



11-12 YEARS | WEEK 03

Technology-Coding Algorithms And Robotics

1. Mathematical concepts based on algorithm

2. Coding - Sequences

3. Coding - Basic terms

4. Coding - Algorithm

5. Computers - Cryptic codes

6. Computers - Binary code

7. Gadgets - Crack the binary code

8. Color coding

9. Color coding

10. Color coding

11. Tracing the route

12. Tracing the route

13. Tracing the route

14. Unplugged coding

15. Unplugged coding

16. Robotics - History of robots

17. Robotics - Robot inspired movies

18. Robotics - Workshop

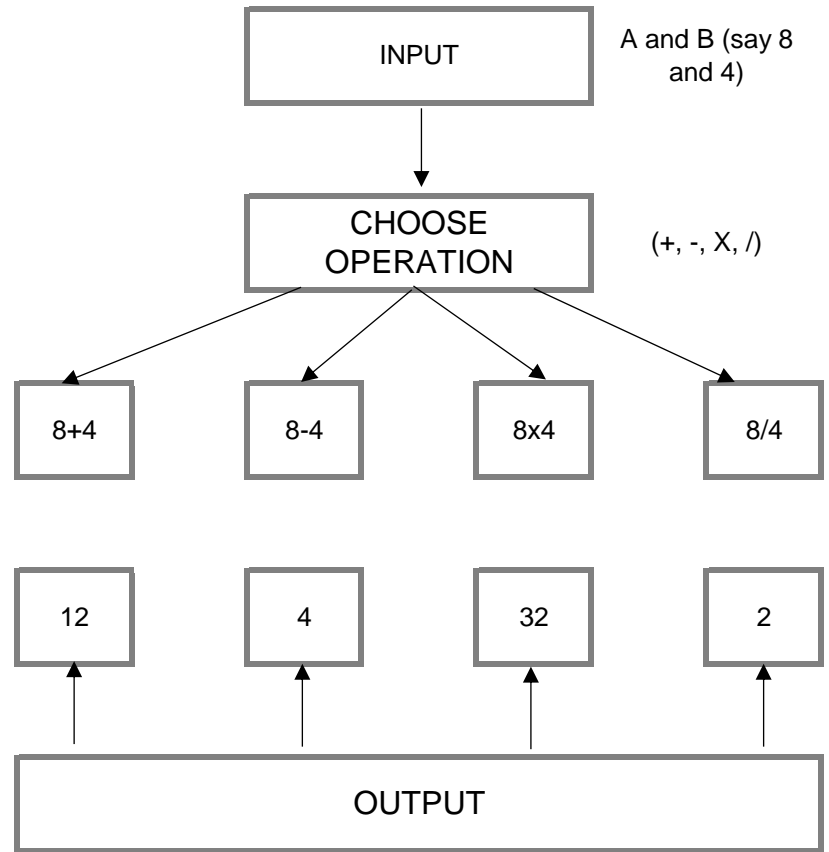
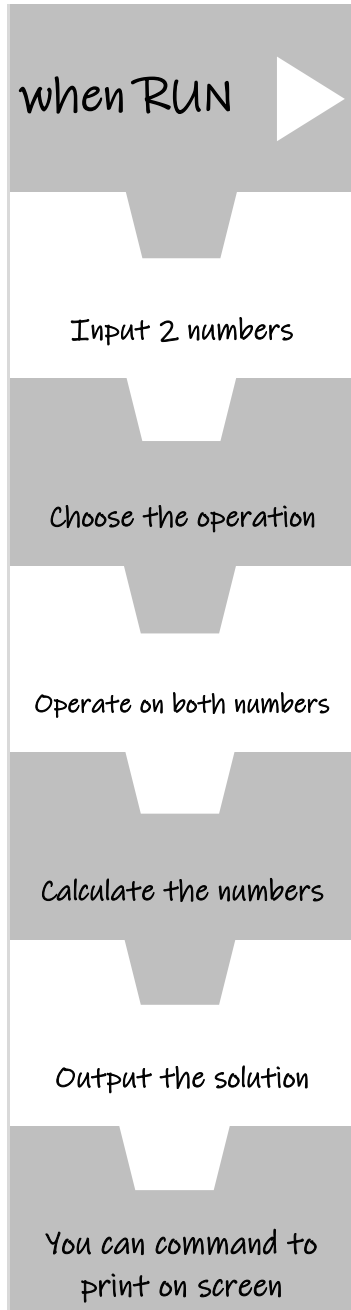
19. Robotics - Vocabulary

