

**EUROPEAN 'KANGAROO' MATHEMATICAL CHALLENGE  
'PINK'**

**Thursday 18th March 2004**

**Organised by the United Kingdom Mathematics Trust and the  
Association Kangourou des Mathématiques, Paris**

*This paper is being taken by students in twenty-six European countries.*

**RULES AND GUIDELINES** (to be read before starting):

1. Do not open the paper until the Invigilator tells you to do so.
2. Time allowed: **1 hour**.  
No answers, or personal details, may be entered after the allowed hour is over.
3. The use of rough paper is allowed; **calculators** and measuring instruments are **forbidden**.
4. Candidates in England and Wales must be in School Year 10 or 11.  
Candidates in Scotland must be in S3 or S4.  
Candidates in Northern Ireland must be in School Year 11 or 12.
5. **Use B or HB pencil only**. For each question, mark *at most one* of the options A, B, C, D, E on the Answer Sheet. Do not mark more than one option.
6. Five marks will be awarded for each correct answer to Questions 1 - 15.  
Six marks will be awarded for each correct answer to Questions 16 - 25.
7. *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.
8. 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.

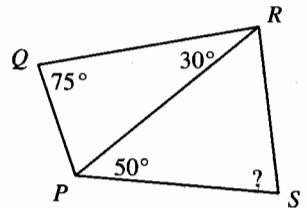
*Enquiries about the European Kangaroo should be sent to: Maths Challenges Office,  
School of Mathematics, University of Leeds, Leeds, LS2 9JT.*

*(Tel. 0113 343 2339)*

*<http://www.ukmt.org.uk>*

- What is the value of the expression  $(1 - 2) - (3 - 4) - (5 - 6) - (7 - 8) - (9 - 10) - (11 - 12)$ ?  
A -6                      B 0                      C 4                      D 6                      E 13
- Mabel has 2004 marbles. One half of them are blue, one quarter are red, and one sixth are green. How many of Mabel's marbles are of some other colour?  
A 167                      B 334                      C 501                      D 1002                      E 1837
- A pyramid has 7 faces. How many edges does it have?  
A 8                      B 9                      C 12                      D 18                      E 21
- A plan is made of the rectangular ground floor of a building. The floor's actual dimensions are 40m by 60m. On the plan, the floor has a perimeter of 100cm. What is the scale of the plan?  
A 1 : 100                      B 1 : 150                      C 1 : 160                      D 1 : 170                      E 1 : 200
- Timmy is playing Tommy at Ping-Pong. If Timmy had five more points he would have twice as many as Tommy. If Timmy had seven points less, he would have half as many as Tommy. How many points does Timmy have?  
A 5                      B 7                      C 9                      D 11                      E 15

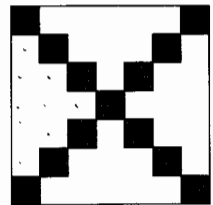
- In the diagram,  $QR = PS$ . What is the size of  $\angle PSR$ ?  
A  $30^\circ$                       B  $50^\circ$                       C  $55^\circ$   
D  $65^\circ$                       E  $70^\circ$



- Little Red Riding Hood is on her way to Grandmother's house with a basket containing 30 apples, each of which is either a Granny Smith or a Red Delicious. If she takes 12 apples out at random, there will be at least one Granny Smith amongst them. If instead she takes 20 apples out at random, there will be at least one Red Delicious amongst them. How many Granny Smith apples are there in the basket?  
A 11                      B 12                      C 19                      D 20                      E 29

- Roo has a very unusual chessboard of side 7, in which only the squares which lie on the diagonals are shaded. Kanga then asks the question "What would be the total white area of your chessboard if each side was 2003 squares long?" What is the correct answer?

- A  $2002^2$                       B  $2002 \times 2001$                       C  $2003^2$   
D  $2003 \times 2004$                       E  $2004^2$



- The target shown consists of an inner black circle with two rings, one black and one white, around it. The width of each ring is equal to the radius of the black circle. What is the ratio of the area of the black ring to the area of the inner black circle?

- A 2 : 1                      B 3 : 1                      C 4 : 1                      D 5 : 1                      E 6 : 1



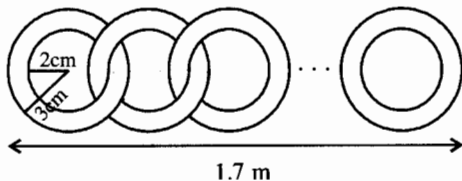
10. Having gathered 770 nuts, three squirrels divided them in proportion to their age. For every 3 nuts Cedric took, Celia took 4. For every 7 nuts Cecily took, Celia took 6. How many nuts did the youngest squirrel get?

A 180      B 198      C 218      D 256      E 264

11. Five children are each asked to choose one of the numbers: one, two or four. When their chosen numbers are multiplied together, which one of the following numbers could be the result?

A 100      B 256      C 768      D 1028      E 2048

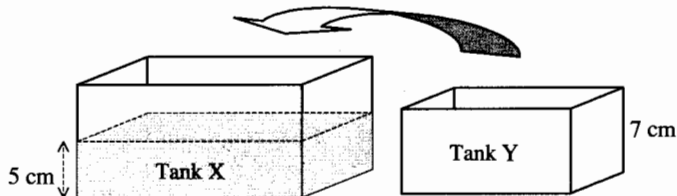
12. A chain is made from circular links with external radius 3 cm and internal radius 2 cm. When the rings are linked together as shown in the diagram, the length of the chain is 1.7 m. How many rings are used?



A 17      B 21      C 30      D 42      E 85

13. Sol is having fun playing with water in two tanks. Tank X has a base of area of  $200\text{cm}^2$ . Tank Y has a base of area  $100\text{cm}^2$  and height 7 cm. Sol has partly filled Tank X to a depth of 5 cm. He then places Tank Y, which is empty, on the bottom of Tank X. The water in Tank X rises, of course, and spills over into in Tank Y. What level does the water reach in Tank Y?

A 1 cm  
B 2 cm  
C 3 cm  
D 4 cm  
E 5 cm

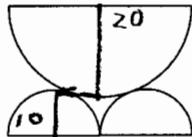


14. The hour hand of a clock is 4 cm long and the minute hand is 8 cm long. What is the ratio of the distance travelled by the tip of the hour hand to that travelled by the tip of the minute hand between 2 pm and 5 pm?

A 1:2      B 1:4      C 1:6      D 1:12      E 1:24

15. Zoli wants to make a bench from some tree trunks sawn in half, as shown in the picture. The diameters of the two bottom trunks are 20 centimetres, and the diameter of the top trunk is 40 centimetres. What is the height of the bench in centimetres?

A 25      B  $20\sqrt{2}$       C 28.5      D 30      E  $10\sqrt{10}$



16. Kanga enters a quiz which has twenty questions. Seven points are awarded for each correct answer, two points deducted for each wrong answer and zero is awarded for each question missed out. If Kanga scores 87 points, how many questions did she miss out?

A 2      B 3      C 4      D 5      E 6

17. How many numbers are there between 100 and 200 whose only prime factors are 2 and 3?

A 2      B 3      C 4      D 5      E 6

