AUSTRALIAN MATHEMATICS COMPETITION

AN ACTIVITY OF THE AUSTRALIAN MATHEMATICS TRUST

THURSDAY 6 AUGUST 2009

JUNIOR DIVISION COMPETITION PAPER

AUSTRALIAN SCHOOL YEARS 7 AND 8
TIME ALLOWED: 75 MINUTES

INSTRUCTIONS AND INFORMATION

GENERAL

1. Do not open the booklet until told to do so by your teacher.
2. NO calculators, slide rules, log tables, maths stencils, mobile phones or other calculating aids are permitted. Scribbling paper, graph paper, ruler and compasses are permitted, but are not essential.
3. Diagrams are NOT drawn to scale. They are intended only as aids.
4. There are 25 multiple-choice questions, each with 5 possible answers given and 5 questions that require a whole number answer between 0 and 999. The questions generally get harder as you work through the paper. There is no penalty for an incorrect response.
5. This is a competition not a test; do not expect to answer all questions. You are only competing against your own year in your own State or Region so different years doing the same paper are not compared.
6. Read the instructions on the **Answer Sheet** carefully. Ensure your name, school name and school year are filled in. It is your responsibility that the Answer Sheet is correctly coded.
7. When your teacher gives the signal, begin working on the problems.

THE ANSWER SHEET

1. Use only lead pencil.
2. Record your answers on the reverse of the Answer Sheet (not on the question paper) by FULLY colouring the circle matching your answer.
3. Your Answer Sheet will be read by a machine. The machine will see all markings even if they are in the wrong places, so please be careful not to doodle or write anything extra on the Answer Sheet. If you want to change an answer or remove any marks, use a plastic eraser and be sure to remove all marks and smudges.

INTEGRITY OF THE COMPETITION

The AMC reserves the right to re-examine students before deciding whether to grant official status to their score.

Junior Division

Questions 1 to 10, 3 marks each

1. The value of $2.6 + 0.12$ is

(A) 3.8 (B) 2.7 (C) 2.02 (D) 2.9 (E) 2.72

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2. The value of $1^2 + 2^2 + 3^2 + 4^2$ is

(A) 10 (B) 30 (C) 32 (D) 36 (E) 100

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3. Darcy went for a 35-minute walk after dinner. If he finished his walk at 7:10 pm, he started at

(A) 6:35 pm (B) 6:30 pm (C) 6:40 pm (D) 6:25 pm (E) 6:45 pm

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4. I have \$10 in 10-cent coins, \$10 in 20-cent coins and \$10 in 50-cent coins. How many coins do I have?

(A) 80 (B) 650 (C) 90 (D) 200 (E) 170

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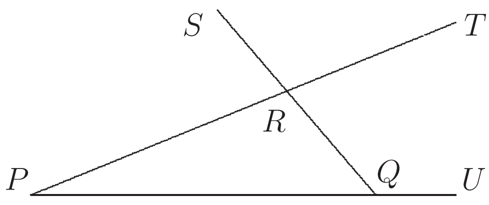
5. If $\angle RPQ = 20°$ and $\angle RQU = 120°$, what is the size, in degrees, of $\angle SRT$?

(A) 60 (B) 140 (C) 80 (D) 100 (E) 120



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6. $(2000 + 9) + (2000 - 9)$ equals

(A) 4000 (B) 4009 (C) 200 (D) 2000 (E) 5000

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7. A painted straight line is 0.5 mm wide and covers an area of 1 square metre. How long, in metres, is the line?

(A) 2 (B) 20 (C) 200 (D) 2000 (E) 5000

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8. A teacher can mark 26 tests in 2 hours. At this rate, the number of hours the teacher needs to mark 91 tests is

(A) 6 (B) 7 (C) 8 (D) 9 (E) 10

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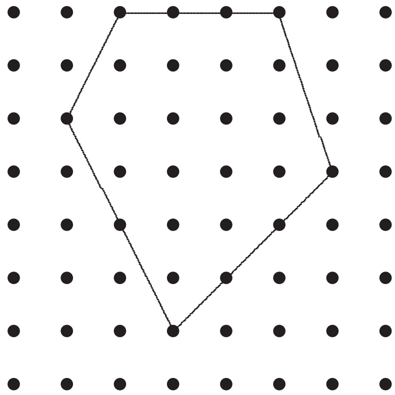
9. What is the area, in square centimetres, of the shape marked out on the 1-cm grid below?



(A) 18.5 (B) 19 (C) 19.5 (D) 20 (E) 20.5

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10. Which of the following has the largest value?

