Skills Show 4th Edition 2026 – 2027
Family Challenge

Updated proposal | 10 Nov 2026 – 28 Jan 2027 | Tue–Thu

Three Concepts • 10 weeks • 30 live episodes

3- Visual Concept Autonomous Delivery Robot – Grade 1–12

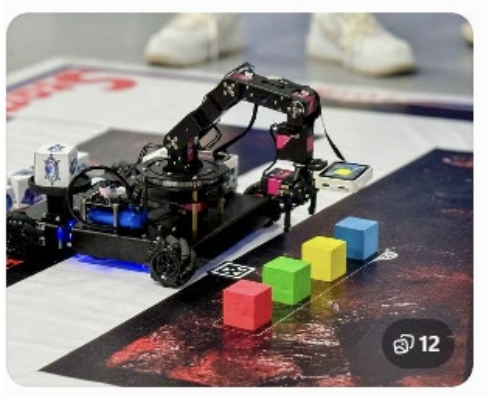
What exactly must the family do?

The family designs, builds and programs a fully autonomous robot that **follows the line, climbs the ramp, senses each parcel's colour** and delivers **three parcels** to their matching zones. Nobody controls the robot after the start.

1. **Start:** the student presses the start button.
2. **Follow the line:** the robot uses line following for the whole route.
3. **Take the right turn:** at **Junction 1 and Junction 2**, choose the correct direction. Short branch lines lead to each pick-up and delivery zone.
4. **Climb the ramp:** the ramp is part of the route and is **mandatory**.
5. **Sense and deliver:** at the pick-up zones, read each cube's colour with a sensor, then push or lift it fully inside the delivery zone of the same colour.
6. **Come home:** return to the start area.

The cubes are placed in random order, and the delivery zone order is revealed on stage just before each run.

On the day: calibration and adjustments in the pit → two runs on stage (best run counts) → student presents the robot to the judges.



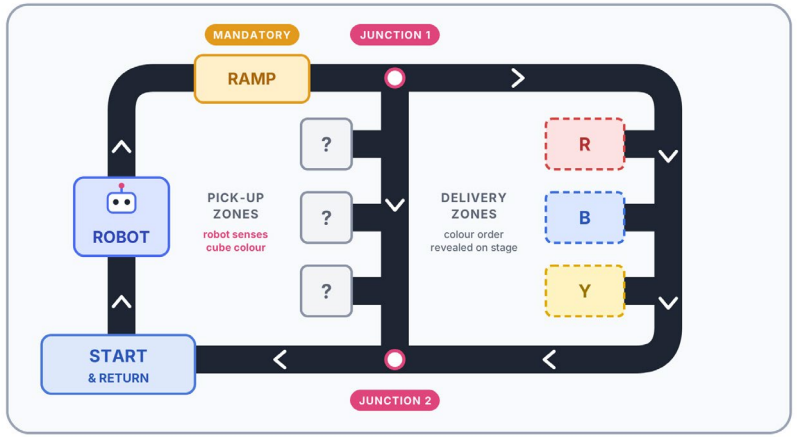


Illustration only. The official Senior mat must specify the actual parcel pick-up points, delivery zones, junctions and ramp.

Innovation A — Reliable gripper or precision pusher
Design a mechanism that handles a 50 mm cube securely and places it fully inside the zone, every time.

Innovation B — Robust colour sensing
Make the colour reading reliable under stage lighting: sensor position, shielding from ambient light, calibration routine, or a confirmation by a second reading.

Innovation C — Smart route planning
Program the robot to decide the delivery sequence from the colours it reads, choosing the shortest route.

Innovation D — Speed and control
Tune the line-following control, speed on the ramp and turning at the junctions to finish more reliably and quickly.

03 Autonomous Delivery Robot – Grade 1–12

CHALLENGE CONCEPT

THE FAMILY MISSION **Design, build and program a fully autonomous robot that follows the line, climbs the ramp, senses the colour of each cube and delivers three parcels into their matching zones, then returns to the start.**

WHAT MUST BE SUBMITTED

Signed family consent form; finished robot; code or program screenshots; labelled mechanism diagram; 3 photos; continuous 60–90 sec trial video; short testing record (younger students may use drawings or photos).

