EV Copy

Republic of Philippines
DEPARTMENT OF EDUCATION
DepEd Complex, Meralco Avenue, Pasig City
https://www.deped.gov.ph/

PROJECT: **Mass Production and Supply of Science and Mathematics Equipment Packages to Public Elementary for Grades 1 to 3 and Grades 4 to 6, Public Junior High Schools for Grades 7 to 10 and Public Senior High Schools for Grades 11 to 12 (CORE and STEM)**

CONTRACT NO.: **2022-BLR4(001to006)-BV-CB001-C032**

CONTRACT

THIS CONTRACT made and entered into this 29th day of August 2023 by and between the **DEPARTMENT OF EDUCATION**, located at DepEd Complex, Meralco Avenue, Pasig City, represented herein by its Undersecretary for Human Resource and Organizational Development, **GLORIA JUMAMIL-MERCADO**, as per Department Order No. 001, s. 2023, dated 09 January 2023 and Office Order OO-OSEC-2023-60, dated 14 March 2023 (hereinafter referred to as "**DEPED**"); and **SCIENTIFIC PRODUCT COMPANY**, represented herein by its Authorized Representative, **ALEXANDER O. LEE**, with office address at 1334 Tayuman St., Brgy. 331, Zone 33, Sta. Cruz, Manila (hereinafter referred to as "**SCIENTIFIC PRODUCT**"), as per Omnibus Sworn Statement dated 03 February 2022 (hereto attached as Annex "A").

DEPED and **SCIENTIFIC PRODUCT** are collectively called **PARTIES.**

***WHEREAS,* DEPED** invited bids for the mass production and supply of Science and Mathematics Equipment Packages consisting of 14 lots, and received bids from two (2) bidders for Lot No. 14; **DEPED** opened, read, and evaluated the bids and declared the Lowest Calculated Bid for Lot No. 14; after evaluation, **DEPED** post-qualified the said bid and declared the same as disqualified; **DEPED** declared the bid of **SCIENTIFIC PRODUCT** as the next calculated responsive bid; after evaluation, **DEPED** declared the bid of **SCIENTIFIC PRODUCT** as the Lowest Calculated Responsive Bid for Lot No. 14 in the sum of **PHILIPPINE PESOS ONE HUNDRED FIFTY-THREE MILLION, FOUR HUNDRED THIRTY-SIX THOUSAND, EIGHT HUNDRED EIGHTY-SIX AND 35/100 (PHP153,436,886.35) ONLY**, (hereinafter called the "Contract Price"), detailed as follows:

Lot No.	Description	Amount (PhP)
14 MI-F&EK	FORCE, MOTION AND ENERGY KITS (MI-LOT 14)	153,436,886.35

NOW THIS CONTRACT WITNESSETH AS FOLLOWS:

1. In this Contract, words and expressions shall have the same meaning as are respectively assigned to them in the Conditions of Contract referred to.

MA. VIRGINIA A. FERNANDEZ
SCIENTIFIC PRODUCT'S Witness

ALEXANDER O. LEE
SCIENTIFIC PRODUCT

ARIZ DELSON ACAY D. CAWILAN
DEPED'S Witness

GLORIA JUMAMIL-MERCADO
DEPED

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2. The following documents as required by the 2016 revised Implementing Rules and Regulations of Republic Act No. 9184 shall be deemed to form and be read and construed as part of this Contract, *viz*:

   a. Philippine Bidding Documents;

      i. General and Special Conditions of the Contract;
      ii. Schedule of Requirements; and
      iii. Technical Specifications;
      iv. Bid Bulletin No. 1 dated 29 December 2021, Bid Bulletin No. 2 dated 17 January 2022, Bid Bulletin No. 3 dated 21 January 2022, and Bid Bulletin No. 4 dated 27 January 2022;

   b. **SCIENTIFIC PRODUCT**'s bid, including the eligibility requirements, technical and financial proposals, and all other documents or statements submitted in accordance with the Bidding Documents;
   c. Performance Security;
   d. Notice of Award (NOA) of Contract and **SCIENTIFIC PRODUCT**'s conforme thereto; and
   e. Other contract documents required by existing laws and/or DepEd in the Bidding Documents. **SCIENTIFIC PRODUCT** agrees that additional contract documents of information prescribed by the Government Procurement Policy Board (GPPB) that are subsequently required for submission after the contract execution such as, but not limited to, Notice to Proceed, Variation Order, and Warranty Security, shall form part of the Contract.

3. **SCIENTIFIC PRODUCT** shall post a Performance Security within 10 calendar days from receipt of the NOA in the form and amount prescribed therein. The Performance Security shall be posted in favor of **DEPED**, and shall be forfeited in the event that it is established that **SCIENTIFIC PRODUCT** is in default of any of its obligations under this Contract. **SCIENTIFIC PRODUCT** shall be responsible for the extension of its performance security and/or undertake to renew its Performance Security whenever necessary, and without the need for prior notice of instruction from **DEPED**, to ensure that it is in force and effect for the whole duration of the Contract and until a Certificate of Final Acceptance is duly issued.

4. The goods referred to in this Contract must be ready for pick-up and hauling by the designated hauling service provider within **210 CALENDAR DAYS** from the receipt of the Notice to Proceed (NTP). **SCIENTIFIC PRODUCT** shall ensure that the goods to be picked up and hauled must be in accordance with the Schedule of Requirements, which is hereto attached as Annex "B" and made an integral part hereof.

5. **DEPED** shall have the right to visit and inspect **SCIENTIFIC PRODUCT**'s premises covered by the Contract at any time or stage of the contract implementation to monitor and assess **SCIENTIFIC PRODUCT**'s capacity to discharge its contractual obligations.

6. **DEPED** shall have the right to inspect and test or cause the testing of the goods covered by the Contract, at any time or stage of contract

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SCIENTIFIC PRODUCT's Witness

ALEXANDER O. LEE
SCIENTIFIC PRODUCT

ARIZ DELSON ACAY D. CAWILAN
DEPED's Witness

GLORIA JUNAMI MERCADO
DEPED

implementation. Prior to and for purposes of inspection, **SCIENTIFIC PRODUCT** shall ensure convenient access to the goods for inspection. **SCIENTIFIC PRODUCT** shall assign personnel to undertake the handling, unpacking, assembly, commissioning, disassembly, repacking, resealing, and sorting of the goods prior to, during, and after inspection.

7. The goods shall be inspected by the designated Inspectorate Team prior to pick-up and hauling from **SCIENTIFIC PRODUCT**'s warehouse in accordance with the provisions of the Special Conditions of the Contract, the Schedule of Requirements, or otherwise indicated in other parts of the Bidding Documents. **SCIENTIFIC PRODUCT** shall coordinate with **DEPED**, through the Procurement Management Service-Contract Management Division (ProcMS-CMD), on the conduct of inspection of goods. Any request for inspection shall be done in writing and contain the following information:

   a. Project Title and Contract Number;
   b. Specific goods for inspection;
   c. Quantity of goods for inspection;
   d. Venue/Address of inspection site; and
   e. Proposed schedule of inspection which must be at least 10 calendar days from the submission of the written request.

   The request for inspection or PDI must be submitted to **DEPED** through ProcMS-CMD or by email at procms.cmd@deped.gov.ph.

8. The goods must conform to and comply with the standards mentioned in Section VI. Schedule of Requirements of the Bidding Documents, and Technical Specifications under Section VII of the same document, which is hereto attached as Annex "C" and made an integral part hereof.

   Any proposal by **SCIENTIFIC PRODUCT** to deliver goods of different technical specifications, in lieu of those indicated in Section VII. Technical Specifications of the Bidding Documents, shall not be allowed. However, under justifiable circumstances, *i.e.* fortuitous events, force majeure, acts of God, public state emergency, or those defined under the Civil Code and other similar circumstances, delivery of goods of equivalent, higher, or superior technical specifications may be permitted, subject to the evaluation and favorable recommendation of the **DEPED**'s end-user or implementing unit, and the approval of the herein authorized signatory. In any such case, the proposal by **SCIENTIFIC PRODUCT** for substitution shall be in writing and shall not result in any additional cost or undue burden to **DEPED**.

9. Title to the goods shall pass from **SCIENTIFIC PRODUCT** to **DEPED** after inspection and upon acceptance by the latter. After inspection and acceptance, **SCIENTIFIC PRODUCT** shall ensure that the goods are appropriately sealed and fit for hauling and transport. **SCIENTIFIC PRODUCT** shall also ensure convenient access to the goods for hauling.

10. The goods shall be picked-up or hauled by the designated hauling service provider of **DEPED** within 90 calendar days after the date of inspection

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SCIENTIFIC PRODUCT's Witness

ALEXANDER O. LEE
SCIENTIFIC PRODUCT

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and acceptance as reflected in the Inspection and Acceptance Report (IAR). The said period is intended to provide **DEPED**, through the designated hauling service provider, sufficient time to undertake the hauling of the goods.

