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

A mechanical friend for children

A   The development of robots that interact socially with people and assist them in everyday life has been an elusive goal of modern science. Despite impressive advances in the mechanical aspects of this problem, producing robots that bond and socialize with people for sustained periods of time has proven difficult. The most successful robots so far have been storytellers, but they have only been able to maintain human interest for a limited time and typically rely on the robot telling stories that change over time. In practice, commercially available robots seldom cross the 10-hour barrier (i.e., individual users tend to spend less than a combined total of 10 hours with the robots before losing interest). This observation is in sharp contrast to the long-term interactions and bonding that commonly develop between humans and their pets.

B   In a recent study, researchers from the Institute for Neural Computation in California introduced a state-of-the-art social robot into a classroom of 18-to-24-month-olds for five months as a way of studying human/robot interactions. The researchers, including Fumihide Tanaka and Javier R. Movellan, introduced a toddler-sized humanoid robot into a classroom at a childhood education center. One of the QRIO series of robots, the 58 cm machine, was originally developed by Sony. 'Children of toddler age were chosen because they have no preconceived notions of robots,' according to Tanaka. One of the goals of the study was to establish whether it was possible for social robots to maintain the interest of children beyond the 10-hour barrier.

C   The researchers sent instructions to the robot about every two minutes to do things like giggle, dance, sit down, fall down, or walk in a certain direction. The 45 sessions were videotaped, and interactions between toddlers and the robot were later analyzed. The results showed that the quality of those interactions improved steadily over 27 sessions. The interactions deteriorated quickly over the next 15 sessions, when the robot was ordered to behave in a more limited, predictable manner. Finally, the human/robot relations improved in the last three sessions, after the robot had been instructed to display its full range of behaviors.

D   'Initially, the children treated the robot very differently from the way they treated each other,' Tanaka said. 'Early in the study, some children cried when QRIO fell. But a month into the study, the toddlers helped QRIO stand up by pushing its back or pulling its hands.' 'The most important aspect of interaction was touch,' Tanaka said. 'At first, the toddlers would touch the robot on its face, but later on they would touch it only on its hands and arms, like they would with other humans. Another robot-like toy named Robby, which resembled QRIO but did not move, was used as a control in the study.

While hugging of QRIO increased, hugging of Robby decreased throughout the study. Furthermore, when QRIO laid down on the floor, caretaking behaviors were frequently observed toward QRIO but seldom toward Robby.'

E   The study concluded that after 45 days of immersion in a childcare center over a period of five months, long-term bonding and socialization occurred between toddlers and a state-of-the-art social robot. Overall, the interaction between children and the robot improved over time and the children progressively treated it more as a peer than a plaything. 'To my knowledge, this is the first long-term study of this sort,' said Ronald Arkin, a roboticist at the Georgia Institute of Technology in the US.

F   Tanaka and Movellan are now developing autonomous robots for the toddler classroom. 'It could have great potential in educational settings, assisting teachers and enriching the classroom environment,' Tanaka said. The researchers hope that more advanced versions of robots like QRIO could become personalized tutors to assist teachers in classrooms. A robotic tutor could react on the spot to social cues and approximate social skills like facial expression and eye gaze, they said. 'It is becoming clear that, to achieve this goal, we are going to endow machines with something similar to emotion, not just traditional forms of intelligence,' said Movellan.

G   Associate Professor David Powers, an expert in artificial intelligence and cognitive science at Flinders University in South Australia, commented, 'In this study, it is clearly demonstrated that a limited range of robot behaviors, however impressive, is nowhere near as important to human/robot interaction as being able to make appropriate responses from a broad repertoire of behaviors.' Ronald Arkin was not surprised by the affection demonstrated by the toddlers toward the robot. 'Humans have a tremendous propensity to bond with artifacts, whether it be a car, a doll, or a robot,' he said. But he also cautioned that researchers do not yet understand the consequences of increased human/robot interaction. 'Studying how robots and humans work together can give us insight into whether this is a good thing or a bad thing for society,' Arkin said. 'We need to find out what the consequences are of introducing a robot into a cadre of children. How will that enhance, or potentially interfere with, their social development? Do we really understand the long-term impact of having a robot as a childhood friend?'

