

## Time!

- 1) Reggie went out for a walk at 11:40 AM. He walked for an hour and a half. What time was it when he came home?
- 2) Heather starts school at 8:45 AM and finishes at 4:20 PM. How long is she in school?
- 3) It takes a pump eight hours to empty a big tank. How long will it take to empty the tank if we use four of the same pumps?
- 4) It takes a teenager one hour to clean a room. How long will it take a team of four teenagers to clean the same room? Explain your answer fully!
- 5) Ronnie left home to go on a trip on a Monday. She returned on a Tuesday. How long was she away?
- 6) What is the angle between the hour and minute hands at three o'clock? At 3:30?
- 7) What is the angle between the hour and minute hands at 12:05? (Be careful!)
- 8) It takes eight hours to fill a swimming pool using pipe A. Using pipe B it takes five hours. How long will it take if we use both pipes?
- 9) A band is playing a dance tune that is 32 measures long. Each measure has two beats. The band is playing at 120 beats per minute. How long will it take the band to play the tune once through?
- 10) A prankster switched the hour and minute hands on a clock. So now when it's really five o'clock, the *hour* hand is pointing to the 12 and the *minute* hand is pointing to the 5. Now that is something you can never see, at any time, on a real clock. In fact most of the time this reversed clock will show the hands in positions that are impossible on a real clock. Here's the question: when will the reversed clock show readings that a real clock could also show?
- 11) Why do we have leap years? Why do we have leap seconds?
- 12) On Tuesday, September 20, 1519, Ferdinand Magellan left Spain with five ships in an attempt to sail around the world. His fleet sailed west through the Atlantic, rounded the southern part of South America (through the strait now named *Magellan*) and entered the Ocean to which he gave the name *Pacific*. Magellan died in battle in the Philippines, but the expedition continued westward around the world past India and Africa. After many misadventures, just one ship, with eighteen sick and starving men aboard, returned to Spain on Sunday, September 7, 1522, after a round-the-world journey of almost three years. But wait! An Italian member of the expedition, Antonio Pigafetta, had kept a daily journal of the voyage. Both his journal and the ship's log said it was September 6! Explain that missing day!

### The Return of Thrackles!

Thrackles were invented by John Conway, professor of mathematics at Princeton University. A thrackle is a doodle in the plane made up of a finite number of *paths* and *spots*. Each path has two distinct endpoints called spots. No path may cross itself. Every pair of paths must intersect exactly once, either at a common endpoint or at an interior point where they cross. So no path can pass through a spot, and no paths can touch without crossing.

The question: Can there be more paths than spots? This is an open question. No one has solved it. John Conway has offered \$1000 for the first correct solution!

Study the examples below. Draw some thrackles. What can you discover? Would this problem be different on a sphere or donut? Have fun!