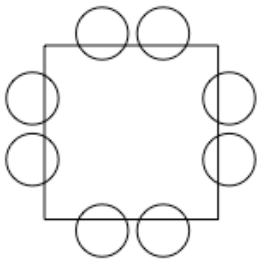
Optional Extension Maths:

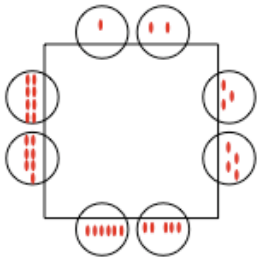
Monday

Sitting Round the Party Tables

So, you are at the party and sitting around the table with seven friends.



At the top left-hand corner is the friend who is giving the party. She or he has a bag of sweets and starts giving them out in a clockwise direction: one for themselves, two for the next person and three for the next and so on.

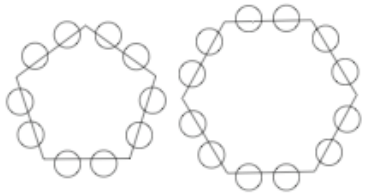


There are other similar parties going on at the same time. They have bigger square tables with more children sitting round on each side.

Explore and compare all the tables: 2 on each side, 3 on each side, 4 on each side and 5 on each side.

You could look at:
the total number of sweets that children sitting opposite each other have;
the total number of sweets needed for each size of the table;
the total number of sweets belonging to children who are diagonally opposite.

Then, what about five- and six-sided tables?



Tuesday

Five Coins

Age 5 to 11 ★★

Ben has five coins in his pocket.

How much money might he have?

How will you make sure you don't repeat any totals?
How will you make sure you find all the different ways?
It might help to limit yourself to just two types of coin first so that you develop a good system.

Wednesday

A Cartesian Puzzle

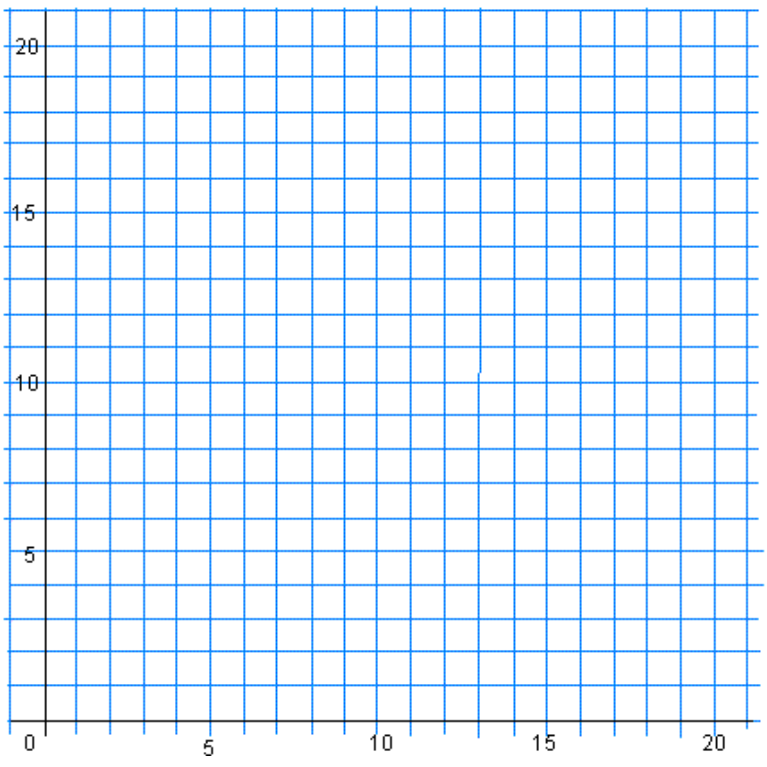
Age 7 to 11 ★

Here are the coordinates of some quadrilaterals, but in each case one coordinate is missing! The coordinates are given going round each quadrilateral in an anti-clockwise direction.

