SENIOR PHASE

GRADE 9

NOVEMBER 2014

TECHNOLOGY
MEMORANDUM

MARKS: 120

This memorandum consists of 9 pages.

SECTION A: MULTIPLE-CHOICE QUESTIONS

QUESTION 1

1.1 B √ (1)

1.2 B √ (1)

1.3 C √ (1)

1.4 B √ (1)

1.5 B √ (1)

1.6 B √ (1)

1.7 A √ (1)

1.8 C √ (1)

1.9 D √ (1)

1.10 C √ (1)

TOTAL SECTION A: 10

SECTION B: STRUCTURES

QUESTION 2

2.1 A   Tension √   (1)
     B   Bending √   (1)
     C   Torsion √   (1)
     D   Shearing √   (1)

2.2 2.2.1   Frame structure√   (1)

     2.2.2   Grass and flexible poles √   (1)

     2.2.3   Natural materials are environmentally friendly (do not cause harm to
              the environment). √   (1)

     2.2.4   Flexible poles were set in a circle then bent over and fastened
              towards the center. √√   (2)

     2.2.5   The grass serves as an insulator and water proofing. √

OR

              The grass keeps the dwellings warm in winter and cool in summer. √
              (Any ONE of the above or any other acceptable answer.)   (1)

2.3 EVEN LOADS

     •   When a load is placed in such a way that it is balanced/in the centre of
         the base on which it stands. √   (1)

     UNEVEN LOAD

     •   When a load is placed in such a way that it is not balanced/placed off
         centre on the base on which it stands. √   (1)

                                                                    TOTAL SECTION B: 12

SECTION C: DESIGN AND GRAPHIC COMMUNICATION

QUESTION 3

3.1   Check the ability of the learner to create a design brief (the sentence should
        start with: Design and make …) √   (1)

        e.g. Design and make a container to keep money safe and can be placed in
        a place that is out of reach of others.

3.2   3.2.1   **Material:**   (a)   What type of material should be used? √   (1)
                                    (b)   Is the material readily available? √   (1)

        3.2.2   **Cost:**   (a)   How much money is needed? √   (1)
                                    (b)   How much should the final device cost? √   (1)

        3.2.3   **Function:**   (a)   What is the purpose of the device? √   (1)
                                    (b)   How should the device be used? √   (1)

        3.2.4   **Ergonomics:**   (a)   How functional for the user is it? √   (1)
                                    (b)   What age group should use the device? √   (1)

        NB.: Any other reasonable and valid answer given on the above aspects
        should be considered by the marker.

3.3   Check the ability of the learner to develop specifications. Give ONE mark for
        each of the SEVEN specifications given under the following aspects: (1)

        3.3.1   People √ e.g. to be used by school children.   (1)

        3.3.2   Purpose √ e.g. a container in which money is secured for safe
                  keeping.   (1)

        3.3.3   Appearance √ e.g. should look aesthetically pleasing and
                  appropriate for school children.   (1)

        3.3.4   Ergonomics √ e.g. Should be an appropriate size for children's
                  hands to operate.   (1)

        3.3.5   Safety √ e.g. should be safe for children to open and close.   (1)

        3.3.6   Cost √ e.g. the cost should not be excessive.   (1)

        3.3.7   Impact √ e.g. should be made of natural materials so that it is
                  environmentally friendly.   (1)

3.4 **RUBRIC FOR DESIGN SKILLS**

Skills	Description	Marks Allocated
Initial idea sketches	It is evident from the sketch that it is a solution to the problem identified.	1 mark for each sketch = (3)
(Maximum = 8 marks for the entire question)	The view is complete and neatly drawn	1 mark for each sketch = (3)
	➢ A clear reason explaining why one of the initial ideas is chosen. ➢ The reason is there but not clear of why one of the initial ideas was chosen.	2 marks 1 mark

3.5 Check the ability of the learner to formulate THREE questions against the list of specifications to evaluate the final solution: Evaluate and design.

e.g.
• Was a suitable material used?
• Is the product well-constructed?
• Is the product functional?
• Is it safe for children to open and close?
• Is it cost affordable?
• Is the size appropriate for children's hands to operate and open?
• Does it look aesthetically pleasing?
1 mark for each question developed (Maximum of 3 marks). (3)

3.6 ASSESSMENT RUBRIC

Skill		Description	Marks Allocated
Isometric projection (maximum marks = 6)	(a)	The features of the sketch are those of an isometric projection, e.g. angles at $30^°$, any hidden detail shown?(if necessary)	3 marks
	(b)	Lines are constructed effectively, e.g. hard, soft, broken lines, etc.	2 marks
	(c)	Neatness	1 marks

3.7   The learner must be able to draw at least FIVE steps (on sequence of operations) that he/she will follow to make the solution. NB. The teacher must check for logical sequence of steps to be followed and allocate 1 MARK for each step. Diagnostic

e.g.

