**Twenty playground games for coding**

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All these games are designed to be played outside but can be adapted for the classroom if you have enough space. Obviously the games should relate to a computing topic they are familiar with or you are just about to introduce. It goes without saying that, where appropriate, you should discuss with the children afterwards how they solved the problem e.g what ‘code’ did they use, what was difficult etc

1. **Simon says…**

One child is nominated as ‘Simon’ (teacher should be Simon for the first few rounds)

Tell the children that IF Simon says they should do something, then they do it ELSE do nothing.

For example, Simon gives the following instructions

“Simon says put your hands on your head” (children do action)

“Simon says stand on one leg” (children do action)

“Now stand on the other leg” (children do NOT do the action)

Get faster as the game progresses. Teachers decision as to whether children are knocked out if they move when they shouldn’t.

1. **Conditionals**

Similar to above but using a combination of conditional instructions as in…

“IF I scratch my nose THEN wave your left hand in the air, ELSE do nothing”

You can make it increasingly difficult according to age of children and their experience with coding

“IF I stand on one leg THEN put your hands on your head ELSE jump up and down”

“IF I wave my left arm around THEN hop on one leg ELSE sit on the floor”

“IF I turn around AND put my hands on my head THEN shout ‘Hello’ ELSE shout ‘Noooooo’

“IF I wave my left leg THEN wave your arms ELSE and turn around and hum”

1. **Human database**

Without speaking, ask the children to get into a line ordered by

* Height
* Initial letter of first name
* Birthday
* Who lives furthest away etc

You can make it easier for younger children by letting them speak or a little harder by letting them speak but restricting answers to ‘yes’ or ‘no’ or giving them ‘yes’ / ‘no’ cards to hold up.

You can make it harder – and more fun – by drawing two parallel lines on the playground about 30cm apart and telling them they have to start of lining up between the lines until you give them the instructions then they cannot move outside the lines while they are ordering themselves. A plank also works pretty well.

1. **Human playing cards**

This is really a variation on the activity above but with more than one variable. Give each child a large playing card. We have a set with holes punched in the top through which we threaded elastic. Put one playing card over each child’s head so that the card is on their back facing outwards. (Yes, we know – health and safety – hence the elastic but you might have to adapt!) The important thing is that people do not know what card they have.

Ask the children to sort out the cards by suit and in rising order. Make up your own rules to suit the age and ability of the children. For example, tell them there is to be no talking and no touching.

1. **Human Robots**

Divide into teams of about 4 or 5. Locate the teams in the ‘corners’ of a space about equidistant from a chair in the middle. Put a small bowl of sweets (if you are allowed!) on the chair.

Blindfold one member of each team and turn them around so that they are disoriented. They are the robots. Other members of the team have to instruct the blindfolded child how to get to the sweets.

Then make it harder by putting soft obstacles such as beanbags in the way.

You will probably find initially that the other children will walk alongside the robot shouting instructions as they need to.

For the next round (change the robot) tell they need to stand in their corner and shout instructions

Next round you can restrict the sort of instructions they can give e.g start, stop, 3 paces forward/backwards, turn right / left etc. Or, if they have done angles you can use 180/90/45 degrees

Next round, blindfold the robot then tell the group they have to give the robot the instructions before he/she starts moving so they have to work out the moves in advance and the robot has to remember them. You may want to supply laminated arrow cards for the groups to work out their algorithm first.

You can introduce an element of competition by getting one member of the group to count the number of instructions they give the robot. The winner is not the group who did it fastest but who managed it most efficiently i.e in the least number of moves

1. **Copy cups or cones**

Work in pairs or in teams of about 3. You need one set of 6 playground cones and 6 bean bags per pair or plastic cups if you are doing this in a classroom. One team has a sheet on which are drawn different arrangements of cups.

First round, let one of the pair/teams give instructions to the other so that they can reproduce a particular arrangement of cups.