1. $(2,11),\ (0,9),\ (2,7),\ (?,?)$
2. $(3,7),\ (3,4),\ (8,4),\ (?,?)$
3. $(18,3),\ (16,5),\ (12,5),\ (?,?)$
4. $(13,12),\ (15,14),\ (12,17),\ (?,?)$
5. $(7,14),\ (6,11),\ (7,8),\ (?,?)$
6. $(15,9),\ (19,9),\ (16,11),\ (?,?)$
7. $(11,3),\ (15,2),\ (16,6),\ (?,?)$
8. $(9,16),\ (2,9),\ (9,2),\ (?,?)$

The quadrilaterals are all symmetrical. This may be rotational or line symmetry or both. Can you work out what the missing coordinates are if you know they are all positive? Is there more than one way to find out?

Now plot those eight missing coordinates on a graph like this. What shape do they make and what sort of symmetry does it have?

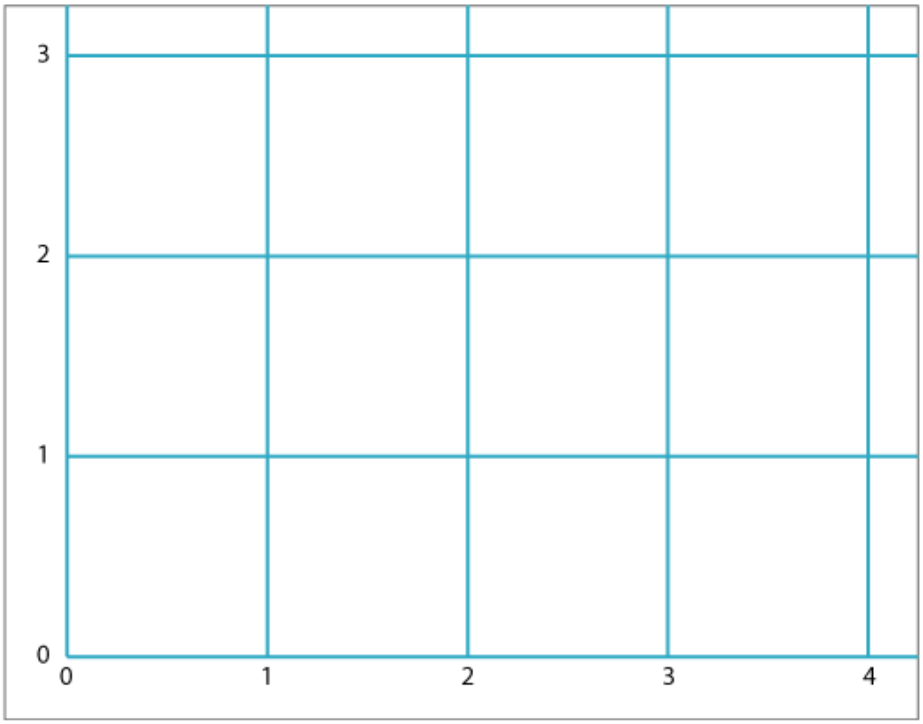


Thursday

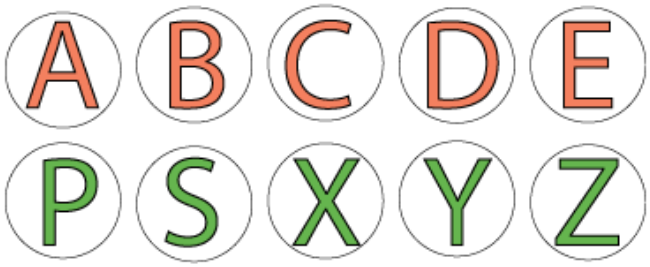
Coordinate Challenge

Age 7 to 11 ★

Here is a grid:



Can you position these ten letters in their correct places according to the eight clues below?



Clues:

The letters at $(1,1)$, $(1,2)$ and $(1,3)$ are all symmetrical about a vertical line.

The letter at $(4,2)$ is not symmetrical in any way.

The letters at $(1,1)$, $(2,1)$ and $(3,1)$ are symmetrical about a horizontal line.

The letters at $(0,2)$, $(2,0)$ have rotational symmetry.

The letter at $(3,1)$ consists of just straight lines.

