

GROUP ROUND

INSTRUCTIONS

- Your team will have 40 minutes to answer 10 questions. Each team will have the same questions.
- Each question is worth 6 points. However, some questions are easier than others!
- You will have to decide your team's strategy for this group competition. Do you split up so that individuals work on a few questions each or do you work in pairs on a greater number of questions? Working all together on all the questions may well take too long. You decide!
- There is only one answer sheet per team. Five minutes before the end of the time you will be told to finalise your answers and write them on the answer sheet. This answer sheet is the only thing that will be marked.



Senior Team Maths Challenge

Regional Final 2008

Group Round



Question 1

When $10^{30} - 90$ is written in full, what is the sum of the digits?



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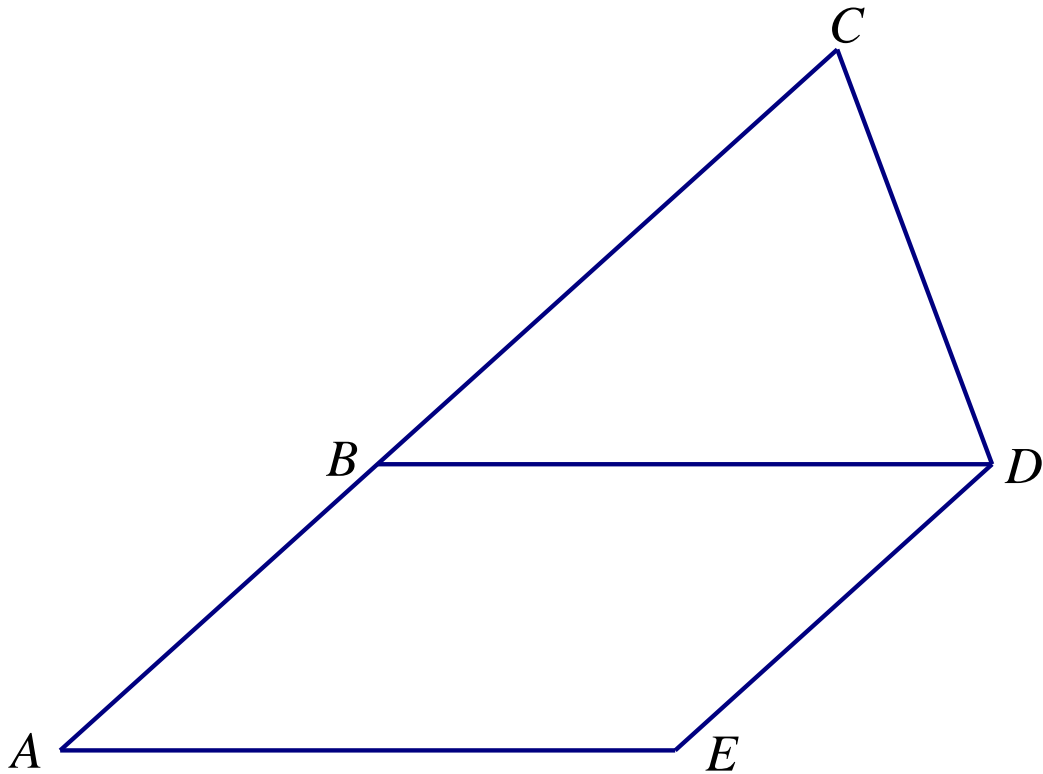
Regional Final 2008

Group Round



Question 2

In the diagram below $ABDE$ is a parallelogram, ABC is a straight line, $AB = x$ cm and $BC = y$ cm. If the area of triangle BCD is Q cm², what is the area of the parallelogram?



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the Further Mathematics network
www.fmnetwork.org.uk

Question 3

How many positive whole numbers less than 100 have exactly 4 positive factors?



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Question 4

Factorise $120x^2 + 97x - 84$.



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Question 5

A researcher is sent to a certain address where he knows the house-owner has three daughters. Part of the conversation was:

Researcher: “How old are your daughters?”

House-owner (and amateur Mathematician): “The product of their ages is 36 and the sum of their ages equals this house number.”

The house-owner pointed to the number on the front door.

Researcher: “You haven’t given me enough information.”

House-owner: “My oldest daughter is a lot older than her sisters.”

