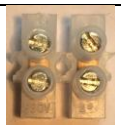
DIY Faraday Challenge Day

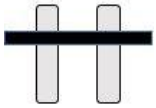
JAMES WEBB SPACE TELESCOPE

Teacher Extras

Shop manager resource sheet

Items to buy

Electrical components				
Item	**Description**		**Unit**	**Cost**
Crocodile leads		Lead with crocodile clips at each end	Each	4 Faradays
Insulated wire – red or black		Can be used to create a circuit using terminal blocks or used for electro-magnets	Per 30 cms	2 Faradays
Terminal blocks		Can be used to connect insulated wire	Block of 4	2 Faradays
Crocodile clips		Used with the insulated wire to create connections	Pair	1 Faraday
Piezo buzzer		Connect in a circuit to give a sound output	Each	6 Faradays
LED – various colours		Light Emitting Diode which lights up when connected in a circuit. Choose from red, orange, green or blue.	Each	6 Faradays
2.5V Bulb with bulb holder		Used as a light in a circuit. **NOTE:** Will not work with an LDR	Each	6 Faradays
Motor		Connect in a circuit to create clockwise or anti-clockwise movement. Will **not work** with a solar panel or an LDR.	Each	6 Faradays
Solar motor		Connect to a solar panel to create clockwise or anti-clockwise movement	Each	6 Faradays

Servo motor		Use with a servo motor control unit to have automatic movement to degrees or continuous control through 90°	Each	6 Faradays
Light Dependent Resistor (LDR)		Component that detects the light level and changes resistance in a circuit.	Each	8 Faradays
Push button switch		Connects a circuit when pushed down and breaks the circuit when released.	Each	6 Faradays
Moisture sensor		Component which detects moisture in the surroundings. Can also be used to detect materials which conduct electricity.	Each	8 Faradays
Servo motor control unit		Use this to control a servo motor. **You MUST** read the 'How to …' sheet before connecting this component.	Each	8 Faradays
Motor holder		Used to fix a motor or a syringe in position. NOTE: you will need the insert to connect a syringe.	Each	4 Faradays
Gear attachment for motor		Used to connect a motor to a cog	Each	2 Faradays
Pulley attachment for motor		Used to connect a motor to a pulley wheel – will need connector (e.g. elastic band)	Each	2 Faradays
Solar panel		Used to power components using the power of the sun. **You MUST** read the 'How to …' sheet before connecting this component.	Each	6 Faradays
2AA cells in battery holder with battery snap		Used to provide power for your circuit	Each	4 Faradays
4 AA cells in battery holder with jumper leads		**ONLY to be used** with servo motor tester. **DO NOT** use with LEDs	Each	6 Faradays

Construction materials			
Item	**Description**	**Unit**	**Cost**
Correx	Used to create structures	Piece	6 Faradays
Plastic syringes with tube	Used to develop pneumatic system	Pair of syringes with plastic tube	6 Faradays
Small cog	Used in gear systems with motors	Each	2 Faradays
Medium cog	Used in gear systems with motors	Each	2 Faradays
Large cog	Used in gear systems with motors	Each	4 Faradays
Dowel	Piece of solid cylindrical wooden rod used to create structures	Each	4 Faradays
Pulley wheel 54cm	Used to connect to pulley attachments on motor	Each	6 Faradays
Wooden wheel 54cm	Used with motors to drive something	Each	4 Faradays
Plastic reel	Used in construction	Each	4 Faradays
Polyfoam	A5 foam sheet – assorted colours	Each	4 Faradays
Coloured card	A4 sheet of card – assorted colours	Each	4 Faradays
Tin foil	A conductive material which can be used to make pressure pads or switches (**MUST NOT** be used in place of connecting wires)	10cm strip	6 Faradays
Masking tape	Can be used to secure light parts in your design. **NOTE:** excessive use of tape will result in an additional charge	Roll	6 Faradays
Sponge	Can be used to make pressure switches or enhance your design.	Each	6 Faradays
Paperclip	Used to create switches or in construction	Each	1 Faraday
Paper fastener	Used to create switches or in construction	Each	1 Faraday

Elastic bands	Used to hold or create working parts, including driving pulley wheels	Each	1 Faraday
Cable ties	Can be used to hold your structures in place	Each	2 Faradays
String	Can be used as part of your product design	30cm piece	4 Faradays
Hire Centre Trade Card	Use this to hire various items from the hire section of the shop – see below for details	One per team	6 Faradays

Available with your Hire Centre Trade Card

These items can be hired from the shop if you buy a Hire Centre Trade Card. You will need to take it to the shop and show the shopkeeper each time you want to use of one of these items. You may only get one item at a time.

