

**STATION 1**

In the number 5371, every pair of neighbouring digits, taken in order, is a two-digit prime, since 53, 37 and 71 are prime.

- (a) Place exactly *five* of the numbers 1, 2, 3, 4, 5, 6, 7, 8 and 9, with one in each cell, to form the *smallest* positive integer that satisfies the same condition, that every pair of neighbouring digits, taken in order, is a two-digit prime.

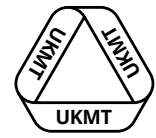
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[3 marks]

- (b) Place *some* of the numbers 1, 2, 3, 4, 5, 6, 7, 8 and 9, with at most one in each cell, to form the *largest* possible integer that satisfies the same condition, that every pair of neighbouring digits, taken in order, is a two-digit prime.

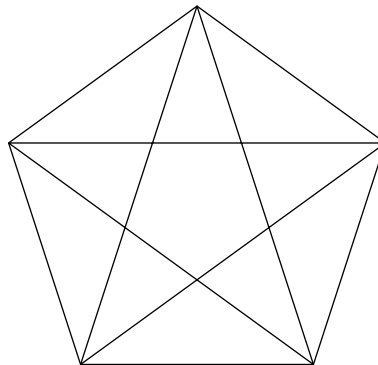
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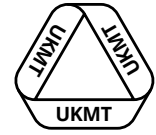
[3 marks]



## STATION 2

How many triangles are there in the figure below?



**STATION 3**

- (a)  $p$  and  $q$  are different non-zero digits. The two-digit number ' $pq$ ' is divisible by  $p$  and  $q$ . What is the largest possible value of ' $pq$ '?

[3 marks]

- (b)  $r$ ,  $s$  and  $t$  are different non-zero digits. The three-digit number ' $rst$ ' is divisible by  $r$ ,  $s$  and  $t$ . What is the largest possible value of ' $rst$ '?

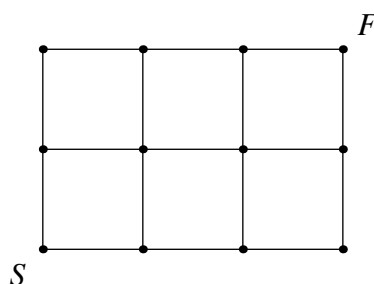
[3 marks]

**STATION 4**

Steve wishes to walk from the point  $S$  to the point  $F$ .

He may only walk along the straight lines in the diagram shown below.

On any particular route, Steve may not pass through any of the twelve vertices more than once.



- (a) When Steve walks vertically up, horizontally left or horizontally right, what is the maximum number of different routes that Steve can take?

[3 marks]

- (b) When Steve walks horizontally to the right, vertically up or vertically down, what is the maximum number of different routes that Steve can take?

[3 marks]

**STATION 5**

- (a) Place the numbers 1, 2, 3, 4, 5, 6, 7, 8, 9 and 10, with one in each cell, such that they become the numerators and denominators of five fractions satisfying the following conditions

Each of the values of the five fractions is an integer.  
The numerators are in increasing order.


[3 marks]

- (b) Place the numbers 1, 2, 3, 4, 5, 6, 7, 8, 9 and 10, with one in each cell, such that they become the numerators and denominators of five fractions satisfying the following conditions

One of the five fractions has a value greater than one.  
Three of the five fractions have the value one half.  
The sum of the five fractions is three.  
The numerators are in increasing order.


[3 marks]

**STATION 6**

The letters  $a, b, c, d, e, f, g, h, i$  and  $j$  represent different digits, where  $a, d$  and  $g$  are all non-zero.

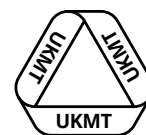
$$\begin{array}{r} a \ b \ c \\ + \ d \ e \ f \\ \hline g \ h \ i \ j \end{array}$$

- (a) What is the smallest possible value of the four-digit number 'ghij' in the addition sum above?

[3 marks]

- (b) What is the largest possible value of the four-digit number 'ghij' in the addition sum above?

[3 marks]

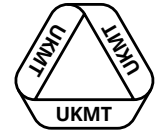
**STATION 7**

In a  $4 \times 4$  grid, eight cells are shaded and the number 1 placed, as shown below.

Place the numbers 2, 3, 4, 5, 6, 7 and 8, in unshaded squares, with one number in each square, so that the following conditions are satisfied.

