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THE AUSTRALIAN MATHEMATICS COMPETITION SOLUTIONS AND STATISTICS 1995 @ \$A18.00 each
These books provide a record of the AMC questions, solutions, analyses and prize winners at the Junior, Intermediate and Senior level. 1996 @ \$A18.00 each
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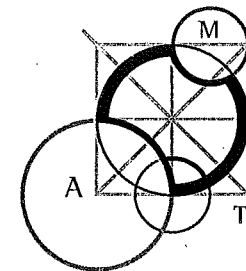
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AUSTRALIAN MATHEMATICS COMPETITION

AN ACTIVITY OF THE AUSTRALIAN MATHEMATICS TRUST



TUESDAY 29 JULY 1997

JUNIOR DIVISION COMPETITION PAPER

SCHOOL YEARS 7 AND 8

INSTRUCTIONS AND INFORMATION

GENERAL

1. Do not open this booklet until told to do so by your teacher.
2. Calculators are not 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. Avoid random guessing as one quarter of the marks assigned for that question will be deducted for an incorrect response.
5. Read the instructions on the answer sheet carefully. It is the student's responsibility that the answer sheet is correctly coded.
6. When your teacher gives the signal, begin working on the problems.
You have $1\frac{1}{4}$ hours working time.

INTEGRITY OF THE COMPETITION

To ensure the integrity of the Competition and to identify the outstanding students the AMC reserves the right to re-examine students before deciding whether to grant official status to their score.

ANSWERS ON THE ANSWER SHEET

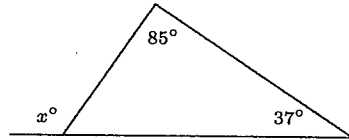
1. All answers should be recorded on the answer sheet.
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JUNIOR DIVISION

Questions 1 - 10, 3 marks each

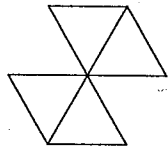
- 123 + 321 equals
(A) 246 (B) 642 (C) 333 (D) 444 (E) 666
- The number of minutes in $3\frac{3}{4}$ hours is
(A) 220 (B) 225 (C) 245 (D) 325 (E) 375
- $(1997 + 1997) \times 50$ equals
(A) 99 850 (B) 198 500 (C) 399 400 (D) 199 800 (E) 199 700

- In the diagram, x equals
(A) 112 (B) 48 (C) 58
(D) 122 (E) 132



- $0.2 \times 0.3 \times 0.4$ equals
(A) 0.024 (B) 0.24 (C) 0.009 (D) 0.0024 (E) 2.4
- If a $1\frac{1}{4}$ hour speech starts at 10:50 am, it should finish at
(A) 12:05 am (B) 12:05 pm (C) 11:05 am (D) 11:15 am (E) 1:05 pm

- The number of lines of symmetry in the plane of the diagram is
(A) 1 (B) 2 (C) 4
(D) 6 (E) 12



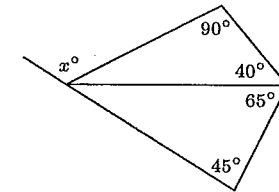
- There will be 43 500 tickets available for people to watch the finals of the cycling events at the next Olympic Games. When 29 678 tickets have been sold, the number of tickets which will be then available for sale is
(A) 14 822 (B) 4932 (C) 3822 (D) 13 822 (E) 14 922

- The angle which the hour hand of a clock sweeps out during the 75 minutes of this competition is
(A) 27.5° (B) 30° (C) 32.5° (D) 35° (E) 37.5°
- Mariko bought a radio valued at \$50. If she received a discount of 5%, the price she paid was
(A) \$55 (B) \$45 (C) \$48 (D) \$47.50 (E) \$52

Questions 11 - 20, 4 marks each

- How many numbers from 10 to 99 have the sum of their digits equal to 9?
(A) 9 (B) 10 (C) 18 (D) 90 (E) 99
- A jar containing one hundred 20 c pieces weighs 1400 g. If the jar weighs 230 g when empty, then the weight, in grams, of one 20 c piece is closest to
(A) 10 (B) 11 (C) 12 (D) 13 (E) 14