(A) $\frac{1}{3}$ (B) $\frac{1}{3}+\frac{1}{3}$ (C) $\frac{1}{3}\times\frac{1}{3}$ (D) $\frac{1}{3}-\frac{1}{3}$ (E) $\frac{1}{3}\div\frac{1}{3}$

Questions 11 to 20, 4 marks each

11. Which of the following values can replace the box so that

$$0.1\times 0.2\times 0.3\times 0.4\times \square = 0.12\,?$$

(A) 500 (B) 50 (C) 5 (D) 0.5 (E) 0.05

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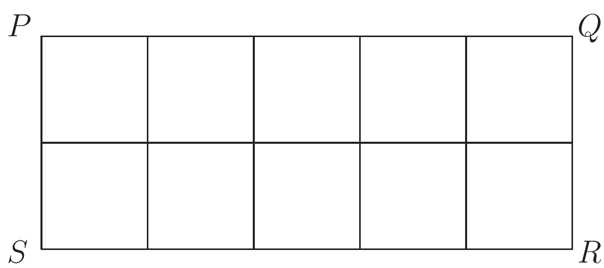
12. The figure $PQRS$ is a rectangle divided into 10 squares as shown. The perimeter of this rectangle is 21 centimetres. In centimetres, what is the perimeter of each square ?



(A) 2.1 (B) 3 (C) 6 (D) 8.4 (E) 12

13. The odd numbers from 1 to 999 are multiplied together. The last digit of the result is

(A) 1 (B) 3 (C) 5 (D) 7 (E) 9

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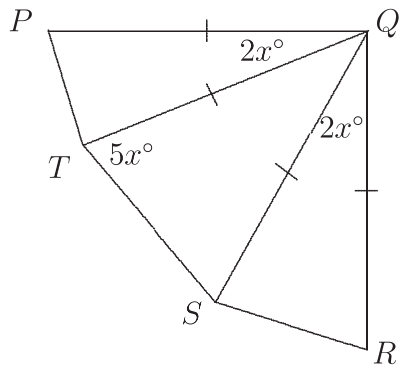
14. In the diagram, triangles PQT, QTS and QRS are isosceles and $\angle PQR$ is a right angle. Angles PQT and RQS are $2x°$ and angle QTS is $5x°$. The value of x is



(A) 10 (B) 12 (C) 14 (D) 15 (E) 20

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15. In Mrs Atkins' class, every student swims or cycles and half the students do both. The total number of students who swim is the same as the total number of students who cycle. If 24 students in total swim, how many students are in Mrs Atkins' class?

(A) 24 (B) 28 (C) 32 (D) 36 (E) 48

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16. Australia has rectangular currency notes for \$5, \$10, \$20, \$50 and \$100. These notes are all 65 mm wide but each note is 7 mm longer than the note of the next lowest value, so the \$10 note is 7 mm longer than the \$5 note, and so on.
The difference in area, in square millimetres, between the \$10 note and the \$100 note is

(A) 455 (B) 910 (C) 1365 (D) 1820 (E) 2275

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17. In this magic square, the sum of each row, column and diagonal is the same. The value of $x + y$ is

16		y
	x	10
8		12

(A) 34 (B) 35 (C) 36 (D) 37 (E) 38

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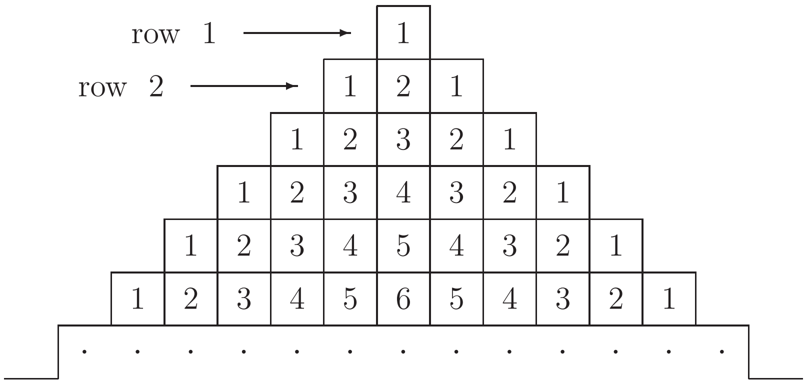
18. A train leaves Canberra for Sydney at 12 noon and another train leaves Sydney for Canberra forty minutes later. Both travel at the same constant speed, taking $3\frac{1}{2}$ hours to complete the journey. At what time will they pass?

(A) 1:45 pm (B) 2:00 pm (C) 2:05 pm (D) 2:15 pm (E) 2:25 pm

19. Consider the following number pattern.



The 83rd number on the 57th row is

(A) 26 (B) 31 (C) 57 (D) 29 (E) 35

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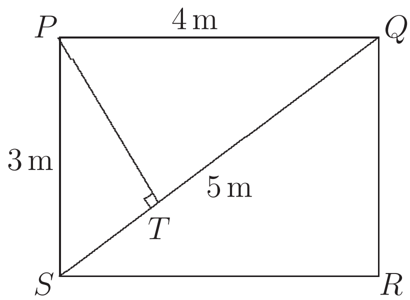
20. $PQRS$ is a rectangle with $PQ = 4\,\text{m}$, $PS = 3\,\text{m}$ and $QS = 5\,\text{m}$. PT is the perpendicular from P to QS. What is the length, in metres, of PT?