20. Robotics - Design your robot



MATHEMATICAL CONCEPTS BASED ON ALGORITHM

Let's understand how robot would work with numbers. Follow the given steps of the algorithm and design inputs and outputs.



	+	-	X	/
(15 , 5)				
(18 , 6)				
(24 , 3)				
(36 , 4)				
(49 , 7)				

T: Coding - Basic terms



Do you understand the terminologies used in coding technology? Write the terms in the blanks using the vocabularies given in the boxes.

algorithm	arrays	argument	bit	coding
conditional statements	function	loops	machine learning	scripts
training	boolean	character	string	neural network

1. _____ is the process of feeding a huge amount of data into the algorithm so the algorithm can adjust and improve as if it is learning.
2. A variable type to represent words and phrases is _____.
3. A _____ is a block of code that can be referenced by name to run the code it contains.
4. _____ are the statements that evaluate true or false.
5. The individual 1's and 0's in binary are called _____.
6. _____ are containers that hold variables of similar data type.
7. An _____ is a set of instructions used to solve a problem.
8. An _____ is a way to provide more information to a function.
9. _____ is how people create instructions for computers to follow using programs through different programming languages.

Answer Key: 1. Training, 2. String, 3. function, 4. Conditional statements, 5. bit, 6. Arrays, 7. algorithm, 8. argument, 9. Coding.

T: Coding - Algorithm



An algorithm is a series of instructions to finish a task. Draw a magical creature on the right based on an algorithm on the left. You can add all the body parts, like eyes, ears, nose, mouth, body, arms, legs, tails, wings, horns, etc. by giving the intricate details of it.
Get innovative !!!

Algorithm	My creature

T: Computers - Cryptic codes



Cryptic codes came into existence to protect the messages for military use. Have you heard of substitution cipher? The key for the substitution cipher is 7, which means you will have to shift the alphabets to 7 places and rearrange them. The plain text is the unmodified text and the cipher text is the modified text. Few are done for you. Complete the remaining key and decrypt the code below to get the plain text or the message.

Plain Text	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q
Cipher Text	g	h	i		k			n				r			u		

Plain Text	r	s	t	u	v	w	x	y	z
Cipher Text									



Example:

h	e	l	l	o	→	Plain text / message
n	k	r	r	u		Cipher text / code

1. Given plain text, can you change the message to cipher text?

h	i	c	a	n	y	o	u	h	e	l	p	m	e

d	e	c	o	d	e	t	h	i	s	t	e	x	t

2. Given cipher text, can you change the code to plain text?

n	o	o	g	s	y	k	t	j	o	t	m	e	u	a

g	s	k	y	y	g	m	k

T: Computers - Binary code



Binary codes are codes of '0' and '1' understandable by the computer. Each bit is either '0' or '1'. Convert the binary codes in each row to bitmaps by shading the grids on the left, where '0' represent an unshaded grid and '1' represent a shaded grid. The first one, 'a' is done as a reference.

a	1	1	0	0	1	1	1	0	0
b	0	0	1	1	1	0	0	1	1
c	1	0	1	1	1	0	0	1	1
d	1	1	1	0	0	0	1	0	1

e	0	0	0	0	1	0	0	0	0
f	0	0	0	1	1	1	0	0	0
g	0	0	1	1	1	1	1	0	0
h	0	1	1	1	1	1	1	1	0
i	1	1	1	1	1	1	1	1	1
j	0	0	1	1	1	1	1	0	0
k	0	0	0	1	1	1	0	0	0
l	0	0	0	0	1	0	0	0	0

j	1	1	1	1	1	1	1	1	1
k	1	1	1	1	1	1	1	1	1
l	0	0	0	0	1	1	1	0	0
m	0	0	0	1	1	1	0	0	0
n	0	0	1	1	1	0	0	0	0
o	0	0	1	1	0	0	0	0	0
p	1	1	1	1	1	1	1	1	1
q	1	1	1	1	1	1	1	1	1

r	1	0	1	0	1	0	1	0	1
s	0	1	0	1	0	1	0	1	0

T: Gadgets - Crack the binary code



Do you like to play riddles? Answer the following questions by cracking the codes using the key given below. Have fun playing!!!

