

Section 1

Its raining cats and ...

Since the ancient times people marvelled at the fact that cats always manage to land on all four paws no matter the height they fall from. It took scientists a considerable amount of research to explain this phenomenon. Only with the advancement of photography it became possible to find a plausible explanation, when at the end of nineteenth century french physiologist Marei took pictures of falling cats in different stages of their descent. These pictures were later presented to the Academy of Science for further examination. Specifically, it was ascertained that cat's tail which was previously believed to play an important role in the phenomenon doesn't help in any way. The latter was proven by a series of experiments with tail-less animals.

Having debunked the first myth the scientists assumed that cats somehow push off from experimenter's hands to gain momentum which allows to change body position in midair. This technique is somewhat similar to what springboard athletes use. This proposition however got rejected as well, proven wrong by a series of photoshoots. Cats were able to alter their body position even when simply thrown. At the beginning of twentieth century it became clear that they are able to do so by actively moving their paws and entire body.

At the beginning of their fall a cat moves its body so that the front half is turned to the right. This way the front limbs are moved closer to their head while the rear extremities are drawn as far as they can be. The rear part of cat's body bends toward the opposite direction. It all means that a cat directs its front body part towards the ground, able to see clearly which spot to choose for landing. They part their rear extremities to compensate the inertia of front and rear body.

Finishing their landing, the feline extends its front limbs stopping the body from rotating. Rear extremities gradually reach their final position, the cat assumes a stance that ensures safe landing, bends its back and grounds.

It was also established that if a cat is dropped with its limbs pressed to the body then it is unable to turn itself upright and land on all fours. As the technology of photo shooting advanced it became possible to observe the process in more detail. Among other findings it was noted that if a cat is propelled upwards with its paws facing up then it will keep that stance until reaching the peak of the ascent, at which points it will then start to turn.

Scientists have also observed how cat's fall is affected by its sense organs. If the cat is blindfolded then it will display lower proactivity during the fall. It looks rather odd and awkward, and if the cat in question is put in a spinner prior to being thrown then it confuses up and down, landing on its back. Interestingly, absence of hearing has no apparent impact on the way the cat acts while falling.

Another questions on everyone's lips is how cats manage to stay alive after falling from great heights. The answer to this is rather simple — a cat weighs much less than a human at the same time it has greater aerodynamic drag resulting in a rate of fall of about 17 meters per second. To give you an idea how fast or slow that is, a parachute jumper will reach a velocity of almost 50 meters per second. What is more surprising though is that a cat falling off a higher altitude has more chances to stay alive, supposedly because it relaxes its muscles mid-fall, spreading its body to create better aerodynamic resistance.

Some people have tried to imitate the movements of a falling cat to land upright. One of the daring ones was a high-board diver and an Olympic champion Brian Phelps. As it turned out it took the highly-trained man 0,3 seconds to do

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what cat manages to in just 0,12. Phelps managed to turn his body upright midair after being propelled with his belly pointing down. No other person managed to reproduce said trick.

Questions 1-3

Complete the summary.

Choose **ONE WORD ONLY** from the passage for each answer.

Cat's ability to land on all fours has always fascinated people. It was only with a breakthrough in 1 _____ that scientists succeeded in solving this mystery. The picture of a cat in the state of 2 _____ helped to study the phenomenon in more detail. One of the interesting findings was that cat's 3 _____ is the only limb not aiding it to turn upright.

Questions 4-8

Complete the flow-chart

Choose **ONE WORD ONLY** from the passage for each answer

Start of the fall



Cat's front body turns 4 _____



Cat arches its back in the 5 _____ direction



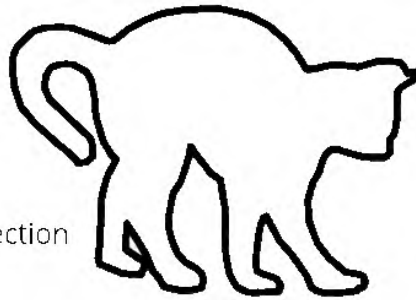
Rear limbs are drawn apart to make up for 6 _____ of the body



Front paws are extended just before 7 _____



Cat positions itself to 8 _____ safely



Questions 9-13

Do the following statements agree with the information given in Reading Passage 2?

Write ...

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

9. A cat will always land on all four legs.
10. Cat's aural abilities have no impact on successful landing.
11. Even the biggest of falls leave cats uninjured.
12. Longer falls increase cat's chances to land on four legs.
13. No man managed to imitate cat's landing technique.

Section 2

Waking numbness or sleep paralysis

Image yourself waking up and not being able to move, not even your finger. The room is pitch dark but you can sense somebody in the room — someone malicious standing next to your bed or even sitting on your chest, stopping you from breathing.