Stapler	Used to staple soft materials only
Hole punch	Used to make small holes in soft materials
Rulers	Used to measure any part of your product or additional items
Scissors	Used for soft materials only
Screwdriver	Used to connect insulated wire in terminal blocks or to bulb holders.
Wire strippers	Used to cut or strip insulated wire.

Free to use

The cutting station – craft knives and junior hacksaws may be used at any point **BUT** only 3 people will be allowed at this station at any one time. Please take care when using this equipment.

Account sheet

Team……………………………………..

You will need to keep an accurate record of all the purchases your team makes.

Materials/resources purchased	Quantity	Cost		Faradays remaining
		Spent	Received (if sold back)	
			Total Faradays remaining:	

Student Team Registration Form

Team number ……

Faraday Challenge Date: ……

Your School Name: ……

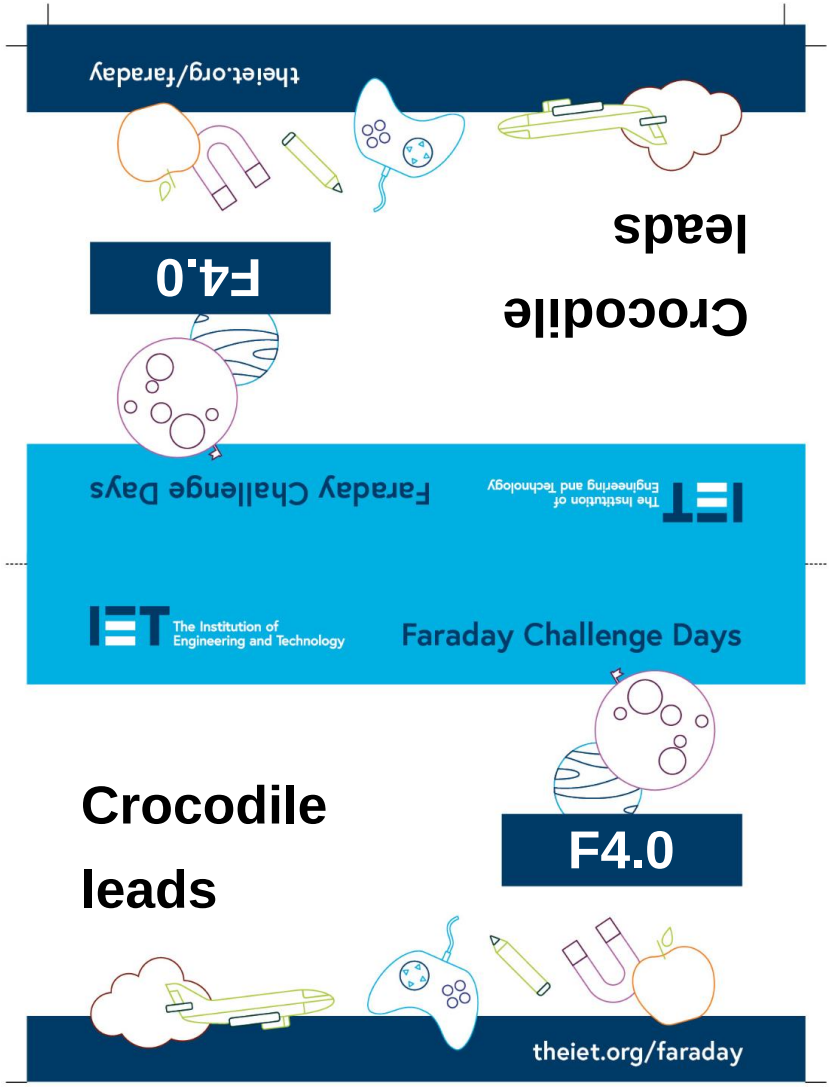
Your Teacher's Name: ……..

