

# Station 1

The  $3 \times 3$  square below contains all of the digits 1 to 9. One of these digits goes in each of the squares. Each digit is used once only.

The 3-digit number in the middle row is double that in the top row. The number in the bottom row is three times the number in the top row.

Find two other ways of arranging the digits 1 to 9 so that the 3-digit row numbers are related in the same way.

1	9	2
3	8	4
5	7	6

(There are 3 marks for one, 6 marks for two.)



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# Station 1 - Supervisor

Equipment: grid and digit cards.

Answer: Any two of the following:

2	1	9
4	3	8
6	5	7

2	7	3
5	4	6
8	1	9

3	2	7
6	5	4
9	8	1

Mark scheme:

3 marks for one grid; 6 marks for two.



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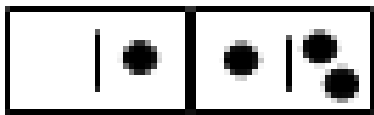
# Station 2

You have been given 10 dominoes:

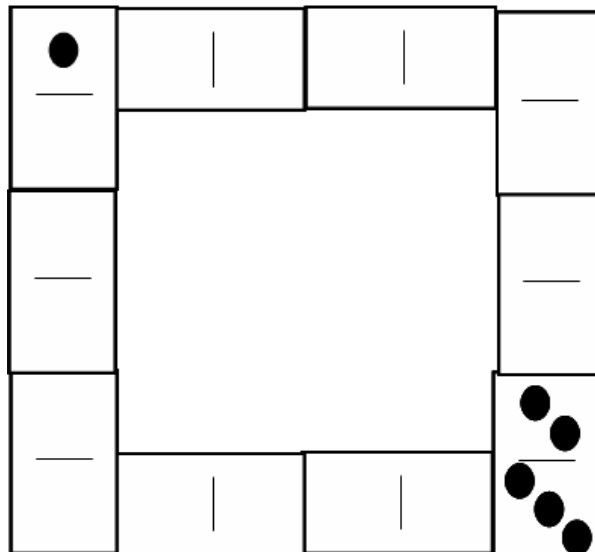
0-0, 0-1, 0-2, 0-3, 1-1, 1-2, 1-3, 2-2, 2-3, 3-3.

Arrange these ten dominoes (two have been placed) in the pattern shown below so that:

- the total number of spots on each of the four sides of the square is the same (corner numbers count in both directions);
- none of the joins match, for example domino 0-1 directly next to 1-2,



is not allowed.



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# Station 2 - Supervisor

Equipment: 10 dominoes as specified.

Answer: one of these, total 9.

1					1
0					3
3					0
3					0
1					2
1					3

[22/30], [22/03], [03/22] or [30/22]

[20/21], [02/12], [21/02] or [21/20]

or one of these, total 10.

1					3
0					0
2	↕				1
1					1
3					2
3					3

[31/20], [31/02], [20/31] or [02/31]

[22/00] or [00/22]

Mark scheme: 6 or 0 marks

(correct answer only)



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# Station 3

Each of the letters used below is standing for a different single digit.

Example:  $AB + 2 = AC$

[the answer could be  $A = 1, B = 3, C = 5$   
because  $13 + 2 = 15.$ ]

$$\text{If } ABCD \times 9 = DCBA$$

find A, B, C and D.



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# Station 3 - Supervisor

**Answer:**

$$A = 1, B = 0, C = 8, D = 9$$

$$[1089 \times 9 = 9801]$$

**Mark scheme:**

**6 or 0 marks**

**(correct answer only)**



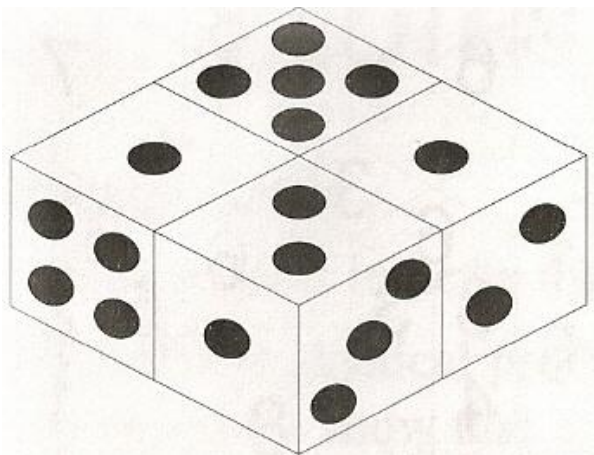
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# Station 4

You have a 'four-block' in front of you as shown in the diagram below. This is just four standard dice placed together on the table.

Arrange the four dice, still keeping them in the form of a four-block, so that the total number of dots around the side faces is equal to the number of dots on the top face added to the number of dots which are in contact with the table.



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# Station 4 - Supervisor

**Equipment: four standard dice.**

**Answer:**

**check that the total dots round the  
four side faces = 28.**

**Mark scheme: 6 or 0 marks**

**(correct answer only)**



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# Station 5

You have an arrangement of playing cards as shown in the diagram below. One of the cards has been turned over so we are unable to see it.

Find the pattern in this arrangement and write down a description of the card which has been turned over.

6♦	4♣	2♥	K♠
8♠	?	3♠	J♦
10♥	Q♣	A♦	9♣
A♣	3♦	5♠	7♥



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# Station 5 - Supervisor

**Answer:**

**5♥ (or five of Hearts).**

**Mark scheme: 3 marks for the suit**

**3 marks for the number  
(5 or five)**



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# Station 6

Find the maximum number of red counters that can be placed on the grid applying the rules below.