- The value of x in the diagram is
(A) 50 (B) 60 (C) 70
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- In a direct flight from Sydney to Cairns, the time from takeoff to touchdown is 2 h 40 min. The video display on board tells the passengers that the distance travelled is 1968 km. The average speed of the plane, in kilometres per hour, for this journey is
(A) 738 (B) 744 (C) 755 (D) 760 (E) 843
- The manufacturer of the dry food my cat eats recommends that I feed her 1 cup (250 mL) per day. The food comes in a rectangular box with base 18 cm by 7 cm and is filled to a depth of 25 cm. If I follow the manufacturer's recommendation, then the number of days the food should last is
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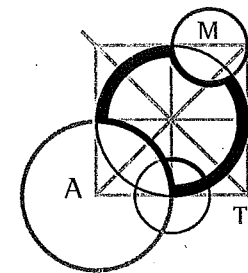
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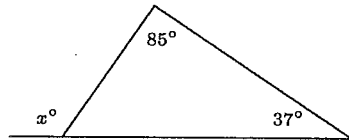
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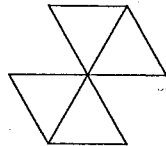
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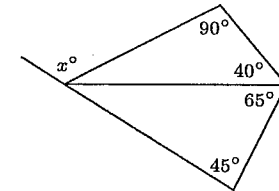
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16. Los Angeles local time is 17 hours behind Sydney. If the final of the basketball at the Sydney Olympics starts at 4:30 pm on a Wednesday, it will be seen live on TV in Los Angeles starting at

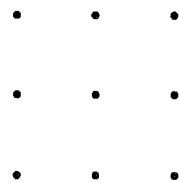
- (A) 10:30 pm Tuesday (B) 1:30 am Wednesday
 (C) 11:30 pm Tuesday (D) 5:30 am Wednesday
 (E) 11:30 am Tuesday

17. A rectangle has an area of 600 cm^2 and sides in centimetres which are multiples of 5. The number of different rectangular shapes satisfying this condition is

- (A) 4 (B) 2 (C) 6 (D) 3 (E) more than 6

18. How many different straight lines can be drawn through two or more dots arranged in the square of dots as shown?

- (A) 8 (B) 12 (C) 20
 (D) 24 (E) 36



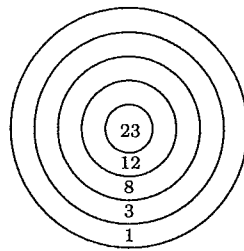
19. In 1990, the Australian Government decided that Australia would plant one billion (ie one thousand million) trees in the following decade. If one billion trees are planted in these 10 years, on average, how many will be planted per second?

- (A) 0.03 (B) 0.3 (C) 3 (D) 30 (E) 300

20. Three darts are thrown at the dart-board illustrated on the right. The three scores are added together, a miss counted as zero.

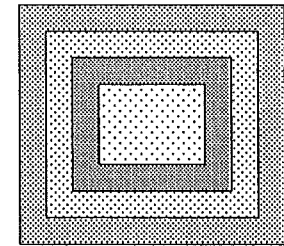
What is the smallest total score which is impossible to obtain?

- (A) 14 (B) 18 (C) 19
 (D) 22 (E) 30



Questions 21 - 30, 5 marks each

21. To make a quilt 120 cm by 80 cm for my baby's cot, I add borders to a central panel as shown. If the borders are the same width all the way around, then the dimensions of the central panel, in centimetres, could be

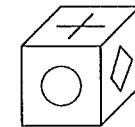


- (A) 60 by 40 (B) 90 by 60
 (C) 80 by 40 (D) 80 by 36 (E) 75 by 50

22. All but one of the numbers from 110 to 120 inclusive can be fitted into a single sequence 119, 112, 116, 118, 114, 117, 111, 120, 115, 110, in which each successive pair has a highest common factor greater than one. If you make the longest possible sequence of this kind using the numbers from 31 to 39 inclusive, how many numbers will be left out?