(A) 2.1 (B) 2.2 (C) 2.3 (D) 2.4 (E) 2.5



Questions 21 to 25, 5 marks each

21. How many 2-digit numbers are the product of two different primes? (Note that 1 is not prime.)

(A) 14 (B) 27 (C) 37 (D) 31 (E) 29

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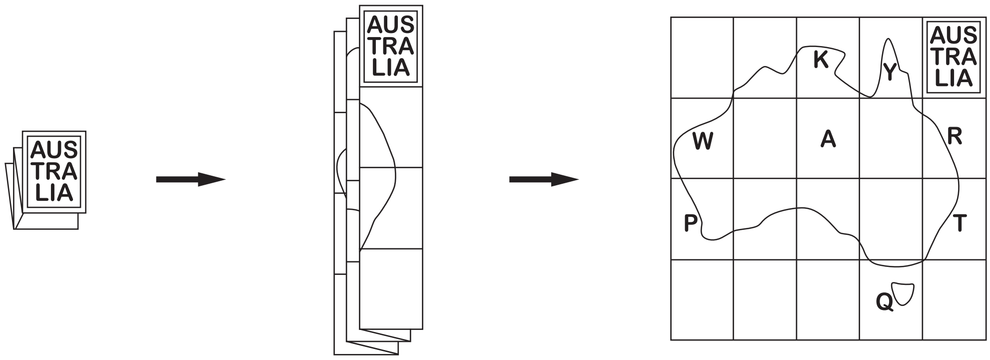
22. Billy, Lenny and Peter went fishing and caught less than 100 fish. The number that Billy caught was exactly three times as many fish as Lenny caught and four times as many as Peter caught. The largest number Billy could have caught was

(A) 48 (B) 50 (C) 60 (D) 66 (E) 72

23. I bought a map of Australia, unfolded it and marked eight places I wanted to visit.



I then refolded the map and placed it back on the table as it was. In what order are my marks stacked from top to bottom?

(A) RTYQKAWP (B) YKRAWTPQ (C) RTQYKAWP (D) YKTPRAWQ (E) YKWARTPQ

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24. A four-digit number has four different odd digits. What is the fraction of all such four-digit numbers that are divisible by three?

(A) $\frac{4}{5}$ (B) $\frac{1}{4}$ (C) $\frac{1}{3}$ (D) $\frac{2}{5}$ (E) $\frac{3}{4}$

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25. A palindromic number is a 'symmetrical' number which reads the same forwards as backwards. For example, 55, 101 and 8668 are palindromic numbers.
There are 90 four-digit palindromic numbers. How many of these four-digit palindromic numbers are divisible by 7?

(A) 7 (B) 9 (C) 14 (D) 18 (E) 21

For questions 26 to 30, shade the answer as an integer from 0 to 999 in the space provided on the answer sheet.

Question 26 is 6 marks, question 27 is 7 marks, question 28 is 8 marks, question 29 is 9 marks and question 30 is 10 marks.

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26. The letters W, X, Y and Z represent different digits. If the subtraction

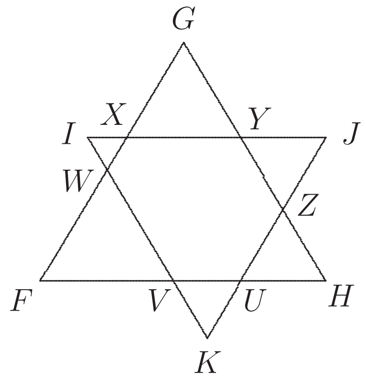
$$\begin{array}{rcccc} & 4 & \mathrm{W} & \mathrm{X} & \mathrm{Y} \\ - & \mathrm{Y} & 5 & 3 & \mathrm{Z} \\ \hline & 2 & 0 & 0 & 9 \\ \hline \end{array}$$

is correct, what is the value of $W \times X \times Y \times Z$?

27. How many integers in the set $100, 101, 102, \ldots, 999$ do **not** contain the digits 1 or 2 or 3 or 4?

28. We say a number is *ascending* if its digits are strictly increasing. For example, 189 and 3468 are ascending while 142 and 466 are not. For which ascending 3-digit number n (between 100 and 999) is $6n$ also ascending?

29. The sides of two equilateral triangles FGH and IJK meet at points X, Y, Z, U, V and W as shown, where $IJ \parallel FH$.



The perimeters of triangles IXW, IJK and FGH are 100 cm, 500 cm and 700 cm respectively, and $\angle GXY = 60°$. What is the perimeter, in centimetres, of $\triangle ZHU$?

30. A magician deposits the same number of rabbits (at least one) at each of five houses. To get to the first house he crosses a magic river once, and to get to any house from another, he also crosses a magic river once. Each time he crosses a magic river, the number of rabbits he has doubles. He has no rabbits left when he leaves the fifth house. What is the minimum number of rabbits he could have at the start?

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