However, during the 90-day intervening period, **SCIENTIFIC PRODUCT** shall retain the risks over the goods and have the residual obligation to ensure the safekeeping of the goods while the same are in its custody. **SCIENTIFIC PRODUCT** shall assume accountability over the goods until the pick-up or hauling of the same and the issuance of the Transfer Manifest by the designated hauling service provider.

Further, assembly, installation, start-up, and/or commissioning of goods, in cases where they are necessary, shall remain to be the responsibility and for the account of **SCIENTIFIC PRODUCT** notwithstanding inspection and acceptance at its warehouse or premises.

11. Goods with defects or non-compliant with the required technical specifications upon delivery shall be rejected, orally or in writing, by **DEPED** and replaced by **SCIENTIFIC PRODUCT** in accordance with the warranty provisions in the bidding documents. The replacement of the goods shall be subject to re-inspection.

12. In case **SCIENTIFIC PRODUCT** encounters condition(s) impeding timely delivery of the goods, **SCIENTIFIC PRODUCT** shall promptly notify **DEPED**, through the **Bureau of Learning Resources-Cebu (BLR-Cebu)**, in writing within five (5) calendar days from notice of such condition(s). Any request for work suspension and/or contract period extension shall be promptly done in writing as soon as circumstances justifying such request have become apparent. **SCIENTIFIC PRODUCT** must provide sufficient proof to support any request for work suspension and/or contract period extension.

13. The Contract Price shall be paid to **SCIENTIFIC PRODUCT** in accordance with the following disbursement procedures:

    a. **SCIENTIFIC PRODUCT** may submit a request for payment based on the following:

        i. **SCIENTIFIC PRODUCT**'s invoice showing goods' description, quantity, unit price, and total amount;
        ii. Duly signed Delivery Receipts in sequential order of DR numbers (cumulative quantities of goods delivered based on the schedule of deliveries and other relevant terms and conditions of the Contract);
        iii. Duly signed IARs, including certification by **SCIENTIFIC PRODUCT**, duly signed and dated by **DEPED**, through the authorized representative of BLR-Cebu, indicating that the goods have been delivered in accordance with the Contract; and
        iv. Warranty Certificate.

MA. VIRGINIA A. FERNANDEZ
SCIENTIFIC PRODUCT's Witness

ALEXANDER O. LEE
SCIENTIFIC PRODUCT

ARIZ DELSON ACAY D. CAWILAN
DEPED's Witness

GLORIA JUKAMIL-MERCADO
DEPED

Other documents in support of a request for payment may be required by **DEPED** pursuant to existing disbursement, accounting, and auditing rules and procedures.

b. Payment shall be made to **SCIENTIFIC PRODUCT** within 60 days from submission of the documents specified in SCC Clause 2.2 and other documents as may be prescribed by **DEPED** in the following manner:

   i. For every progress payment, a minimum of 25% of the Contract Price shall be paid to **SCIENTIFIC PRODUCT** upon delivery of at least 25% of the goods and acceptance of the same by the duly authorized representative of **DEPED**;

   ii. Final payment shall consist of the full and final payment of the unpaid inspected and accepted goods, subject to the submission of the required documents under the Bidding Documents.

14. Payment shall be subject to the "Warranty" provision in the form of either retention money in an amount equivalent to three percent (3%) of the progress payment or a Special Bank Guarantee in an amount equal to three percent (3%) of the Contract Price required under Section 62 of RA 9184 and its revised IRR.

    a. A one-year warranty for the goods shall reckon from the date of the issuance of the Certificate of Final Acceptance by **DEPED**.

    b. In case **SCIENTIFIC PRODUCT** opts for retention money, the amount shall be released at the expiration of the warranty period or the remaining amount in case it has been utilized pursuant to the warranty provision unless, during the remainder of the warranty period, the retention money is substituted with a special bank guarantee.

15. Each party in the performance of their respective duties and responsibilities under this Contract and in the implementation thereof shall adhere to Republic Act No. 10173, otherwise known as the "Data Privacy Act of 2012." Any gathered data and information should be protected and respected during the term and even after the termination of this Contract. The processing of any gathered data and information should be in compliance with the confidentiality and privacy requirements under the said law and applicable regulations.

16. **SCIENTIFIC PRODUCT** shall be liable for liquidated damages in an amount equal to one-tenth (1/10) of one percent (1%) of the cost of the delayed goods scheduled for delivery, for every day of delay until such goods are finally delivered and accepted by **DEPED**. **DEPED** shall deduct the liquidated damages from any money due or which may become due to **SCIENTIFIC PRODUCT**, or collect from any of the securities or warranties posted by **SCIENTIFIC PRODUCT**, whichever is convenient to **DEPED**. Once the accumulated amount of liquidated damages reaches 10% of the

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GLORIA DEMAMIL-MERCADO
DEPED

Contract Price, **DEPED** may rescind or terminate the Contract, without prejudice to other courses of action and remedies available under the circumstances.

17. The **PARTIES** shall make every effort to resolve amicably and by mutual consultation any and all disputes or differences arising between the **PARTIES** in connection with the implementation of the Contract. Should such dispute not be resolved amicably, it shall be submitted to Early Neutral Evaluation pursuant to Republic Act No. 9285 or the "Alternative Dispute Resolution Act of 2004", and its Implementing Rules and Regulations.

IN WITNESS WHEREOF, the **PARTIES** hereto have caused this Contract to be executed in accordance with governing laws on the day and year first above written.

SIGNED, SEALED AND DELIVERED BY:

GLORIA JUMAMIL-MERCADO
Undersecretary for Human Resource
and Organizational Development
DEPED

ALEXANDER O. LEE
Authorized Representative
SCIENTIFIC PRODUCT

SIGNED IN THE PRESENCE OF:

ARIZ DELSON ACAY D. CAWILAN
DEPED's Witness

MA. VIRGINIA A. FERNANDEZ
SCIENTIFIC PRODUCT's Witness

CERTIFIED FUNDS AVAILABLE: ₱153,436,886.35

MA. RHUNNA E. CATALAN
Chief Accountant
Chief Accountant

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REPUBLIC OF THE PHILIPPINES)
PASIG CITY, METRO MANILA) S.S

ACKNOWLEDGMENT

BEFORE ME, a Notary Public in and for PASIG CITY, Philippines, this _____ day of 30 AUG 2023 2023 personally appeared:

NAME	**GOVERNMENT ISSUED ID** *(Number, Issued On, Issued By)*
GLORIA JUMAMIL-MERCADO Undersecretary for Human Resource and Organizational Development DEPED	P6519758A, 22 March 2018 DFA Manila

Known to me and to me known to be the same person who executed the foregoing instrument and acknowledged to me that the same is the free and voluntary act and deed of the entity which he/she respectively represents.

The foregoing instrument is a CONTRACT consisting of six (6) pages (exclusive of attachments), excluding this page on which this acknowledgment is written and signed by the party hereto.

WITNESS MY HAND AND SEAL on the date and place first above written.

ATTY. LETICIA M. AMON
Notary Public / NOTARY PUBLIC
Pasig, Pateros & San Juan
Valid Until December 31, 2023
Roll No. 22188
PTR AA No. 0112306/01-03-23
Lifetime IBP Member No. 04286
Official Receipt No 574709. IBP Chapter
MCLE Compliance No VII-0000050/6-18-2019
Ground Flr. Armal Centre, U. Velasco, Ave.,
Malinao, Pasig City

Doc. No. 28;
Page No. 7;
Book No. 22;
Series of 2023.

REPUBLIC OF THE PHILIPPINES)
PASIG CITY, METRO MANILA) S.S

ACKNOWLEDGMENT

BEFORE ME, a Notary Public in and for PASIG CITY, Philippines, this ____ day of 30 AUG 2023 2023 personally appeared:

NAME	**GOVERNMENT ISSUED ID** *(Number, Issued On, Issued By)*
ALEXANDER O. LEE Authorized Representative SCIENTIFIC PRODUCT	P 2207967B, 19 May 2019 DFA Manila

Known to me and to me known to be the same person who executed the foregoing instrument and acknowledged to me that the same is the free and voluntary act and deed of the entity which he/she respectively represents.

The foregoing instrument is a CONTRACT consisting of six (6) pages (exclusive of attachments), excluding this page on which this acknowledgment is written and signed by the party hereto.

WITNESS MY HAND AND SEAL on the date and place first above written.

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Doc. No. 29;
Page No. 7;
Book No. 122;
Series of 2023.

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Omnibus Sworn Statement

REPUBLIC OF THE PHILIPPINES)
CITY/MUNICIPALITY OF MANILA) S.S.

