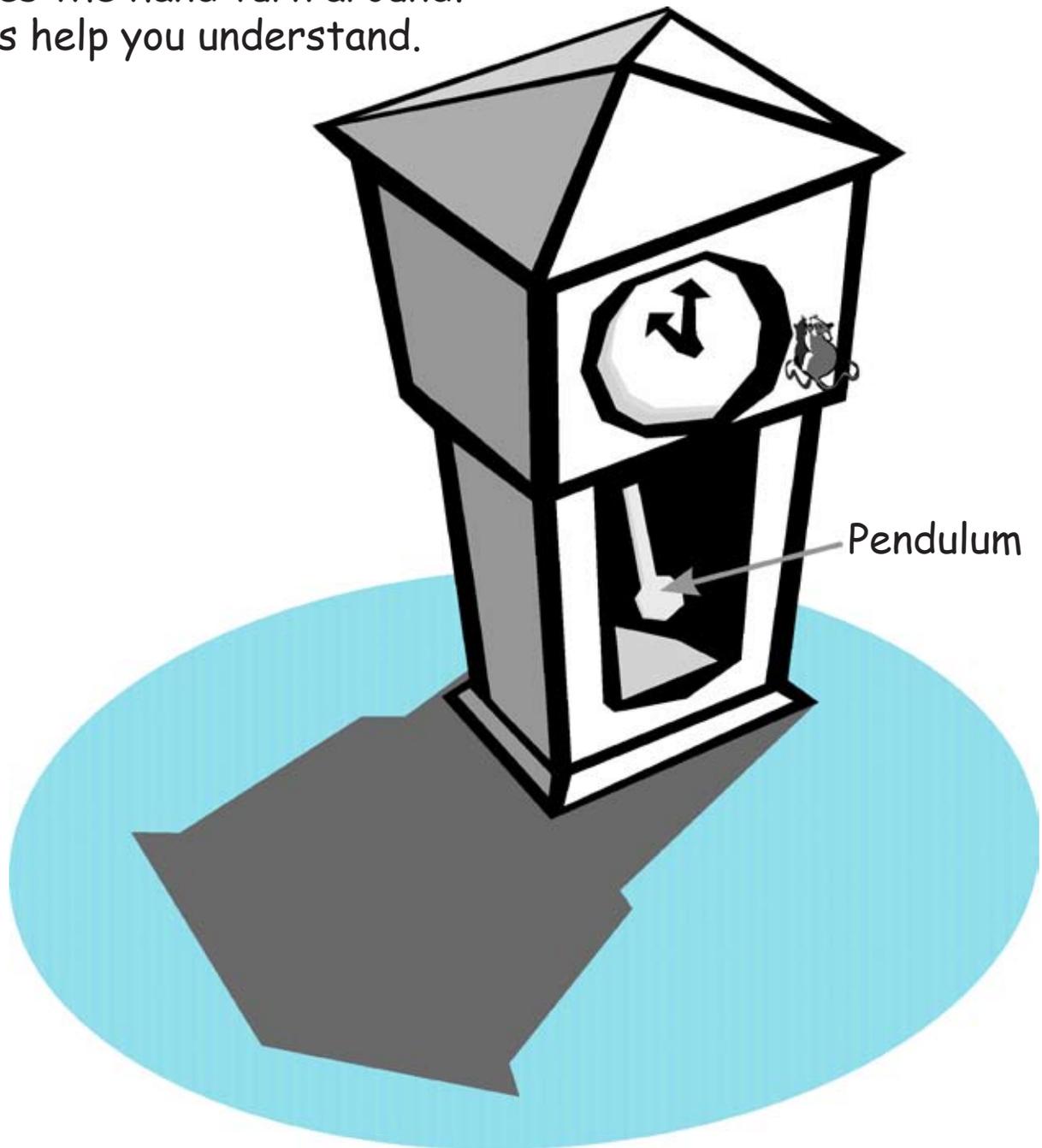


Clepsydra

3

One invention was the CLEPSYDRA (clep-si-druh).
The clepsydra marked time by measuring water height.
The clepsydra worked at night and on cloudy days.
It did not work well in...WINTER!

