

LESSON 12: GEOMETRY PROBLEMS

P1. In figure 2, there are 5 shaded squares. The numbers are the length of the line segments. What is the total area of all the vacant spaces?

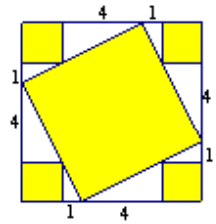


Figure 2

P2. Figure 4 is a geometric figure formed by several rectangles with 2cm length and 1cm width. What is the perimeter of this geometric figure in cm?

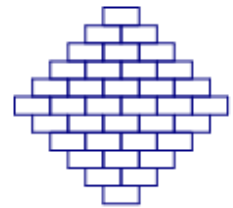
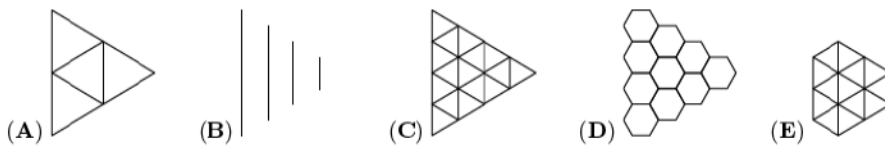
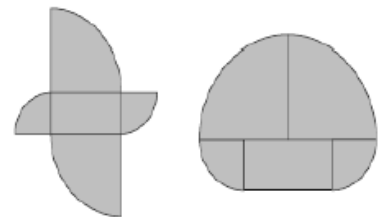


Figure 4

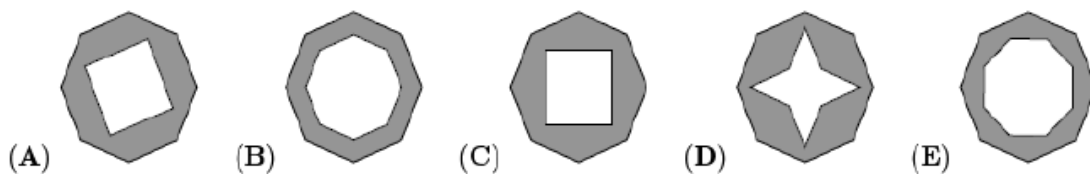
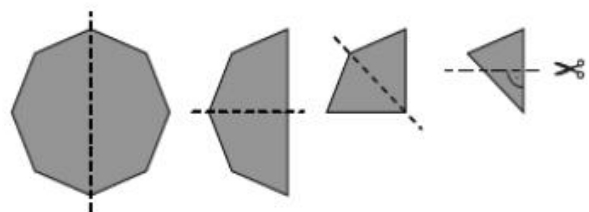
P3. The pattern on the picture is constructed by regular hexagons. Adam connects the centres of any two adjacent hexagons. Which of the following patterns is the result of Adam's drawing?



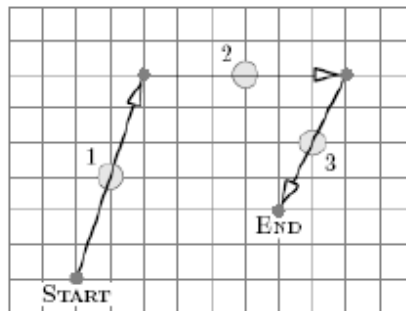
P4. Both figures on the right are formed from the same five pieces. One of the pieces is a rectangle with a length of 10 cm and a width of 5 cm, and the other pieces are quarters of two different circles. What is the difference in the perimeter lengths of the figures?



P5. A regular octagon is folded in half exactly three times until a triangle is obtained, as shown. Then the vertex is cut off at right angles, as shown in the picture. If we unfold the paper what will it look like?

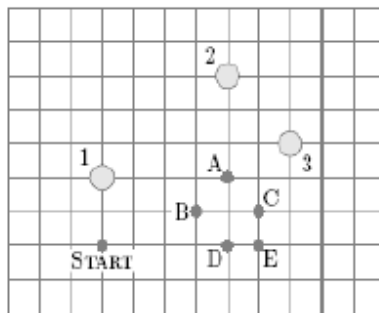


P6. Hip and Hop play jumping by hopping over a stone, then landing across so that the stone is in the middle of the segment traveled during each jump. Picture 1 shows how Hop jumped three times hopping over stones marked 1, 2 and 3.