No.	Operation
1.	Collecting materials
2.	Measuring
3.	Cutting/sawing etc.
4.	Joining/applying glue
5.	Apply finish

(5)

3.8   3.8.1   1 – Front view √   (1)
                2 – Side view or Left view √   (1)
                3 – Top view √   (1)

        3.8.2   (a)   Show symmetry   (1)

                (b)   Outlines   (1)

                (c)   Hidden detail line by means of broken lines   (1)

                (d)   Construction lines   (1)

                                                    TOTAL SECTION C: 46

SECTION D: SYSTEMS AND CONTROL (MECHANICAL)

QUESTION 4

4.1   *Mechanical advantage* $= \frac{\text{load}}{\text{effort}}$ √ (ONE mark for formula)

$= \frac{600 \text{ N}}{150 \text{ N}}$ √

$= 4$ √   (3)

4.2   Disc brakes are used to stop a moving vehicle more effectively. √   (1)

4.3   • Rim brakes are cheap. √
       • They are easy to maintain. √   (2)

4.4   4.4.1   A – Pawl √   (1)
                B – Ratchet √   (1)
                C – Crank handle √   (1)

       4.4.2   To turn the ratchet axle. √   (1)

       4.4.3   Car seat belts, mechanical jack, turnstiles in shops, a winch in a
                water well, etc. √
                (1 mark for a correct answer)   (1)

4.5   4.5.1   Gear B. √   (1)

       4.5.2   Gear A is the one that is connected to a motor so it has to be the
                first one to move √   (1)

       4.5.3   Anticlockwise √   (1)

       4.5.4   Velocity ratio $= \frac{\text{No. of teeth on driven gear}}{\text{No. of teeth on driver gear}}$

                $= \frac{20}{40}$ √

                $= 1 : 2$ √   (2)

4.6

INPUT	PROCESS	OUTPUT
Person pushes and pulls the handle of the jack up and down. √	The hydraulic fluid is forced past the one way valve and moves the output piston. √	The jack lifts the car or the load. √

(3)

4.7   4.7.1   Cleat – Boats, blinds, mountain climbing equipment, flag pole. √   (1)

       4.7.2   One-way valve –- Hydraulic jack, taps, pneumatic safety valves. √ (1)

                                                        TOTAL SECTION C: 21

SECTION E: SYSTEMS AND CONTROL (ELECTRICAL)

QUESTION 5

5.1   A – Battery √   (1)
        B – Switch √   (1)
        C – Resistor √   (1)
        D – Capacitor √   (1)
        E – Transistor √   (1)
        F – Light Emitting diode √   (1)

5.2 $= \dfrac{V}{I}$ √

        $= \dfrac{12}{3}$ √

        $= 4\ \Omega$ √   (3)

5.3   5.3.1   thermistor – process √   (1)

        5.3.2   LED – output √   (1)

        5.3.3   Photovoltaic panel/cell – input √   (1)

5.4   5.4.1   Transistor √   (1)

        5.4.2   They can be used as switches. √   (1)

        5.4.3   e – Emitter √
                  b – Base √
                  c – Collector √   (3)

5.5   5.5.1   Yellow in the 1st band = 4 √
                  Violet in the 2nd band = 7 √
                  Brown in the 3rd band = 0 √
                               $= 470\ \Omega$ (3)

        5.5.2   Accuracy/Tolerance rating = 10% √   (1)
                                                                                       [21]

QUESTION 6: PROCESSING

6.1   6.1.1   Drying (Beans, maize, a variety of fruits and vegetables, meat etc.) √

(1)

        6.1.2   Pickling (Fish and vegetables such as onions, gherkins etc.). √

        6.1.3   Salting (Meat and vegetables) √   (1)

6.2   6.2.1   Polyvinyl chloride √   (1)

        6.2.2
- Plastics can be moulded into many different shapes.
- Plastics are flexible.
- Plastics can stretch.
- Plastic is durable and degrades slowly.
- Can be transparent – or coloured.
- Can be heat resistant.
- Plastics are waterproof. √√   (2 x 1)   (2)

6.1   6.3.1   Recycle √   (1)

        6.3.2   Reuse √   (1)

        6.3.3   Reduce √   (1)

6.4   Galvanising √   (1)

[10]

TOTAL SECTION E: **31**
GRAND TOTAL: **120**