The researcher is then able to work out the ages of the daughters.

What are the ages of the daughters?



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Question 6

Solve $2^{8+6x+x^2} = \frac{2008}{2^8-5}$



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Question 7

$PQRS$ is a rectangle in which $PQ = 2QR$.

Point E is such that PQE is an equilateral triangle which overlaps rectangle $PQRS$.

M is the mid-point of EQ .

Find the size of angle QMR .



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Question 8

Three touching circles have centres P , Q and R as shown. Find the diameters of these three circles if $PQ = 9$, $PR = 7$ and $QR = 5$.

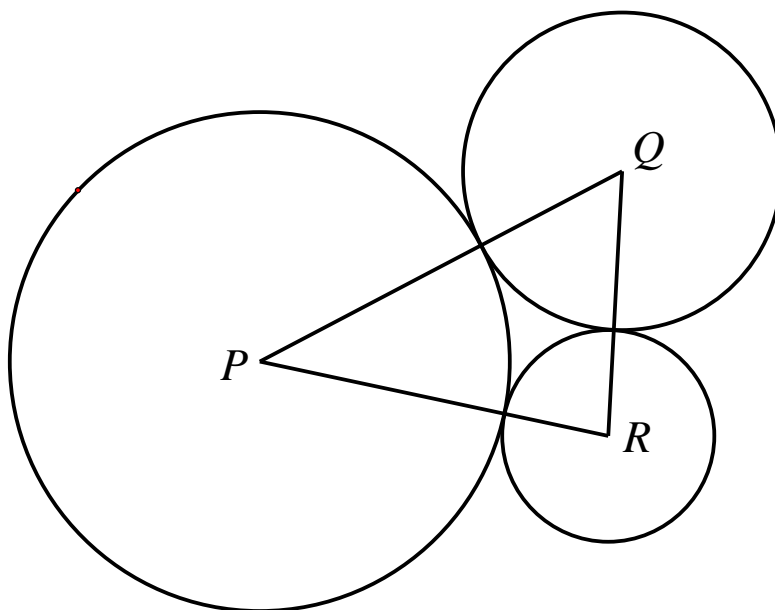


DIAGRAM NOT TO SCALE



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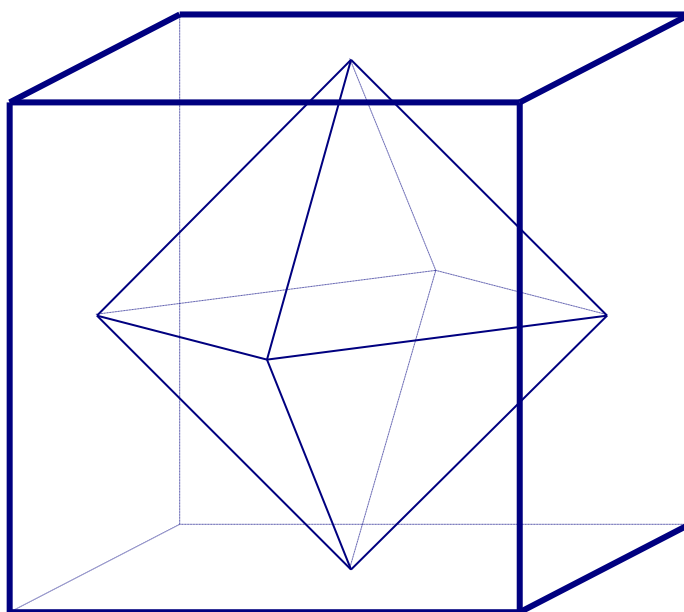
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Question 9

The centres of the faces of a cube of side $2a$ are joined to create a regular octahedron. What fraction of the volume of the cube does the octahedron occupy?



$2a$



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Question 10

The sum of 101 consecutive positive integers is p^3 where p is a prime number.

What is the smallest of the 101 integers?



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Group answer sheet

Team number

Team name

1. Sum of digits	2. Area of parallelogram cm^2
3. Number of numbers	4. Factorised quadratic
5. Ages of daughters (in any order)	6. Values of x
7. Angle QMR degrees	8. Diameters of the circles (in any order)
9. Fraction of the volume of the cube	10. Smallest of the 101 integers

Award 6 points for each correct answer.

TOTAL SCORE = _____



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