3 point problems

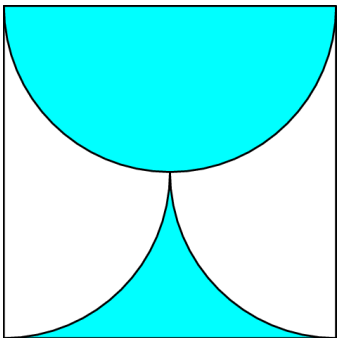
1. Which of the following numbers is closest to 20.15 × 51.02 ?

(**A**) 100 (**B**) 1000 (**C**) 10000 (**D**) 100000 (**E**) 1000000

2. Mother did the laundry and hanged t-shirts in line on a clothing line. Then she asked her children to put a single sock between any two t-shirts. Now there are 29 clothes on the clothing line. How many t-shirts are there on the line?

(**A**) 10 (**B**) 11 (**C**) 13 (**D**) 14 (**E**) 15

3. The shaded part of the square with side a is bounded by a semicircle and two quarter arcs. What is its area?

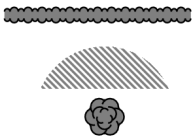


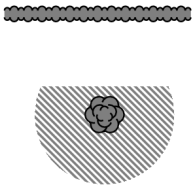
(**A**) $\frac{\pi a^2}{8}$ (**B**) $\frac{a^2}{2}$ (**C**) $\frac{\pi a^2}{2}$ (**D**) $\frac{a^2}{4}$ (**E**) $\frac{\pi a^2}{4}$

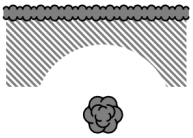
4. Three sisters, Ann, Beth and Cindy, bought a bag of 30 cookies; each received 10 cookies. However Ann paid 80 cents, Beth 50 and Cindy 20. If they had divided the cookies proportionally to the price each paid, how many more cookies should Ann have received?

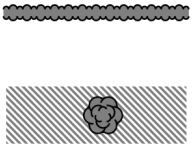
(**A**) 10 (**B**) 9 (**C**) 8 (**D**) 7 (**E**) 6

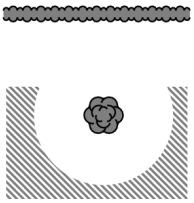
5. Mister Hide wants to dig up a treasure that he buried in his garden years ago. He only remembers that he buried the treasure at least 5 m away from the hedge and at most5 m from the trunk of the old pear tree. Which of the following pictures shows the region where Mister Hide should look for the treasure?

(**A**) 

(**B**) 

(**C**) 

(**D**) 

(**E**) 

6. What is the unit digit of the number $2015^2 + 2015^0 + 2015^1 + 2015^5$?

(**A**) 1 (**B**) 5 (**C**) 6 (**D**) 7 (**E**) 9

7. There are 33 children in a class. Their most favourite subjects are computer studies and physical education (PE). Three children like both subjects. There are twice as many children who like only computer studies than those who like only PE. How many children like computer studies?

(**A**) 15 (**B**) 18 (**C**) 20 (**D**) 22 (**E**) 23

8. Which of the following is neither a square number nor a cube number?

(**A**) 6^{13} (**B**) 5^{12} (**C**) 4^{11} (**D**) 3^{10} (**E**) 2^9

9. Mr Candle bought 100 candles. He burns one candle every day and always makes one new one from the remaining wax of seven burnt candles. After how many days will he have to go and buy new candles again?

(**A**) 112 (**B**) 114 (**C**) 115 (**D**) 116 (**E**) 117

10. The number of right angles in some convex pentagon is n. Which is the complete list of the possible values of n?

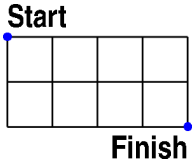
(**A**) 1, 2, 3 (**B**) 0, 1, 2, 3, 4 (**C**) 0, 1, 2, 3 (**D**) 0, 1, 2 (**E**) 1, 2

4 point problems

11. The picture shows my decision die in three different positions. What is the probability to roll YES with this die? [Possible to take away first die on the picture!]

(**A**) $\frac{1}{3}$ (**B**) $\frac{1}{2}$ (**C**) $\frac{5}{9}$ (**D**) $\frac{2}{3}$ (**E**) $\frac{5}{6}$

12. The length of a side of one square is 1. What is the minimum distance you walk from "Start" to "Finish", if we can only move along the sides or diagonals of individual squares?



(**A**) $2\sqrt{5}$ (**B**) $\sqrt{10} + \sqrt{2}$ (**C**) $2 + 2\sqrt{2}$
(**D**) $4\sqrt{2}$ (**E**) 6

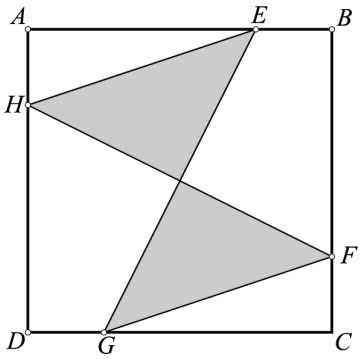
13. Every inhabitant of the Winger planet has at least two ears. Three inhabitants named Imi, Dimi and Trimi met in a crater. Imi said: "I can see 8 ears." Dimi: "I can see 7 ears." Trimi: "That's strange, I can only see five ears." None of them could see his own ears. How many ears does Trimi have?