The sum of the numbers in each column is the same.  
The sum of the numbers in each row is even.  
Exactly three of these even sums are equal.

		1	

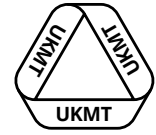


## STATION 8

The digits 1, 2, 3, 4, 5, 6, 7, 8 and 9 all appear, at least once, in the squares from  $1^2$  up to  $n^2$ .

What is the smallest possible value of  $n$ ?



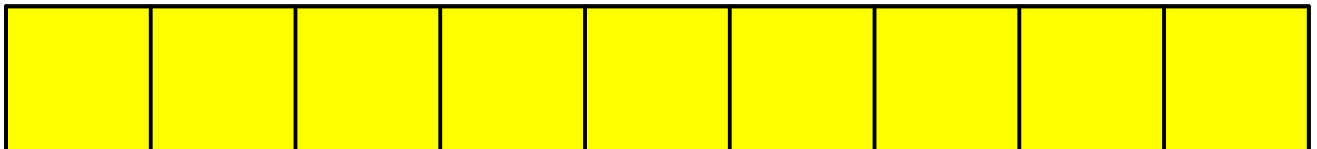


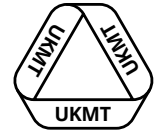
# STATION 1 WORKSHEET

(a)

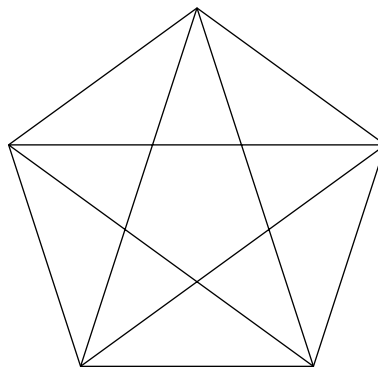
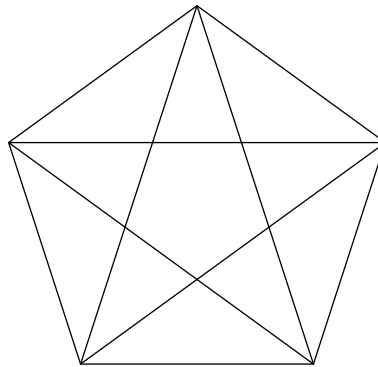
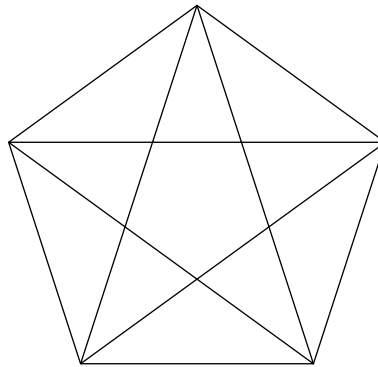


(b)

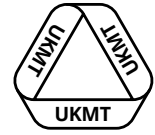




**STATION 2 WORKSHEET**



NUMBER:



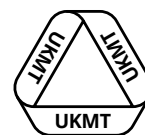
# STATION 3 WORKSHEET

(a)

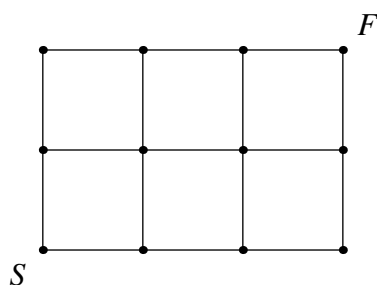
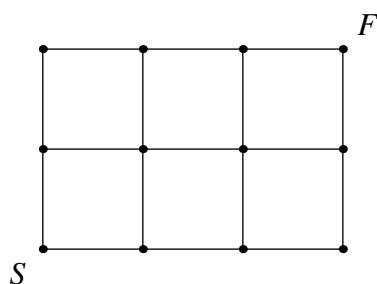
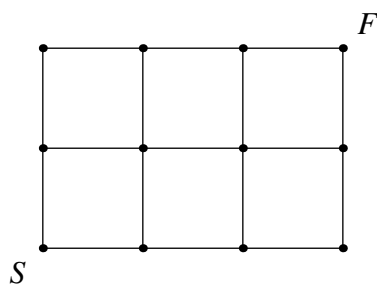
' $pq$ ':