Find a clock that has a face.
Watch the moving minute hand.
Why does the hand turn around?
Shadows help you understand.

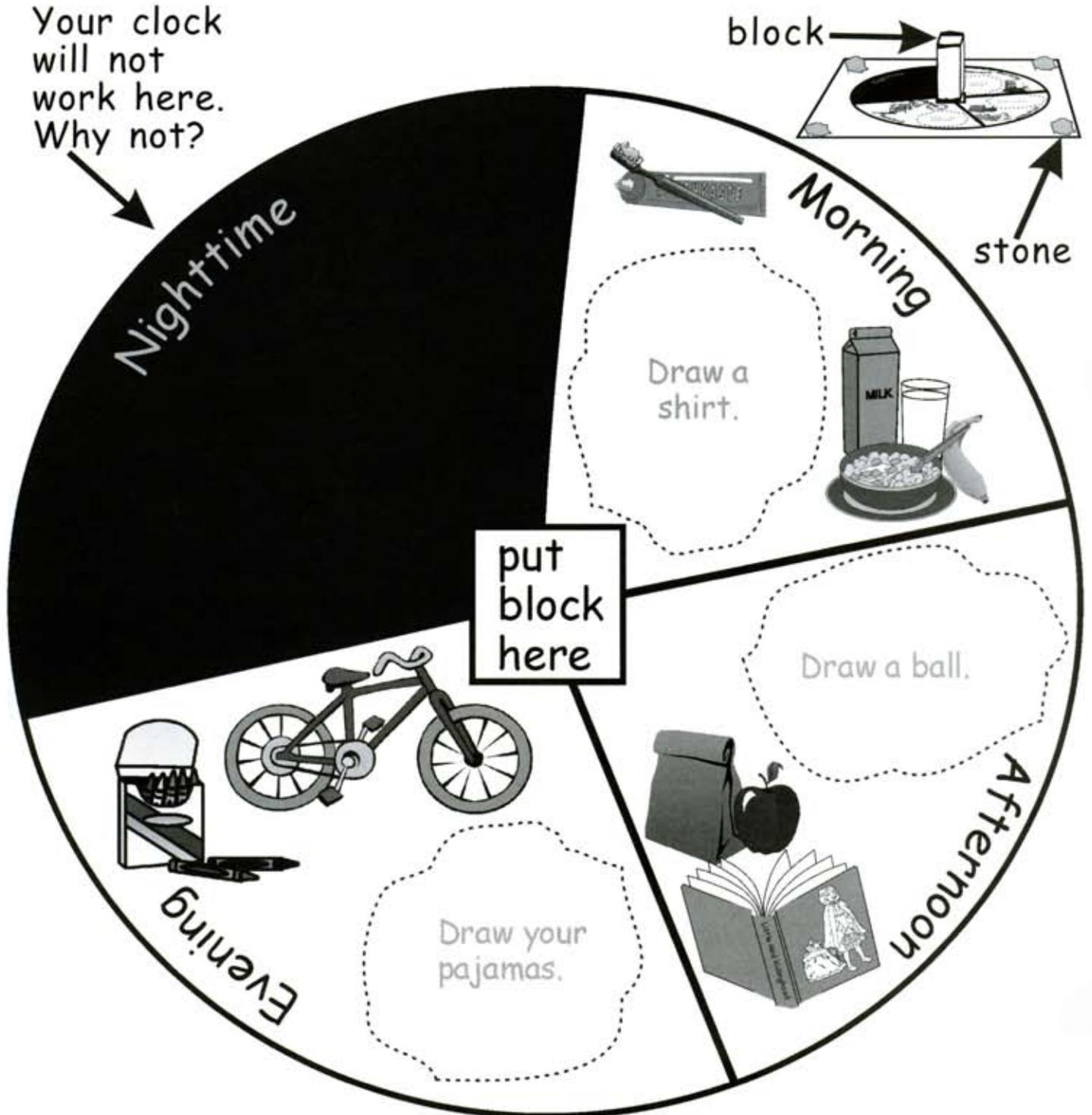


Measuring time began with shadows. When inventors built clocks, they made them with hands that turn like shadows turn. Pendulum clocks were the first clocks that could divide minutes into seconds. Today, clocks are even better. To find out the exact time in Atlanta, check <http://www.worldtimezone.com/time-usa2.htm>

MAKE A SUN CLOCK!