1. I am black in colour, yet I am colourless. Who am I?

01100001

01110011 01101000 01100001 01100100 01101111 01110111

2. I can carry lots of food, but cannot eat anything. Who am I?

01100001

01100110 01110010 01101010 01100100 01100111 01100101

3. You can eat me at night, but never in the morning. What am I?

01100100 01101010 01101110 01101110 01100101 01110010

Letters of the alphabet in binary code

a - 01100001
e - 01100101
i - 01101001
m - 01101101
q - 01110001
u - 01110101

b - 01100010
f - 01100110
j - 01101010
n - 01101110
r - 01110010
v - 01110110
y - 01111001

c - 01100011
g - 01100111
k - 01101011
o - 01101111
s - 01110011
w - 01110111
z - 01111010

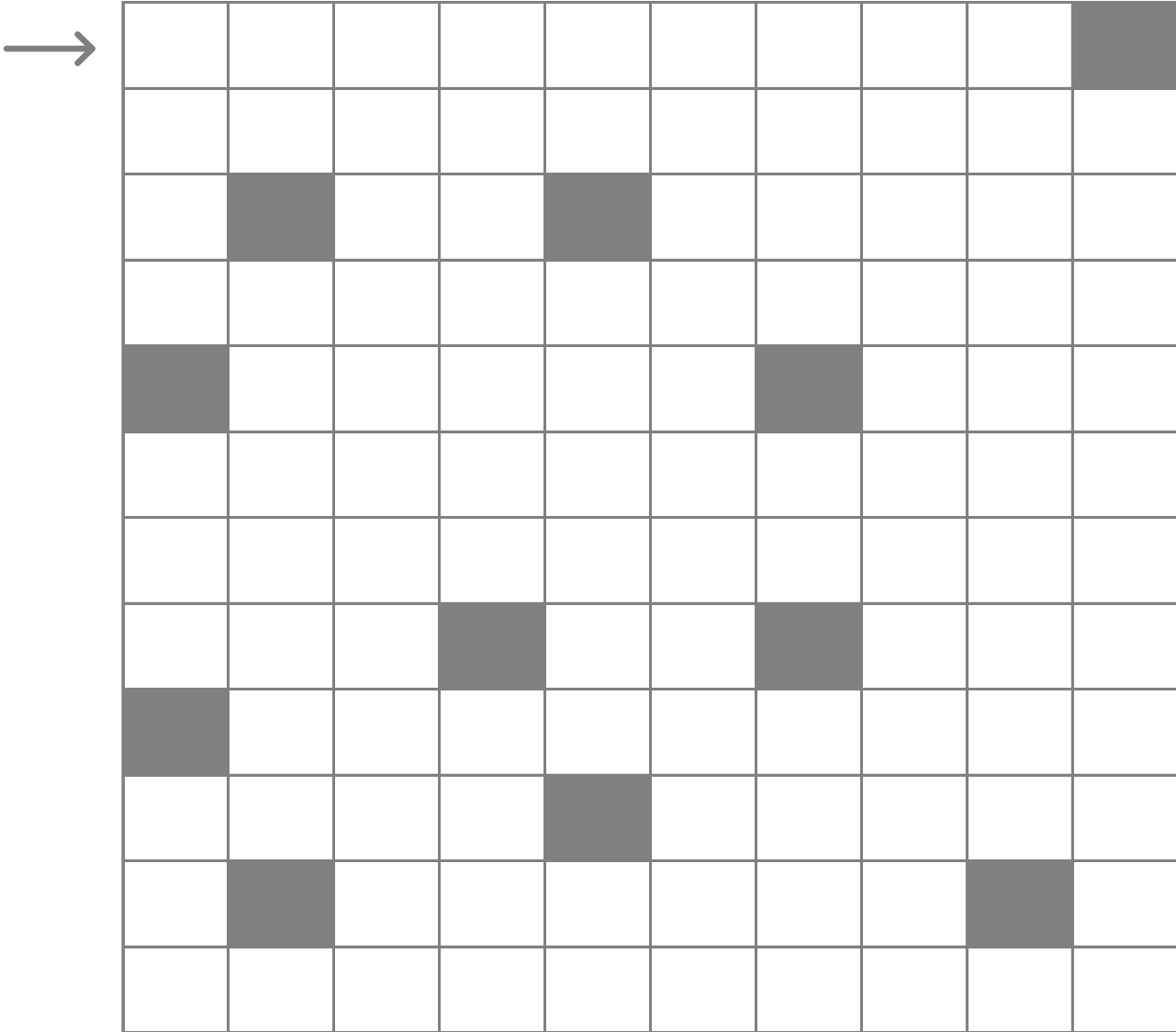
d - 01100100
h - 01101000
l - 01101100
p - 01110000
t - 01110100
x - 01111000