Team Member Names (please print clearly):

	First name	Surname
1		
2		
3		
4		
5		
6		

SHOP MANAGER GUIDANCE

- Please record the number of Faradays spent each time a team comes to the shop. You do not need to record what the team buys, only the amount spent. If teams come up more than the available spaces then continue on the reverse side. There is no restriction on the number of times they may visit the shop.
- Most unused items can be sold back to the shop for half price. No refunds given for partially used items (e.g.: card, polyfoam, dowel, etc.) or for Hire Centre Trade Cards or rolls of masking tape.
- All prices and the amounts they can receive are on the list on the clipboard. Please keep to these amounts and do not give them whole rolls of string or tin foil. No negotiation on shop items and no selling/bargaining between teams.
- Please remind students to read the 'How to ….' sheets where the shop label indicates this.
- Please make sure students are reading any specific instructions written on the price tag relating to items such as solar panels, solar motors, 4 x AA battery packs and servo motor testers.
- **Do not** sell teams a 4 x AA battery pack unless they are using it with a servo motor and control unit as they will blow the LEDs.
- If teams are unsure what components to buy, particularly which motor, please direct them to the 'How to ….' Sheets, the Student Booklet or the Challenge Leader for assistance.
- Only 2 members from each team at the shop at any time.
- Please monitor (or arrange for another person to monitor) the cutting station to ensure safe use of the craft knives and hacksaw and ensure the cutting station rules are adhered to. In the case of injury, Challenge Leaders are not allowed to administer first aid.
- Hire centre trade cards need to be purchased first before using the Hire Centre items. They can only get one item at a time.
- If you think students are buying tin foil to connect their circuits, please inform the Challenge Leader urgently.
- Teams have a budget of 120 Faradays. Please inform the Challenge Leader if a team spends over this.
- Change for the shop is in the box provided.


Crocodile leads
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Terminal blocks
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Piezo buzzer
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LED – various colours
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Motor

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Solar motor

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Servo motor –
0 to 90 degrees

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Servo motor –
continuous

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Servo motor –
0 to 90 degrees

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Product name
to go here

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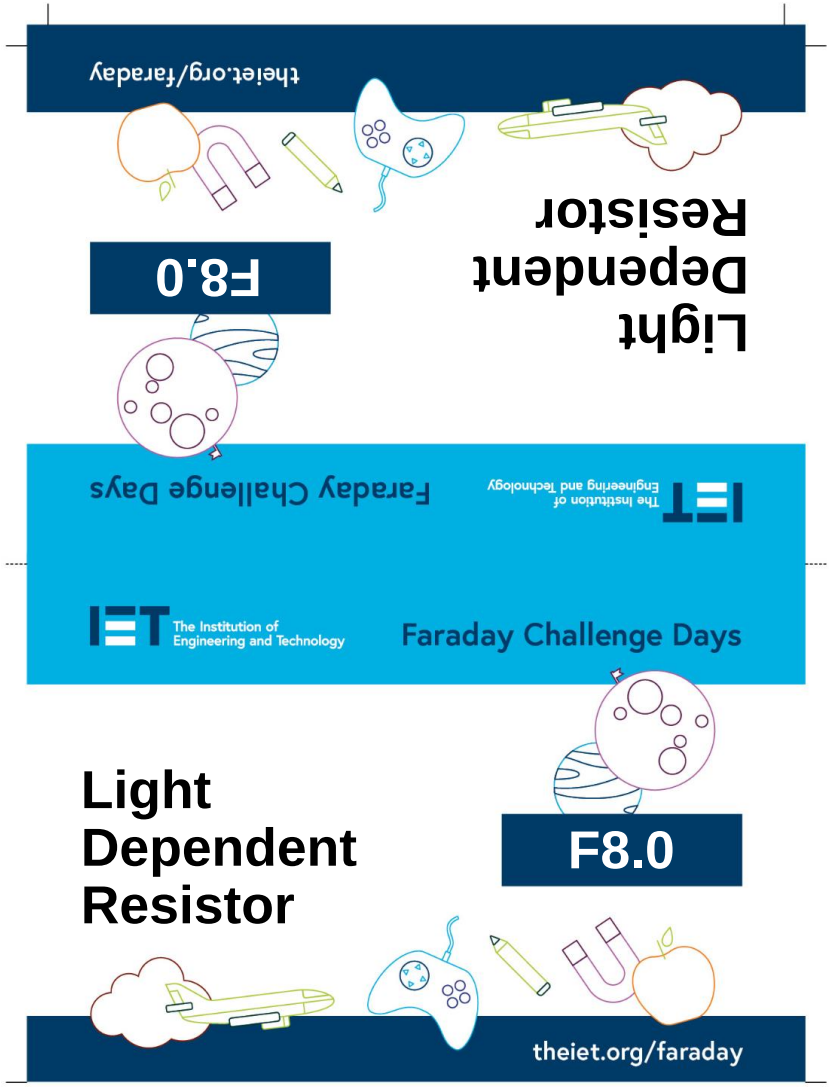
Light
Dependent
Resistor
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Push to make
switch
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Moisture sensor

