

17. The numbers x and y are both greater than 1. Which of the following fractions has the greatest value?

A $\frac{x}{y+1}$ B $\frac{x}{y-1}$ C $\frac{2x}{2y+1}$ D $\frac{2x}{2y-1}$ E $\frac{3x}{3y+1}$

18. Simone has a cube with sides of length 10 cm, and a pack of identical square stickers. She places one sticker in the centre of each face of the cube, and one across each edge so that the stickers meet at their corners, as shown in the diagram. What is the total area in cm^2 of the stickers used by Simone?

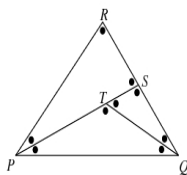


A 150 B 180 C 200 D 225 E 300

19. Rafael writes down a 5-digit number whose digits are all distinct, and whose first digit is equal to the sum of the other four digits. How many 5-digit numbers with this property are there?

A 72 B 144 C 168 D 216 E 288

20. In triangle PQR , a point S is chosen on the line segment QR , then a point T is chosen on the line segment PS . Considering the nine marked angles, what is the smallest number of different values that these nine angles could take?



A 2 B 3 C 4 D 5 E 6

21. Xerxes chooses a positive integer x , and Yasmin chooses a positive integer y , such that $\frac{1}{x} + \frac{1}{y} = \frac{1}{3}$. In how many ways could they choose these numbers?

A 1 B 2 C 3 D 4 E 5

22. C_1 is a circle of radius r . PQ is a chord of this circle. C_2 is a circle with diameter PQ and which passes through the centre of C_1 . What is the area of the part of the circle C_2 which is outside the circle C_1 ?

A $\frac{1}{2}r^2$ B $\frac{\sqrt{3}\pi}{12}r^2$ C $\frac{\pi}{6}r^2$ D $\frac{\sqrt{3}}{4}r^2$ E $\frac{1}{\sqrt{2}}r^2$

23. Hassan selects four edges of a cube in such a way that none of the edges share a common vertex. How many different ways are there for Hassan to do this?

A 6 B 8 C 9 D 12 E 18

24. Barbara has a new challenge. She places draughts on a 5×5 board in such a way that each 3×3 square contains exactly n draughts. No more than one draught is placed in any cell. Given that $0 < n < 9$, what are the possible values of n ?

A 1 B 1 and 8 C 1, 2, 7 and 8 D 1, 2, 3, 6, 7 and 8
E All whole numbers 1 to 8 inclusive

25. This morning, the two turtles Tor and Tur multiplied their ages together, correctly obtaining 1188. When they multiply their ages together on this day next year, which of the following will definitely not be a factor of the product?

A 19 B 21 C 23 D 25 E 27



EUROPEAN 'KANGAROO' MATHEMATICAL CHALLENGE
'PINK'

Thursday 17th March 2011

Organised by the United Kingdom Mathematics Trust and the
Association Kangourou Sans Frontières

*Kangaroo papers are being taken by over 5.5 million students
in 46 countries in Europe and beyond.*

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 10 or 11.
Candidates in Scotland must be in S3 or S4.
Candidates in Northern Ireland must be in School Year 11 or 12.
- 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.
- 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.
- 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.
- 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,

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