AFFIDAVIT

I, Alexander O. Lee , of legal age, Married, Filipino, and residing at No, 513 Adams Ext. St. Don Antonio Royale, Commonwealth Avenue, Quezon City after having been duly sworn in accordance with law, do hereby depose and state that:

1. I am the duly authorized and designated representative of Scientific Product Company with office address at 1334 Tayuman St. Brgy. 331 Zone 33 Sta. Cruz Manila;

2. I am granted full power and authority to do, execute and perform any and all acts necessary to participate, submit the bid, and to sign and execute the ensuing contract for **Mass Production and Supply of Science and Mathematics Equipment Packages to Public Elementary Schools for Grades 1 to 3 & Grades 4 to 6, Public Junior High Schools for Grades 7 to 10 and Public Senior High Schools for Grades 11 to 12 (CORE & STEM) Project No: 2022-BLR4(001to006)-BV-CB-001 for Lot 10 (MI-M:EOHB) Models: Earth and Other Heavenly Bodies (MI-Lot 10) , Lot 13 (MI-M:MG) Models: Molecular Geometry (MI-Lot 13) and Lot 14 (MI-F&EK) Force, Motion and Energy Kits (MI-Lot 14) of the Department of Education - Bureau of Learning Resources – Cebu (BLR-Cebu)** as shown in the attached notarized Secretary's Certificate;

3. Scientific Product Company is not "blacklisted" or barred from bidding by the Government of the Philippines or any of its agencies, offices, corporations, or Local Government Units, foreign government/foreign or international financing institution whose blacklisting rules have been recognized by the Government Procurement Policy Board, by itself or by relation, membership, association, affiliation, or controlling interest with another blacklisted person or entity as defined and provided for in the Uniform Guidelines on Blacklisting;

4. Each of the documents submitted in satisfaction of the bidding requirements is an authentic copy of the original, complete, and all statements and information provided therein are true and correct;

5. Scientific Product Company is authorizing the Head of the Procuring Entity or its duly authorized representative(s) to verify all the documents submitted;

6. None of the officers and members of Scientific Product Company is related to the Head of the Procuring Entity, members of the Bids and Awards Committee (BAC), the Technical Working Group, and the BAC Secretariat, the head of the Project Management Office or the end-user unit, and the project consultants by consanguinity or affinity up to the third civil degree;

7. Scientific Product Company complies with existing labor laws and standards; and

8. Scientific Product Company is aware of and has undertaken the following responsibilities as a Bidder in compliance with the Philippine Bidding Documents, which includes:

   a) Carefully examining all of the Bidding Documents;

   b) Acknowledging all conditions, local or otherwise, affecting the implementation of the Contract;

   c) Making an estimate of the facilities available and needed for the contract to be bid, if any; and

   d) Inquiring or securing Supplemental/Bid Bulletin(s) issued for the Project: **Mass Production and Supply of Science and Mathematics Equipment Packages to Public Elementary Schools for Grades 1 to 3 & Grades 4 to 6, Public Junior High Schools for Grades 7 to 10 and Public Senior High Schools for Grades 11 to 12 (CORE & STEM) Project No: 2022-BLR4(001to006)-BV-CB-001**

9. Scientific Product Company did not give or pay directly or indirectly, any commission, amount, fee, or any form of consideration, pecuniary or otherwise, to any person or official, personnel or representative of the government in relation to any procurement project or activity.

10. In case advance payment was made or given, failure to perform or deliver any of the obligations and undertakings in the contract shall be sufficient grounds to constitute criminal liability for Swindling (Estafa) or the commission of fraud with unfaithfulness or abuse of confidence through misappropriating or converting any payment received by a person or entity under an obligation involving the duty to deliver certain goods or services, to the prejudice of the public and the government of the Philippines pursuant to Article 315 of Act No. 3815 s. 1930, as amended, or the Revised Penal Code.

OMNIBUS SWORN STATEMENT 6

IN WITNESS WHEREOF, I have hereunto set my hand this FEB 03 2022 day of _____ 2022 at MANILA, Philippines.

Alexander O. Lee
Bidder's Representative/Authorized Signatory

SUBSCRIBED AND SWORN TO before this FEB 03 2022 day of _____ 2022 at MANILA, Philippines. Affiant is personally known to me and was identified by me through competent evidence of identity as defined in the 2004 Rules on National Practice (A.M. No. 02-8-13-SC). Affiant/s exhibited to me his Passport with his photograph and signature appearing thereon, with no. P2207967B issued on 19 May 2019 and valid until 18 May 2029 at DFA NCR North.

Witness my hand and seal this FEB 03 2022 day of _____.

Doc. No. 120
Page No. 25
Book No. VIII
Series of 2022

ATTY. HENRY D. ADASA
NOTARY PUBLIC CITY OF MANILA
NOTARIAL COMMISSION 2020-097 / 12/31/2021 Manila
IBP NO. 178598 - 01/03/2022, PASIG
PTR NO. 0060197 - 01/05/2021 MLA
ROLL NO. 29679, TIN: 172-528-520
03 MCLE COMPL. NO. VII-0000165 6/26/2019 Valid April 14 2025
URBAN DECA HOMES MANILA, B-2, UNIT 355, TOMAS [illegible]
UNDER SUPREME COURT B.M. NO. 3795 EXTENDED FROM MAR. 1 TO JUNE 30, 2022

Alexander O. Lee

ANNEX "B"

SCHEDULE OF REQUIREMENTS

List/Description of Goods /Services

The delivery schedule expressed below stipulates the date upon which the goods are ready for pick-up or hauling at the supplier's warehouse.

Lot No.	Item No.	Description	Total Quantity	Delivery Period
Mass Production Items				
14	1	Advanced Electromagnetism Kit	640	***210 Calendar Days from the receipt of NTP***
	2	Air Blower	128	
	3	Archimedes Principle Set	640	
	4	Basic Electronics Kit	640	
	5	Basic Lens Set, acrylic	16,750	
	6	Coefficient of Linear Expansion	640	
	7	Connector (# 18 copper, AWG stranded): Black, 350mm long with alligator clip on one end and banana plug on the other end	94,965	
	8	Connector (# 18 copper, AWG stranded): Red, 350mm long with alligator clip on one end and banana plug on the other end	94,965	
	9	Connector (# 18 copper, AWG stranded): Yellow, 350mm long with alligator clip on one end and banana plug on the other end.	67,000	
	10	DC Ammeter	16,750	
	11	DC String Vibrator, string included	3,875	
	12	DC Voltmeter	16,750	
	13	Diffraction slits & Diffraction grating Set	16,110	
	14	Digital Geiger-Muller Counter with Set of Isotopes (a. 0.1 microcurie Polonium 210, b. 0.1 microcurie Strontium 90, and c. 1 microcurie Cobalt 60)	22	
	15	Dry Cell Holder (size D)	126,620	
	16	Dry Cell, 1.5 volts, size D	126,620	
	17	Engine Model (Internal Combustion)	640	
	18	Flask, Florence, glass, **500** mL	640	
	19	Force Table	640	
	20	Fuse Holder w/ Fuse	16,750	
	21	Galvanometer	16,750	
	22	Helical Spring	16,750	
	23	Iron Core Rod (non-corrugated)	8,950	
	24	Lamp, Halogen, Low voltage with tabletop stand	775	
	25	Laser Light	19,985	
	39	Long Nose Pliers, 6-inch, 1 pair/set	1,790	
	26	Magnet Wire	5,012	
	27	Manometer, Open U-tube with Nakamura-type Water Pressure Apparatus	640	
	28	Miniature Light Bulb	94,965	
	29	Miniature Light Bulb Holder	94,965	
	30	Mirror Set, acrylic	16,750	
	31	Motor-Generator Model Experiment Set	16,750	
	32	Multimeter, digital	1,280	
	33	Optical Bench Set	16,750	

	34	Pair of Bar Magnets	12,406	
	35	Prism Set	19,985	
	36	Resistance Board	640	
	37	Ring and Ball Apparatus	640	
	38	Ripple Tank Set	110	
	40	Slinky Coil, metal	16,750	
	41	Sound Resonance Set: Loud Speaker	640	
	42	Sound Resonance Set: Resonance Tube, close-ended	640	
	43	Sound Resonance Set: Tone Generator	640	
	44	Strobe Light	3,875	
	45	Switch, Knife type, Single Pole Single Throw	31,655	
	46	Ticker Timer Set	16,110	
	47	Toy Car, non-friction, non-battery	5,955	
	48	Tuning Fork Set	640	
	49	Vacuum Tube and Manual Vacuum Pump	3,875	
TOTAL:			**1,028,458**	

