AUSTRALIAN MATHEMATICS COMPETITION

AN ACTIVITY OF THE AUSTRALIAN MATHEMATICS TRUST

THURSDAY 2 AUGUST 2012

NAME
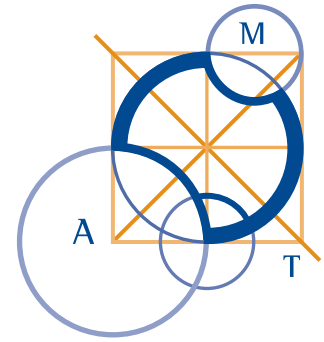
UPPER PRIMARY DIVISION COMPETITION PAPER

AUSTRALIAN SCHOOL YEARS 5, 6 AND PRIMARY 7*
TIME ALLOWED: 60 MINUTES
*SOME STATES ONLY

INSTRUCTIONS AND INFORMATION

GENERAL

1. Do not open the booklet until told to do so by your teacher.
2. You may use any teaching aids normally available in your classroom, such as MAB blocks, counters, currency, calculators, play money etc. You are allowed to work on scrap paper and teachers may explain the meaning of words in the paper.
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 Ssheet (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.

Upper Primary Division

Questions 1 to 10, 3 marks each

1. What is the value of $101 - 2 + 1 + 102$?

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

2. Mary's soccer team wins a game by two goals. Between them the two teams scored 8 goals. How many goals did Mary's team score?

(A) 3   (B) 4   (C) 5   (D) 6   (E) 8

3. Which of these spinners would be more likely to spin a rabbit?
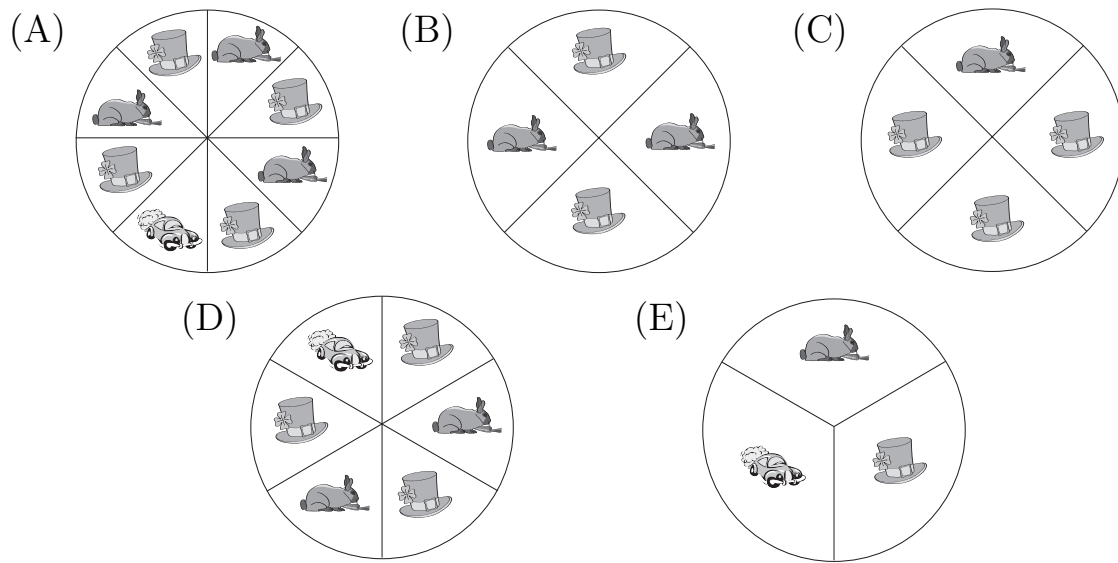
4. A small can of lemonade holds $250\,\text{mL}$. How many of these cans would fill a $1.5\,\text{L}$ jug?