Place the red counters on squares of the  $3 \times 12$  grid provided, with no more than one counter in each square, so that no two counters are directly next to each other, not even diagonally. Each row of 12 squares must contain at least one red counter.



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# Station 6 - Supervisor

Equipment: grid and red counters.

Teams to present the grid with counters to the teacher to gain the marks.

Answer: 11 counters.

Mark scheme: 6 or 0 marks

(correct answer only)



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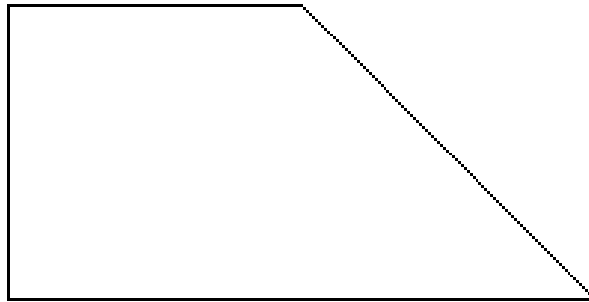
# Station 7

You have a paper trapezium in front of you. This trapezium consists of a square and half another identical square.

Divide this paper trapezium into four pieces, all exactly the same shape and size.

Show these clearly by

- folding the paper, or
- drawing the relevant lines to give the four pieces.



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# Station 7 - Supervisor

**Equipment:** paper trapezium for each team.

**Answer:**

check for 4 smaller trapezia which are all congruent.

**Mark scheme:** 6 or 0 marks

(correct answer only)



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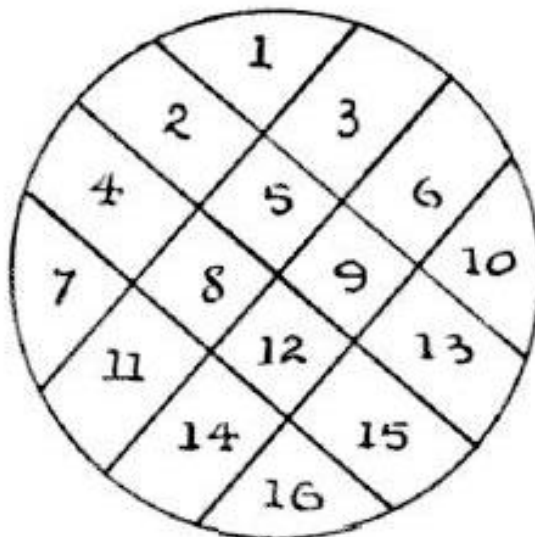


# Station 8

You have a large circle in front of you.

You can draw six straight lines across this circle. Each line must cross the circle completely. For instance, three parallel lines drawn one way and three in another direction can divide the circle into 16 distinct regions as shown in the diagram below.

Find the greatest number of distinct regions that can be obtained using six lines across the circle. Your lines do not have to be parallel. You may obtain your answer by either reasoning or drawing.



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# Station 8 - Supervisor

**Equipment:** a large circle for each team.

**Answer:** 22 distinct regions  
(by reasoning or by drawing).

**Mark scheme:**

**6 or 0 marks**

**(correct answer only)**



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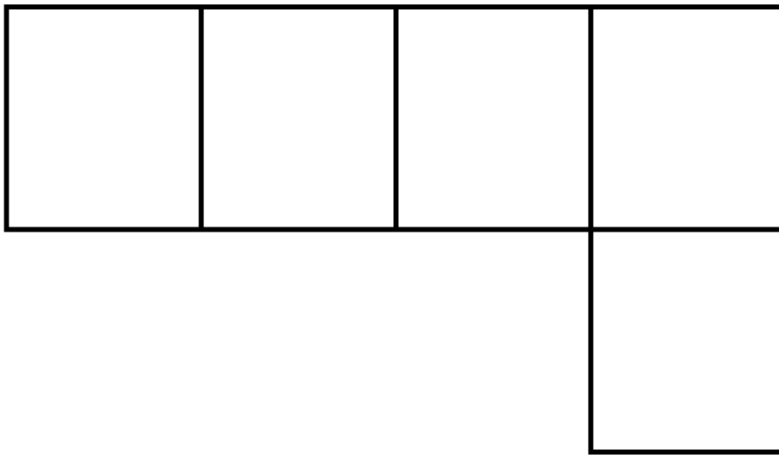




# Station 9

At this station there must be no placement of matches directly on top of one another. Each match must form one of the congruent squares with no loose matches anywhere.

- (i) Move (but do not remove) three matches to make only four congruent squares.



- (ii) Move (but do not remove) three matches to make five congruent squares.



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# Station 9 - Supervisor

**Equipment: matches.**

**Answer:**

**teachers to witness two demonstrations.**

**Mark scheme:            3 marks for each part**



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# Station 10

You have 27 interlocking cubes in front of you. There are three each of nine different colours. The challenge is to fit them all together to make one cube with all nine colours showing on each face.



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# Station 10 - Supervisor

**Equipment:** 27 cubes, 3 each of 9 colours.

**Answer:**

check that each face shows all nine colours.

**Mark scheme:**

6 marks for all faces correct

3 marks for 4 faces correct



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