READING PASSAGE 1

*You should spend about 20 minutes on **Questions 1-13**, which are based on Reading Passage 1 below.*

Jane Goodall

A remarkable career studying chimpanzee behaviour.

In February 1935, the year of King George V's silver jubilee, a chimpanzee at London Zoo called Boo-Boo gave birth to a baby daughter. A couple of months later, a little blonde-haired girl was given a replica of the zoo's new arrival to mark her first birthday. This was Jane Goodall's first recorded encounter with a chimp. The now 87-year-old became famous for her research on a community of chimpanzees in Tanzania, which revolutionised our understanding of these primates, our closest living relatives, and challenged deep-set ideas of what it means to be human.

Goodall tells a story from her childhood that demonstrates how fixated she was by the Africa of her imagination. As a special treat, her mother had taken her to the cinema to see her first Tarzan film. When the curtains drew back, however, the young Goodall burst into a fit of hysterical tears. After being taken to the lobby, she composed herself and told her mother firmly: "That is *not* Africa." When she describes her earliest experiences of Africa as an adult, however, they do not sound all that different from the jungles of her dreams as a child.

Not long after arriving in Kenya, Goodall captured the attention of Louis Leakey, the eminent paleoanthropologist and curator of the Coryndon Museum in Nairobi. Within hours of meeting, she had impressed him so much with her knowledge of natural history that he had offered her a job. Within months, Leakey and his wife, Mary, set out on an expedition to Olduvai Gorge in what is now northern Tanzania in East Africa, and Goodall went too.

During her first stint in the field, Goodall struggled to get close to the chimps. However, the individual she named David Greybeard proved a particular inspiration, showing her a side to chimpanzees nobody had ever documented before. In late October 1960, she watched David from a distance as he gnawed away at the freshly killed corpse of what was probably a baby bush pig – an observation that ran counter to the then-widespread

assumption that chimps were strict vegetarians. A few days later, Goodall witnessed David making and using a tool to feed on ants. Picking up a stick, he pushed it into one of the narrow entrance holes to the ant colony. The disturbance caused ants to emerge. David would then lick them off the stick. After subsequent, clearer sightings of this behaviour, Goodall went to Leakey with the discovery.

Goodall knew from her time with Leakey that this was an important discovery, because most people believed humans were the only species capable of making and using tools. In response to Goodall's observations of David and others, Leakey famously declared: "Now we must redefine 'tool', redefine 'man', or accept chimpanzees as humans." But despite Leakey's excitement over Goodall's early findings, not everyone was ready to embrace them. Goodall received patronizing treatment at the hands of her mainly male colleagues. She was criticised for giving her study-animals names and personalities, although she claims that she did not give them, but merely described their already existing ones. As for Goodall's reported discovery that chimps used tools, some scientists accused her of teaching them.

Along with her studies, Goodall focused a lot of her time to animal welfare activism, which she eventually switched to full-time after finding it a more rewarding path. She pinpoints her transformation to 1986, and a chimpanzee conference that was organised by the Chicago Academy of Sciences. By then, she'd spent more than 25 years in the field, completed her PhD, established the Gombe Stream Research Center, got married, raised a son and made further ground-breaking observations on chimpanzee society – including insights into chimp communication, mother–infant bonding, inter-community warfare and cannibalism. But at the age of 52, she walked away from the field and turned to a life on the road focusing on the betterment of animal welfare.

Her initial focus – facilitated by the Jane Goodall Institute she'd established almost a decade earlier to support her chimp research at Gombe – was to draw attention to the plight of chimpanzees more generally. In the wild, habitat destruction, commercial hunting, and animal trafficking all posed significant threats to the species' future. Even today, countries are asking African governments for chimpanzees and gorillas for entertainment, which Goodall fears could risk the integrity of her sanctuaries.

READING PASSAGE 2

*You should spend about 20 minutes on **Questions 14-26**, which are based on Reading Passage 2 below.*

Medical Marijuana

How some patients use cannabis for medical reasons.

A. Many people connect cannabis with smoking a joint (a rolled cannabis cigarette) for pleasure. Indeed, cannabis cigarettes have long been used to treat asthma, as it was thought that inhaling cannabis opened the airway. However, recent research has found that, while short-term exposure to cannabis from joints can do this, the effects do not last if used over a six-to-eight-week period. As medical use of cannabis has grown over the past three decades, and as people have moved away from smoking because of its harmful effects, other modes of administration have been developed. Most are still being investigated by scientists and have not yet been commercialised, but some have successfully gone through the medical approvals process and are used by patients all around the globe.

B. One of the more popular methods of cannabis intake is through inhalation. This method lets patients control the dose of cannabis because, when inhaled, its effects begin almost immediately. The drug is taken into the lungs and quickly absorbed through the capillaries into the bloodstream. Smoking a joint, however, is dangerous – depositing tar and destroying cilia – not to mention illegal in many countries. It is also inefficient, as most of the cannabis is burnt. A bong or waterpipe can cool the smoke, which was thought to make it less irritating to the airway. However, the US Centers for Disease Control and Prevention says that this filtration method fails to remove any dangerous chemicals from the mixture.

A new means of inhalation is vaporisation (or "vaping"), which heats the cannabis to 180–200°C, releasing the cannabinoids as a fine vapour to be inhaled. Some newer models of vaporiser have digital temperature controls to let patients control the heating more precisely. One of the authors of a US study published in 2007 said that "Using carbon monoxide as an indicator, there was virtually no exposure to harmful combustion products" using vaporisation. Dutch studies have also reported that it was a safe method of delivery.