Second round, the team with the cups needs to question the team who can see the arrangement and they should provide no information other than in response to a question.

Third round, you can make this harder by restricting the answers to ‘yes’ or ‘no’.

Another variation is to restrict the number of questions they can ask – this is good for differentiating for more able children.

We have also used cards with 1 (for yes) or 0 (for no) that can be used to answer the questions.

To play the game, you will need two separate sheets with different arrangements on each so that each team has a different sheet. Alternatively, put each arrangement on a single sheet and hand them out individually as one pair finishes.

1. **2 x 2 sorting matrix (IF this AND this…)**

Draw a 2x2 matrix on the playground with chalk. Depending on the environment, mark up the axes of the matrix with pairs of variables such as hard/soft, smooth/rough, ‘light /heavy’ etc. Children need to find objects (leaves, stones, twigs etc) and place them in the appropriate sector.

If you have to play this in a class room you could collect a bag of things ready for sorting

Introduce the idea of ‘NOT’ so that the axes are marked ‘Hard’ and ‘Not hard’ or ‘Long’ and ‘Not long’ etc. Explain that this is how computers need to work. You could use ‘Light/Dark’ or “Light / Heavy” to explain how computers could get confused.

Draw a 2x2 matrix on the playground with chalk – this needs to be large enough to accommodate all the children in the class in one quadrant (although a bit of squashing adds to the fun)

Ask the children to sort themselves according to the cells on the matrix. So you could have girl / boy, brown eyes /blue eyes, fair hair / dark hair etc. We found it easier to explain to start with by just using one pair (e.g boy/girl) then when they are on the correct side of the axis, add the second variable. Once they have got the hang of it, as with the previous example, change to Brown eyes / Not brown eyes or Girl / Not girl etc

1. **Algorithms for playground games**

This is an activity suitable for older children – we used it with 9-11 year olds. Look at the algorithms for some simple playground games they probably know. Clearly, games will be specific to each country or even each region but we have chosen some we think will have something similar in each country – like ‘Hide and Seek’.

There are no names on the algorithms because you need to ask the children if they can work out what the game is called (and the names will vary by country!).

If you want to extend this activity, then show them the second set of cards. Each of these has a bug in it. Can they find it?

If there is a game they are not familiar with, can they follow the algorithm and play the game?

Finally, ask them to work in groups and write the algorithm for a simple game they play in the playground.

In the discussion, ask how they would normally explain a game to someone. Compare this with the algorithm. What are the major differences? (Usually, verbal instructions tend to start with ‘the object of the game is…’ followed by a list of rules whereas the algorithm will start with the first decision you have to make.)

1. **Find the smiley co-ordinates**

Create a 5 x 5 grid on a piece of laminated card. Make a smiley face on a disc that will fit in a cell of the grid. Make another larger disc with the same smiley face on it and laminate. Arrange 25 pieces of carpet samples, paper (if it’s not windy) mats or similar in the same 5 x 5 grid. Hide the large smiley face underneath one piece of carpet. Stick the little smiley face onto the corresponding cell in the grid on the card.

Give one child the card and ask them to stand in front of a partner with their back to them (i.e so that the orientation is the same). Using hand signals only, the person with the card needs to direct their partner to the mat under which the smiley is hidden.

For added interest, we combined this lesson with learning about points of the compass. So two arms straight up above their heads was North, 2 hands at their sides pointing down was South, both arms swung to the right was East and both arms swung to the left was West.

A variation on this game is to hide children’s names instead of Smileys under the carpet grid. Then you can make several grids on cards and stick one child’s name on each of them. This means you can have several pairs working at the same time or, for maximum chaos, the whole class.

Another variation we tried was to stick pairs of cards randomly under the carpet samples to play human pelmanism. Exactly the same principle as pelmanism but player one decides which two cards (mats) they want to turn over and programmes player two to get to them. Next turn they reverse roles.