(A) 3   (B) 4   (C) 6   (D) 8   (E) 10

5. Which of the following numbers has a value between $\frac{1}{5}$ and $\frac{1}{4}$?

(A) 0.26   (B) 0.15   (C) 0.21   (D) 0.19   (E) 0.3

6. The first time Bill looked at the clock it was 2.00 pm. Later that afternoon he saw it was 4.00 pm. Through how many degrees had the minute hand turned in this time?

(A) 90   (B) 180   (C) 360   (D) 270   (E) 720
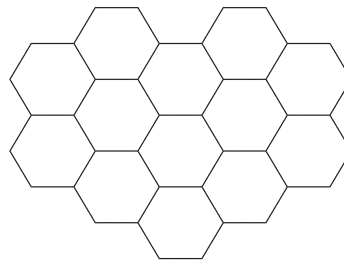
7. Mary colours in a honeycomb tessellation of hexagons. If hexagons share a common edge, she paints them in different colours.

What is the smallest number of colours she needs?

(A) 2   (B) 3   (C) 4   (D) 5   (E) 6

8. After half an hour Maya notices that she is one-third of the way through her homework questions. If she keeps working at a similar rate, how much longer, in minutes, can she expect her homework to take?

(A) 20   (B) 30   (C) 40   (D) 60   (E) 90

9. Sentries marked S guard the rows and columns they are on. Sentries marked T guard diagonally.

How many squares are unguarded?

(A) 1   (B) 3   (C) 5   (D) 7   (E) 8

10. A rectangular rug is 3 times as long as it is wide. If it were 3 m shorter and 3 m wider it would be a square. How long, in metres, is the rug?

(A) 3   (B) 6   (C) 9   (D) 12   (E) 15

Questions 11 to 20, 4 marks each

11. Lee's mobile phone gives him a warning that only 20% of the battery charge remains. If it is 48 hours since he last charged his phone and he uses the phone in the same way, how much longer, in hours, can he expect to use the phone before it runs out of battery life?

(A) 12   (B) 20   (C) 24   (D) 80   (E) 192

12. Michael threw 8 darts at the dartboard shown.

All eight darts hit the dartboard. Which of the following could have been his total score?

(A) 22   (B) 37   (C) 42   (D) 69   (E) 76

13. A prime number is called a *jillyprime* when doubling it and adding 1 results in another prime. How many numbers less than 15 are jillyprimes? (Note that 1 is **not** a prime.)

(A) 2   (B) 3   (C) 4   (D) 5   (E) 6

14. The square $PQRS$ is made up of 36 squares with side length one unit. The square $JKLM$ is drawn as shown.

P J Q
K
M
S L R
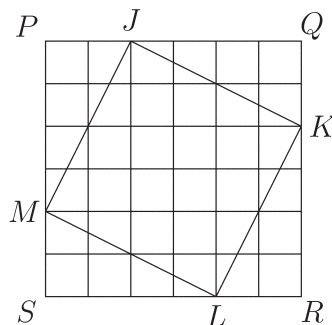
What is the area, in square units, of $JKLM$?

(A) 18   (B) 20   (C) 24   (D) 25   (E) 30

15. Following a recipe, Shane roasts a chicken for 20 minutes and then a further 30 minutes for each $500\,$g. How many minutes does it take Shane to cook a $1.75\,$kg chicken?

(A) 50   (B) 80   (C) 125   (D) 52.5   (E) 150

16. Alex placed 9 number cards and 8 addition symbol cards on the table as shown.
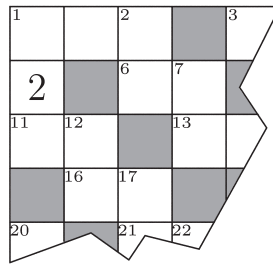
$$9 + 8 + 7 + 6 + 5 + 4 + 3 + 2 + 1$$

Keeping the cards in the same order he decided to remove one of the addition cards to form a 2-digit number. If his new total was 99, which 2-digit number did he form?