Such bizarre phenomenon is commonly referred to as waking numbness, or more ominously "sleep paralysis"(SP). People think of it as something supernatural, thus spawning many superstition around it. In the older times the cause was believed to be demons, or incubi — an evil spirit with a physical appearance of a human male. Some cultures believed the cause to be malicious magical rituals or curses aimed at the person suffering from this state.

According to official data at least five percent of people experienced this state at some point in their lives. Some go through it only once whereas there are individuals that face the symptoms fairly regularly. Whether you belong to one group or another, there is good news for you: this state is harmless for both your life and your health.

This state is very similar to rapid eye movement (REM) stage of sleep, the stage when you see dreams. The purpose of this state is to prevent you from making any abrupt movements thus ensuring a long uninterrupted sleep. In case of sleep paralysis the brain wakes up while the body is still sleeping. Until the body wakes up, you are left motionless. Alternatively you might experience being able to move your body, but the delay between your impulse to move it and the actual movement feels unbearably long.

The symptoms are not limited to numbness of body. One can experience feel of imminent danger, horror, stifling pressure, one can feel like it is difficult to breathe or as if they are being choked. Palpitation, or accelerated heart rate is also rather common. Some report having an illusion of involuntary body movement, like turning over to one side or to one's stomach/back, even though in reality the person lies still. Voices, unnatural sounds and noises, approaching footsteps are often reported by patients suffering from sleep paralysis. Hallucinations are not unheard of either — silhouettes of ghosts or people. The latter can be held accountable for the popular evil spirit myth.

Sleep paralysis can often be caused by sleeping on one's back. Sleeping on your body side drastically lowers chances of experiencing most of the symptoms. It can be caused by various sleep disturbances (such as insomnia or narcolepsy). It can only be triggered by waking up naturally. If the person is woken up abruptly, be it a bright light or an alarm-clock ringing then sleep paralysis does not take place.

There is no surefire way to battle this condition. A common recommendation is to establish a sleeping routine and follow it religiously. Some break sleep paralysis by rolling their eyes, moving their tongue or right thumb on their right hand (or their left hand for lefties). Others are more successful with relaxing completely and remaining calm — this reduces the negative emotional impact and the state gradually recedes. Brain activity has also been reported to help — thinking about something complex or running calculations in your head seems to aid in overcoming the numbness. Using your pharynx to pronounce something is a good way to break the state too — since you can't open your mouth it will come out as incomprehensible moaning, but it is likely to help.

Research has shown that analytically minded people are less susceptible to the negative effect of the state. When they happen to suffer from it they feel less depressed after the occurrence because they are usually not superstitious — they do not allow negative emotions caused by beliefs connected with evil spirits. As the scientists explained this, the type of people above tend to explain everything from the scientific point of view, whereas people that rely on intuition are more likely to base their conclusions on a less rational basis.

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Questions 14-17

Do the following statements agree with the information in Reading Passage 2?

Write ...

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

14. People nowadays believe sleep paralysis to be caused by the supernatural

15. Five percent of people suffer from sleep paralysis symptoms regularly

16. Sleeping paralysis can make people see things Avoiding sleeping on the back helps to avoid the state

17. Sleeping on the back raises the chances of sleep paralysis occurrence

Questions 18 and 19

Choose the correct letter **A-D**

18. Symptoms of waking numbness do not include

A Anxiety

B Pounding heart

C Nausea

D Hallucinations

19. According to the passage

A SP can be dangerous

B SP is biologically redundant

C There are ways to dispel the state

D Smarter people do not suffer from SP

Questions 20-27

Complete the summary using words from the box below

Sleep paralysis is a **20** _____ of not being able to move or **21** _____ right after one wakes up. It has certain **22** _____ surrounding it — most of them dating back to the ancient times. Biologically, this phenomenon is to **23** _____ you from waking caused by involuntary body movements. Other typical symptoms of this **24** _____ include **25** _____, struggling for **26** _____. Despite of it, a person with sleep paralysis faces no **27** _____ from it.

HALLUCINATIONS, DANGER, THINK, BREATH, SPEAK, STOP, HELP, DISEASE, SUPERSTITIONS, STATE, FEAR

Section 3

Honey bee, or *apis mellifera* is a fascinating insect. They live in big families or swarms. These swarms have historically been created in varying climatic and geographical zones which caused a great variety among them. Natural selection ensured gradual improvement of the species. Eventually the biological differences shaped into the honey bees that inhabit the Earth today. There are roughly three types of honey bees, each having defined duties and responsibilities.

The Working Bee

The vast majority of bees in the hive are females. In the course of evolution they have been deprived of the ability to mate with male bees, and therefore, procreate. Neither their deteriorated reproductive organs nor the size of their bodies allow that. However, female bees retained their maternal instincts which makes offspring of the hive their prime concern. They have gained and in the evolutionary course greatly developed other qualities important for a family member — they feel the urge to build shelter and to gather food for future use, ensure that the larvae (the offspring) are satiated, their hive is warm and well-protected from intruders. The working bee does everything to make the hive function properly.