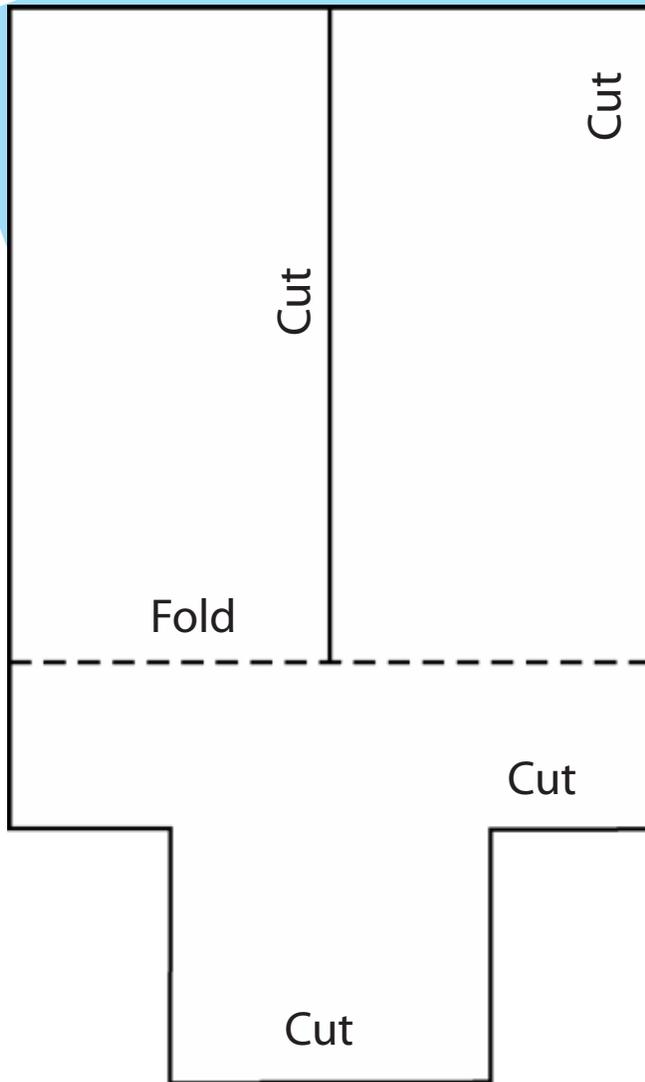
1. Take this page outside on a sunny morning.
2. Put the page on a flat place.
3. Stand up a tall block in the middle of the clock.
4. Turn clock so the shadow of the block is on Morning.
5. Add stones to the corners so page does not blow away.
6. Look at the shadow in the morning, afternoon and evening.

Your clock will not work here. Why not?

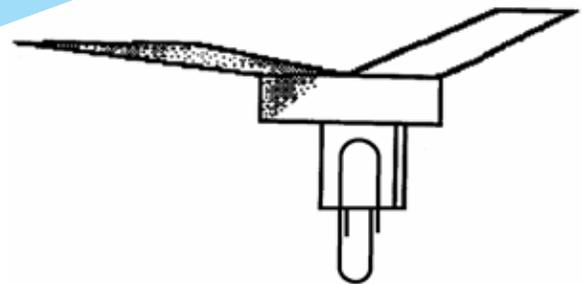


The invention of clocks also created new words.
The words "clockwise" and "counterclockwise"
describe the direction things turn.

MAKE A WHIRLYBIRD THAT SPINS BOTH DIRECTIONS!



1. Cut along the solid lines.
2. Fold on the dotted lines.
3. Put a paper clip at the end.
4. Hold out the whirlibird.
5. Let it go.
6. Watch how it spins.
7. Fold the wings the opposite way.
8. Hold out the whirlibird.
9. Let it go.
10. Watch how it spins.



JUST FOR FUN!

**Why do watchmakers always get in trouble?
They make faces all day!**