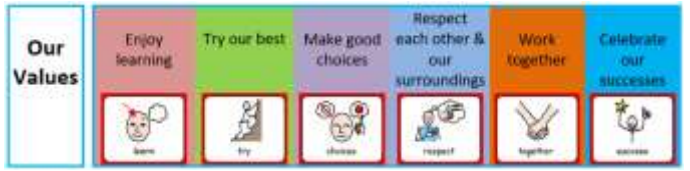


SUBJECT MEDIUM TERM PLANNING - SUBJECT

Year Group: 1	**TERM:** Spring 1	**Theme:** Moving a Robot

National Curriculum:

- Understand what algorithms are; how they are implemented as programs on digital devices; and that programs execute by following precise and unambiguous instructions
- Create and debug simple programs
- Use logical reasoning to predict the behaviour of simple programs
- Use technology purposefully to create, organise, store, manipulate and retrieve digital content
- Recognise common uses of information technology beyond school
- Use technology safely and respectfully, keeping personal information private; identify where to go for help and support when they have concerns about content or contact on the internet or other online technologies.

Context: - Pupils will be introduced to early programming concepts. Pupils will explore using individual commands, both with other learners and as part of a computer program. They will identify what each command for the floor robot does, and use that knowledge to start predicting the outcome of programs. Pupils are also introduced to the early stages of program design through the introduction of algorithms.	**Concepts:** **Computer Science** – developing pupil's understanding of early programming by introducing the concepts of commands, algorithms and program design. **Digital Literacy** – developing their knowledge of how to be a safe user when online.	**Vocabulary:** **program** – how the algorithm is run as a code on the computer **command** – a single, specific instruction **algorithm** – a precise set of instructions **debug** – finding and fixing errors in our algorithms and programs **directions** – the position to which something is moving or facing **robot** – machines that we can program to do human jobs **route** – the path taken to get from a start point to an end point **solution** – an answer to a problem

Prior Knowledge: • Problem solving skills (computational thinking) – **FS2**. • Creating and following simple instructions – **FS1 & FS2**	**Future Knowledge**: • To use an algorithm to create a program for an animation **(Year 1, Spring 2 – Programming animations)** • To use logical reasoning to predict the outcome of a program **(Year 2, Autumn 2 – Robot Algorithms)** • To create and debug a program that I have written **(Year 2, Autumn 2 – Robot Algorithms and Year 2, Summer 2 – Programming Quizzes)** • To design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts **(KS2)** • To use sequence, selection, and repetition in programs; work with variables and various forms of input and output **(KS2)** • To use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs **(KS2)** • To use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact. **(KS2)**
End points /by the end of this unit pupils will… • Be able to run a command on a device. • Be able to follow and give instructions • Be able to predict the outcome of a sequence involving up to four commands. • Be able to choose the order of commands in a sequence. • Be able to debug a program. • Be able to find more than one solution to a problem. • Be able to use online resources respectfully. • Be able to explain why it is important to be kind to others online.	**Crucial Knowledge**: Pupils need to know what a command, algorithm and program is, and begin to form an understanding of the relationship between them. Pupils will need to be able to plan a simple program and explain what that program should do. Pupils will need to be able to debug a simple program Pupils will need to know how use online resources respectfully in order to maintain positive relationships with others online.

<table>
<tr><th colspan="3">Lesson Number - 1</th></tr>
<tr><td>Key learning: To explain what a given command will do</td><td>Concepts:
Computer Science</td><td rowspan="2">Lesson structure: Introduction, direct teaching, activities, key questions

<u>Engage:</u>

Show pictures of different types of robots (e.g. bee-bot, robot floor cleaner, robot grass mower etc.)
Q – What do we use robots for?
Q – Why do robots do what they do?

Talk to a partner about the kinds of jobs or tasks robots can do and focus on why robots do those tasks. (E.g. robots help us to clean, mow, used in factories, help us learn).

Lead learners to the idea that robots are machines that can do tasks (robots can be specialised or multipurpose). Robots complete their tasks because they have been programmed to do so by humans: (i.e. we tell robots what to do.)

<u>Introduce:</u>

Introduce the floor robots to the class. Have a picture on the flipchart as well as an actual Bee-bot as you are explaining.
Q – What do the buttons on top do?
Allow pupils time to discuss with a partner what the different buttons do. Encourage them to be specific in their descriptions.