The Queen

The queen does not normally leave the hive. There are several occasions when it does so — one of them is the period of chastity to search for mating partners. It makes its first venture out of the hive to scout the surroundings, usually during the warm and quiet mornings hours while drone bees are still inside the nest. The only other times the queen leaves her nest is for mating rituals. This usually corresponds with the period when young bees go out to learn the vicinity of their hive for their future pollination duties. The queen can go as far as 7 kilometres away from the apiary. At such distance from her home she is likely to encounter drones from other families, reducing the chances of inbreeding.



A newly-born queen is yet considered to be the supreme mother of the bee family as she isn't fertile at this point. It is only after several days pass that she reaches puberty and with it the ability to lay eggs after mating with drones. After her first mating eggs start growing inside her bosom, her belly grows larger, she turns bulky and cumbersome. The queen becomes slow, her movement — paced and gracious. The queen resides in empty honeycombs that she uses to lay eggs into. Those eggs are of two types — fertilized and unfertilized. The former give life to female specimen — working bees and other queens, while the latter bring male, or drones. The queen is the cornerstone insect of the hive, regulating the pace at which it functions, its population and prosperity. The queen is the sole ruler of the bee society.

However the queen bee is nothing without her humble servants. She won't be able to lay an egg unless the worker bees prepare a honeycomb for it. She is totally reliant on worker bees for food and protection because her size doesn't allow to either provide for or defend herself. It is the ultimate goal for any bee to ensure that the queen is safe, happy and has everything in abundance. And that isn't surprising — if the queen dies the whole societal structure of the hive collapses. That is why whenever a queen falls ill the bees grow agitated and promptly hatch another queen by feeding a larva with royal jelly exclusively.

The Drone

Drones are hatched at the end of spring when the hive has enough strength to start swarming. Drones are male bees whose primary and only goal is fertilizing the queen. Without them bees would not be able to procreate, so technically they are as important as the queen. Bees try to hatch as many drones as they can sustain to insure female impregnation. They spare no expense at bringing drones up — a growing drone eats up to six times more than a worker bee. An adult drone consumes even more bee and bee bread.



Drones usually mate in the air at an altitude of up to 25-30 meters. They can travel up to 7 kilometers away from their hive to find a mating partner so they require acute sense of smell to track a bee queen down as well as sharp

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eyesight and strength to see and catch her. A drone's eye has up to eight thousand facets compared to only four or five thousand of a worker bee. This grants drones extreme spatial awareness and quick reaction to any changes around them. They are also blessed with longer antennae — bee's organ of smell. They can sense the presence of a bee queen from 50 meters away.

Drones are exempt from any work in the hive. They do not take part in defending it, they can't even get food for themselves. Their only purpose is to impregnate bee queens. Nature has liberated drones from any duties other than the procreative one. This all comes at a great cost though. After the mating with the queen is over the drone dies. Drones are part of the bee family for only as long as the swarming period lasts. After that drones are exiled, their purpose fulfilled and they no longer needed for.

Questions 28-35

Complete the table below.

Choose **NO MORE THAN TWO WORDS** from Reading Passage 3 for each answer.

Type of bee	Function	Comments
Worker bee	<ul style="list-style-type: none">• Ensuring there is enough 28 _____• 29 _____ the hive from trespassers• Feeding the 30 _____	Unable to 31 _____
Queen bee	Breeding new bees	Completely 32 _____ worker bees
Drone	33 _____ the queen bee.	<ul style="list-style-type: none">• Cannot 34 _____ for themselves• 35 _____ from the hive after swarming is over.

Questions 36-40

Do the following statements agree with the information in Reading Passage 2?

Write ...

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

36. Worker bees constitute the majority of hive population

37. There can only be one queen in the hive at a time

38. The gender of newborn bee is decided by chance

39. Drones are larger than worker bees in size

40. Drone's perception is better than that of a worker bee.

Answer Keys

- | | |
|--------------------|------------------------------|
| 1. photography | 21. speak |
| 2. falling/descent | 22. superstitions |
| 3. tail | 23. stop |
| 4. right | 24. disease |
| 5. opposite | 25. fear |
| 6. inertia | 26. breath |
| 7. landing | 27. danger |
| 8. ground | 28. food |
| 9. FALSE | 29. protecting/defending |
| 10. TRUE | 30. larvae |
| 11. NOT GIVEN | 31. procreate |
| 12. TRUE | 32. reliant on |
| 13. FALSE | 33. fertilizing/impregnating |
| 14. FALSE | 34. get food |
| 15. FALSE | 35. exiled |
| 16. TRUE | 36. NOT GIVEN |
| 17. TRUE | 37. TRUE |
| 18. C | 38. FALSE |
| 19. C | 39. NOT GIVEN |
| 20. state | 40. TRUE |