(Carpet samples are my all–time favourite bit of outdoor kit and shops will usually give you old ones for nothing!)

1. **Make a card-sorting machine**

Divide children into groups of about 5 or 6. Exact numbers don’t matter. Put several packs of playing cards in front of each group jumbled together. (Even better if they are all face down) The exact number of packs is irrelevant – the more packs the harder the exercise and the longer it will take. For 6 people in a team I would use 3 packs, for 8 people 4 packs etc.

The objective is for each team to sort out the cards into suits in numerical / picture order.

Time the activity.

Make it harder for older children by making them do it without talking.

You can also add the rule that everyone in the group must have a job.

Try allowing 2 minutes before you start the timer for them to plan how they would do this.

You can also try this with lego allowing the teams to decide on what categories they are going to sort them in. Obviously each team will need a pile of lego but it is not that important that they have identical sets. The giant size lego is excellent for this if you are playing outside.

The teacher could go around to all the sorted lego with the same ‘problem’ e.g find one red x8 spot brick, one non-standard ‘special’ brick, three yellow x 6 spot bricks etc. Time how long it takes the teacher to find them

1. **Smiley variables**

Divide into small (3 or 4 max) groups

Draw circles on the ground with chalk or, in a classroom, print and laminate some yellow circles –two or three for each group.

Talk about emoticons – what they are and why we use them.

Identify the variables in a simple emoticon – and what doesn’t change?

mouth: upturned, downturned, straight, circular, zig-zagged

eyes: solid dots, straight lines

eyebrows: straight, slanting down - bottoms close together, slanting up – tops close together

Explain that different combinations of variables can totally alter the meaning of the message. Get children to *systematically* explore different combinations and write down what emotion they feel is expressed each time. ( E.g eyebrows slanting up, eyes as dots, mouth round = surprise) This works well on a playground because they can keep on chalking more and more faces.

You can adapt this for quite young children by proving cards with the names of emotions on and asking them to match the cards with the faces.

Emphasise that the investigation should be systematic (e.g changing one variable at a time). Let them choose a way of recording their results. This could be on a paper grid but if you are outside, it’s more fun to take a picture of the faces on a mobile device so that they can compare it with the conclusions of another group.

1. **DOWN DOWN – loops, procedures and variables**

Children make a circle. Teacher demonstrates the chant whilst clapping to keep the rhythm. At the ‘Hey Sam’, teacher points to a child and substitutes their name (Hi Jane / Tom / Marie etc). Child responds with ‘Hey what?’. That is repeated twice. Teacher then says ‘ Show us how to get down!’ Named person says ‘No way!’. Teacher repeats ‘Show us how to get down’. This time the named child says ‘OK!’ and gets down to the floor performing a particular action (waving wiggling etc) Teacher copies the action whilst continuing the chant from the beginning.

After the demonstration, all children join in the chant with the teacher and copy the action. When they can all do it, let the child whose name was called pick the next person.

To see the game in action, click here <https://www.youtube.com/watch?v=-_zPkqqJN14&t=1s>

This is the chant

D-O-W-N

And that’s the way to get down

D-O-W-N

And that’s the way to get down

Hey Sam

Hey what?

Hey Sam

Hey what?

Show us how to get down

No way!

Show us how to get down

OK

D-O-W-N

And that’s the way to get down

D-O-W-N

And that’s the way to get down

We use it as a fun game when we are talking about loops, procedures and variables. If you write the chant down ask the children to identify these and discuss them. To make it harder, once the children have played it maybe 10 rounds, ask them if they can spot the loop, find the procedure and identify the variables without writing it down.

1. **Relay race coding**

Put the children into teams, in lines, as you would for a relay race. Some distance in front of each team (depends on the space available and the age of the children.) place laminated cards with a 4 x 4 grid on them with some squares filled in. Either put large sheets of paper and pencils next to the grid or give them dry-wipe pens to write on the bottom of the grid.