Answer Key: 1. A shadow. 2. A fridge. 3. Dinner.



COLOR CODING

The route has been laid out to navigate the blocks. The arrows show the direction of movement. Trace the path using these arrows in the white boxes. Color the blocks as directed. If grey blocks come in the route, jump over and continue following the path. You can also cut out the arrows from the reference sheet and paste them to trace the route!

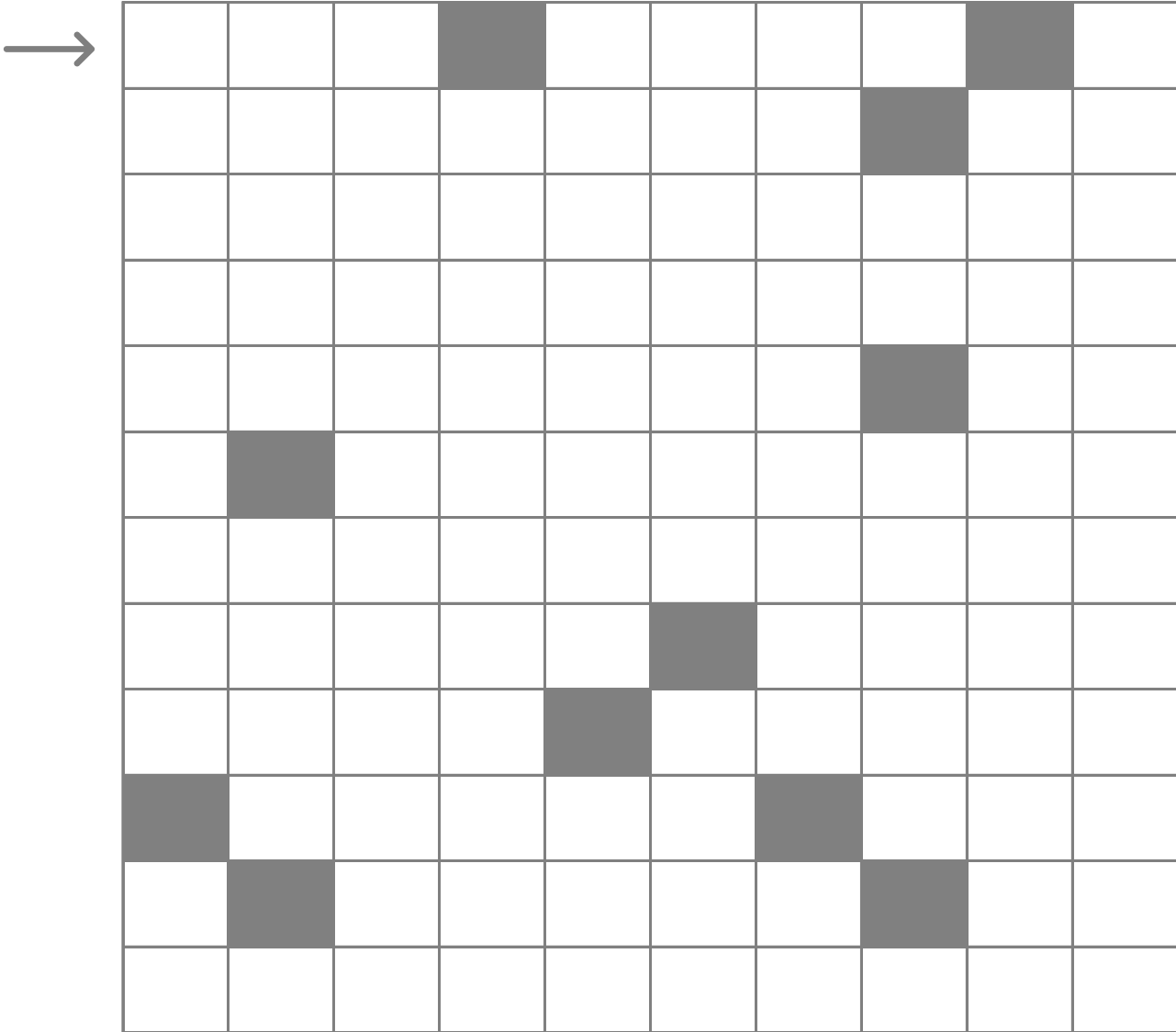


- | | | | | | |
|---|-------|--------------|----|-----|--------------|
| 1 | → | 2 times | 6 | ↑ | Color Green |
| 2 | ↓ ↓ ↓ | Color Orange | 7 | ↑ → | 3 times |
| 3 | → → → | 3 times | 8 | ← | Color Yellow |
| 4 | ↓ | Color Blue | 9 | ↑ ↑ | 2 times |
| 5 | ↓ ← ← | 3 times | 10 | → | Color Red |



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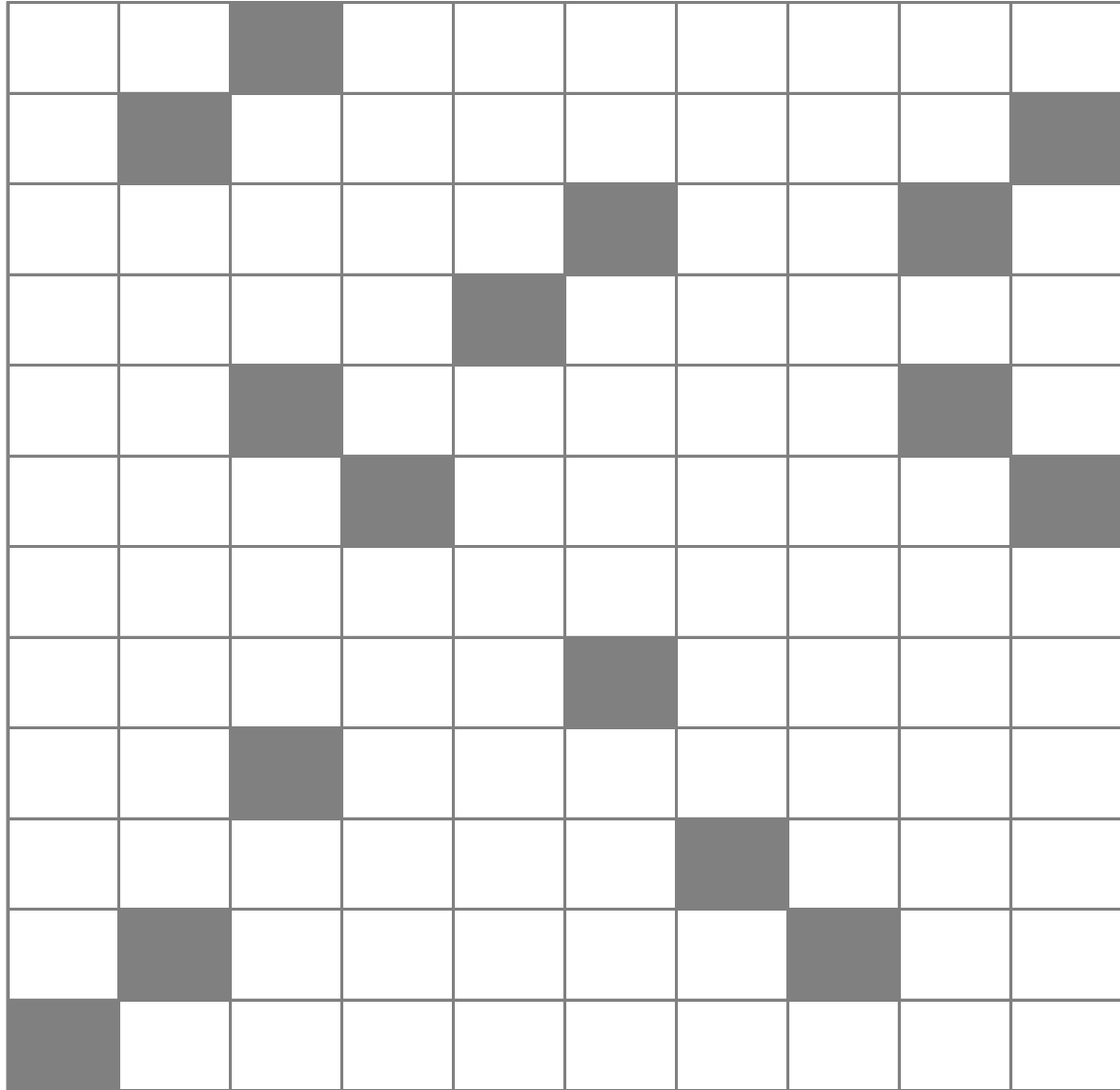


