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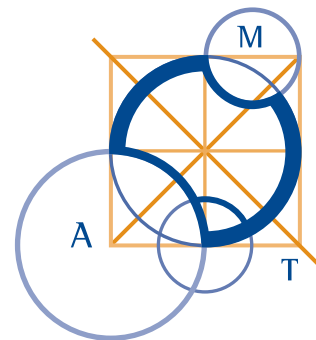
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# AUSTRALIAN MATHEMATICS COMPETITION

AN ACTIVITY OF THE AUSTRALIAN MATHEMATICS TRUST

THURSDAY 2 AUGUST 2012

NAME \_\_\_\_\_



## 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 entered. It is your responsibility to correctly code your answer sheet.
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 scanned. The optical scanner will attempt to read 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 AMT reserves the right to re-examine students before deciding whether to grant official status to their score.

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## Junior Division

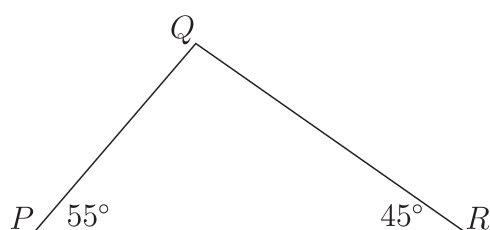
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### Questions 1 to 10, 3 marks each

1. The value of  $99 - 2 + 1 + 102$  is

- (A) 0                      (B) 100                      (C) 198                      (D) 200                      (E) 202
- 

2. The size, in degrees, of  $\angle Q$  is



- (A) 40                      (B) 55                      (C) 60                      (D) 80                      (E) 90
- 

3. Yesterday it rained continuously from 9:45 am until 3:10 pm. For how long did it rain?

- (A) 3 hours 25 minutes      (B) 3 hours 35 minutes      (C) 5 hours 25 minutes  
(D) 6 hours 25 minutes      (E) 6 hours 35 minutes
- 

4. The value of  $8 \times 3.1$  is

- (A) 11.1                      (B) 16.8                      (C) 8.31                      (D) 24.1                      (E) 24.8
- 

5. The change you should receive from a \$20 note after paying a bill of \$9.45 is

- (A) \$10.55                      (B) \$10.45                      (C) \$11.55                      (D) \$9.55                      (E) \$10.65
- 

6. Three-fifths of a number is 48. What is the number?

- (A) 54                      (B) 60                      (C) 64                      (D) 80                      (E) 84
- 

7. Which of the following is closest to 100?

- (A)  $99 + 2.01$     (B)  $98 + 3.011$     (C)  $97 + 4.0111$     (D)  $101 - 1.01$     (E)  $102 - 2.011$
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23. The product of three consecutive odd numbers is 226 737. What is the middle number?

- (A) 57                      (B) 59                      (C) 61                      (D) 63                      (E) 65
- 

24. A *Meeker* number is a 7-digit number of the form  $pqrstuv$ , where  $p \times q = 10r + s$  and  $s \times t = 10u + v$  and none of the digits are zero. For example, 6 742 816 is a Meeker number. The value of  $s$  in the largest Meeker number is

- (A) 2                      (B) 3                      (C) 5                      (D) 7                      (E) 8
- 

25. Four positive integers are arranged in a  $2 \times 2$  table. For each row and column of the table, the product of the two numbers in this row or column is calculated. When all four such products are added together, the result is 1001. What is the largest possible sum of two numbers in the table that are neither in the same row nor in the same column?

- (A) 33                      (B) 77                      (C) 91                      (D) 143                      (E) 500
- 

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. This cube has a different whole number on each face, and has the property that whichever pair of opposite faces is chosen, the two numbers multiply to give the same result.



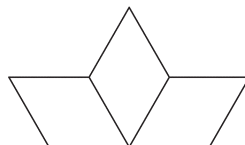
What is the smallest possible total of all 6 numbers on the cube?

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27. How many four-digit numbers containing no zeros have the property that whenever any its four digits is removed, the resulting three-digit number is divisible by 3?

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- 28.** A rhombus-shaped tile is formed by joining two equilateral triangles together. Three of these tiles are combined edge to edge to form a variety of shapes as in the example given.



How many different shapes can be formed? (Shapes which are reflections or rotations of other shapes are not considered different.)

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- 29.** Warren has a strip of paper 10 metres long. He wishes to cut from it as many pieces as possible, not necessarily using all the paper, with each piece of paper a whole number of centimetres long. The second piece must be 10 cm longer than the first, the third 10 cm longer than the second and so on. What is the length, in centimetres, of the largest possible piece?

- 
- 30.** Terry has invented a new way to extend lists of numbers. To *Terryfy* a list such as [1, 8] he creates two lists [2, 9] and [3, 10] where each term is one more than the corresponding term in the previous list, and then joins the three lists together to give [1, 8, 2, 9, 3, 10]. If he starts with a list containing one number [0] and repeatedly *Terryfies* it he creates the list

$$[0, 1, 2, 1, 2, 3, 2, 3, 4, 1, 2, 3, 2, 3, 4, 3, 4, 5, 2, 3, 4, \dots].$$

What is the 2012th number in this *Terryfic* list?

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