Junior Division

Questions 1 to 10, 3 marks each

1. The value of $95 - 83$ is

(A) 2 (B) 8 (C) 11 (D) 12 (E) 22

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2. 0.5 expressed as a fraction is

(A) $\frac{1}{8}$ (B) $\frac{1}{5}$ (C) $\frac{1}{4}$ (D) $\frac{1}{3}$ (E) $\frac{1}{2}$

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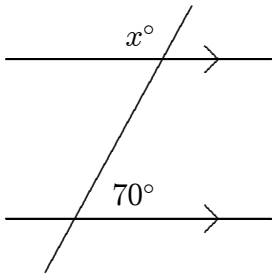
3. In the diagram, x equals

(A) 70 (B) 80 (C) 90 (D) 100 (E) 110



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4. The value of $\dfrac{6 \times 25}{3 \times 5 \times 2}$ is

(A) 1 (B) 2 (C) 3 (D) 5 (E) 6

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5. When I start a journey, the tripmeter reads 789 km. When I finish it reads 901 km. The distance travelled, in kilometres, is

(A) 102 (B) 108 (C) 110 (D) 112 (E) 288

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6. The change from \$50 if you bought 7 bottles of orange juice at 70 c per bottle should be

(A) \$45.10 (B) \$49.10 (C) \$41.90 (D) \$44.10 (E) \$45.90

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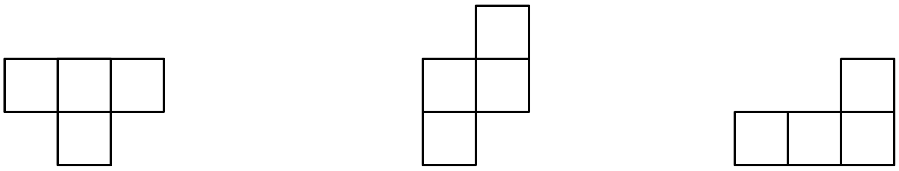
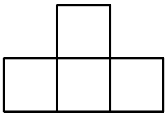
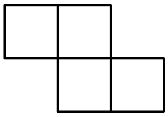
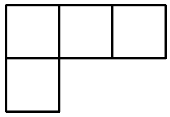
7. A tetromino is a shape consisting of four squares joined along their edges. Here are three different tetrominoes:-

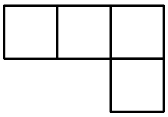


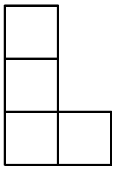
Which of the tetrominoes below **cannot** be obtained by a rotation, in the plane, of one of the above tetrominoes?

(A) 

(B) 

(C) 

(D) 

(E) 

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8. The area, in square centimetres, of one face of a cube whose volume is $64\,\text{cm}^3$ is

(A) 8 (B) 16 (C) 24 (D) 32 (E) 64

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9. The value of $\frac{3}{5} - \frac{2}{10} + \frac{3}{15} - \frac{4}{10}$ is

(A) $\frac{2}{5}$ (B) $\frac{3}{5}$ (C) $\frac{1}{5}$ (D) $\frac{1}{2}$ (E) 0

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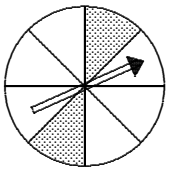
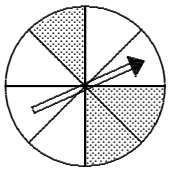
10. The average of five numbers is 4. Four of them are 1, 2, 3 and 4. What is the other?

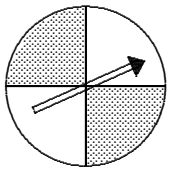
(A) 6 (B) 7 (C) 8 (D) 9 (E) 10

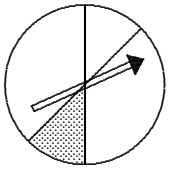
Questions 11 to 20, 4 marks each

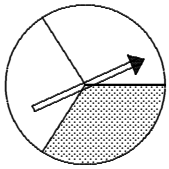
11. Which of the spinners below would give a one-in-four chance of the arrow landing in the shaded region?

(A) 

(B) 

(C) 

(D) 

(E) 

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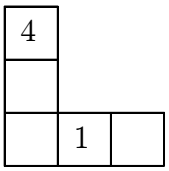
12. The numbers from 1 to 5 are placed one per square in the diagram shown, so that the sum of the three numbers in the horizontal row is the same as the sum of the 3 numbers in the vertical column.



If the numbers 1 and 4 are placed as shown, then the sum of the row or column is

(A) 8 (B) 9 (C) 10 (D) 11 (E) 12

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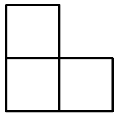
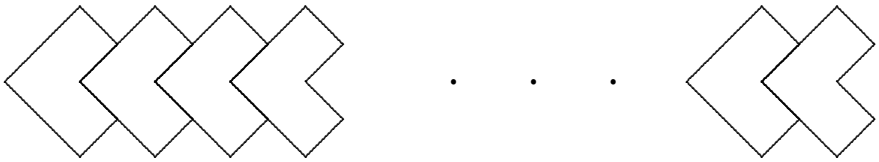
13. Fifty **L** shaped tiles, each made out of three 1 cm by 1 cm squares,



are arranged as shown below.



The perimeter of the resulting shape, in centimetres, is

(A) 202 (B) 204 (C) 206 (D) 208 (E) 210

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14. Using only 5 c, 10 c and 20 c coins, in how many ways can you make up 35 cents?