*Reading Passage 2 has seven paragraphs, **A–G**.*

Which paragraph contains the following information?

*Write the correct letter, **A–G**, in boxes 14–18 on your answer sheet.*

NB *You may use any letter more than once.*

14 a comparison of children's reactions towards different robots

15 a speculation about ways robots may be able to communicate

16 a description of changes in the way the children physically handled a robot

17 a comparison between people's connections with animals and their connections with robots

18 an account of the way one robot was programmed

Look at the following statements (Questions 19–23) and the list of people below.

*Match each statement with the correct person, **A-D**.*

*Write the correct letter, **A-D**, in boxes 19–23 on your answer sheet.*

NB *You may use any letter more than once.*

19 In future, robots will not only have to think, but also to show feelings.

20 It is uncertain whether more contact between people and robots will be beneficial.

21 Very young children have not yet developed ideas about robots.

22 Robots need to perform a wide variety of actions for people to relate to them.

23 Using robots as an aid in schools may have many benefits.

List of People

A   Fumihide Tanaka
B   Javier R. Movellan
C   Ronald Arkin
D   David Powers

Complete the sentences below.

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

Write your answers in boxes 24–26 on your answer sheet.

24 Until recently, robots that were best at holding people's attention were those that acted as ………… .

25 The children responded to the QRIO robot as a friend or a ………… rather than as a toy.

26 Arkin expected that the children would show ………… towards the QRIO robot.

Questions 14–18 段落信息匹配（A–G）

题号	答案	题干翻译	详细定位句（原文）	定位句翻译	详细解释
14	D	比较孩子对不同机器人的反应	第 D 段：*"While hugging of QRIO increased, hugging of Robby decreased throughout the study."*	在研究期间，拥抱 QRIO 的行为增加，而拥抱 Robby 的行为减少。	题干关键词是 **comparison / different robots**。第 D 段把 **QRIO vs Robby** 放在同一句里对比（拥抱趋势相反），并补充 "caretaking behaviours … toward QRIO but seldom toward Robby"，属于明确的 "不同机器人反应对比"。
15	F	推测机器人将来可能用哪些方式交流/沟通	第 F 段：*"A robotic tutor could react on the spot to social cues and approximate social skills like facial expression and eye gaze …"*	机器人导师可以当场对社会线索作出反应，并近似实现如面部表情、眼神等社交技能……	题干是 **speculation**（推测、展望未来）。第 F 段谈 "could… / hope… / become…"：机器人未来可通过 **facial expression / eye gaze** 等社交信号与人互动，本质是 "沟通方式的推测"。
16	D	描述孩子**身体接触/处理机器人方式**的变化	第 D 段：*"At first, the toddlers would touch the robot on its face, but later on they would touch it only on its hands and arms …"*	起初幼儿会摸机器人的脸，但后来他们只摸它的手和胳膊……	题干关键词是 **changes / physically handled**。第 D 段直接给出 "先摸脸 → 后来只摸手臂"，并且前文还有 "helped QRIO stand up…"，都属于身体接触方式的变化。
17	A	比较人与动物的连接 vs 人与机器人的连接	第 A 段：*"This observation is in sharp contrast to … bonding … between humans and their pets."*	这一现象与人类和宠物之间常见的长期互动与情感联结形成鲜明对比。	题干要 **robots vs animals** 的比较。第 A 段先说机器人难以维持长期兴趣（10-hour barrier），紧接着用 **contrast** 对比人和宠物的长期 bonding，完全匹配。
18	C	说明某个机器人是如何被编程/控制的	第 C 段：*"The researchers sent instructions to the robot about every two minutes …"*	研究者大约每两分钟就给机器人发送指令……	题干关键词 **programmed / account of the way**。第 C 段描述具体控制方式：研究者频繁发送指令、不同阶段命令其表现 "limited/predictable" 或 "full range of behaviors"，这是最直接的 "编程/控制过程叙述"。

