1. There are 3 ants sitting on three corners of a triangle. All ants randomly pick a direction and start moving along the edge of the triangle. What is the probability that any two ants will collide?

* Each ant can move in one of two directions (clockwise or counterclockwise).
* For the ants to **not collide**, all ants must move in the same direction (either all clockwise or all counterclockwise).
* There are 2 choices for each ant, leading to 2^3 = 8 possible ways the ants can move.
* Out of these, only 2 cases are favourable for no collision: all ants move clockwise or all ants move counterclockwise.
* Therefore, the probability of no collision is 2/8=1/4.
* Hence, the probability of a **collision** occurring is the complement: 1−1/4=3/4.

1. There are 25 horses among which you need to find out the fastest 3 horses. You can conduct a race among at most 5 to find out their relative speed. At no point, you can find out the actual speed of the horse in a race. Find out the minimum no. of races that are required to get the top 3 horses.

**Step 1**: Conduct 5 races with 5 horses in each race. This will give us 5 groups of horses. So, 5 races have been conducted, and we know the ranking within each group.

**Step 2**: Conduct a race between the winners of each of the 5 groups. This will identify the fastest horse out of the 25. This adds 1 more race, for a total of 6 races.

**Step 3**: Now, to identify the top 3 fastest horses:

* The fastest horse is the winner of the race between the 5 group winners.
* The 2nd and 3rd fastest horses can be found by considering horses that could possibly be faster than those that came 2nd and 3rd in the race of the 5 winners.
* Only horses from the following groups are candidates for the 2nd and 3rd fastest:
  + The 2nd and 3rd place horses from the group of the fastest horse.
  + The 2nd place horse from the group of the 2nd place horse.
  + The 3rd place horse.
* Conduct a race with these 5 horses, and the top 2 from this race will be the 2nd and 3rd fastest horses.

1. There are two candles of equal lengths but of different thicknesses. The thicker candle lasts for 6 hours while the thinner one lasts for 2 hours less than the thicker one. A person lights the two candles at the same time and goes to play. After returning home, the person saw that the thicker candle was twice the length of the thinner one. How long ago did the person light the two candles?

* Let the total time elapsed be t.
* The thicker candle burns at a rate of 16\frac{1}{6}61​ of its length per hour, and the thinner candle burns at a rate of 14\frac{1}{4}41​ of its length per hour.
* Thicker candle: Remaining length=1−t/6 Remaining length=1−t/6​
* Thinner candle: Remaining length=1−t/4Remaining length=1−t/4
* We are told that the remaining length of the thicker candle is twice the length of the thinner candle:
* Thus, 1-t/6 = 2\*(1-t/4)
* Simplifying we get t = 3
* Therefore 3 hours have elapsed.

1. Two hourglasses of 4 minutes and 7 minutes were given. How will you measure 9 minutes?

* Start both the hourglasses
* When the 4-minute hourglass is completed flip it over. (Total time 4 minutes)
* When the 7-minute hourglass is completed flip it. (Total time 7 minutes).
* Wait for the 4-minute hourglass to finish the second time then flip the other hourglass. (Total time 8 minutes).
* At this point, the other side of the 7-minute hourglass will have 1 minute of sand which gives us 9 minutes total.

1. You are blindfolded and 10 coins are placed in front of you on the table. You are allowed to touch the coins but can't tell which way up they are by feel. You are told that there are 5 coins head up, and 5 coins tails up but not which ones are which. Can you make two piles of coins each with the same number of heads up? You can flip the coins any number of times.

* Randomly divide the 10 coins into two piles, each containing 5 coins.
* Flip all the coins in one of the piles.
* If you have xxx heads in one pile, that means the other pile has 5−x heads (because there are 5 heads in total).
* When you flip the coins in the pile with xxx heads, the number of heads in that pile becomes 5−x
* Now, both piles have 5−x heads, so both piles have the same number of heads.