The letters at $(3,3)$ and $(2,0)$ consist of just curved lines.

The letters at $(3,3)$, $(3,2)$ and $(3,1)$ are consecutive in the alphabet.

The letters at $(0,2)$ and $(1,2)$ are at the two ends of the alphabet.

Friday

Always, Sometimes or Never? Shape

Age 7 to 11 ★

Are the following statements always true, sometimes true or never true?

A hexagon has six equal length sides	Triangles have a line of symmetry
Squares have two diagonals that meet at right angles	Cutting a corner off a square makes a pentagon
The base of a pyramid is a square	A cuboid has two square faces

Answers:

Monday

Amount of people at the table.	8	12	16	20
Amount of sweets needed at table.	36	78	136	210

Tuesday

The answer could be for example £2.03.
Ben could have two pound coins and three one penny coins total would be £2.03.
Or he could have £1.37 - he would have 1 x 2p coin, 1 x 5p coin, 1 x 10p coin, 1 x £1 coin and 1 x 20p coin making a total of £1.37.

Wednesday

Our solutions to the missing coordinates are:

1. (2,11), (0,9), (2,7) .....(4,9)
   which had both rotational and line symmetry.
2. (3,7), (3,4), (8,4) .....(8,7)
   which had both rotational and line symmetry.
3. (18,3), (16,5), (12,5) .....(10,3)
   which had line symmetry.
4. (13,12), (15,14), (12,17) .....(10,15)
   which had both rotational and line symmetry.
5. (7,14), (6,11), (7,8) .....(8,11)
   which had both rotational and line symmetry.
6. (15,9), (19,9), (16,11) .....(12,11)
   which had rotational symmetry.
7. (11,3), (15,2), (16,6) .....(12,7)
   which had both rotational and line symmetry.
8. (9,16), (2,9), (9,2) .....(16,9)
   which had both rotational and line symmetry.

We plotted these 8 sets of coordinates, which made a symmetrical star.

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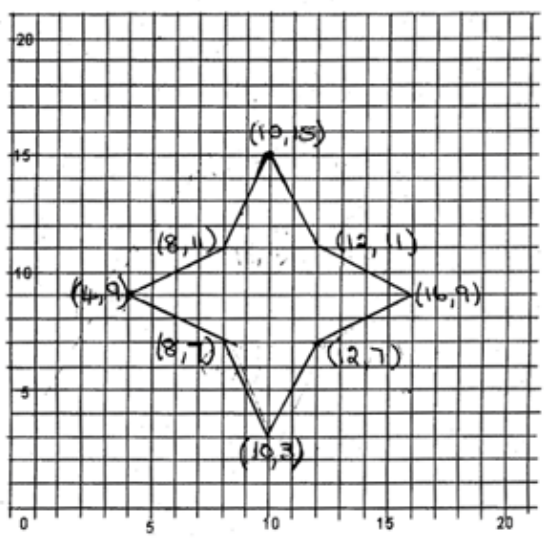
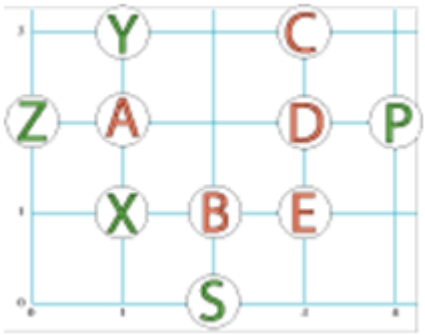


Thursday



Friday

A hexagon has six equal length sides ***sometimes*** The shape could be regular or irregular.	Triangles have a line of symmetry ***sometimes*** Equilateral and isosceles triangles always have symmetry, scalene triangles don't
Squares have two diagonals that meet at right angles ***always*** Squares have equal length sides and angles so the diagonals always meet at 90 degree angles.	Cutting a corner off a square makes a pentagon ***always*** but not always a regular pentagon.
The base of a pyramid is a square ***sometimes*** but a pyramid can have of lots of shapes for their base.	A cuboid has two square faces ***sometimes*** all faces must be rectangles but not always squares.