Show pupils how to switch the robot on. Ask pupils to identify what lights up when the robot is switched on (the robot's eyes). This will help them to check independently that they have turned it on correctly.

Show pupils the Clear (X) button, as this is hard to see working and is really important. Explain that each time they try a new button, they will need to press X first.

Activity – give pupils time to explore the Bee-bot. In 3s, allow them to try each button 1 at a time to see if the buttons did what they expected them to.</td></tr>
<tr><td>Success Criteria:
I can predict the outcome of a command on a device
I can match a command to an outcome
I can run a command on a device
I can follow an instruction
I can recall words that can be acted out
I can give and follow directions</td><td>Suggested resources:
Flipchart

Bee-bots</td></tr>
</table>

		NOTE – *model pressing a command at a time and then clearing the instruction before having another go.* **P&C** Sit pupils in a circle. Either have their Bee-bots in front of them **(switched off)** or provide pieces of paper showing the 7 buttons on top. Tell them that you are going to secretly press one button on the robot, without them seeing it. You will then place the robot on the floor and press Go. After the robot has moved, ask pupils to place a finger on their sheet or Bee-bot indicating which (arrow) button they think you pressed. Repeat this several times until the learners are confident. Remember to use the **Clear button (X)** to clear the memory each time, and highlight to learners that you are doing that. **Note:** Learners not behind the robot might find the specific direction button harder to identify. If necessary, move around the circle so that all the learners have been behind the robot at some point during the activity. *CHECKPOINT* *Show the **'Go'** and **Clear button (X)** on the screen.* *Q – Why do you think these buttons are important?* *Highlight that the **'Go'** button makes the robot start its program. The **Clear (X)** button clears the robot's memory so that it forgets any instructions/buttons that were pressed before.* ***Note:** Turning the robot off and on again also clears the memory.* **Independent** Tell pupils they are now going to pretend to be robots. They will be following the instructions you give them, just as the floor robots have to. That means they shouldn't be doing anything that you have not told them to do. Give the class simple instructions to follow, one instruction at a time. Ask the class to all act out the instructions you give. Ensure that you give precise instructions and keep the wording to a minimum (E.g. stand up, sit down, put your hand up, nod, wave, clap once.)

		Note: For this activity, do not use instructions that involve moving around Q – Can you think of more words that can be acted out? Pupils to discuss with a partner and then feedback to class. Write up these phrases on a class list on a board. If pupils suggest instructions that involve moving around, note them down on a separate list that can be revisited in the Deepening. ***NOTE –*** *you could add pictures to the actions on the list to help children to remember them for later.* Tell pupils they are now going to try out the instructions on the class list you have written on the board (not moving around the room) working in pairs. Ask one partner to give their partner instructions one at a time, to act out. Remind pupils that the instructions need to be from the class list and should be said clearly. The learner who is following instructions is a robot and can only do as they are instructed. After a few minutes they can swap over. **Deepen** Q – Which instructions could you use to move your partner around the room? Ask pupils to think of instruction words to now move each other around the room. Before gathering responses, ask the learners to think about the Bee-bot from earlier. You may need to encourage pupils to think of single words or short phrases, and also to think about precision (like the robot). Add words to the class list and highlight those that will work particularly well; for example, 'step' is a better instruction than 'walk'. ***Possible misconception*** *- Learners may suggest turns, but may not be accurate with the terms left and right. To make the activity achievable, tell pupils that they can use the instruction 'turn' and show by pointing which way they want their partners to turn.* Allow pupils time in their partners to try out the movement instructions. ***This task could be down outside or in the classroom depending on preference.***

		NOTE - *If some pupils are successfully issuing and following instructions, ask those learners to think about a specific destination in the room / outside that they can try to direct their partner to.* **Reflection** Q - What was it like giving your partner instructions? Q - What was it like acting out the instructions? Q - How did it compare with using the floor robot?
Vocabulary: **Forwards, backwards, turn, clear, go, instruction**		

Lesson Number - 2		
Key learning: To combine forwards and backwards commands to make a sequence.	**Concepts:** Computer Science	**Lesson structure: Introduction, direct teaching, activities, key questions** **Engage:** Show image of the 7 buttons on a Bee-bot. Q – Which buttons will you need to use to program the Bee-bot to go forwards and backwards? (Answer – **forwards, backwards**, **go** and **clear X**)
Success Criteria: • I can compare forwards and backwards movements. • I can start a sequence from the same place. • I can predict the outcome of a sequence involving forwards and backwards commands.	**Suggested resources:** Flipchart Bee-bots Floor mats for the Bee-bots (available to print from NCCE computing curriculum – Spring 1 – Lesson 3)	**Introduce:** Q – What is a command? A command is a specific instruction that can be used in a program to control a computer / robot. Each time we press a button on a Bee-bot we are giving it a command.