The code should enable a third person to take the appropriate steps from top left hand corner to bottom right and show where the filled in squares are.

They will have to decide as a team how they are going to show the black squares and how they are going to show the steps.

First player in each team runs up and writes the first coding symbol, runs to back of line. Next player runs up and checks the code so far and adds the next bit of code.

The fastest team have to have their code checked before being declared winners. If the code is wrong, continue playing with remaining teams.

There are loads of variations. A lot depends on how many children and how much time you have. So, you could shorten the game by telling them that each child is going to code as far as the next black square. Or each runner could write a line of code. For more experienced children, include some grids where there are repeated patterns so that they have the chance to incorporate loops or procedures

There will almost always be a problem at the end of a line – do they do a right turn and another right turn and continue to program from right to left etc or do they start again from the left for the second line. Discuss this!

1. **Creating dances with loops**

Most dances are based on sequences (procedures) which are repeated (loops). A great fun activity is to let the children get into groups, put some loud dance music on and let the children create a group dance. It’s better if they all do the same movements.

The learning bit is when they have to turn it into a code so that another group can perform it. They are allowed to explain their code symbols to the other group but cannot demonstrate the actual movements.

Chalking the code on the ground is the easiest way of doing this! Can they make their code more efficient by using loops and procedures?

1. **Building projects**

Not so much a game but a great way of introducing planning and problem solving for older children which is ideal for an outdoor activity but can also be carried out in the classroom if you have room.

Children should work in groups of 6 ideally but 5 or 7 is OK

Provide for EACH child one plastic cup, two drinking straws, a 60 cm length of string, a cotton wool ball, a large rubber band. Add a lego figure per team for good measure if you like. (If there are more or less than 6 kids, make sure they only have 6 cups between them.)

The task is to make a pyramid out of the cups without touching them.

Here is an example of 10year olds doing this.

<https://www.youtube.com/watch?v=Bg3AuxaoqjA>

1. **Jump in, jump out**

Group stands in a circle and holds hands. There are only 4 things that each person can do – jump to the left, jump to the right, jump in and jump out.

Teacher gives a commands and the group repeat the commands whilst carrying out the action.

First round

* Say what I say and do what I say - e.g jump in, jump left, jump right etc. Do this about 12 times getting faster.

Second round

* Say the opposite of what I say but do what I say

Third round

* Say what I say but do the opposite of what I say

1. **Routing and deadlocks in networks**

Divide the children into groups of about 6 and sit them in a circle. Give each child a number – preferably written on a piece of paper and pinned on them or written on a post it note stuck to their forehead

The members of the group are given two oranges each (or balls, or cards), except for one

child who has only one. The children are labeled with a letter of the alphabet, and their

oranges are labeled with the same letters, two oranges per letter. The oranges are mixed up so that people don’t have any with their own letter on. The children hold one orange in each hand.

The object of the game is for the children to pass the oranges around so that each child

ends up holding their corresponding oranges—that is, child A is holding both oranges

labeled A, and so on. They must follow two rules:

(a) Only one orange may be held in a hand.

(b) An orange can only be passed to an empty hand of an immediate neighbor in the

circle.

Children will quickly find that if they are “greedy” (hold onto their own oranges as soon

as they get them) then the group might not be able to attain its goal. It may be necessary

to emphasize that individuals don’t “win” the game, but that the puzzle is solved when

everyone has their oranges.

* Try the activity with a larger or smaller circle.
* Let the children come up with different rules.
* Carry out the activity without any talking.
* Try a different configuration for message passing, such as sitting in a line, or having more

than two neighbors for some children (such as sitting in a 3x3 grid)

Discuss where children have experienced the problem of deadlock. Some examples might

be a traffic jam or gridlock in a road network or trying to get a lot of people through a doorway at once. Talk about how this can happen with computer systems.

1. **Sorting numbers network**

Draw a network in chalk on the yard. Try this one to start.