TECHNICAL SPECIFICATIONS

Item	Description	Specifications
DETAILED PRODUCT SPECIFICATIONS (MARKET ITEMS)		
LOT 14: FORCE, MOTION, AND ENERGY KITS		
1	**Advanced Electromagnetism Kit**	**Functional Specifications:** used to demonstrate the relationship between electricity and magnetism
		Performance Specifications: should be able to demonstrate the relationship between electricity and magnetism
		Design Specifications:
		1. The kit contains the following:
		a. 2 -Bar Magnets: 150 mm X 12 mm X 8 mm; magnet strength: 2 times its weight, correctly labeled and/or color-coded to indicate North and south poles
		b. 6 -Magnetic compass, 20 mm diameter, correct orientation
		c. 2 -U-Magnets, 6 mm X 16 mm cross-section X 100 mm long, jaw opening: 50 mm; magnet strength: 2 times its weight; correctly labeled and/or color-coded to indicate North and south poles
		d. 1 -Magnetic field mapper-9 cm X 16 cm clear transparent casing contains iron filings immersed in non-mold forming viscous liquid, should clearly show magnetic lines
		e. 1 -spool magnet wire (insulation coated) #20, 500 g.
		f. 1 - steel rod 12 mm dia x 100 mm long
		g. 2 -copper wire solid, #14, insulated,15 cm long each wire
		h. 3- wood blocks 25 mm X 75 mm X 100 mm with pilot holes that run through center of block
		2. Comes with plastic container that can accommodate the items indicated above.
2	**Air Blower**	**Functional Specifications:** Used to blow air into light balls to keep them airborne to demonstrate Bernoulli's principle.
		Performance Specifications: Should be able to blow air into light balls to keep them airborne to demonstrate Bernoulli's principle
		Design Specifications:
		1. Electric air blower with variable speed control, volute type, 400 W motor, 220 to 240 VAC 60 Hz power supply, 0 to 12000 RPM
		2. Volute diameter: 150 mm minimum Exhaust diameter: 35 mm minimum Exhaust tangential length: 110 mm minimum. Attachment nozzle: soft rubber, to fit diameter of exhaust tapered to 22 mm, length: 165 mm
		3. With English User's Manual that includes operation guide
		4. With transport box
3	**Archimedes Principle Set**	**Functional Specifications:** Used to visually demonstrate that objects immersed in a liquid like water displaces volume of liquid equal to the volume of the immersed object and that the apparent loss of weight of the immersed object is equal to the weight of the displaced liquid
		Performance Specifications: Should be able to visually demonstrate that objects immersed in a liquid like water displaces volume of liquid equal to the volume of the immersed object and that the apparent loss of weight of the immersed object is equal to the weight of the displaced liquid
		Design Specifications:
		1. The item consists of:
		a) Bucket and Plummet: Transparent bucket with handle stainless steel/brass, plummet white color with hook
		Diameter of Plummet: 54.99 mm to 55.00 mm;

		Inside diameter of bucket: 55.01 mm to 55.02 mm
		Height of Plummet: 53 mm ± 0.01 mm,
		Inside height of bucket: 53 mm ± 0.01 mm
		Volume of Cavity in Bucket: to fit plummet precisely
		Both are made of ABS plastic Accurately marked divisions on plummet and bucket representing different volume levels b) Overflow Can and Catch Bucket: Overflow can: 3 inches diameter x 5 inches high, seamless, with spout, made of plastic Catch bucket: 3 inches diameter x 3 inches high, made of plastic c) Large demonstration 2N (dynamometer)/0.1 read, spring type linear, at least 3 inches width x 10 inches length
		2. Fixations and supports should be stable during activity
		3. With English Manual that includes User's Guide
		4. Contained in a transport box with Styropor
4	**Basic Electronics Kit**	**Functional Specifications:** Used to perform activities on resistors, capacitance, ohmic and non-ohmic resistance and other basic electronics concepts
		Performance Specifications: Should be able to perform activities on resistors, capacitance, ohmic and non-ohmic resistance and other basic electronics concepts
		Design Specifications:
		1. Each component is mounted on individual board with color-coded binding post terminals depending on mounted components (see No. 4 for color code of binding post terminals) Min. dimensions: 60 mm width x 80 mm length x 5 mm height
		2. Component name and symbol should be permanent (embossed or etched) and painted black on a conspicuous location on board.
		3. With external binding post connectors that can accommodate 4 mm banana plugs, color-coded encapsulation: black for negative, red for positive, yellow for non-polar terminals
		4. The Kit should contain the following:
		a. 5-Resistors: (2-100 Ω, 2 watts; 1-1000 Ω, 2 watts; 1-10 kΩ, 2 watts; 1- 100 kΩ, 2 watts), binding post terminals: all yellow 2-Rectifier Diodes, IN 4002, binding post terminals: black for negative, red for positive1- LED, large size, binding post terminals: black for negative, red for positive b. 1-NPN transistor, 2N3440 or 2N3439 or equivalent, binding post terminals: black for negative, red for positive c. 2-Capacitor 1000 µF, 25 V, binding post terminals: black for negative, red for positive d. 1-Variable Resistor, large, rotary, carbon, 5 kΩ mono, binding post terminals: all yellow
		5. Items placed in storage box, 1 box per set
5	**Basic Lens Set, acrylic**	**Functional Specifications:** Used to demonstrate refraction of light
		Performance Specifications: Should be able to demonstrate refraction of light
		Design Specifications:
		1. Set of 7 lenses, acrylic material, secured in compartmentalized storage box, with the following types and diameters:
		1-double convex, 50 mm ±2 mm
		1-plano convex, 50 mm ±2 mm
		1-double concave, 50 mm ±2 mm
		1-plano concave, 50 mm ±2 mm
		1-convex-concave lens, 50 mm ±2 mm
		1-concave-convex lens, 50 mm ±2 mm

		1-double convex lens, 75 mm ±2 mm
		2. Must be contained in one storage box.
		3. No sharp edges.
		4. Free from toxic materials.
6	**Coefficient of Linear Expansion**	**Functional Specifications:** Used to verify coefficient of linear expansion of some metals
		Performance Specifications: Should be able to verify coefficient of linear expansion of some metals
		Design Specifications:
		1. With steam jacket pipe, made of brass, 500 mm long x 25 mm dia., with steam inlet and outlet, with attachment tube for inserting rubber stopper which in turn is inserted with thermometer
		2. Steam jacket pipe supported by a rigid metal base; with alignment and lock mechanism when inserting expanding rod under study, 27in X 4.5in X 1.5in (L x W x T) minimum
		3. With dial gauge 0-10 mm, 0.01 mm readability
		4. Supplied with 4 mm x 500 mm brass, copper, steel rods; rods should be free from sharp, pointed edges
		5. With English User's Manual that includes operation guide
7	**Connector (# 18 copper, AWG stranded): Black, 350mm long with alligator clip on one end and banana plug on the other end**	**Functional Specifications:** Used to effectively interconnect components in an electrical circuit
		Performance Specifications: Should be able to effectively interconnect components in an electrical circuit
		Design Specifications: # 18 copper, AWG stranded, 350 mm length minimum, with insulated brass alligator clip, 18 mm - 20 mm jaw length, on one end and 4 mm brass banana plug, on the other end; all black
8	**Connector (# 18 copper, AWG stranded): Red, 350mm long with alligator clip on one end and banana plug on the other end**	**Functional Specifications:** Used to effectively interconnect components in an electrical circuit
		Performance Specifications: Should be able to effectively interconnect components in an electrical circuit
		Design Specifications: # 18 copper, AWG stranded, 350 mm length minimum, with insulated brass alligator clip, 18 mm - 20 mm jaw length, on one end and 4 mm brass banana plug, on the other end, all red
9	**Connector (# 18 copper, AWG stranded): Yellow, 350mm long with alligator clip on one end and banana plug on the other end**	**Functional Specifications:** Used to effectively interconnect components in an electrical circuit
		Performance Specifications: Should be able to effectively interconnect components in an electrical circuit
		Design Specifications: # 18 copper, AWG stranded, 350 mm length minimum, with insulated brass alligator clip, 18 mm - 20 mm jaw length, on one end and 4 mm brass banana plug, on the other end, all yellow
10	**DC Ammeter**	**Functional Specifications:** Used to measure DC current in electrical circuit
		Performance Specifications: Should be able to measure DC current in an electrical circuit
		Design Specifications:
		1. Analog, dual range selectable:-0.2 - 0 - +0.6A/0.02 read;-1.0 -0- +3.0A/0.1 read, ± 2.5% full scale, analog