	Paper-bots (available to print from NCCE computing curriculum – Spring 1 – Lesson 3) Command worksheets (available to print from NCCE computing curriculum – Spring 1 – Lesson 3)	**P&C** Tell pupils that for the activities in today's lesson it's very important to start the robot from the same position. Tell pupils that they will try programming the robot with one forward command. They will need to press **Clear (X)** first, then **Forwards**, and then **Go** to run their program. Pupils need to remember where their robot moves to. Q – Where does the Bee-bot finish? They should then move the robot back to the start position, clear the memory, and try a program with **two Forwards** commands. Again, pupils need to remember where their robot got to. Q – How many squares does the Bee-bot move? Bring pupils back to the carpet. Tell pupils that the first program moved the robot forwards one square. The second program moved the robot forwards two squares. Highlight to pupils that each Forwards command moves the robot forwards one square. Q – How far do you think the Bee-bot will move for every **backwards** command? Allow pupils a few minutes to explore what happens with a **single backwards** command and **two backwards** commands. Feedback to class. Show pupils an image of the floor mat. Q - What will happen if the robot is given one Forwards command and one Backwards command? Q - Which square do they think the robot will finish on? Give them time to find out and then time to try different sequences of their own of **Forwards** and **Backwards** commands. Ask pupils to think about where their robot will move to before they press **Go** each time.

Independent

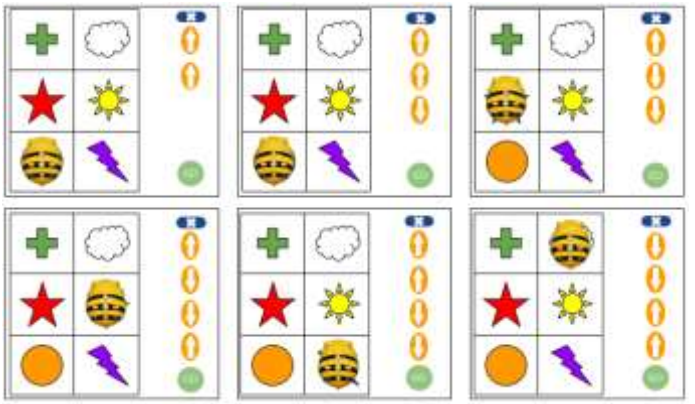
Q – What does the word **'predict'** mean?

To predict is to say what you think is going to happen in the future.

Q – What is a **'program'**

Programs are a set of instructions that a computer uses to perform a specific function.

Explain that pupils will be trying out some different programs to see what happens (See example in picture). They will be using a paper-bot to predict the outcome first, and then use the Bee-bots to see if they were correct.



They will need to place their paper-bot in the correct start position for each program by matching the location of the robot shown in the diagram. Once the paper-bot is in the correct square, they should carefully move the paper-bot (by hand) following the program. Pupils should mark with a pen or a counter where the paper-bot finally gets to. They should then place the Bee-bot back on the start square, enter the commands shown, and run the program to see if their prediction was correct.

Deepening

Show pupils an image of a floor mat and three different programs.

Q – Which program will make the Bee-bot move and then end up back in the original start position?

Ask volunteers to talk through each program to help reach a conclusion.

Teacher to use a Paper-bot / Bee-bot to reveal the answer.