C. The British firm GW Pharmaceuticals developed a way in which cannabis plant-derived medicine is sprayed into the mouth. They say: "The oral spray method of delivery results in a slower delivery method that enables patients to adjust their dose. As a result, patients are typically able to separate the thresholds for symptom relief and intoxication, thus enabling them to obtain the former without experiencing a high." Patients tend to administer three to ten sprays over a 24-hour period. The company also points to the flexibility of a spray that can be carried around in a handbag and taken without water. In the US, the Food and Drug Administration (FDA) has required the spray to include a dose counter, to reduce the potential for diversion for other purposes.

D. Meanwhile, in Colorado (and some other US states), a dizzying array of cannabis edibles is now legally available, including sweets, cookies, ice creams, teas and even cannabis butter. However, absorbing cannabis through the gut is a slow process, taking an hour or more, so it is difficult for a patient to get their dose right. Unlike when vaporised or smoked, cannabis that is ingested gets metabolised through the liver. The liver converts some of the cannabis chemicals to a more psychoactive chemical, so the effects (which some patients find unpleasant) can be stronger and take longer to wear off. A recent study of edible cannabis products found wide variation in two of the major chemicals, which meant that many products were mislabelled with regard to their contents and dosage recommendations.

E. Cannabis can also be applied topically for pain linked to inflammation, product manufacturers say, although general topical use is questionable, as it is unclear how well the chemicals are absorbed through the skin. A new generation of transdermal patches, gels and gel pens is being developed, containing an agent that manufacturers say can penetrate the skin. These products have not, however, been reviewed by the FDA in the US.

F. There is still much uncertainty around medical cannabis. In the US, for example, the rapidly emerging cannabis industry lacks clear regulation. Many different products are available, some with little or no evidence to support their claims of effectiveness. The FDA recently tested medical cannabis products of all kinds and found that six out of 18 had no cannabinoids in them at all – despite claims to the contrary. This raised concerns within the rather lax market, as some fear that medicinal benefits are being belittled by the marketing craze around the word marijuana. Many hope for the stigma to change so that more research can be conducted.

READING PASSAGE 3

*You should spend about 20 minutes on **Questions 27-40**, which are based on Reading Passage 3 below.*

Are *smart* phones making kids dumb?

Swiping through photos and entertaining videos, 18-month-old Jessica's tiny fingers dart around the iPad as she emits a squeal of delight. After watching a video on the YouTube app, she moves onto a mobile game, which involves humanized fruits making their way into a character's belly. When Jessica's mum, Sandy, tries to take away the iPad, there's a tantrum that threatens to unleash: wobbly lip, tears, and high-pitched wails. Like many parents, she's worried about her child's obsession with screens and wants to know how much time spent on screens is too much.

It's been ten years since the launch of the iPad and, with it, the rebirth of tablet computers. The academic research simply hasn't been able to catch up, which means it's hard to know the long-term impact on young brains of being exposed to tablets and smartphones. The concern among some experts is that these devices, if used in particular ways, could be changing children's brains for the worse – potentially affecting their attention, motor control, language skills and eyesight, especially in under-fives, for whom so much brain development is taking place.

People have always feared new media. Almost 2,500 years ago Socrates was decrying the spread of written language, arguing that it would erode memory and knowledge. In the 15th century it was the printing press that brought about moral panic. Benedictine monks, who profited from hand-copying reading materials, petitioned against the mechanised printers, saying: "They shamelessly print, at negligible cost, material which may, alas, inflame impressionable youths." Even when radio arrived, it too was deemed a menace, blamed for distracting children from their homework. A 1936 article in *Gramophone* magazine reported that youngsters were developing a habit of dividing their attention between their school assignments and the compelling excitement of the loudspeaker.

Few technologies, however, have invaded our lives – and those of our children – as stealthily as the mobile computer, most commonly the smartphone or tablet. These devices are the right size for little hands to handle them, and the touchscreens easy for

tiny fingers to manipulate. But there's little clarity around the consequences of long-term use of such devices. The American Academy of Pediatrics (AAP) has erred on the side of caution, recommending absolutely no screen time for children under the age of two, and a two-hour daily limit for those older. These restrictions simply don't tally with how many people are integrating these devices into their children's lives, nor do they reflect the fact that some interactions with screens might actually be beneficial.

So why don't we know more about the risks of children using screens? There's a fundamental problem at the basis of all the research in this area – what do we even mean by "screen time"? Firstly, it's important to distinguish between types of screen: do we mean a television screen, a tablet, a smartphone or an e-reader? Secondly, the nature of the content matters: is it an interactive drawing game, an e-book, a Skype call with Grandma or a Netflix show? Thirdly, there's the context: is there a caregiver in the room talking to the child as they interact with the screen or are they left on their own?

There are a few things we do know. Most child development experts agree that while passive screen time – such as putting your child in front of a device for a *Peppa Pig* marathon – might be entertaining, it isn't going to provide a rich learning experience. In this case, it doesn't make a difference whether they're watching on TV or a tablet: the experience is broadly the same.

Having a video or TV on when a child is doing something else can distract them from play and learning, negatively affecting their development. Hours of background TV has also been found to reduce child–parent interaction, which has an adverse impact on language development. This displacement is a big concern: if kids are left with screen-based babysitters then they are not interacting with caregivers and the physical world. There are only so many hours in a day, and the time spent with screens comes at the expense of other, potentially better, activities.

Under-threes, in particular, need a balance of activities, including instructed play, exploring the natural environment, manipulating physical toys and socialising with other children and grown-ups. The rise in screen use means less of all of these things. The problem is that tablets are extremely appealing to children and adults alike. Thanks to their design, versatility and intuitive interfaces, tablets are a perfect way for children to draw, solve puzzles and be entertained on the move. Combine that with marketing efforts of digital media companies and app developers – whose measure of success tends to be the amount of time people are glued to their creation – and you have a toy that's difficult to prise out of tiny hands.