Take 6 children and stand them in the squares on the left hand (IN) side. Give them all a number from 1 to 6 in random order.

At a command they all walk forward to the next node in the network and wait for someone else to arrive. When there are two children in a circle they compare cards. The one with the smaller number takes the exit to their left and the other to their right (it can be helpful if the line to the right is thicker to remind them that the larger number goes that way). When they arrive at the six squares on the

right they should have ended up in ascending numerical order of cards.



Once the children have understood the goal and have had a trial run, use a stopwatch to time how long each team takes to get through the network. Now use cards with larger numbers such as the three-digit ones. For older children, make up cards with even larger numbers that will take some effort to compare - or with words, to be compared alphabetically. The idea is to see which team can get

through the network quickest. In the rush it is possible that the numbers will end up unsorted, or that a lone child will be left standing in the middle of the network. In both cases the team has made an error, and must start again.

What happens if the smaller one goes right instead of left and vice versa?” (The numbers will be sorted in reverse order.) Another question for them to try to answer is “does it work if the network is used backwards?” (It will not necessarily work, and the children should be able to find an example

of an input that comes out in the wrong order.)

The children can try to design smaller and larger networks. For example, a network that sorts just three numbers, which children should try to come up with on their own.



1. **Human o’s and x’s**

Put cushions or small mats on the floor (we used carpet sample books) in a 3 x 3 grid so that there is enough space for children to walk between them.

Tell the children they are going to play human noughts and crosses (Tic Tac Toe)

Divide the group into two teams. One team holds their arms in a cross above their head, the other team holds their arms up in a circle.

The teams line up one either side of the grid. Number the teams off 1, 2, 3 etc so that the players with the same numbers are opposite each other.

Start the game off by calling “On your, marks, get set, SEVEN (shouting out a number). Both players with that number rush to sit on any cushion they want. First to sit down stays there. The ‘loser’ goes back and rejoins their team.

Repeat the process until one team has a line of X’s or 0’s

Gets really funny when some of the children already sitting on cushions forget to keep their arms up so the rest of their team cannot see where they are sitting.

You can add rules to this game if you want to make it less boisterous by saying only walking / crawling / hopping allowed. But most kids prefer the original rowdy version!

1. **Ships and Sailors**

This is like a more elaborate version of Simon Says. It’s another IF…THEN game but the kids absolutely love it so we still play it way after it has served its initial purpose. It takes a bit of practice to lead it. The idea is to catch people out. Play with a whole class.

If teacher says “Captain’s coming!” then everyone stands at attention, salutes and remains absolutely still and follow no further orders until teacher says “At ease”

If teacher says “At Ease” the they can relax.

If teacher says “ships” then children walk to a line on one side of the yard.

If teacher says “sailors” then they walk to a line on the opposite side of the yard

If teacher says “Hit the deck” then they lie on the floor

If teacher says “seasick” then children run to a line at the back of the yard and pretend to be sick.

They also get to imitate certain characters on board.

If the teacher says “Captain’s son” then they all make themselves as big and growly as possible

If the teacher says “Captain’s daughter” then they pretend to wiggle along on high heels with appropriate sounds

If the teachers says “Jack the Peg Leg” then they hop on one leg, put one hand over their eye, pretend to have a hook for an arm and say “Arrr”.

If the teacher says “Mermaid” then children lie on their side, raise their feet keeping feet together and move like a fin, smile, wave and shout coo-ee.

If you want to make the game competitive, there are elimination commands.

If the teacher says “Person overboard” then some people lie down and splash around and need to find another to pull them out else they are out.

If the teacher says “in the rowing boats” then children get into lines of three, sitting on the floor, one behind the other and rowing else they are out.

If the teacher says “time for dinner” then children get in groups of 4 and pretend to eat else they are out.

If the teacher says starfish then children get into groups of 5, link arms and make a circle facing outwards else they are out.