		Reflection Use thumbs up (3 – confident), thumbs middle (2 – unsure), thumbs down (1 – not confident) to reflect on the three statements. • I can compare forwards and backwards movements • I can start a sequence from the same place • I can predict the outcome of a sequence involving two commands
Vocabulary: **Forwards, backwards, turn, clear, go, commands, instructions, directions**		

Lesson Number - 3		
Key learning: To combine four direction commands to make sequences.	**Concepts:** Computer Science	**Lesson structure: Introduction, direct teaching, activities, key questions** **Engage:** Remind pupils of the buttons used last lesson. (Show a picture) Q – What did these buttons do? Remind pupils that the forwards command makes the robot move forwards one square and the backwards command makes the robot move backwards one square. **Introduce:** *LET'S RECAP!* Q – What is a command? A command is a specific instruction that can be used in a program to control a computer / robot. Each time we press a button on a Bee-bot we are giving it a command. Today we are going to be giving some different commands to the Bee-bot using the **Turn buttons** (show a picture).
Success Criteria: • I can compare left and right turns • I can experiment with turn and move commands to move a robot • I can predict the outcome of a sequence involving up to four commands	**Suggested resources:** Flipchart Bee-bots Floor mat (same as the previous lesson) Worksheets ((available to print from NCCE computing curriculum – Spring 1 – Lesson 4)	

		P&C Give pupils time to explore using the **Turn buttons** on the floor mats used last week. As they explore, think about the following questions: Q – How does the robot move? Q – Does the Bee-bot move into other squares? Discuss what they noticed. Highlight to the pupils that the robot turns on the spot and that the turn commands do not make it move between squares. **Note**: Pupils may need reminding that the **Go** button makes the robot start its program. The **Clear (X)** button clears the robot's memory so that it forgets any instructions/buttons that were pressed before. **Independent** This activity is about pupils trying out programming through trial and error. Give pupils the destination cards (six cards per group). Talk pupils through the instructions on the screen. 1. Place the destination cards in a pile, face down. 2. Ask pupils to turn over one card. 3. Place the Bee-bot on the matching square on the mat. 4. Turn over another card. 5. Ask pupils to program their robot to get to the square matching the second card. Give pupils time to try this activity several times. If they aren't successful with their program they should place the robot back on the start square, clear the memory, and try again.

		Note: The learners may need to be discouraged from picking the robot up and moving it if their program isn't successful. **Deepening** Recap from last lesson the definition of "predict". Pupils given sheets with 6 different programs on it. Pupils predict where they think the Bee-bot will finish. In the last lesson, pupils manually moved their paper-bot. In this lesson, encourage pupils to point at squares, matching movement. Mark on their sheet where they think the Bee-bot will finish. ***Possible misconception –*** *Some pupils may find it difficult to visualise where the Bee-bot will finish which will mean their predictions will be incorrect. Have some paper-bots available to support with this.* Once pupils have made their predictions, they should try the program out using the Bee-bot. **Reflection** Show picture of the buttons on the top of a Bee-bot. Q – Which buttons move the Bee-bot to another square? Q – Which buttons make the Bee-bot turn on the same square?
Vocabulary: **Left, right, turn, commands, sequence, predict**		

Lesson Number - 4		
Key learning: To plan a simple program.	**Concepts:** Computer Science	**Lesson structure: Introduction, direct teaching, activities, key questions** **Engage:**

Success Criteria: • I can explain what my program should do • I can choose the order of commands in a sequence • I can debug my program	**Suggested resources:** Flipchart Bee-bot Paper-bot Floor mats (from previous lesson) Destination cards (available to print from NCCE computing curriculum – Spring 1 – Lesson 4) Command cards (available to print from NCCE computing curriculum – Spring 1 – Lesson 5)	Recap key vocabulary (could use a match up the word to the definition task) for the following words: Command Program Predict *See previous lessons for definitions** **Introduce:** Remind pupils about the last lesson, in which they used the cards to choose a start square and an end square. They used trial and error to get the Bee-bot in to the correct place, and finished by predicting the outcome of a program given to them. In this lesson, they will be planning and creating their own program. Q – What is an algorithm? An algorithm is the set of instructions (commands) needed to complete a task which can be turned into a code. The steps in an algorithm need to be in the right order. An algorithm is part of the design of a program. Tell pupils that today they will be creating their own algorithms for the Bee-bot to follow. **Practise & Consider:** Work in 2s / 3s. Pupils place the destination cards face down on their desk. Pupils turn over a destination card. Place the paper-bot on that square. Pupils turn over another destination card. Use their finger to point out a possible route that the Bee-bot could take. **Note:** Asking pupils to point out a specific route encourages them to consider an early stage of program design. Pointing out a route allows pupils to show intent, before they move onto programming.