		2. Dial plate dimensions: 93 mm width x 83 mm height, minimum
		3. Overall encasement dimensions minimum: 93 mm width x 130 mm depth x 93 mm height encasement material: plastic, any color
		4. Binding post terminals, threaded, can accommodate 4 mm banana plug, brass material, color coded plastic insulation (black for negative or common terminal, red for positive terminal)
		5. External zero-adjust calibration
		6. With English User's Manual that includes operation guide
11	**DC String Vibrator, string included**	**Functional Specifications:** Used to demonstrate standing waves on a string
		Performance Specifications: Should be able to demonstrate standing waves on a string
		Design Specifications:
		1. Utilizes an offset-weighted shaft on a DC motor
		2. Input voltage (0 volts -6 volts DC)
		3. Vibration Frequency: controlled by stepless attenuator
		4. With steel mounting platform, binding posts for external wire connection
		5. Includes twisted polyester cotton string, 3 mm diameter (Size #72), 5 meters
		6. With Operation Manual in English
12	**DC Voltmeter**	**Functional Specifications:** Used to measure DC voltage across components in an electrical circuit
		Performance Specifications: Must be able to measure DC voltage across components in an electrical circuit
		Design Specifications:
		1. Analog, dual range selectable -1V -0- +3V/0.1 read-5 0- +15V/ 1.0 read±2.5% full scale, analog
		2. Dial plate dimensions: 93 mm width x 83 mm height, minimum
		3. Overall encasement dimensions minimum: 93 mm width x 130 mm depth x 93 mm height encasement material: plastic, any color
		4. Binding post terminals, threaded, can accommodate 4 mm banana plug, brass material, color-coded plastic insulation (black for negative or common terminal, red for positive terminal
		5. External zero-adjust calibration
		6. With English User's Manual that includes operation guide
13	**Diffraction slits & Diffraction grating Set**	**Functional Specifications:** Used to investigate the concept of diffraction of light and to calculate wavelength of light of certain color through diffraction
		Performance Specifications: Should be able to investigate the concept of diffraction of light and to calculate wavelength of light of certain color through diffraction
		Design Specifications:
		The set is composed of:
		1) Diffraction slits consist of:
		1 frame single slit1 frame double slits grating size: 36 mm x 18 Mm frame size: 50 mm x 50 mm x 2 mm thick
		2) Diffraction Gratings consist of:
		1 frame 50 lines/mm1 frame 100 lines/mm1 frame 300 lines/mm1 frame 600 lines/mm grating size: 36 mm x 18 mm frame size: 50 mm x 50 mm x 2 mm thick

		3) Each frame placed in compartmentalized storage box
14	**Digital Geiger-Muller Counter: MAIN UNIT**	**Functional Specifications:** is used to measure alpha, beta, and gamma radiation
		Performance Specifications: should be able to measure alpha, beta, and gamma radiation
		Design Specifications:
		1. Main unit: Digital Geiger-Muller Counter; measures alpha, beta, gamma radiation;
		2. Manufacturer should be accredited/certified by their respective Nuclear Regulatory Institute/Agency and shall provide calibration certificate for each item.
		3. Units of Measurement: milli Roentgen per hour (mR/hr), micro Sievert per hour (μSv/hr), Counts per Minute (CPM), digital readout
		4. Range: 0.001 mR/hr to 1000 mR/hr
		5. With provision for connecting to desktop/laptop PC, comes with software and appropriate connectors
		6. Approx. dimensions: minimum 4 x 2 x 1 inches (minimum)
		7. Runs on dual power supply: dry cell and external power, comes with dry cell and adapter for external DC input
		8. With English User's Manual that includes operation guide
		9. Includes training on use and maintenance and storage (please refer to Quality Assurance Procedure during Contract Implementation on the details).
		10. The offered brand of the item must be an international brand with at least 5 years presence at the local market and/or global presence in the USA, Europe, or Japan market.
	Digital Geiger-Muller Counter: Accessories-SET OF LEGAL RADIOISOTOPE SAMPLES	**Functional Specifications:** is used to provide sources of alpha, beta, and gamma radiations
		Performance Specifications: should be able to provide sources of alpha, beta, and gamma radiations
		Design Specifications:
		1. Set of sample legal radioactive sources, each is enclosed in a permanently shield disk: 3 mm thick x 25 mm dia.
		2. Each disk is identified by radio nuclide, amount of activity in microcuries, half-life and type of radiation
		The words "Caution - Radioactive Material" appear on the label of each source *0.1 microcurie - alpha source:* ***Polonium 210*** *as per* ***Appendix A (EXEMPT QUANTITIES OF RADIOACTIVE MATERIALS) of Philippine Nuclear Research Institute (PNRI) Licensing of Radioactive Material (CPR Part 02)*** *0.1 microcurie - beta source:* ***Strontium 90*** *as per* ***Appendix A (EXEMPT QUANTITIES OF RADIOACTIVE MATERIALS) of Philippine Nuclear Research Institute (PNRI) Licensing of Radioactive Material (CPR Part 02)*** *1 microcurie - gamma source:* ***Cobalt 60*** *as per* ***Appendix A (EXEMPT QUANTITIES OF RADIOACTIVE MATERIALS) of Philippine Nuclear Research Institute (PNRI) Licensing of Radioactive Material (CPR Part 02)***
		3. Branded; with English User's Manual that includes operation guide (Permanent and properly labeled; labels are scratch-resistant)
15	**Dry Cell Holder (size D)**	**Functional Specifications:** Used to securely mount size D dry cell in place
		Performance Specifications: Should be able to securely mount size D dry cell in place

		Design Specifications:
		1. Single Holder for size D dry cell, snap-on type;
		2. With built-in nickel-plated brass plate connectors;
		3. Holders can be interconnected in series or parallel;
		4. Plastic body, should be sturdy, thickness: 2 mm minimum;
		5. Crack resistant when dropped from 1meter height, mounted with dry cell;
		6. Any color;
		7. Must be packed by 5units/set in a resealable plastic
16	**Dry Cell, 1.5 volts, size D**	**Functional Specifications:** Used to provide 1.5 volts DC power source for a basic electrical circuit
		Performance Specifications: Should be able to provide 1.5 volts DC power source for a basic electrical circuit
		Design Specifications:
		1. industry standard size D 1.5 volt dry cell
17	**Engine Model (Internal Combustion)**	**Functional Specifications:** Used to simulate the operation of a 4-stroke cycle gasoline engine
		Performance Specifications: Should be able to simulate the operation of a 4-stroke cycle gasoline engine
		Design Specifications:
		1. Cross-section model of a 4-stroke cycle gasoline engine model, Size: 14 inches x 8 inches x 7 inches minimum
		2. Material: cast alloy construction, mounted on stable base
		3. Internal sections in different colors to indicate air, fuel, and gas mixtures and exhaust gas contents. The carburetor is shown in section.
		4. The crankshaft can be rotated by hand wheel to simulate the operating cycle of 4-stroke cycle gasoline engine; with electrical contact for illuminating a a 3-volt lamp as spark plug to simulate ignition
		5. Base with illustration and correct part names and show the following parts correctly: crank case, crank shaft, connecting rod, cylinder block, piston, intake valve, exhaust valve, push rod, spark plug, rocker arm, exhaust manifold, crank shaft gear, cam shaft gear, cam shaft, contact point, carburetor, needle valve, float, throttle valve, intake manifold
		6. Includes training on use, maintenance, and storage (please refer to Quality Assurance Procedure during Contract Implementation on the details).
18	**Flask, Florence, glass, round bottom, 500 mL**	**Functional Specifications:** Used to contain liquids with unobstructed view of liquid inside; for activity on 'how eye focusses light rays to create an image in the retina'
		Performance Specifications: Should be able to contain liquids with unobstructed view of liquid inside; for activity on 'how eye focusses light rays to create an image in the retina'
		Design Specifications:
		1. 500 mL capacity
		2. Round bottom
		3. NO Graduations
		4. Made of glass
		5. Minimum dimensions: 110 mm x 210 mm (bulb diameter x height)
19	**Force Table**	**Functional Specifications:** Used to demonstrate the vector nature of forces

