Junior Division

1. What is the value of $17 + 16 + 14 + 13$?

(A) 60   (B) 61   (C) 63   (D) 68   (E) 70

2. In the diagram the value of x is

(A) 80   (B) 70   (C) 60

       (D) 50   (E) 40

3. What is the perimeter of the figure below in centimetres?

(A) 21   (B) 30   (C) 36   (D) 39   (E) 78

4. This week at my lemonade stand I sold \$29 worth of lemonade, but I had spent \$34 on lemons and \$14 on sugar. My total loss for the week was

(A) \$1   (B) \$9   (C) \$19   (D) \$21   (E) \$29

5. The value of $\dfrac{1}{0.04}$ is

(A) 15   (B) 20   (C) 25   (D) 40   (E) 60

6. If $\dfrac{5}{6}$ of a number is 30, what is $\dfrac{3}{4}$ of the number?

(A) 22.5   (B) 24   (C) 25   (D) 27   (E) 40

7. A map, 40 cm wide and 20 cm high, is folded along the dashed lines indicated to form a 10 cm × 10 cm square so that it just fits in its envelope. It is then pinned to a notice board.
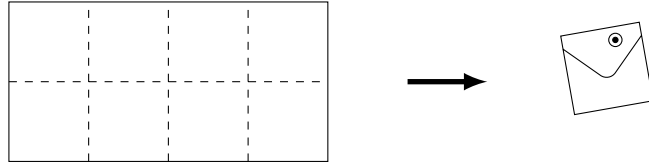
Which one of the following could be the pattern of pinholes on the map?

(A)

(B)

(C)

(D)

(E)

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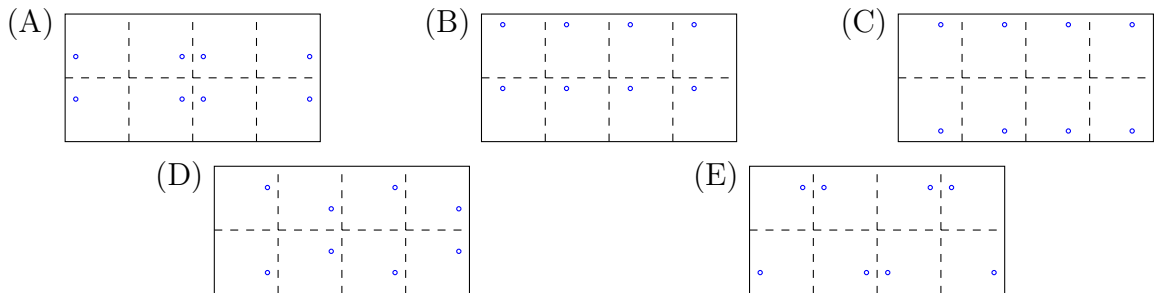
8. This diagram is called an *open square* of order 4, since the three sides are all the same length and each side has four posts spaced evenly along it. The total number of posts which would be evenly spaced along an open square of order 10 would be
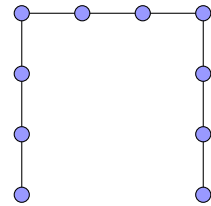
(A) 26   (B) 27   (C) 28

     (D) 30   (E) 32

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9. A train is scheduled to leave the station at 10:14 am and it takes 2 hours and 47 minutes to arrive at its destination. If the train leaves 8 minutes late, when does it arrive?

(A) 7:28 am   (B) 7:35 am   (C) 12:09 pm   (D) 1:01 pm   (E) 1:09 pm

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10. Consecutive numbers are written on five separate cards, one on each card. If the sum of the smallest three numbers is 60, what is the sum of the largest three numbers?

(A) 62   (B) 63   (C) 64   (D) 65   (E) 66

Questions 11 to 20, 4 marks each

11. The width of a rectangle is one-third of its length. If its area is $108\,\text{cm}^2$ then its perimeter in centimetres is

(A) 54   (B) 48   (C) 42   (D) 36   (E) 24

12. Six people are standing in a line. The height of the first person is 150 cm and the height of the sixth person is 180 cm. The height of each other person is the average of the heights of the person directly in front and the person directly behind. What is the height of the fourth person in the line?

(A) 165 cm   (B) 168 cm   (C) 170 cm   (D) 172 cm   (E) 174 cm

13. An unusual tower is built with cubes starting with one in the bottom layer, then 4 in the second layer, 9 in the third, then 16, and so on. Altogether 91 cubes are used to build the tower. How many layers does the tower have?