		Give pupils time to try this out several times. Highlight that robots do not need to be switched on or programmed for this activity. The activity encourages pupils to describe what their program will do before they actually start writing it. **Independent:** 1. Pupils repeat the steps from the P&C (choose a start and end card. Point out a route with their finger). 2. Once a route has been chosen, ask pupils to use the command cards to design their algorithm. Tell pupils that they should place the command cards in the order they think they are needed. At this stage, the learners should place the cards directly onto the mat, matching each planned movement. **Note:** Forwards and backwards cards should be placed between squares, because the commands will move the robot between squares. Turn commands should be placed inside a square, because these commands don't move the robot between squares. 3. Once an algorithm is complete, ask pupils to try it as a program on the paper-bot. This means picking up and moving the paper-bot, following the command cards. 4. After the algorithm is complete and has been tested, pupils can implement it on the robot by pressing the command buttons. **Note:** The algorithm becomes a program when you take the planned route and implement it on the floor robot using the buttons. The button presses enter the code into the floor robot. **Deepening:** Q – what is debugging? When you find an issue or problem in the program that you have written and fix it.

		Q – did the Bee-bot always do what you expected it to do? If not then you would need to debug the program. 1. First check that they keyed in their program correctly, by clearing and re-entering it. 2. If the program still isn't correct, ask the learners to watch the robot as it executes each step to try and identify where the bug is. Then you can sort the problem. Pupils given the opportunity to create more simple algorithms, test and debug if necessary. ****Evidencing – teacher can video pupils programming the Bee-bots and upload to their seesaw accounts.**** **Reflection / Assessment** Use thumbs up (3 – confident), thumbs middle (2 – unsure), thumbs down (1 – not confident) to reflect on these statements. • I can choose the order of commands in a sequence • I can explain what my program should do • I can debug my program
Vocabulary: **plan, algorithm, program, debug,**		

Lesson Number - 5		
Key learning: To find more than one solution to a problem.	**Concepts:** Computer Science	**Engage:**

Success Criteria: • I can identify several possible solutions • I can plan two programs • I can use two different programs to get to the same place.	**Suggested resources:** Flipchart Bee-bot Paper-bot Story floor mats (available to print from NCCE computing curriculum – Spring 1 – Lesson 6) Destination cards (available to print from NCCE computing curriculum – Spring 1 – Lesson 6) Route planning sheet (available to print from NCCE computing curriculum – Spring 1 – Lesson 6)	Ask the learners to think about routes around places that are familiar to them, such as from one location in school to another. Explain that when we travel, there is often more than one way to get there. Tell the learners that today they will be planning different routes for the robot and writing programs to make it travel along those routes. **Introduce:** Recap the definitions of 'algorithm' and 'debugging' from the previous lesson. Use the destination cards to pick a 'start' and 'end' point on the floor mat. On their floor mat, draw 2 different routes that could be taken to get from the start to the finish. (Model an example on the board). **Note:** Learners do not need the robot for this activity, as they are just marking the route the floor robot could take. **P&C** Tell pupils that they are now going to create algorithms that would make the robot complete their two routes. First, pupils will need to choose which way the robot will face when it's on the start square. They should place their robot on the mat facing that direction. Pupils should then create algorithms for one of the routes. This should be done with the command cards. If pupils are able, they should plan their algorithms at the side of the mat. Some pupils may initially need to place the cards on the mat. Then pupils can create their second algorithm using the command cards. Highlight to the pupils that the robot has to start from the same square, facing the same direction, for both algorithms. Once the learners have their two programs, they should test them with the Bee-bots and debug

		them, fixing any errors. ***NOTE –*** *If learners complete one set of journeys, they can try another set.* **<u>Independent</u>** Pupils will now select three destination cards and plan routes that move over each of the squares in the order they were turned over (start, then, end). Pupils can also try facing the robot in different directions on the start square. The robot doesn't have to start facing the square it's moving towards. Pupils may then have to turn the robot, or even move it backwards. Pupils should follow the same pattern of drawing their route on the map, planning their algorithm using the command cards, then testing and debugging accordingly. ***NOTE -*** *Some pupils may move on to using four destination cards.* ****Evidencing – teacher can video / take pictures of pupils planning and programming the Bee-bots and upload to their seesaw accounts**** **<u>Deepening</u>** Tell pupils that they have a final challenge. Using **only left turns and forwards commands**, ask them to move the robot from the woods to the mushroom. Ask them to start with the robot facing the owl. **<u>Reflection</u>** Use thumbs up (3 – confident), thumbs middle (2 – unsure), thumbs down (1 – not confident) to reflect on these statements. ● I can plan two programs ● I can use two different programs to get to the same place.