(A) 4 (B) 6 (C) 5 (D) 8 (E) 7

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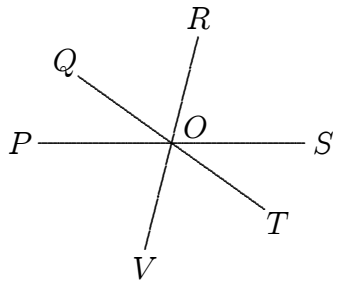
15. In the diagram, $\angle POR = 120°$ and $\angle QOS = 145°$. The size of $\angle TOV$ is

(A) 45° (B) 60° (C) 85° (D) 90° (E) 95°



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16. The middle date of the year in 2006 is

(A) 29th June (B) 30th June (C) 1st July (D) 2nd July (E) 3rd July

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17. Gina has three children and one of them is a teenager. When she multiplies their ages together the result is 770. How old is the teenager?

(A) 13 (B) 14 (C) 15 (D) 16 (E) 17

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18. A $1 \times 1 \times 1$ cube is cut out of a $10 \times 10 \times 10$ cube. Then a $2 \times 2 \times 2$ cube is cut from the remainder followed by a $3 \times 3 \times 3$ cube and so on. What is the largest cube which can be cut out?

(A) $3 \times 3 \times 3$ (B) $4 \times 4 \times 4$ (C) $6 \times 6 \times 6$ (D) $7 \times 7 \times 7$ (E) $5 \times 5 \times 5$

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19. The digits 3, 4, 5 and 6 can be put together to form 24 different four-digit numbers. If these numbers are arranged from smallest to largest, which number is in the thirteenth position?

(A) 3654 (B) 4563 (C) 5346 (D) 5436 (E) 6345

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20. The corner of a rectangular piece of paper is folded as shown in figure 1, then folded again, so the corner A just touches the first fold line as shown in figure 2.

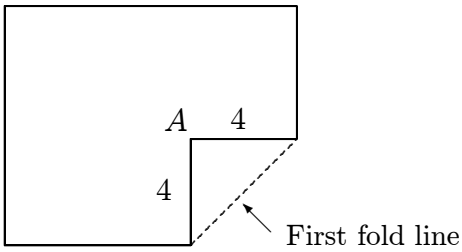


figure 1

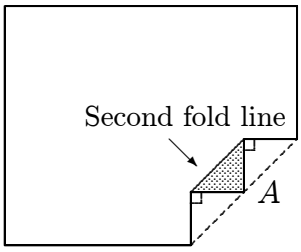


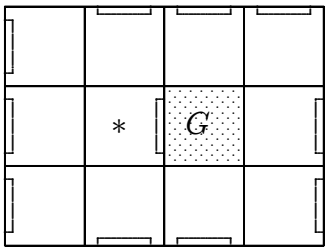
figure 2

The area, in square units, of the shaded triangle is

(A) 4 (B) 2 (C) 6 (D) $2\frac{1}{3}$ (E) $1\frac{2}{3}$

Questions 21 to 30, 5 marks each

21. In aerial view, an apartment block is composed of a number of square apartments and a number of square gardens, joined to form a rectangular block. Apartments must have at least one window, either to the outside or to one of the gardens. For example, in the 3×4 block below, the apartment marked $*$ has a window onto the internal garden G, whilst all other apartments have outside windows.



What is the smallest number of gardens required for such a 6×6 square block?

(A) 4 (B) 5 (C) 6 (D) 7 (E) 8

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22. The number 2^{2006} ends in what digit?

(A) 0 (B) 2 (C) 4 (D) 6 (E) 8

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23. The nine squares of a 3×3 grid painted on a wall are to be coloured red, white and blue so that no row or column contains squares of the same colour. One such pattern is shown in the diagram. How many different patterns can be made?

(A) 15 (B) 6 (C) 9 (D) 12 (E) 24

R	W	B
B	R	W
W	B	R

24. How many different pairs of 2-digit numbers multiply to give a 3-digit number with all digits the same?

(A) 5 (B) 6 (C) 7 (D) 8 (E) 9

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25. We will call a number N green if $6 \times N$ contains none of the digits 0, 1, 2, 3 and 4. There are two digits such that every green number contains at least one of them. One of these two digits is 1. What is the other?

(A) 5 (B) 6 (C) 7 (D) 8 (E) 9

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

26. What is the sum of the **digits** of all 2-digit numbers from 10 to 99?

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27. Each of the students in a class writes a different 2-digit number on the whiteboard. The teacher claims that no matter what the students write, there will be at least three numbers on the whiteboard whose digits have the same sum. What is the smallest number of students in the class for the teacher to be correct?

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28. A 5 cm by 5 cm by 4 cm block is built from one hundred 1 cm $\times$ 1 cm $\times$ 1 cm cubes, each of which is coloured red or white. The cubes are arranged in such a way that no two cubes which touch along a face are the same colour. What is the number of red **faces** in the interior of the block?

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29. The vertices of a cube are each labelled with one of the integers 1, 2, 3, ..., 8. A *face-sum* is the sum of the labels of the four vertices on a face of the cube. What is the maximum number of equal face-sums in any of these labellings?

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30. It is a surprising fact that $1 \times 2 \times 3 \times 4 \times 5 \times 6 = 8 \times 9 \times 10$. It is even more surprising that $8 \times 9 \times 10 \times 11 \times 12 \times 13 \times 14$ is equal to another such product of consecutive whole numbers. What is the smallest number in this other product?
