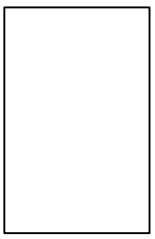
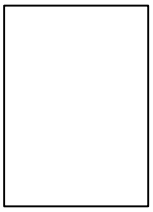
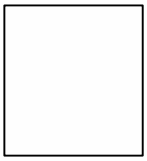
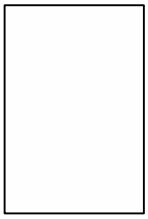
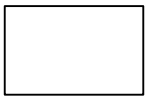
Shape and ordering (Junior UKMT)

These questions must be attempted ***without a calculator***

Topics covered in the questions below may not necessarily be from the topic of the title.

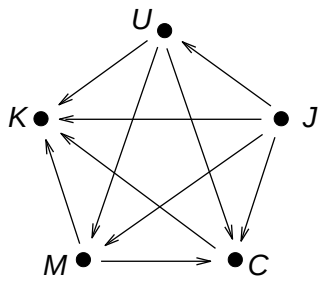
1. Referring to the rectangles below, the largest is red and the smallest is blue. Orange is the same size as yellow and not next to blue.

Which is orange?

A  B  C  D  E 

2. The network below illustrates the relative ages of five children *Uo*, *Ko*, *Jo*, *Mo*, and *Co*. The arrow from *U* to *K* means that *Uo* is *older* than *Ko*.

Which is the correct order of ages − *youngest* first?



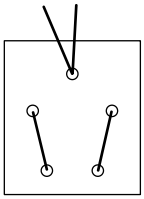
A *JUCMK* B *KCMUJ* C *JUMCK* D *KCUMJ* E *UMCJK*

3. Amy, Ben and Chris are standing in a row. If Amy is to the left of Ben and Chris is to the right of Amy, which of these statements must be true?

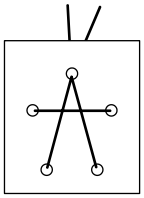
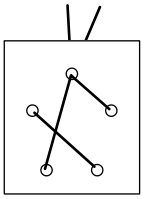
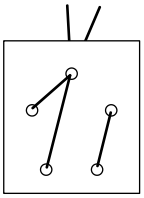
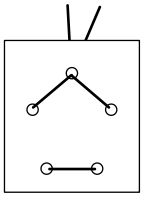
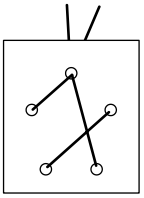
A Ben is furthest to the left B Chris is furthest to the right C Amy is in the middle

D Amy is furthest to the left E None of statements A, B, C, D is true

4. A single piece of string is threaded through five holes in a piece of card. One side of the card is shown here.

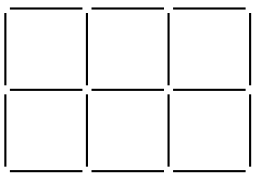


Which of the diagrams below could *not* represent the pattern of the string on the reverse side?

A 
B 
C 
D 
E 

5. The diagram shows 6 small squares made with matchsticks.

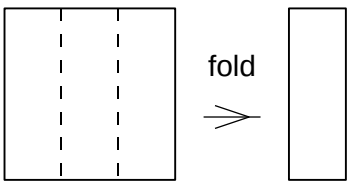
How many matchsticks must be removed to leave precisely 3 small squares which touch only at corners?



A 3 B 4 C 5 D 6 E 7

6. The sheet of paper shown on the left is folded along the dotted lines (each fold being either forwards or backwards) to make the leaflet shown on the right. Each of the six 'pages' of the leaflet is printed in a different colour. No matter how it is folded, the leaflet will have two pages visible on the outside.

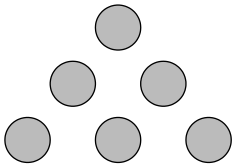
How many different pairs of outside pages can be obtained by folding the sheet of paper in different ways?



A 4 B 6 C 9 D 12 E 15

7. Sam has six plain-coloured plates hanging on her lounge wall, in the formation shown.

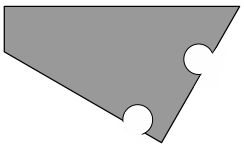
What is the smallest number of plates that need to be moved to turn this formation upside down?

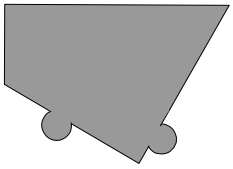


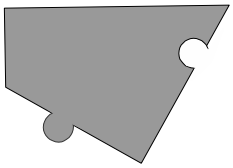
A 1 B 2 C 3 D 4 E 5

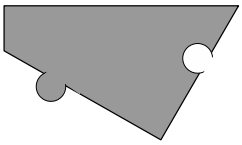
8. Four of these jigsaw pieces fit together to form a rectangle.

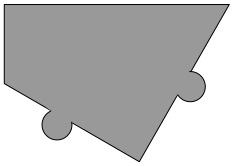
Which one is not used?

A 

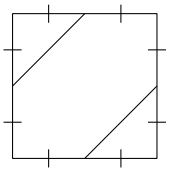
B 

C 

D 

E 

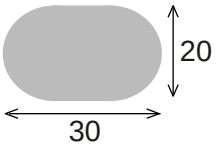
9. A square is cut into three pieces as shown. Which of the following shapes cannot be made? (You must use all three pieces for each shape.)

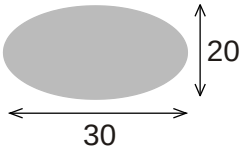


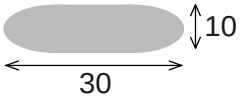
A quadrilateral B pentagon C hexagon D heptagon E octagon

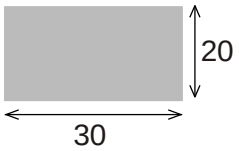
10. A guinea-pig in a large field is tethered to one end of a 10 metre rope. The other end of the rope is attached to a ring which is free to slide along a fixed horizontal rail, 10 metres long, in the middle of the field.

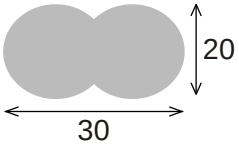
Which diagram shows the shape of the part of the field that the guinea-pig can reach?

A 

B 

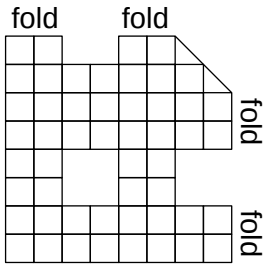
C 

D 

E 

11. A square piece of paper measuring 16 × 16 is folded in half twice. Then pieces are removed by cutting through all the resulting layers, leaving the shape shown.

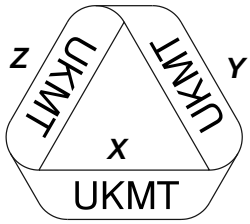
When the paper is unfolded, how many square holes are in it?



A 1 B 2 C 6 D 7 E 9

12. The UKMT logo shows a single strip of paper with 'UKMT' in the positions *X*, *Y* and *Z.*

Which of these are written on the same side of the paper?



A *X* and *Y* B *Y* and *Z* C *X* and *Z* D *X*, *Y* and *Z* E none of them