Junior

3-Point-Problems

1. Helga lives with her father, mother, brother, one dog, two cats, two parrots and four fish. How many legs do they have altogether?

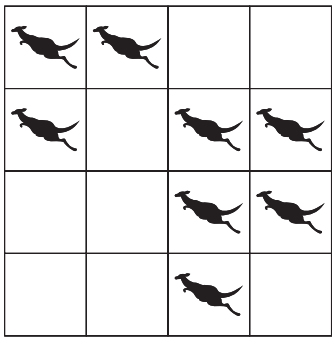
(**A**) 22 (**B**) 28 (**C**) 24 (**D**) 32 (**E**) 13

2. (J3.11) Sally had the fiftieth best result, and at the same time the fiftieth poorest result, at the latest Kangaroo contest in her school. How many pupils took part in the competition?

(**A**) 50 (**B**) 75 (**C**) 99 (**D**) 100 (**E**) 101

3. (J3.33) There are eight kangaroos in the cells of the table (see the figure on the right). Any kangaroo can jump into any free cell. Find the least number of kangaroos which have to jump into another cell so that exactly two kangaroos remain in any row and in any column of the table.

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



4. 18 pupils are crossing a road in pairs. The pairs are labelled from 1 to 9. A pair with an even label consists of a boy and a girl, and a pair with an odd label consists of two boys. How many boys are crossing the road?

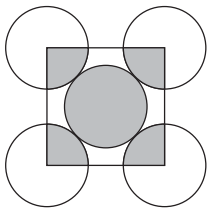
(**A**) 10 (**B**) 12 (**C**) 14 (**D**) 11 (**E**) 18

5. Johnny inflates 8 balloons every three minutes. How many balloons will be inflated after two hours, if every tenth balloon pops immediately after having been inflated?

(**A**) 160 (**B**) 216 (**C**) 240 (**D**) 288 (**E**) 320

6. (J3.48) In the diagram, the five circles have the same radius and touch as shown. The small square joins the centres of the four outer circles. The ratio of the area of the shaded part of the five circles to the area of the unshaded parts of the five circles is

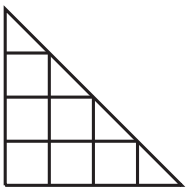
(**A**) 1 : 3 (**B**) 1 : 4 (**C**) 2 : 5 (**D**) 2 : 3 (**E**) 5 : 4



7. (J3.51) A company received an order for constructing blocks in rectangular form the size of 10cm × 12cm × 14cm but erroneously it constructed them with dimensions 12cm × 14cm × 16cm. What is the percentage increase in the volume of the constructed blocks with respect to the ordered blocks?

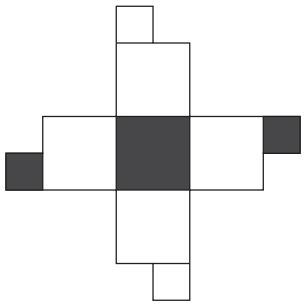
(**A**) 20 (**B**) 30 (**C**) 40 (**D**) 50 (**E**) 60

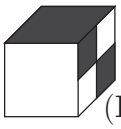
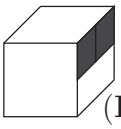
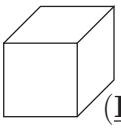
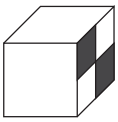
8. There are seven squares in the picture. How many more triangles than squares are there in the picture?



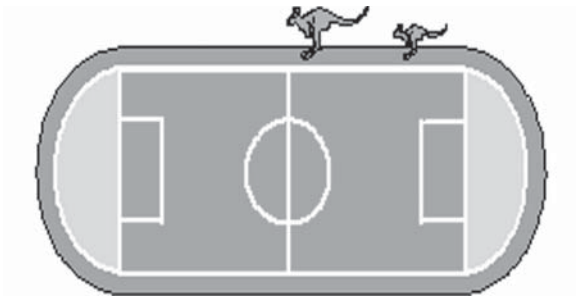
(**A**) 1 (**B**) 2 (**C**) 3
(**D**) 4 (**E**) the same quantity

9. Which of the following cubes could be made from the net on the right?



(**A**)  (**B**)  (**C**)  (**D**)  (**E**) 

10. A mother kangaroo and her baby Jumpy are jumping around the stadium with a perimeter of 330 m. Both of them make 1 jump every second. The mother's jumps are 5 m long, while Jumpy's jumps are 2 m long. They both start at the same point and move in the same direction.



After 25 seconds Jumpy get tired and stops while his mother continues to jump. How long is it until she is next to Jumpy again?