(b)

' $rst$ ':



# STATION 4 WORKSHEET

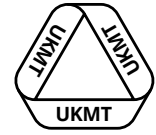


(a)

NUMBER:

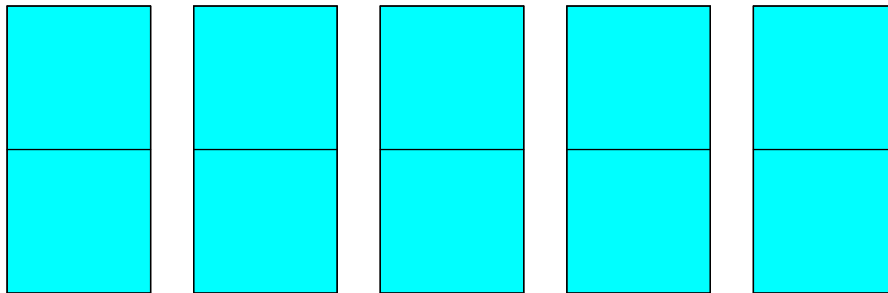
(b)

NUMBER:

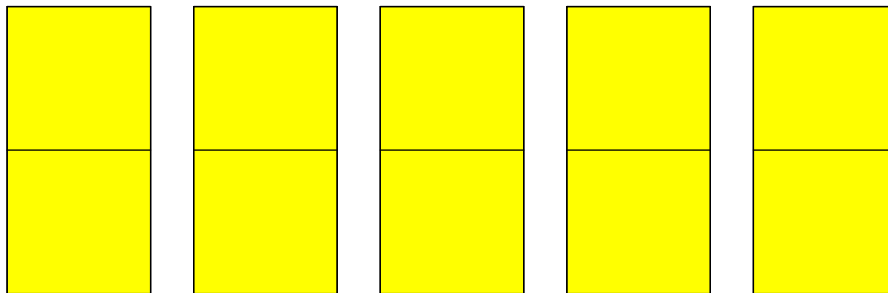


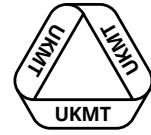
# STATION 5 WORKSHEET

(a)



(b)





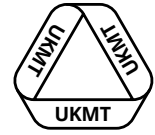
# STATION 6 WORKSHEET

(a)

NUMBER:

(b)

NUMBER:



# STATION 8 WORKSHEET

NUMBER:

<u>9</u>	<u>9</u>	<u>9</u>	<u>9</u>	<u>9</u>	<u>9</u>
8	8	8	8	8	8
7	7	7	7	7	7
<u>6</u>	<u>6</u>	<u>6</u>	<u>6</u>	<u>6</u>	<u>6</u>
5	5	5	5	5	5
4	4	4	4	4	4
3	3	3	3	3	3
2	2	2	2	2	2
1	1	1	1	1	1



<u>6</u>	7	8	<u>9</u>	10
1	2	3	4	5
<u>6</u>	7	8	<u>9</u>	10
1	2	3	4	5
<u>6</u>	7	8	<u>9</u>	10
1	2	3	4	5
<u>6</u>	7	8	<u>9</u>	10
1	2	3	4	5

8	8	8	8
7	7	7	7
<u>6</u>	<u>6</u>	<u>6</u>	<u>6</u>
5	5	5	5
4	4	4	4
3	3	3	3
2	2	2	2

TEAM NUMBER 

SCHOOL NAME 

**Station 1**

Show your answer(s) to the supervisor.

- (a)  0  3  
 (b)  0  3

**Station 5**

Show your answer(s) to the supervisor.

- (a)  0  3  
 (b)  0  3

**Station 2**

Complete the worksheet and show it to the supervisor.

0  6

**Station 6**

Complete the worksheet and show it to the supervisor.

- (a)  0  3  
 (b)  0  3

**Station 3**

Complete the worksheet and show it to the supervisor.

- (a)  0  3  
 (b)  0  3

**Station 7**

Show your answer(s) to the supervisor.

0  6

**Station 4**

Complete the worksheet and show it to the supervisor.

- (a)  0  3  
 (b)  0  3

**Station 8**

Complete the worksheet and show it to the supervisor.

0  6

Circle the mark awarded for each question and cross out the others.

FINAL SCORE /48