- | | | | | | |
|---|--|--------------|----|--|--------------|
| 1 | | 6 times | 6 | | Color Green |
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E: Robotics - History of robots



Have you seen robots? Let us learn about the history of robots by reading the paragraph and answer the following questions below.

History of robots

The first robot was built in the 10th Century, BC, in ancient China. A scientist made a mechanical man as a gift for the Emperor. During the Industrial Revolution, many factories began to have mechanical devices to do the work, like the 'Spinning Jenny'. The word 'robot' was used in 1921 that comes from the Czech word 'robota', which means 'to serve'. Hence, robots are designed to serve humans. The first robot made to work in a factory was called 'Unimate'. It was invented for the General Motors car company. Many factories, like cars and computer factories, don't use human workers. Robots can do dangerous things that humans cant do like robots can go inside volcanoes or go to the bottom of the sea. In the future, we might all robots help us in household chores like cleaning, washing the clothes and the dishes. If robots get too powerful, we must be careful where they won't work just as help. They might decide to take over the world, as they do in movies 'The Terminator'.

Read the above passage carefully and answer the following questions.

1. Write a short note on the first robot.

2. How was 'Unimate' invented?

3. List the differences and similarities between a human and a robot.

E: Robotics - Robot inspired movies



Have you watched movies with robots as a character? Write your answers to the questions given below.

1. Name some of the robots based movies that you have seen.



2. How robots play a significant role in movies?



3. Which is your favourite movie based on robots? And why?



4. What do you learn from the robot inspired movies?



E: Robotics - Workshop



Let us make a gliding robot. Are you interested in making it? Start !!!

Materials required:

Two pony beads of any colour

A drinking straw

A white cardboard

Markers or coloured pencils

Scissors

Tapes

A string

Instructions:

1. Stick the robot template onto the white cardboard.

2. Cut along the dotted lines.

3. Colour this robot with coloured pencils or markers.

4. Cut two 1.5 inch pieces of the drinking straw and tape them on to the back of the robot.

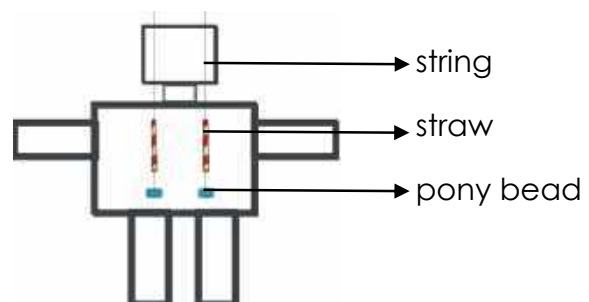
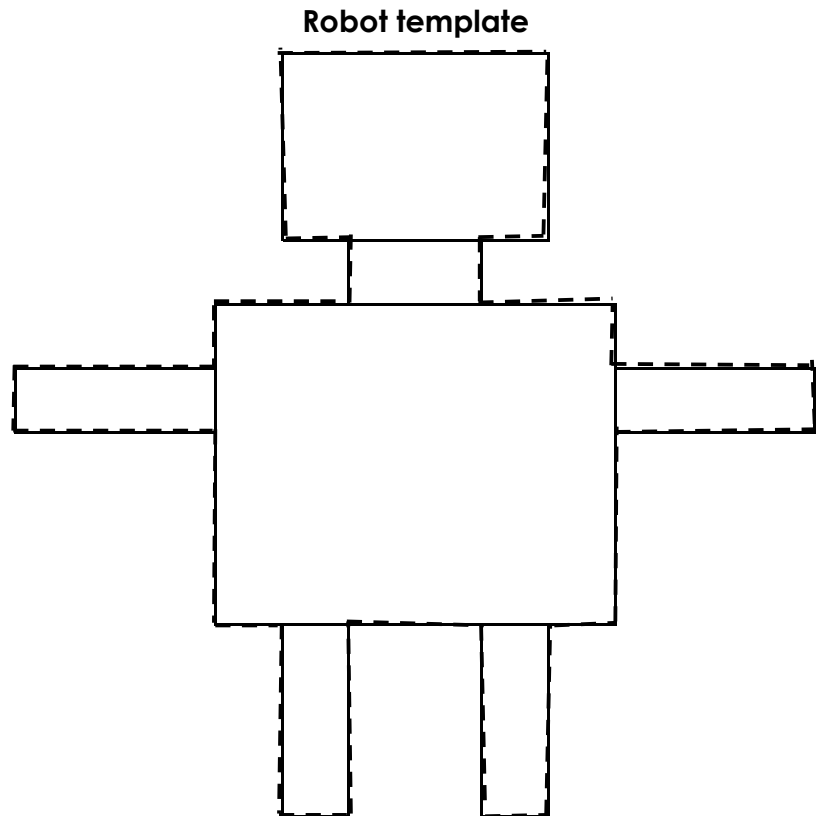
5. Take a piece of string about 4 feet long and thread both the ends through the straw pieces so that you form a giant loop above your robot.

6. Tie a pony bead onto each end of the string to keep the string coming out of the straw pieces.

7. Hang your gliding robot onto the door knob.

8. Grab one bead in each hand and pull out and away from the robot.

9. Enjoy watching your robot gliding !!!



E: Robotics - Vocabulary



Are you keen on knowing the terms used in robotics? Search the words in the grid horizontally, vertically, diagonally or backwards and circle them.

b	a	t	t	e	r	y	x	z	a
p	r	o	g	r	a	m	u	q	p
t	r	a	i	n	i	n	g	w	t
c	o	m	p	u	t	e	r	d	h
a	x	z	c	g	q	z	v	b	n
p	d	w	a	r	s	x	j	g	m
a	y	h	b	i	w	i	r	e	s
c	t	e	l	p	i	f	o	a	r
i	w	e	e	p	t	g	s	r	o
t	i	l	s	e	c	a	n	s	t
o	h	s	x	r	h	z	e	c	o
r	o	b	o	t	i	c	s	x	m

Answer Key: 1. training, 2. program, 3. robotics, 4. capacitor, 5. sensor, 6. motors, 7. gears, 8. wheels, 9. battery, 10. cables, 11. wires, 12. switch, 13. computer, 14. gripper.

E: Robotics - Design your robot



Design your robot by giving a suitable name to your robot and drawing it in the box.
Answer the following questions given below. Get innovative!!!

My robot's name _____.

1. What does it look like?

2. What materials would you need to make it?

3. What are the features of your robot?

4. Who could benefit from its creation? And how?