(A) 32   (B) 43   (C) 54   (D) 65   (E) 76

17. How many different isosceles triangles can be drawn with sides that can be only $2\,$cm, $3\,$cm, $7\,$cm or $11\,$cm in length? Note that equilateral triangles are isosceles triangles.

(A) 8   (B) 10   (C) 12   (D) 14   (E) 19

18. There is a total of $25 in $2, $1 and 50 c coins on a table. Peter notices that there are 20 coins altogether and that there are two more $2 coins than $1 coins. How many 50 c coins are there?

(A) 6   (B) 8   (C) 10   (D) 12   (E) 14

19. I can walk at 4 km/h and ride my bike at 20 km/h. I take 24 minutes less when I ride my bike to the station than when I walk. How many kilometres do I live from the station?

(A) 1   (B) 1.5   (C) 2   (D) 2.5   (E) 4

20. Jasdeep plays a game in which he has to write the numbers 1 to 6 on the faces of a cube. However, he loses a point if he puts two numbers which differ by 1 on faces which share a common edge. What is the least number of points he can lose?

(A) 0   (B) 1   (C) 2   (D) 3   (E) 4

Questions 21 to 25, 5 marks each

21. Twelve points are marked on a square grid as shown.

How many squares can be formed by joining 4 of these points?

(A) 5   (B) 6   (C) 9   (D) 11   (E) 13

22. A rectangular tile has a perimeter of 24 cm. When Sally places four of these tiles in a row to create a larger rectangle, she finds the perimeter is double the perimeter of a single tile. What would be the perimeter of the rectangle formed by adding another 46 tiles to make a row of 50 tiles?

(A) 306   (B) 400   (C) 416   (D) 480   (E) 612

23. The grid shown is part of a cross-number puzzle.

Clues

16 across is the reverse of 2 down

1 down is the sum of 16 across and 2 down

7 down is the sum of the digits in 16 across

What is 7 down?

(A) 11 (B) 12 (C) 13 (D) 14 (E) 15

24. Damian makes a straight cut through a painted cube, dividing it into two parts. The unpainted face created by the cut could not be which of the following?

(A) an equilateral triangle (B) a right-angled triangle

(C) a trapezium (D) a pentagon (E) a hexagon

25. A $5 \times 5 \times 5$ cube has a $1 \times 1 \times 5$ hole cut through from one side to the opposite side, a $3 \times 1 \times 5$ hole through another and a $3 \times 1 \times 5$ hole through the third as shown in the diagram.
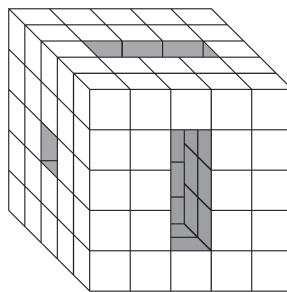
The number of $1 \times 1 \times 1$ cubes removed in this process is

(A) 25 (B) 29 (C) 36 (D) 48 (E) 92

For questions 26 to 30, shade the answer as a whole number 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.

26. Traffic signals at each intersection on a main road all change on the same 2-minute cycle. A taxi driver knows that it is exactly 3.5 km from one intersection to the next. Without breaking the 50 km/h speed limit, what is the highest average speed, in kilometres per hour, he can travel to get to each intersection as it just changes to green?

27. Rani wrote down the numbers from 1 to 100 on a piece of paper and then correctly added up all the individual digits of the numbers. What sum did she obtain?

28. 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.
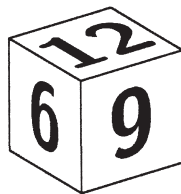
What is the smallest possible total of all 6 numbers on the cube?

29. 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.
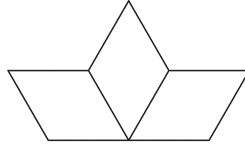
How many different shapes can be formed? (Shapes which are reflections or rotations of other shapes are not considered different.)

30. Andrew has two children, David and Helen. The sum of their three ages is 49. David's age is three times that of Helen. In 5 years time, Andrew's age will be three times David's age. What is the product of their ages now?