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

14. At my school, there are 76 students who are placed as evenly as possible in six classes, so that no two classes differ in size by more than one student. How many classes at the school have exactly 12 students?

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

15. Four equilateral triangles of the same size are arranged with horizontal bases inside a larger equilateral triangle, as shown. What fraction of the area of the larger triangle is covered by the smaller triangles?

(A) $\dfrac{2}{3}$ (B) $\dfrac{1}{2}$ (C) $\dfrac{4}{9}$

(D) $\dfrac{4}{7}$ (E) $\dfrac{16}{25}$

16. After 9 weeks Mikayla has an average mark of 5 out of 10 in the weekly spelling tests. What is the minimum number of extra weeks now required to raise her average to 7?

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

17. Anne has four cards, each with a different number written on it. She makes a list of all the different totals that can be obtained by choosing two or more cards and adding the numbers on them. What is the maximum number of different totals that she could have in her list?

(A) 7   (B) 8   (C) 9   (D) 10   (E) 11

18. In the months of March, April and May, my lawn grows 0.7 cm every day. On the day that it reaches a height of 20 cm, I always mow it back to a height of 2.5 cm. If I mow my lawn on the first day of March, how many times in total do I need to mow the lawn during these three months?

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

19. There are n people sitting equally spaced around a circle. The people are numbered in order around the circle from 1 up to n. Person 31 notices that person 7 and person 14 are the same distance from him. How many people are sitting around the circle?

(A) 42   (B) 41   (C) 40   (D) 39   (E) 38

20. A 3 by 5 grid of dots is set out as shown. How many straight line segments can be drawn that join two of these dots and pass through exactly one other dot?
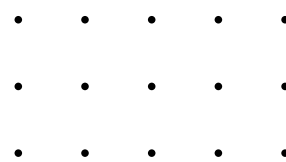
(A) 14   (B) 20   (C) 22

     (D) 24   (E) 30

Questions 21 to 25, 5 marks each

21. What is the sum of ten consecutive two-digit whole numbers where the first and last numbers are perfect squares?

(A) 205   (B) 210   (C) 215   (D) 225   (E) 230

22. A hotel has rooms that can accommodate up to two people. Couples can share a room, but otherwise men will share only with men and women only with women. How many rooms are needed to guarantee that any group of 100 people can be accommodated?

(A) 50   (B) 51   (C) 67   (D) 98   (E) 99

23. A three-digit number, written abc, is called *fuzzy* if abc is divisible by 7, the two-digit number bc is divisible by 6, the digit c is divisible by 5 and the three digits a, b and c are all different. How many fuzzy numbers are there?

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

24. If a is the number $1111\ldots1111$, with 100 digits all 1, and b is the number $999\ldots999$ with 50 digits all 9, how many digits are 1 in the number $a - b$?

(A) 49   (B) 50   (C) 97   (D) 98   (E) 99

25. Zac has three jackets, one black, one brown and one blue. He has four shirts, one white, one blue, one red and one yellow. He has three pairs of trousers, one brown, one white and one yellow. How many combinations of jacket, shirt and trousers are possible if no two items are of the same colour?

(A) 23   (B) 25   (C) 26   (D) 27   (E) 29

**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.

26. The diagram shows a grid 3 units high and 4 units wide that uses 31 matches. How many matches would you need to create a grid of squares that is 13 units high and 33 units wide?
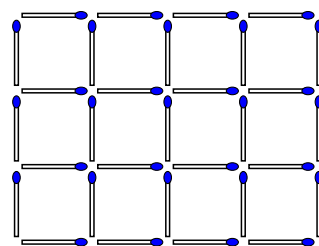
27. Eighteen points are equally spaced on a circle, from which you will choose a certain number at random. How many do you need to choose to guarantee that you will have the four corners of at least one rectangle?

28. In a 3×3 grid of points, many triangles can be formed using 3 of the points as vertices. Three such triangles are shown below. Of all these possible triangles, how many have all three sides of different lengths?
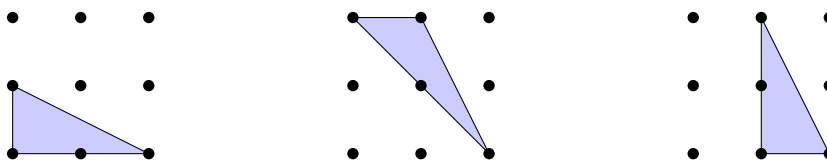
29. How many three-digit numbers are there in which one of the digits is the sum of the other two?

30. What is the largest three-digit number with the property that the number is equal to the sum of its hundreds digit, the square of its tens digit and the cube of its units digit?