		Performance Specifications: Should be able to demonstrate the vector nature of forces
		Design Specifications:
		1. Table: material-cast iron, diameter: 40 cm approx., with stable stand support, 30 cm height minimum
		2. With leveling screw
		3. 360° protractor scale, 0.5°-1° resolution, texts and graphics 20 mm length approx.
		4. Can demonstrate combination of at least 3 coplanar forces in equilibrium
		5. Includes the following accessories composed of at least:
		a. 3 pieces load hangers -100 grams each
		b. additional slotted masses to be loaded on each load hanger3 pieces-10 grams3 pieces- 50 grams3 pieces- 20 grams3 pieces- 10 grams
		c. 3 pieces pulley clamps with guide pulley to be clamped on the Force Table
		d. 1 piece center rod/ post, nickel-plated metal, threaded to be mounted on the center of the Force Table
		e. 1-piece center/ fastening ring, 35 mm diameter x 2 mm thickness, nickel-plated metal
		f. 4 meters string for hanging loads (crochet type), can support 500 grams load without breaking
		6. With English User's Manual that includes Assembly and Operation Guide
		7. Includes training on use and maintenance (please refer to Quality Assurance Procedure during Contract Implementation on the details).
20	**Fuse Holder w/ Fuse**	**Functional Specifications:** Used to demonstrate the function of fuses
		Performance Specifications: Should be able to demonstrate the function of fuses
		Design Specifications:
		1. Fuse: 0.3 amperes, maximum, slow-blow, glass-tube type, Rating should beengravede/etched on metal cap
		2. Fusc dctachablc from holdcr, holdcr brass nickcl platcd, holdcr mountcd on black plastic base w/ dimensions: 12 mm x 60 mm x 95 mm minimum, thickness of base material: 2 mm minimum
		3. Binding post terminals mounted on base, threaded, can accommodate 4 mm banana plug, brass material, with yellow plastic insulation
		4. Connecting wires properly soldered to eyelet of binding posts
		5. Each set comes with at least 50 spare fuses
21	**Galvanometer**	**Functional Specifications:** Used to measure small electrical current
		Performance Specifications: Should be able to measure small electrical current
		Design Specifications:
		1. Analog, general purpose galvanometer;
		2. -500 to +500 µA full scale/ 10 µA read, full scale accuracy of ± 2.5%;
		3. Dial plate dimensions: 93 mm width x 83 mm height, minimum
		4. Overall encasement dimensions minimum: 93 mm width x 130 mm depth x 93 mm height encasement material: plastic, any color
		5. Binding post terminals, threaded, can accommodate 4 mm banana plug, brass material, color-coded plastic insulation (black for negative or common terminal, red for positive terminal);
		6. External zero-adjust calibration;

		7. With English User's Manual that includes operation guide; and
		8. With molded Styropor as part of its packaging9. fuse protected
22	**Helical Spring**	**Functional Specifications:** Used to demonstrate transverse waves
		Performance Specifications: Should be able to demonstrate transverse waves
		Design Specifications:
		1. Wire material: Galvanized Spring Steel Wire;
		2. Unstretched Length range: 1.82 meter to 1.84 meter;
		3. Can be stretched to 3 times its length without deformation;
		4. Coil Outside Diameter: 20 mm to 22mm;
		5. Wire Diameter: 1.25 mm to 1.43mm;
		6. Weight of Spring: 805 grams to 815 grams;
		7. Number of turns per centimeter: 7 to 8 turns;
		8. With circular hooks (on both ends), hook diameter is 20 mm; and
		9. Packed in a carton or box made from cardboard.
23	**Iron Core Rod, non-corrugated**	**Functional Specifications:** Used to perform activities on electromagnet
		Performance Specifications: Should be able to perform activities on electromagnet
		Design Specifications:
		1. Iron rod 12 mm ± 1 mm dia x 100 ±1 mm long
24	**Lamp, Halogen, Low voltage with table top stand**	**Functional Specifications:** Used to produce halogen light for open viewing
		Performance Specifications: Should be able to produce halogen light enough for direct naked eye viewing
		Design Specifications:
		1. tungsten filament
		2. Bromine filled
		3. Bulb minimum dimensions: Length: 30 mm Diameter: 8 mm
		4. Rating: 12 volts DC, 50 watts (minimum)
		5. With socket; socket housing mounted on table top stand: stand minimum dimensions - base width/diameter: 75 mm; height of stand: 145 mm
		6. Bulb is free standing to socket for open viewing; without reflector or any obstruction for viewing.
		7. With external connector of 500 mm long #20 stranded color coded (red-positive, black-negative) wire with banana plug soldered at the end for connectivity to variable power supply.
		8. **Operates on 12 volts DC only.**
		9. Without provision for 220-240 volts line voltage for safety reason.
25	**Laser Light**	**Functional Specifications:** Used to produce laser beam for diffraction activities
		Performance Specifications: Should be able to produce laser beam for diffraction activities
		Design Specifications:
		1. Pen type laser, red output
		2. Powered by, 1.5 volts size AA or AAA dry cells
		3. With ON-OFF switch

		4. Minimum body dimensions: 12 mm diameter x 135 mm length
		5. Function: Should be able to project clearly a laser spot to a distance of 5 meters minimum
26	**Long Nose Pliers, 6- inch, 1 pair/set**	**Functional Specifications:** Used to bend tiny solid wire connectors
		Performance Specifications: Should be able to bend tiny solid wire connectors
		Design Specifications: Long Nose Pliers with side cutter, 6 inches long, chrome vanadium material, 1 pair/set
27	**Magnet Wire**	**Functional Specifications:** Used to perform activities on electromagnet
		Performance Specifications: Should be able to perform activities on electromagnet
		Design Specifications: 1 spool magnet wire (insulation coated) #20, 100 g. spool
28	**Manometer, Open U- tube with Nakamura-type Water Pressure Apparatus**	**Functional Specifications:** Used to measure pressure difference of fluids
		Performance Specifications: Should be able to measure pressure difference of fluids
		Design Specifications:
		1. Open U-tube glass manometer tube with a 50cm arm with funnel top on one arm and a 2.5 cm rifted tip on another arm for easy connection with silicone-rubber tubing, glass wall 1mm thickness, 4-6 mm inner diameter
		2. A millimeter scale is fitted between the arms of the tube
		3. U-tube is mounted on a wooden board, fixed on a wooden stand for vertical U-tube is mounted on a wooden board, fixed on a wooden stand for vertical mounting
		4. Includes SIMPLE WATER PRESSURE APPARATUS (Nakamura type) -its body can be made to rotate around a rigid tube. The rigid tube is L- bent to be inserted into the pressure apparatus, so that the pressure apparatus can be rotated -with 10 pcs spare diaphragms per set
		5. Includes 1-meter silicone-rubber tubing for interconnecting U-Tube manometer and the simple water pressure apparatus
29	**Miniature Light Bulb**	**Functional Specifications:** Used to demonstrate the conversion of electrical energy to light
		Performance Specifications: Should be able to demonstrate the conversion of electrical energy to light
		Design Specifications:
		1. Miniature, incandescent, screw type base
		2. Bulb rating: 2.2 V to 2.5 V, 0.3 A, handling current; engraved on base of bulb
		3. Operational Specs:
		a) should fit with bulb socket in bulb holder assembly
		b) should light with one fresh dry cell connected (1.5 volts)
		c) will not burn out when connected to 2 fresh dry cells in series (3 volts supply for 5 minutes)
30	**Miniature Light Bulb Holder**	**Functional Specifications:** Used to securely mount light bulb in place
		Performance Specifications: Should be able to securely mount light bulb in place
		Design Specifications:

		1. Socket to match the miniature incandescent light bulb, socket in plastic housing;
		2. Socket housing is mounted on black, plastic base: Base dimensions minimum: 12 mm x 60 mm x 95 mm, Material thickness: 2 mm minimum
		3. Binding post terminals, threaded, can accommodate 4 mm banana plug, brass material, with yellow plastic insulation;
		4. Connecting wires properly soldered to eyelet of binding posts.
31	**Mirror Set, acrylic**	**Functional Specifications:** Used to demonstrate the formation of image by reflection of light
		Performance Specifications: Should be able to demonstrate the formation of image by reflection of light
		Design Specifications:
		1. Set of 3 spherical mirrors, acrylic, secured in compartmentalized storage box with the following types and diameters:
		a) 1-plane mirror, 50 mm ±2 mm
		b) 1-concave mirror, 50 mm ±2 mm
		c) 1-convex mirror, 50 mm ±2 mm
		2. All mirrors free from sharp edges;
		3. Should be clear and no sign of cloudiness
		4. Should be able to reflect expected image/s of a light source on screen.
32	**Motor-Generator Model Experiment Set**	**Functional Specifications:** Used to demonstrate the conversion of electrical energy to mechanical energy when set to motor function and vice versa when set to generator function
		Performance Specifications: Should be able to demonstrate the conversion of electrical energy to mechanical energy when set to motor function and vice versa when set to generator function
		Design Specifications:
		1. DC motor mode, runs on 6 volts -12 volt
		2. Can function as generator when the armature is rotated; AC- DC generator output is determined by commutator configuration;
		3. Selectable split-ring and slip-ring commutator that enables AC-DC output w/o changing the direction of rotation of the rotor;
		4. Binding posts, for external connections, labeled with "motor input: 6 V-12 VDC" and "generator output", unit should be should be free of indicator bulbs;
		5. Rotor should be concentric with the stator to produce equal air gap;
		6. Stator is activated by a permanent magnet.Stator assembly should have one color except blue and red; Example all yellow, all white or all black stator assembly.
		7. Includes spare: 4 pcs belt, 1 set magnet;
		8. Armature diameter: 68 mm minimum, Armature shaft diameter: Ø 8 mm minimum, w/ rigid mounting;
		9. Drive pulley, plastic, diameter: 168 mm minimum, driven pulley diameter: 26 mm minimum, steel nickel plated; 10. Base wooden board minimum dimensions: 200 mm x 300 mm x 19 mm
33	**Multimeter, digital**	**Functional Specifications:** Used to provide digital readouts of measurements of AC/DC currents and voltages, resistance, capacitance, frequency
		Performance Specifications: Should be able to provide digital readouts of measurements of AC/DC currents and voltages, resistance, capacitance, frequency