(**A**) 2 (**B**) 4 (**C**) 5 (**D**) 6 (**E**) 7

14. A recipient with the form of a rectangular prism whose base is a square of side 10 cm, is filled with water up to a height of h cm. A solid cube of 2 cm of edge is put in it. The minimal value of h such that the cube keep full submerged in the water is:

(A) 1.92 cm (**B**) 1.93 cm (**C**) 1.90 cm (**D**) 1.91 cm (**E**) 1.94 cm

15. The square $ABCD$ has area 80. Points E, F, G and H are on the sides of the square and $AE = BF = CG = DH$. If $AE = 3\,EB$, what is the shadowed area?

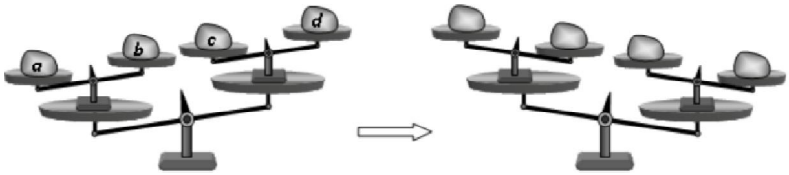


(**A**) 20 (**B**) 25 (**C**) 30 (**D**) 35 (**E**) 40

16. Today the product of the ages (in integers) of father and son is 2015. What is the difference of their ages?

(**A**) 26 (**B**) 29 (**C**) 31 (**D**) 34 (**E**) 36

17. Four loads a, b, c, d are placed in the scales (see fig.). Then some two of the loads were interchanged and the scales change the position as shown in the figure. Which loads were interchanged?



(**A**) a and b (**B**) b and d (**C**) b and c (**D**) a and d (**E**) a and c

18. If the two roots of the equation $x^2 - 85x + c = 0$ are prime numbers, what is the value of the sum of the digits of c?

(**A**) 12 (**B**) 13 (**C**) 14 (**D**) 15 (**E**) 21

19. How many three-digit positive integers are there in which any two adjacent digits differ by 3?

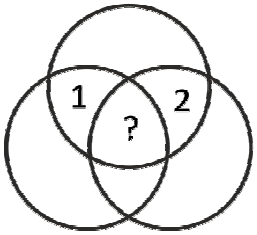
(**A**) 12 (**B**) 14 (**C**) 16 (**D**) 20 (**E**) 27

20. Which of the following is a counter-example to the statement 'If n is prime then exactly one of the numbers $n - 2$ and $n + 2$ is prime'?

(**A**) $n = 11$ (**B**) $n = 19$ (**C**) $n = 21$ (**D**) $n = 29$ (**E**) $n = 37$

5 point problems

21. The figure shows seven regions enclosed by three circles. A number is written in each region. It is known that the number in any region is equal to the sum of the numbers in all neighbouring regions. (We call two regions neighbouring if their boundaries have more than one common point.) Two of the numbers are known (see fig.). Which number is written in the central region?



(**A**) 0 (**B**) -3 (**C**) 3 (**D**) -6 (**E**) 6

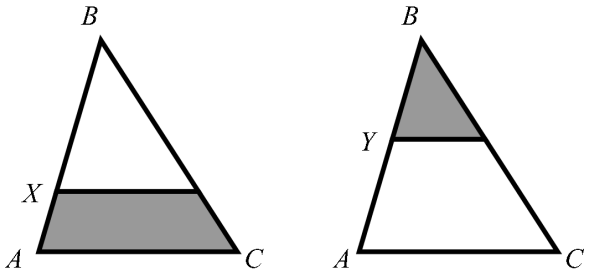
22. Petra has three different dictionaries, and two different novels on a shelf. How many ways are there to arrange the books if she wants to keep the dictionaries together and the novels together?

(**A**) 12 (**B**) 24 (**C**) 30 (**D**) 60 (**E**) 120

23. How many 2-digit numbers can be written as the sum of exactly six different powers of 2, including 2^0?

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

24. In the triangle ABC, we can draw a line parallel to its base AC, through point X or Y. The areas of the shaded regions are the same. The ratio $BX:XA = 4:1$. What is the ratio $BY:YA$?



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

25. In a right triangle, the angle bisector of an acute angle divides the opposite side into segments of length 1 and 2. What is the length of the bisector?

(**A**) $\sqrt{2}$ (**B**) $\sqrt{3}$ (**C**) $\sqrt{4}$ (**D**) $\sqrt{5}$ (**E**) $\sqrt{6}$

26. A two-digit number with digits a, b can be written $\overline{ab}$. Let a, b, c be different digits. How many ways can you choose the digits a, b, c such that $\overline{ab} < \overline{bc} < \overline{ca}$?

(**A**) 84 (**B**) 96 (**C**) 125 (**D**) 201 (**E**) 502

27. When one of the numbers 1, 2, 3, ... , $n-1$, n was eliminated, the mean of the remaining numbers was 4.75. Which number was eliminated?

(**A**) 5 (**B**) 7 (**C**) 8 (**D**) 9
(**E**) impossible to determine.

28. Oyla the ant starts on one of the vertices of a cube whose edges have length 1. She wants to walk along every edge of the cube and return to her starting point, making the length of her journey as short as possible. What is the length of her journey?

(**A**) 12 (**B**) 14 (**C**) 15 (**D**) 16 (**E**) 20

29. Ten different numbers are written down. Any number that is equal to the product of the other nine numbers is then underlined. How many numbers can be underlined at most?

(**A**) 1 (**B**) 2 (**C**) 3 (**D**) 9 (**E**) 10

30. Several points are marked on a line, and all possible line segments are constructed between pairs of these points. One of the points lies on 80 of these segments; another point lies on 90 segments. How many points were marked on the line?

(**A**) 20 (**B**) 22 (**C**) 80 (**D**) 90
(**E**) impossible to determine.