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Servo motor control unit

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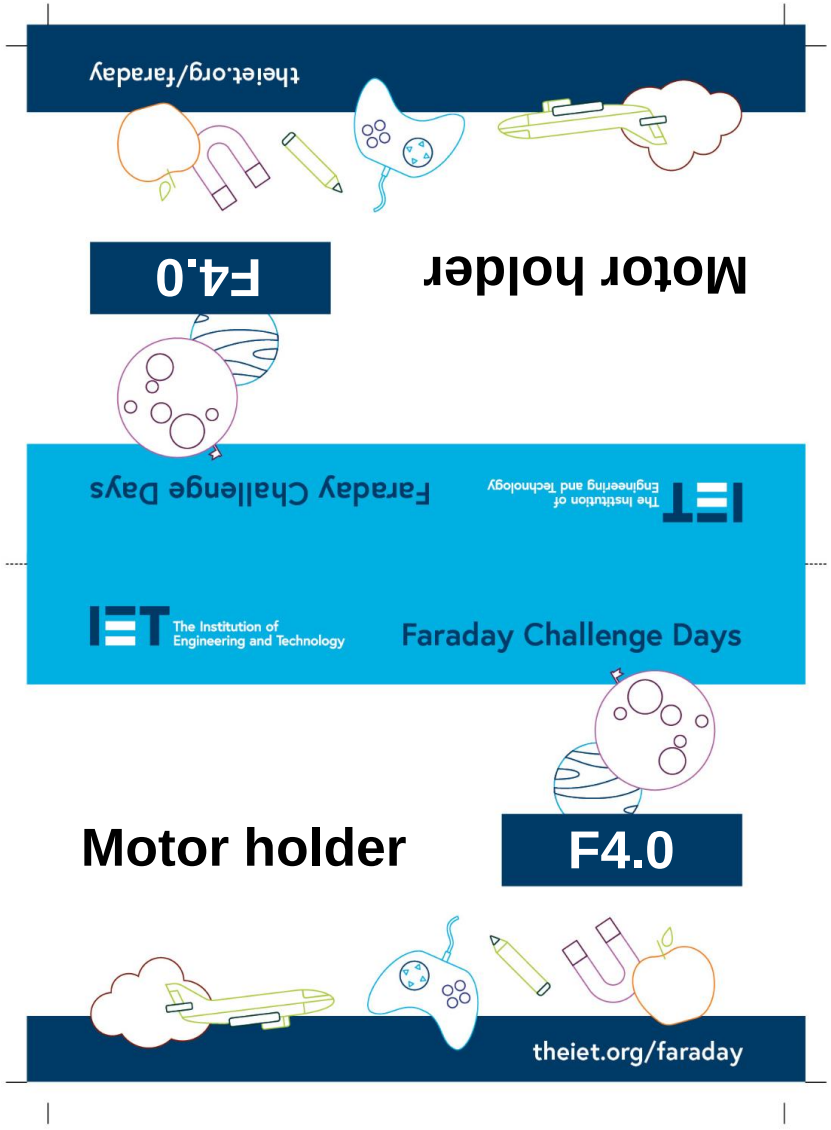
Motor holder
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Gear attachment for motor
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Pulley attachment for motor