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

23. Which of the following nets could be folded to make the cube shown?



- (A) (B) (C)
- (D) (E)

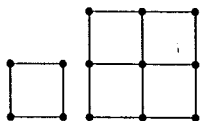
24. Which of the five numbers is not equal to any of the others?

- (A) $\frac{1996}{1997}$ (B) $\frac{996}{997}$ (C) $\frac{1997996}{1998997}$ (D) $\frac{19971996}{19981997}$ (E) $\frac{996996}{997997}$

25. Two players take it in turns to choose from 25 numbered counters, each labelled with a different odd number from 1 to 49. When one player chooses a counter labelled x , the next player must choose the counter whose label is the greatest odd factor of $99 - x$. How many counters will remain when the game ends if the first counter taken is labelled 5?

- (A) 19 (B) 18 (C) 17 (D) 16 (E) 15

26. A 1×1 square is made using 4 matches and a 2×2 square, with all the unit squares inside, uses 12 matches as shown. The number of matches needed to construct a 20×20 square with all the unit squares inside is

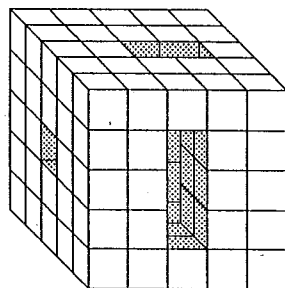


- (A) 800 (B) 820 (C) 840 (D) 860 (E) 880

27. A $5 \times 5 \times 5$ cube has a $1 \times 1 \times 5$ hole cut through one side, a $2 \times 1 \times 5$ hole through another and a $3 \times 1 \times 5$ hole through the third as shown in the diagram.

The volume remaining, in cubic units, is

- (A) 95 (B) 99 (C) 100
(D) 101 (E) 102



28. Sarah, Ben and Louise each bought a birthday present for their mother and decided to combine the three purchase prices and each pay an equal amount. If each had paid the purchase price of his or her own present, Sarah would have paid \$1 more, Ben \$3 less and Louise would have paid \$20. The total cost of the three presents was

- (A) \$54 (B) \$60 (C) \$66 (D) \$48 (E) \$57

29. The number 119 is very curious.

When divided by 2 it leaves a remainder of 1.
When divided by 3 it leaves a remainder of 2.
When divided by 4 it leaves a remainder of 3.
When divided by 5 it leaves a remainder of 4.
When divided by 6 it leaves a remainder of 5.
How many other 3-digit numbers have this property?

- (A) 0 (B) 1 (C) 3 (D) 7 (E) 14

30. We write out all the integers from 1 to 30 inclusive, and cross out some of these so that in the remaining list, no number is the double of any other.

What is the maximum number of integers which can appear in this remaining list?

- (A) 15 (B) 18 (C) 19 (D) 20 (E) 21

AMC CORRECT RESPONSES—JUNIOR DIVISION—1997—2001

QUESTION	1997	1998	1999	2000	2001
1	D	E	B	B	A
2	B	D	C	A	A
3	E	E	D	C	B
4	D	C	D	D	B
5	A	B	E	C	E
6	B	C	C	B	B
7	B	D	D	B	E
8	D	B	C	C	B
9	E	D	D	B	A
10	D	A	A	D	C
11	A	B	E	B	C
12	C	C	A	A	E
13	B	C	E	C	A
14	A	D	B	D	D
15	B	D	D	B	C
16	C	A	A	D	C
17	A	C	A	B	A
18	C	C	C	D	D
19	C	A	C	D	C
20	D	C	E	B	D
21	C	E	D	D	D
22	D	A	B	B	B
23	E	B	D	E	A
24	D	C	C	B	A
25	B	E	E	C	D
26	C	D	A	E	C
27	C	B	E	D	B
28	A	B	A	D	B
29	E	E	D	B	D
30	D	D	A	D	E