		• I can debug my program At the end of the lesson (or at another time before next week) complete the Project Evolve Pre-assessment Knowledge Map for Year 1 – Online Relationships. This will then inform which areas you need to target with your children in the remaining lesson.
Vocabulary: **plan, algorithm, program, debug, route, solution**		

Lesson Number - 6		
Teachers to choose one of the following resources to use from Project Evolve "Year 1 – Online Relationships" topic based on the results of the knowledge map assessment at the end of Lesson 5. **Key learning:** I can give examples of when I should ask permission to do something online and explain why this is important.	**Concepts:** Digital Literacy	Use results of the knowledge map assessment from the previous lesson to identify any gaps in the pupil's knowledge. As a result, decide which lesson outcome / activities will be most beneficial for your class / year group and plan accordingly. Key Questions Lesson1: • What does it mean to 'ask permission'? • What do you have to ask permission to do offline? (e.g. go outside to play, have a snack or a drink, etc.) • Who do you have to ask for permission? • What do you have to ask permission to do with technology or the internet? (e.g. watch cartoons, play a game, video chat with family or friends.)

OR I can use the internet with adult support to communicate with people I know (e.g. video call apps or services). **OR** I can explain why it is important to be considerate and kind to people online and to respect their choices. **OR** I can explain why things one person finds funny or sad online may not always be seen in the same way by others.		• Can you think of any times you might have to ask permission before you do something that is about another person? (e.g. upload/take a photo of them, send a message about someone else.) • Why is it important to ask permission? • What might happen if you don't ask permission? • How might someone feel if you did something without asking their permission? Key Questions Lesson 2: • Who might be a person that you know well? • Who might be an adult that could help you? • Why might you need to use the internet or technology to communicate with someone you know? • How is communicating in this way different? • Why might it be different/better than talking face to face? How? • Why might you need some help from an adult? Key Questions Lesson 3: • What does being considerate mean? • What other words can you think of for being considerate? • How would it make you feel if someone was unkind to you? • If you were being unkind how would it make others feel? • Do people like others who are being unkind? Are they likely to play/chat with them? Why? • What things can you do online to try to be considerate towards others? • What would you do if someone was unkind to you online? • How would it make you feel if you saw somebody being unkind to one of your friends online? What are some of the things you could do?
Success Criteria: Lesson 1: • Understand how to ask permission to use technology/do something online. • Understand how to ask permission to do	**Suggested resources:** Project Evolve knowledge map Flipchart Project Evolve resources for "Year 1	

something that affects someone else online. • Give examples of situations where permission must always be sought. **Lesson 2:** • I can name the people I know and how I know them, describing what they are like. • I can describe how I might use the internet to communicate with family or close friends • I understand and can describe why I might need some help from an adult when doing this. **Lesson 3:** • I understand what being considerate/kind means.	– Online Relationships"	Key Questions Lesson 4: • Why do you think one person might like a thing when someone else doesn't? Reasons? • What do you like to do when you go online? • Do you go to the same sites all the time? • If you do go to different sites, why? Bored? Need a change? Not interesting? • Do you use the same online sites as your friends? All the time? • Are there sites or games that you really like but your friends don't use or like? • Do you think everybody likes the same things online? • Why do you think people like different things? • Can you name some things you like online that your friends like? Don't like? • Have you ever laughed/been upset at something that you have seen online? • Have your friends ever shown you something that they like that has made you laugh/be sad? What about the other way around? • Do different people think about things in different ways? Can you give an example? **Reflection / Assessment** – complete knowledge map "assess impact" on the lesson outcome that has been taught to identify impact of learning.

• I can describe what someone might feel like if you were unkind to them. • I can describe ways in which I can try to be kind both offline and online. **Lesson 4:** • I can explain what I like and dislike and give reasons • I can explain what I like, dislike and find funny and sad online • I can understand that different people may have different reactions to different things online		
Vocabulary:		

permission, trusted adult, online, internet, communicate, kind, respect