(**A**) 15 s (**B**) 24 s (**C**) 51 s (**D**) 66 s (**E**) 76 s

4-Point-Problems

11. (J4.76) If one completes the empty squares of the table so that the numbers in each row, in each column, and in the diagonals form arithmetic progressions (i.e., they increase by the same amount in every step), then the number in square x will be:

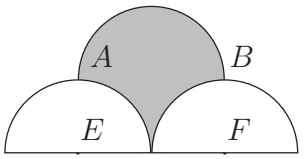
				21
	16			
		27		
				x

(**A**) 49 (**B**) 42 (**C**) 33 (**D**) 28 (**E**) 4

12. (J4.27) John waits for Helen for 19 minutes. Bus A comes every 3 minutes and bus B comes every 5 minutes. Being bored, he counts the difference between the number of the buses A and B that pass him. How many different results could occur?

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

13. (J4.90) The picture shows 3 semi-circles with points A and B directly above the centres E and F of the two lower semi-circles. If the radius of each of the semi-circles is 2 cm, then the area, in cm^2, of the shaded region is:

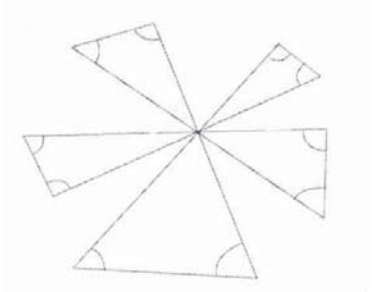


(**A**) 2π (**B**) 7 (**C**) $2\pi + 1$ (**D**) 8 (**E**) $2\pi + 2$

14. (J4.91) Two bottles of equal volume contain both water and juice. The ratios of the volume of water to juice are, respectively, 2 : 1 and 4 : 1. We put all the contents of the two bottles into one big bottle then the ratio of water to juice in this bottle will be:

(**A**) 3 : 1 (**B**) 6 : 1 (**C**) 11 : 4 (**D**) 5 : 1 (**E**) 8 : 1

15. What is the sum of the 10 angles marked in the picture?

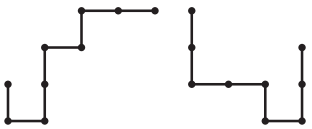


(**A**) 300° (**B**) 450° (**C**) 360° (**D**) 600° (**E**) 720°

16. (J4.11) The average of 16 different positive integers is 16. What is the largest possible value that one of these integers could have?

(**A**) 16 (**B**) 24 (**C**) 32 (**D**) 136 (**E**) 256

17. Each of these two pieces of wire is made of 8 segments of length 1. One of the pieces is placed one above the other so that they coincide partially. What is the largest possible length of their common part?

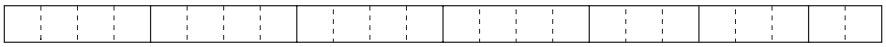


(**A**) 1 (**B**) 3 (**C**) 4 (**D**) 5 (**E**) 7

18. (J4.93) In a bag we have 17 balls numbered from 1 to 17. If we select some balls at random, what is the smallest number of balls needed to guarantee that the selection contains at least one pair of balls that add to 18?

(**A**) 7 (**B**) 8 (**C**) 10 (**D**) 11 (**E**) 17

19. (J4.40) A rectangle with length 24 m and width 1 m is cut into smaller rectangles, each with width 1 m. There are four pieces with length 4 m, two pieces with length 3 m and one piece with length 2 m. These smaller rectangles are put together to form another rectangle. What is the smallest possible perimeter of the new rectangle?



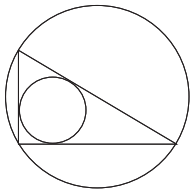
(**A**) 14 m (**B**) 20 m (**C**) 22 m (**D**) 25 m (**E**) 28 m

20. (JNP.6) A car drove with constant speed of 90 km/h. When the car clock showed 21:00, the daily mileage recorder showed 116.0, meaning that up to that moment 116.0 km had been driven. Later that evening the mileage recorder showed the same row of numbers as the clock. At what time did that occur?

(**A**) 21.30 (**B**) 21.50 (**C**) 22.00 (**D**) 22.10 (**E**) 22.30

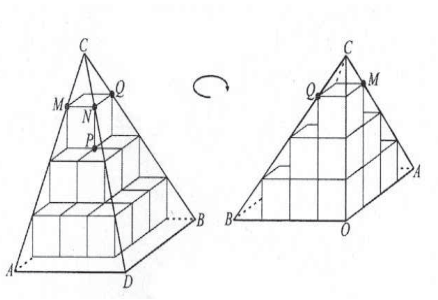
5-Point-Problems

21. (J4.70) Let a and b be the short sides of the right-angled triangle. If d is the diameter of the incircle and D is the diameter of the circumcircle of this triangle, then $d + D$ is equal to



(**A**) $a + b$ (**B**) $2(a + b)$ (**C**) $0,5(a + b)$
(**D**) $\sqrt{ab}$ (**E**) $\sqrt{a^2 + b^2}$

22. (RoJ.30) Forteen cubes of volume 1 are arranged in a corner and surrounded by a pyramid as shown in the picture. What is the volume of the pyramid?