		Design Specifications: Measurement Coverage, or smaller values in lower range and larger values in upper range:
		1. DC Voltage: 60mV , 6V , 60V, 600V, 1000V ±0.7%+2.
		2. AC Voltage: 600mV, 6V, 60V, 600V, 750V ±0.8%+3.
		3. DC Current: 600µA , 6000µA, 60mA, 600mA ±1.2%+3 / 6A , 10A ±2.0%+10.
		4. AC Current: 600µA , 6000µA , 60mA, 600mA ±1.5%+3 / 6A, 10A ±3.0%+10.
		5. Resistance: 600Ω , 6kΩ, 60kΩ, 600kΩ , 6MΩ , 60MΩ ±1.2%+5.
		6. Capacitance: 10nF, 100nF , 1000nF, 10µF, 100µF, 1000µF , 10mF, 100mF±3.0%+3.
		7. Frequency: 10Hz , 100Hz, 1000Hz, 10kHz, 100kHz, 1000kHz, 10MHz ±1.0%+5.
		8. Duty Cycle :0.1%-99.99% ±3.0%+2. 9. Temperature: -20~1000 Centigrade degree / -4~1832 F 10. Display: 6000 counts
		11. Auto range
		12. USB Interface function. The measured data stored in the instrument can be uploaded to a computer for display, record and analysis
		13. Comes with: 1*Pair Test Leads, 1*English Operating Manual. 1*Temperature Probe, 1*USB Data Cable
		14. Branded
34	**Optical Bench Set**	**Functional Specifications:** Used for mounting lenses, mirrors, screen, light source and other optics components
		Performance Specifications: Should be able to mount lenses, mirrors, screen, light source and other optics components in place
		Design Specifications:
		1. This Complete Set includes:
		a) 1-meterstick, with centimeter and millimeter graduations
		b) 1-lens support for the 50 mm diameter lens and 50 mm diameter mirrors (included in this package); should be stable when mounted on meterstick, smooth sliding
		c) 1-lens support for 75 mm lens, should be stable when mounted on meterstick, smooth sliding
		d) 1- screen support, should be stable when mounted on meterstick, smooth sliding
		e) 5-white board screens (10 cm x 12.5 cm, approx.)
		f) 2-metal supports for meter stick, should be stable, meterstick should not tip off 1-candle holder, should be stable when mounted on meterstick, smooth sliding
		g) 1-paraffin candle
		2. Stand supports for meter stick, holders for lenses, mirrors, screens, and candle should be placed inside one compartmentalized casing;
		3. With English User's Manual that includes operation guide.
35	**Pair of Bar Magnets**	**Functional Specifications:** Used to demonstrate that some things can make objects move and describe forces exerted by magnets
		Performance Specifications: Should be able to demonstrate that some things can make objects move and describe forces exerted by magnets
		Design Specifications: Pair of Bar Magnets:
		1. Minimum dimensions of each: 150 mm
		X 12 mm X 8 mm;
		2. Magnet strength: can suspend loads at least 2 times its weight
		3. Color Code: north pole of the magnet should be colored red and the south pole colored blue
36	**Prism Set**	**Functional Specifications:** Used to demonstrate characteristics of refraction of light

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		Performance Specifications: Should be able to demonstrate characteristics of refraction of light
		Design Specifications:
		1. Set is composed of:a) 1-Rectangular block, solid acrylic, frosted on one side minimum dimensions:
		length = 70 mm
		width = 50 mm
		thickness = 20 mm
		b) 1-Right angle prism, solid acrylic, frosted on one side with the following minimum dimension:
		thickness: 10 mm minimum,
		base = 40 mm minimum
		height = 65 mm minimum
		c) 1-Semi-circular block, solid acrylic, frosted on one side minimum dimensions:
		diameter=100 mm,
		thickness 10 mm
		2. Secured in plastic storage casing;
		3. Should be clear and no sign of cloudiness
37	**Resistance Board**	**Functional Specifications:** Used to investigate factors affecting resistance of a conductor
		Performance Specifications: Should be able to investigate factors affecting resistance of a conductor
		Design Specifications:
		1. Board: dimensions-height: 30 mm , width: 120 mm length: 650 mm minimum, material plastic, channel type, thickness of material: 1/8 inches minimum free of warpage and other imperfection like flushes etc.
		2. Board is mounted with the following wires:
		a) 2 - Nichrome wires of 2 different diameters: 0.25, 0.5 length: 600 mm
		b) 1 - Stainless steel wire diameter: 0.5 mm, length : 600 mm
		c) 1 - Copper wire diameter: 0.5 mm, length : 600 mm
		3. Board should be marked by decimeter graduations that only span along entire wires' length
		4. All wires should be rigidly fasten to the terminal posts, stainless steel
38	**Ring and Ball Apparatus**	**Functional Specifications:** Used to demonstrate thermal expansion (and **contraction) of a metal**
		Performance Specifications: Should be able to demonstrate thermal expansion **(and contraction) of a metal**
		Design Specifications:
		1. The ring and ball set demonstrates thermal expansion.
		2. Comprising of a captive brass ball secured to a mounted brass ring by a chain.
		3. Diameter of Ball : 25.00mm +/- 0.01mm, smooth surface
		4. Inside Diameter of Ring: 25.04mm +/- 0.01m, smooth surface
		5. Outside Diameter of Ring: minimum of 38mm
		6. Thickness of Ring: 6 mm minimum
		7. Diameter of Brass Stem: 5mm
		8. Handle of brass ring made of wood.

		Performance Specifications: Should be able to demonstrate characteristics of refraction of light
		Design Specifications:
		1. Set is composed of a) 1-Rectangular block, solid acrylic, frosted on one side minimum dimensions:
		length = 70 mm
		width = 50 mm
		thickness = 20 mm
		b) 1-Right angle prism, solid acrylic, frosted on one side with the following minimum dimension:
		thickness: 10 mm minimum,
		base = 40 mm minimum
		height = 65 mm minimum
		c) 1-Semi-circular block, solid acrylic, frosted on one side minimum dimensions:
		diameter =100 mm
		thickness 10 mm
		2. Secured in plastic storage casing;
		3. Should be clear and no sign of cloudiness
37	**Resistance Board**	**Functional Specifications:** Used to investigate factors affecting resistance of a conductor
		Performance Specifications: Should be able to investigate factors affecting resistance of a conductor
		Design Specifications:
		1. Board: dimensions-height: 30 mm, width: 120 mm length: 650 mm minimum, material plastic, channel type, thickness of material: 1/8 inches minimum free of warpage and other imperfection like flushes etc.
		2. Board is mounted with the following wires:
		a) 2 - Nichrome wires of 2 different diameters: 0.25, 0.5 length: 600 mm
		b) 1 - Stainless steel wire diameter: 0.5 mm, length: 600 mm
		c) 1 - Copper wire diameter: 0.5 mm, length: 600 mm
		3. Board should be marked by decimeter graduations that only span along entire wires' length
		4. All wires should be rigidly fastened to the terminal posts, stainless steel
38	**Ring and Ball Apparatus**	**Functional Specifications:** Used to demonstrate thermal expansion (and **contraction) of a metal**
		Performance Specifications: Should be able to demonstrate thermal expansion **(and contraction) of a metal**
		Design Specifications:
		1. The ring and ball set demonstrates thermal expansion.
		2. Comprising of a captive brass ball secured to a mounted brass ring by a chain.
		3. Diameter of Ball: 25.00mm +/- 0.01mm, smooth surface
		4. Inside Diameter of Ring: 25.04mm +/- 0.01m, smooth surface
		5. Outside Diameter of Ring: minimum of 38mm
		6. Thickness of Ring: 6 mm minimum
		7. Diameter of Brass Stem: 5mm
		8. Handle of brass ring made of wood.

