2024 Arkwright Aptitude Examination
Examiners' report

Overall, the quality of communication this year was not as clear as in previous years. It often took considerable time for markers to interpret a candidate's response to gain an understanding of their thinking. In a small number of instances, the candidate's writing was illegible. Many candidates drew illustrations that were unable to be interpreted due to size or legibility.

There was very little difference between Section A and B responses in terms of quality. Candidates often failed to understand what was being asked for in both sections, and it was evident that many candidates failed to make good use of the reading time at the start of the examination to either fully understand the questions and/or fully appreciate how the marks would be awarded.

Section A

Many candidates failed to make distinct separations in their three Section A responses. Markers often found it difficult to identify which solution some drawings and text belonged to.

Question1

This was, by far, the most popular question in Section A and in many cases, the ball return was well considered, with solutions often including contra-rotating wheels with momentum, pneumatic power, locked release springs or even just an inclined plane employed. There were some quite clever answers when candidates created their own targets. However, a small number of candidates failed to provide a workable solution to return the ball back to the thrower, and some candidates failed to gain marks because their solutions were often very similar.

Question 2

Most candidates had a good understanding of levers, gears, cams and pulleys, and better answers provided some quite unique and creative toy solutions, which was refreshing. However, many ignored the fact that the question asked them to design three different children's toys. Responses often lacked creativity and merely provided examples of the relevant mechanism with a superficial description of how it could be used in a toy.

Question 3

Better answers often demonstrated creativity, with solutions showing a range of unobtrusive clamping systems using relevant technology. Higher scoring candidates provided technical details as to how the mechanical aspects of their designs functioned.

However, few candidates attempted this question, and it was often difficult to understand what had been presented, with little annotation to help the marker follow the candidate's thinking. Some responses were quite basic, with many suggesting a simple box or locker locked with a padlock.

Section B

Questions 4 and 6 were popular with candidates.

Many candidates failed to appreciate that this section requires a more detailed technical answer, distinctly different to Section A. Materials and components were often dealt with as an after-thought, and construction methods were often missing.

Question 4

The better candidates had a good grasp of the question and met the requirement for a 'hand-operated, push-along' grit spreader, with full consideration to the transfer of rotary motion from the wheels to the operation of a 'spreader.' It was pleasing to see that some candidates had considered the use of bearings in the wheel assembly to make movement easier. Higher scoring answers showed consideration of refilling the device with grit and an understanding of the weight of the material.

However, the most popular solution to this question was a large rotating drum with holes, with no understanding of how to control the flow of the grit, and many responses lacked the necessary detail to attain high marks. Too many solutions were large four-wheeled boxes, often with components 'floating' inside, and with wheels that would be too small to roll over snow or ice. Where an electric motor was included, the mounting of it and the integration into the overall system was often poorly explained and illustrated.

Question 5

There were some good technical answers, but these were in the minority. Notable responses included consideration of movement in the X and Y planes to fulfil the rocking motion. Better candidates considered how the weight of the chair and the occupant would affect their design.

The most common solution was to mount the chair on a platform which had hydraulic cylinders at each corner. The control of these cylinders was often not well explained, and the structural integrity of the overall construction was generally overlooked. The mounting of the chair to the frame was seldom considered.

Question 6

There were a broad range of responses to this question, and it was answered by nearly a quarter of all candidates. The good responses were clear, well ordered and the connecting lines between the shapes in flow charts where straight and did not wonder around the page. Some responses unsuccessfully mixed python and other coding languages inside the flowchart shapes. The better responses had clear and concise statements with additional bullet points around the flowchart to explain what was happening. In addition, the better responses had planned their flowchart before starting to write their answer. However, some candidates evolved their flowchart as they went along and did not change the beginning part of their systems where needed. Some students also unnecessarily designed and drew the juice dispenser and all the internal mechanisms, which was nice to see but did not add a lot of marks to the answers.