Questions 19–23 人物观点匹配（A–D）

> 人物表：A Tanaka ｜B Movellan ｜C Arkin ｜D Powers

题号	答案	题干翻译	详细定位句（原文）	定位句翻译	详细解释
19	B (Movellan)	未来机器人不仅要会思考，还要展示情感	第 F 段 (Movellan)：*"… endow machines with something similar to emotion, not just traditional forms of intelligence."*	……赋予机器人某种类似情感的东西，而不只是传统意义上的智能。	"not only think…but also show feelings" 对应 **emotion**。这句话明确把未来目标从 "intelligence" 扩展到 "emotion"。
20	C (Arkin)	尚不确定人与机器人更多接触是否有益	第 G 段 (Arkin)：*"… can give us insight into whether this is a good thing or a bad thing for society."*	……能让我们理解这对社会究竟是好事还是坏事。	题干核心是 **uncertain whether beneficial**。Arkin 说需要研究才能判断 "good or bad"，并强调我们尚不了解后果，完全对应 "不确定"。
21	A (Tanaka)	很小的孩子还没有形成关于机器人的看法	第 B 段 (Tanaka)：*"Children of toddler age were chosen because they have no preconceived notions of robots."*	选择幼儿是因为他们对机器人没有先入为主的观念。	题干 "have not yet developed ideas"= 原文 **no preconceived notions**。这句明确归因并标注 "according to Tanaka"。
22	D (Powers)	机器人需要行为多样，人们才更能与其建立联系	第 G 段 (Powers)：*"… a limited range of robot behaviors … is nowhere near as important … as … a broad repertoire of behaviors."*	有限的机器人行为范围远不如能从广泛行为库中作出恰当回应重要。	题干 "wide variety of actions"= **broad repertoire**。Powers 强调关键不在 "limited range"，而在 "broad repertoire + appropriate responses"，对应 "多样行动才能让人更能共处/理解"。
23	A (Tanaka)	在学校使用机器人辅助可能有很多好处	第 F 段 (Tanaka)：*"It could have great potential in educational settings, assisting teachers and enriching the classroom environment."*	它在教育场景中潜力巨大，可帮助教师并丰富课堂环境。	题干 "many benefits in schools" 对应 **great potential / assisting teachers / enriching**；且该句明确为 Tanaka 所说。

Questions 24–26 句子填空（ONE WORD ONLY）

题号	答案	题干翻译	详细定位句（原文）	定位句翻译	详细解释
24	storytellers	直到最近，最擅长吸引人注意力的机器人是扮演……的机器人	第 A 段：*"The most successful robots so far have been storytellers …"*	到目前为止最成功的机器人是讲故事的机器人……	题干 "acted as …" 对应原文 "have been …"。且要求一个词，原文复数 storytellers 完全匹配语法。
25	peer	孩子们把 QRIO 当作朋友或一个……，而不是玩具	第 E 段：*"… treated it more as a peer than a plaything."*	……更把它当作同伴，而不是玩物/玩具。	空格前是 "a"，后面是 "rather than… toy"，原文对比结构 peer vs plaything，且答案必须来自原文并为一个词：**peer**。
26	affection	Arkin 预期孩子会对 QRIO 表现出……	第 G 段：*"Ronald Arkin was not surprised by the affection demonstrated by the toddlers toward the robot."*	Ronald Arkin 对幼儿向机器人表现出的喜爱/亲昵并不惊讶。	题干 "show ___ towards" 对应原文 "affection … toward"。因此填 **affection**，且为一个词。