MANDATORY TECHNICAL RULES

- Starting size ≤250 × 250 × 300 mm; weight ≤2 kg; on-board power ≤12 V; LiPo in a hard case, handled by an adult.
- Standard mat 2.4 × 1.2 m, 20 mm black line; 2 junctions + mandatory ramp
- Three 50 mm cubes placed in random order; delivery zone order revealed on stage; no reprogramming after the reveal
- Kit, LEGO or self-built; line following; colour sensing required; push or lift; no remote control, magnets, adhesive, suction or projectiles

STANDARDISED ASSESSMENT / EXPERT TEST

01 Check compliance, original mechanism and code decisions, and safety.
02 Robot follows the line, takes the correct direction at both junctions and climbs the ramp.
03 Senses each cube’s colour, delivers all 3 fully inside the correct zones, then returns to start.
04 Two runs of max. 2:30 on one common mat; best run counts; 1 reset allowed, clock running.

03 Assessment Framework & Decision Points – Grade 1–12

100-POINT RUBRIC

SCORING CRITERION	POINTS
Correct deliveries / 3 parcels	40
Autonomous navigation + return	15
Reliability and completion time	10
Engineering execution / mechanism	10
Testing record and student explanation	10
Innovation and problem-solving	15
TOTAL	**100**

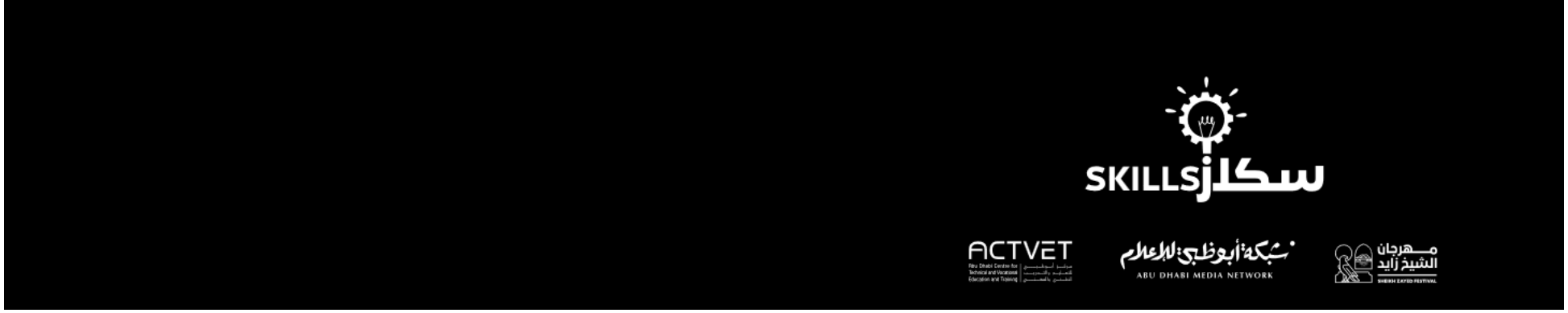
WHAT THE JUDGES WILL VERIFY

Award points per cube fully inside the correct zone, plus points if all three are correct; points if partly inside or in a wrong zone. Navigation: points for start to Junction 1, Junction 1, ramp and Junction 2; return to start. Confirm that no reprogramming took place after the reveal. Record run time, resets and departures. Same mat, lighting and cube order for all families in the same run slot. Questions are adapted to the student's grade.

RISK CONTROL

Colour sensing is required. 3 minutes of calibration on the competition mat on the day. The calibration computer may adjust sensor values only, not the program logic. Ramp and stage lighting tested with a staff robot before the event. LiPo in a hard case, handled by an adult.
Innovation (15): distinctive parcel handling or coding solution (5); evidence of troubleshooting and iteration (5); functional improvement to delivery reliability (5).
Tie-break: more cubes delivered, then lower time, then higher engineering score.

Families bring their own hand tools and spare parts for maintenance and adjustments, used in the pit area only.



Thank you

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