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Solar panel

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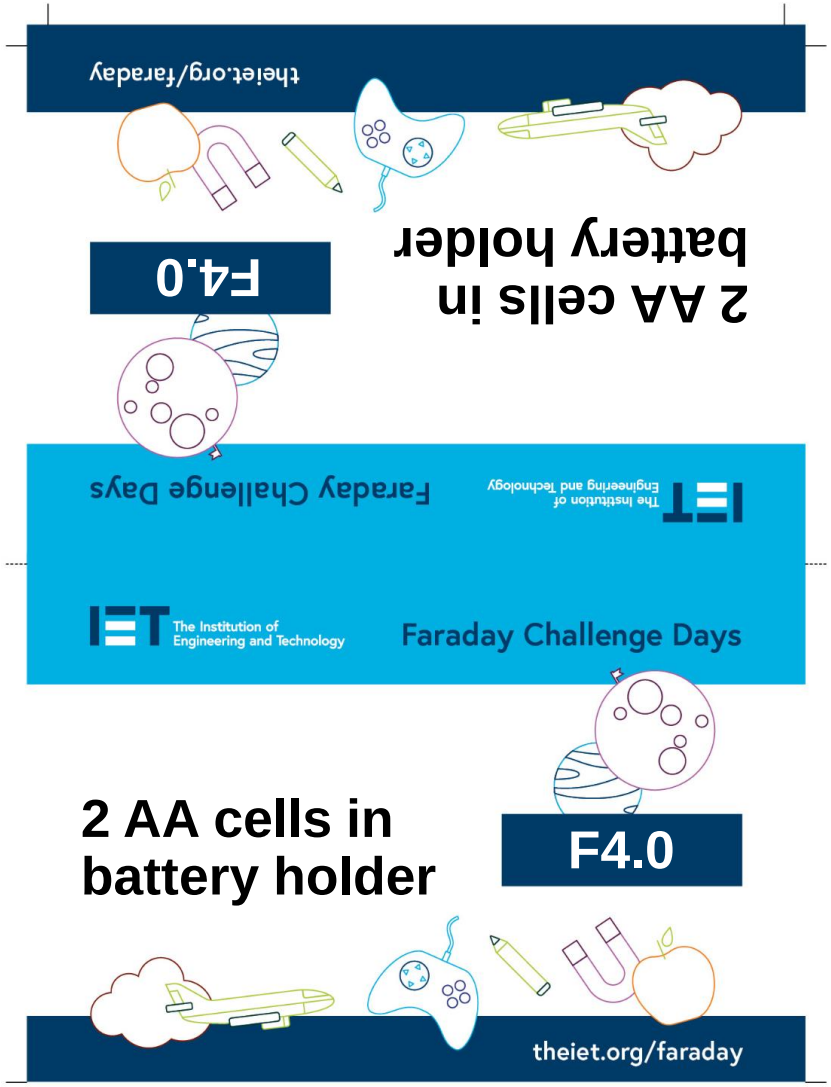
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2 AA cells in battery holder
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4 AA cells in battery holder
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Correx

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Correx

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Plastic syringes with tube

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Plastic syringes with tube

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Small cog

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Medium cog

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Large cog

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Dowel

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Pulley wheel

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Wooden wheel

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Plastic reel

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Polyfoam

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Plastic reel

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Polyfoam

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Coloured card

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Aluminium foil

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Masking tape

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Sponge

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Paperclip

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Paper fastener

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Elastic band

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Cable tie

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String

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Baking parchment

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F4.0

String

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F6.0

Baking parchment

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F4.0
Wooden lolly stick
Faraday Challenge Days
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Faraday Challenge Days
Wooden lolly stick
F4.0
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HIRE CENTRE

