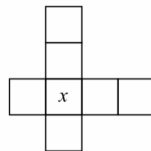


18. The numbers 2, 3, 4, 5, 6, 7, 8 are to be placed, one per square, in the diagram shown such that the four numbers in the horizontal row add up to 21 and the four numbers in the vertical column also add up to 21.



Which number should replace  $x$  ?

- A 2      B 3      C 5      D 7      E 8

19. In rectangle  $PQRS$ , the ratio of  $\angle PSQ$  to  $\angle PQS$  is 1:5. What is the size of  $\angle QSR$ ?

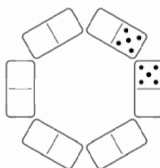
- A  $15^\circ$       B  $18^\circ$       C  $45^\circ$       D  $72^\circ$       E  $75^\circ$

20. Aroon says his age is 50 years, 50 months, 50 weeks and 50 days old. What age will he be on his next birthday?

- A 56      B 55      C 54      D 53      E 51

- 21.

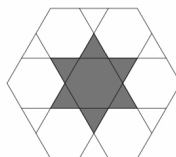
Dominic wants to place the six dominoes above in a hexagonal ring so that, for every pair of adjacent dominoes, the numbers of pips match. The ring on the right indicates how one adjacent pair match.



In a completed ring, how many of the other five dominoes can he definitely *not* place adjacent to ?

- A 1      B 2      C 3      D 4      E 5

22. The diagram shows a design formed by drawing six lines in a regular hexagon. The lines divide each edge of the hexagon into three equal parts.



What fraction of the hexagon is shaded?

- A  $\frac{1}{5}$       B  $\frac{2}{9}$       C  $\frac{1}{4}$       D  $\frac{3}{10}$       E  $\frac{5}{16}$

23. Peter wrote a list of all the numbers that could be produced by changing one digit of the number 200. How many of the numbers on Peter's list are prime?

- A 0      B 1      C 2      D 3      E 4

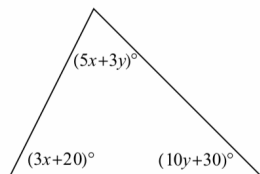
24. After playing 500 games, my success rate at Spider Solitaire is 49%. Assuming I win every game from now on, how many extra games do I need to play in order that my success rate increases to 50% ?

- A 1      B 2      C 5      D 10      E 50

25. The interior angles of a triangle are  $(5x + 3y)^\circ$ ,  $(3x + 20)^\circ$  and  $(10y + 30)^\circ$  where  $x, y$  are positive integers.

What is the value of  $x + y$ ?

- A 15      B 14      C 13      D 12      E 11



## UK JUNIOR MATHEMATICAL CHALLENGE

THURSDAY 26th APRIL 2012

Organised by the **United Kingdom Mathematics Trust**  
from the **School of Mathematics, University of Leeds**

**The Actuarial Profession**  
making financial sense of the future

### RULES AND GUIDELINES (to be read before starting)

- Do not open the paper until the Invigilator tells you to do so.
- Time allowed: **1 hour**.  
No answers, or personal details, may be entered after the allowed hour is over.
- The use of rough paper is allowed; **calculators** and measuring instruments are **forbidden**.
- Candidates in England and Wales must be in School Year 8 or below.  
Candidates in Scotland must be in S2 or below.  
Candidates in Northern Ireland must be in School Year 9 or below.
- Use B or HB pencil only.** Mark *at most one* of the options A, B, C, D, E on the Answer Sheet for each question. Do not mark more than one option.
- Do not expect to finish the whole paper in 1 hour.* Concentrate first on Questions 1-15. When you have checked your answers to these, have a go at some of the later questions.
- Five marks are awarded for each correct answer to Questions 1-15.  
Six marks are awarded for each correct answer to Questions 16-25.  
**Each incorrect answer to Questions 16-20 loses 1 mark.**  
**Each incorrect answer to Questions 21-25 loses 2 marks.**
- Your Answer Sheet will be read only by a *dumb machine*. **Do not write or doodle on the sheet except to mark your chosen options.** The machine 'sees' all black pencil markings even if they are in the wrong places. If you mark the sheet in the wrong place, or leave bits of rubber stuck to the page, the machine will 'see' a mark and interpret this mark in its own way.
- The questions on this paper challenge you to **think**, not to guess. You get more marks, and more satisfaction, by doing one question carefully than by guessing lots of answers. The UK JMC is about solving interesting problems, not about lucky guessing.

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