		9. Chain is made of stainless steel with a 3-turn stainless wire ring to keep the ball in the chain specially during heating.
39	**Ripple Tank Set**	**Functional Specifications:** Used to demonstrate properties of transverse waves
		Performance Specifications: Should be able demonstrate properties of transverse waves
		Design Specifications:
		1. Tank: 55 cm x 55 cm minimum, with foam beaches perimeter to damp reflections, with 4 detachable legs with leveling screws, height of legs: 50 cm, minimum
		2. Glass bottom: 40 cm x 40 cm minimum
		3. Should include the following accessories:
		a) 1-rippler bar with electronic frequency controller (digital)
		b) 1-hand rippler bar
		c) 2-spherical dippers, removable
		d) 4-parafin blocks
		e) 1-glass plate, 20 cm x 28 cm ±2 cm
		f) 1-parabolic reflector 1-plastic viewing screen, white, 60 cm x 60 cm minimum
		4. Light Source:
		a) halogen lamp 6 volts to 12 volts
		b) with electronic controlled strobe to synchronize with frequency controller
		c) detachable and adjustable mounting unto the tank
		d) black shielded with ventilation
		5. With frequency display unit that indicates synchronizing frequency between the controller and the strobe
		6. With English User's Manual that includes Assembly and Operation Guide
		7. Branded
		8. Includes training on use, maintenance, and storage (please refer to Quality Assurance Procedure during Contract Implementation on the details).
40	**Slinky Coil, metal**	**Functional Specifications:** Used to demonstrate longitudinal waves
		Performance Specifications: Should be able to demonstrate longitudinal waves
		Design Specifications:
		1. 3inches diameter x 4 inches long minimum; and
		2. zinc or nickel plated
41	**Sound Resonance Set: Loud Speaker**	**Functional Specifications:** Used to provide continuous sound tone of certain frequency
		Performance Specifications: Should be able to provide continuous sound tone of certain frequency
		Design Specifications:
		1. For connection to the sound signal generator, 2 inches cone diameter
		2. 1 watt, all frequency or low range, 4 Ohms to 8 Ohms impedance
		3. No enclosure, mounted on an open board with stand to match height of resonance tube Height of loudspeaker with stand: center of loudspeaker 52 mm height from table surface to match with height of resonance tube (please see resonance tube specifications)

		4. Binding post terminal connectors conveniently located, should not block opening of resonance tube during activity, color coded encapsulation red for positive, black for negative
42	**Sound Resonance Set: Resonance Tube set**	**Functional Specifications:** Used to vary the length of air column to produce resonance of sound coming out from the loudspeaker
		Performance Specifications: Should be able to vary the length of air column to produce resonance of sound coming out from the loudspeaker
		Design Specifications:
		1. Telescoping tubes used to find the wavelength in air for tuning forks, and other sound sources like loudspeaker
		2. Plastic stopper fixed on one end of inner tube
		3. Outer tube: OD: 63 mm -0.5 mm, +2 mm diameter, 1030 mm long: minimum with detachable rubber plug on free end for safe transport of inner-outer tube assembly Inner tube: OD: 50 mm, 1100 mm long, Permanent graduation with mm scale at 1 mm division to indicate length of air column as the inner tube is pushed or pulled along the outer tube; print should resist rubbing, no sign of fade after 100 slides; inner tube with good quality air sealing material (felt cloth)
		4. With rigid and stable stand to make effective height of outer tube align with loudspeaker cone (please see loudspeaker specifications)
		5. Height including stand: center of outer tube elevated by 52 mm from the surface)
		6. With English User's Manual that includes Operation Guide
43	**Sound Resonance Set: Tone Generator**	**Functional Specifications:** Used to control the frequency, loudness and quality of electrical signal fed to the loudspeaker to produce sound tone
		Performance Specifications: Should be able to control the frequency, loudness and quality of electrical signal fed to the loudspeaker to produce sound tone
		Design Specifications:
		1. Should be able to generate 20 Hz-20 kHz frequency sine waves; with digital display readout of frequency setting
		2. Frequency setting on unit should match to measured output both electrical and acoustical (from loudspeaker) up to 1% accuracy
		3. Should be able to produce pure tones free from unwanted signals (smooth sine waves without harmonics)
		4. Maximum sound output from connected loudspeaker: 60 ±5 dB at 1kHz measured at 8-12 cm distance between loudspeaker and sound measuring instrument
		5. With terminals for external connection to loudspeaker and to oscilloscope
		6. Power supply: 4.5 volts -12 volts DC internal by way of Size D, AA, AAA, or 9 volt dry cells or external by way of appropriate adapter or by way of output from low voltage (0 volts to +12 volts) variable power supply
		7. With English User's Manual that includes Operation Guide
		8. Includes training on use, maintenance, and storage (please refer to Quality Assurance Procedure during Contract Implementation on the details).
44	**Strobe Light**	**Functional Specifications:** Used to provide flashes of light so that position of fast moving objects can be recorded for example by a cemra
		Performance Specifications: Should be able to provide flashes of light so that position of fast moving objects can be recorded for example by a cemra

		Design Specifications:
		1. Light source: High-output white LED (350 mA, 1W max.)
		2. Variable frequency range: 2.5 Hz-250 Hz, steplessly variable
		3. Light emission pulse width: stage switching, with fine tune control
		4. Power source: Rechargeable alkaline/li-ion/li-po batteries with corresponding charger (both included in package) AND/OR unit operates directly from DC adapter (to be included)
		5. Dimensions: 54 mm x 40 mm x 69 mm (minimum)
		6. Weight: Approx. 171g (excluding batteries)
		7. With RCA female terminal and male RCA plug with connectors for connecting to frequency meter
		8. With English User's Manual that includes operation guide
45	**Switch, Knife type, Single Pole Single Throw**	**Functional Specifications:** Used to open and close an electrical circuit
		Performance Specifications: Should be able to open and close an electrical circuit
		Design Specifications:
		1. Single pole Single Throw Knife type switch Knife dimensions minimum: 0.8 mm x 8 mm x 55 mm, nickel plated brass Plastic handle dimensions minimum: 9 mm x 9 mm x 23 mm
		2. Contact plates for knife dimensions minimum: 8 mm x 20 mm, nickel plated brass, thickness of material 0.5 mm minimum
		3. Knife switch-contact plates assembly mounted on black plastic base: 12 mm x 60 mm x 95 mm minimum, thickness of base: 2 mm minimum,
		4. Binding post terminals, threaded, can accommodate 4 mm banana plug, brass material, with yellow plastic encapsulation
		5. Internal connectors properly soldered to eyelet of binding posts;
		6. Switch fixations should survive 100 continuous on-off operation cycles, without signs of wear and tear
46	**Ticker Timer Set**	**Functional Specifications:** Used to measure and record short time intervals by marking "ticks" on paper tape
		Performance Specifications: Should be able to measure and record short time intervals by marking "ticks" on paper tape
		Design Specifications:
		1. Operates between 6 to 12V a.c. and produces dots on the tape using a carbon paper disc at frequency the same with the mains. Has a rugged plastic base and screw type binding posts;
		2. Supplied with: 40mm carbon paper disc (100pcs) 15mm wide ticker tape (3 rolls) c-clamp
47	**Toy Car, non-battery powered**	**Functional Specifications:** Used to demonstrate that some things like people can make objects move
		Performance Specifications: Should be able to demonstrate that some things like people can make objects move
		Design Specifications:
		1. minimum dimensions: 50 cm x 30 cm x 25 cm (L x W x H)
		2. Material: plastic, any color or color combination
		3. 4-wheels free to turn
		4. not driven by any power source except the pushing by people
48	**Tuning Fork Set**	**Functional Specifications:** Used to produce sound tones of fixed frequencies that correspond to the frequencies of the first octave in the diatonic scale

		Performance Specifications: Should be able to produce sound tones of fixed frequencies that correspond to the frequencies of the first octave in the diatonic scale
		Design Specifications:
		1. 8-piece tuning forks: C=256 Hz, D=288 Hz, E=320 Hz, F=341 Hz, G=384 Hz, A=426 Hz, B=480 Hz, C=512 Hz
		2. Aluminum alloy, non-magnetic, handle: 4.5 cm length, approx.
		3. Frequency and scale letter stamped on each fork
		4. Packed in molded tray for storage convenience
		5. With rubber mallet
		6. Measured sound output frequency should match with frequency info stamped on fork Frequency measurements should be within 1% of stamped values on each tuning fork
		7. Should be able to produce pure tones free from unwanted signals (smooth sine waves without harmonics)
49	**Vacuum Tube and Manual Vacuum Pump**	**Functional Specifications:** Used to demonstrate the effect of air resistance to the motion of freely falling objects
		Performance Specifications: Should be able to demonstrate the effect of air resistance on the motion of freely falling objects
		Design Specifications:
		A. Vacuum tube:
		1. 36 inches (910 mm) long x 2.25 inches (55 mm) dia. minimum, transparent acrylic
		2. With stopcock mounted in a rubber stopper on one end, and solid rubber stopper on the other end
		3. Supplied with 13 inches long vinyl tubing for connection to vacuum pump
		4. Includes metal disc and a feather as specimens
		B. Vacuum pump:
		1. Hand operated
		2. With pressure gauge
		3. Pump is sealed, self-lubricating, with removable cap, and elastic valve
		4. Fixed on outer port to provide quick vacuum release
		5. Nozzle fits 1/4 inches tubing