1 item only at a time

Need card

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HIRE CENTRE TRADE CARD

Team 2

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HIRE CENTRE

1 item only at a time

Need card

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HIRE CENTRE TRADE CARD

Team 1

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HIRE CENTRE TRADE CARD

Team 4

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HIRE CENTRE TRADE CARD

Team 3

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HIRE CENTRE TRADE CARD

Team 6

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HIRE CENTRE TRADE CARD

Team 5

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HIRE CENTRE
TRADE CARD

Team 1

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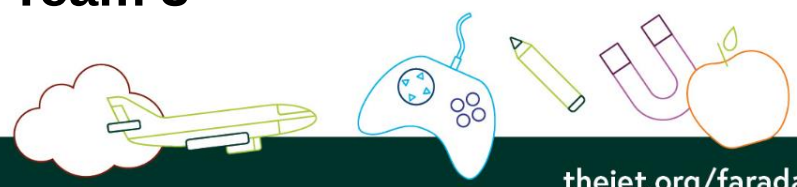
HIRE CENTRE
TRADE CARD

Team 3

F6.0



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HIRE CENTRE
TRADE CARD

Team 7

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HIRE CENTRE
TRADE CARD

Team 2

F6.0

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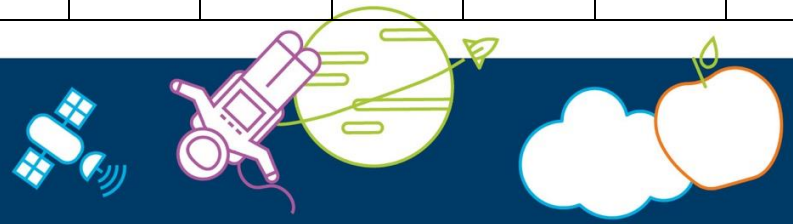
IET Faraday Challenge Day - Shop Manager Balance Sheet

School …… **Date** ……

Each visit	Team 1		Team 2		Team 3		Team 4		Team 5		Team 6		Team 7	
	Spent	Return	Spent	Return	Spent	Return	Spent	Return	Spent	Return	Spent	Return	Spent	Return
1														
2														
3														
4														
5														
6														
7														
8														
9														
10														
11														
12														
TOTAL SPEND														



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James Webb Space Telescope UK

For taking part in the

Faraday Challenge Day

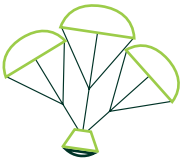
Awarded to

Nigel Fine

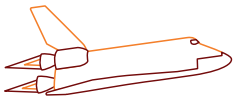
Nigel Fine
IET Chief Executive and Secretary

The Institution of Engineering and Technology

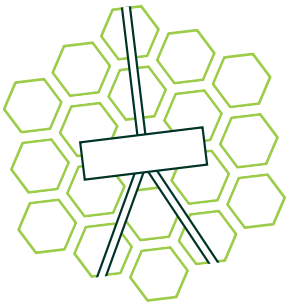
James Webb Space Telescope UK



Faraday Challenge Day



Winning team



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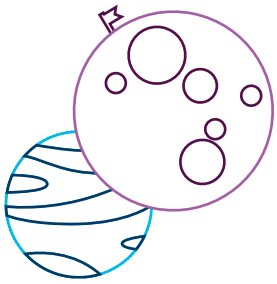

Nigel Fine
IET Chief Executive and Secretary

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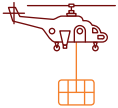
Faraday Challenge Days

F1

Faraday Reserve Note

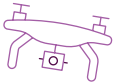
One Faraday

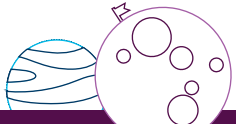


Michael Faraday

Faraday Reserve Note

Five Faradays





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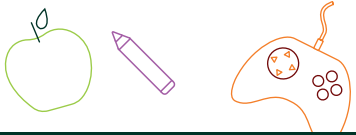
Faraday Reserve Note

Ten Faradays



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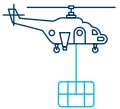
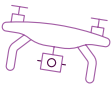
Faraday Challenge Days

F20

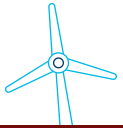
Faraday Reserve Note

= Twenty Faradays





Michael Faraday



IET Education The Institution of Engineering and Technology | Faraday

Faraday Challenge Day

Name .....

Role .....

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Faraday Challenge Day

Name .....

Role .....

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Name .....

Role .....