(**A**) $\frac{64}{3}$ (**B**) 64 (**C**) $\frac{64\sqrt{2}}{3}$ (**D**) $\frac{64\sqrt{2}}{2}$ (**E**) $\frac{32}{3}$

23. (J4.86) Every other day Charles always speaks the truth, otherwise he lies. Today he stated exactly four of the following sentences. Which one could he not have stated today?

(**A**) I have a prime number of friends.

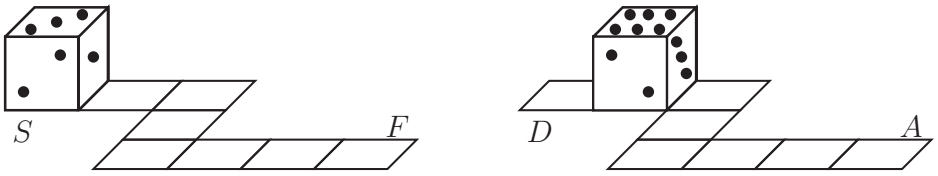
(**B**) I have as many male friends as female.

(**C**) My name is Charles.

(**D**) I always speak the truth.

(**E**) Three of my friends are older than me.

24. (JNP.49) Opposite faces of a die always add to 7. A die rolls on a circuit as represented below.



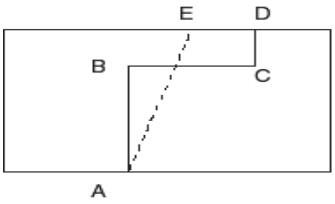
At the starting point (S) the top face is 3. Which will be the top face at the final point (F)?

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

25. (J4.55) How many positive integers n satisfy the inequality $2000 < \sqrt{n(n+1)} < 2005$?

(**A**) 1 (**B**) 2 (**C**) 3 (**D**) 4 (**E**) 5

26. (J5.42) Two pieces of land are separated by the borderline $ABCD$, as shown in the figure. The line segments AB, BC and CD are parallel to the sides of the rectangle and have lengths 30m, 24m and 10m, respectively. We want to straighten the borderline by replacing it with a line AE, such that the areas of the two pieces of land do not change. How far from D must be E?

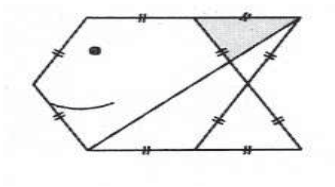


(**A**) 8m (**B**) 10m (**C**) 12m (**D**) 14m (**E**) 16m

27. (JNP.55) How many 4-digit divisors does the number 102^2 have?

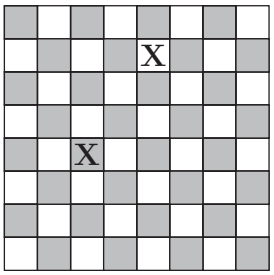
(**A**) 2 (**B**) 3 (**C**) 4 (**D**) 5 (**E**) 6

28. (RoJ.31) Ten matches are used to make this fish-shaped figure. The piece of string is placed on the shape as shown. The area of the whole shape is 24. What is the area of the shaded triangle?



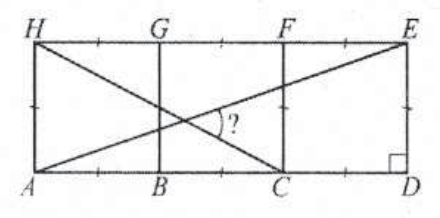
(**A**) $\sqrt{2}$ (**B**) $\sqrt{3}$ (**C**) 2 (**D**) $\sqrt{5}$ (**E**) $\sqrt{6}$

29. (J5.37) How many ways are there to choose a white square and a black square from an 8×8 chess-board so that these squares lie neither in the same row nor in the same column?



(**A**) 56 (**B**) 5040 (**C**) 720 (**D**) 672 (**E**) 768

30. (RoJ.39) Three squares are placed together as shown. The lines AE and CH intersect at point P. What is the angle $\angle CPE$?



(**A**) 30° (**B**) 45° (**C**) 60° (**D**) 50° (**E**) 40°