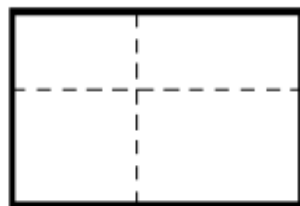
Picture 1: Hop

Hip has the configuration of stones marked 1, 2 and 3 (to jump over in this order), but starts in a different place as shown on Picture 2. Which of the points A, B, C, D or E is his landing point?

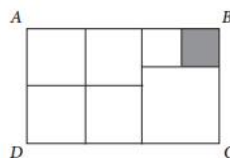


Picture 2: Hip

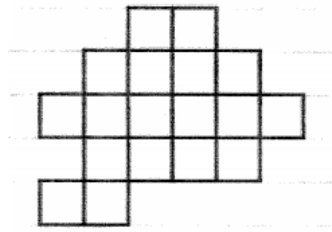
P7. Rectangle ABCD is cut into four smaller rectangles, as shown in the figure. The four smaller rectangles have the following properties: (a) the perimeters of three of them are 11, 16 and 19; (b) the perimeter of the fourth is neither the biggest nor the smallest of the four. What is the perimeter of the original rectangle ABCD?



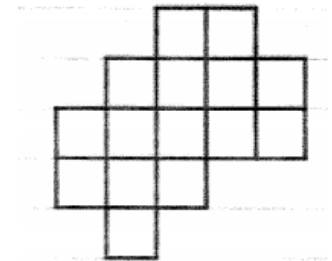
P8. The rectangle ABCD shown on the diagram is divided into 7 squares. Compute how many times larger is the perimeter of the rectangle ABCD than the perimeter of the shaded square.



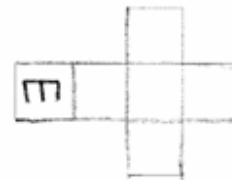
P9. Cut the following shape into 3 parts which are equal in size and shape.



P10. Cut the following shape in to 3 equal parts.

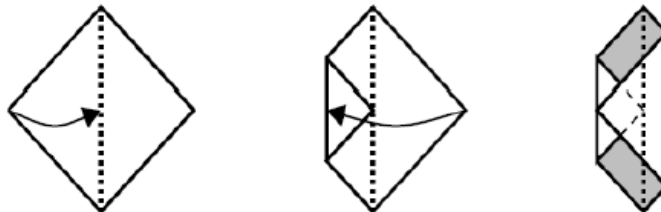


P11. A boy made up his sibling's name from 4 identical cubes. The cubes are positioned so that the boy can read the name on the cubes facing him.



P12.

P13. A square-shaped piece of paper is folded twice as shown in the picture. The area of the original square is 64 cm^2 . What is the total area of the shaded rectangles?



P14. A cube with a side length of 3 cm is painted grey and cut into smaller cubes with a side length of 1 cm each. How many of the smaller cubes will have exactly 2 faces painted?

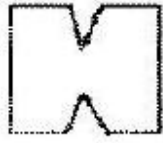


P15. A square piece of paper is folded twice in such a way that the result is a square again. In the new square, one of the corners is cut out and then the paper is unfolded. Which of the following designs cannot be obtained this way?

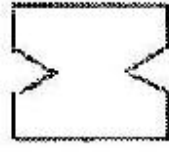




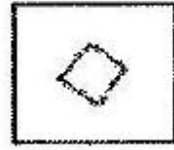
A)



B)



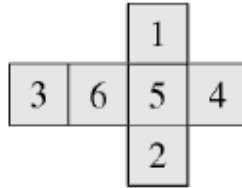
C)



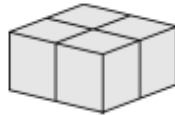
D)

E) All of these designs can be obtained this way.

P16. Alice forms four identical numbered cubes using the net shown.



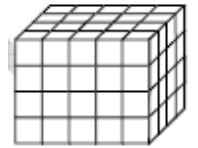
She then glues them together to form a $2 \times 2 \times 1$ block, as shown. Only faces with identical numbers are glued together.



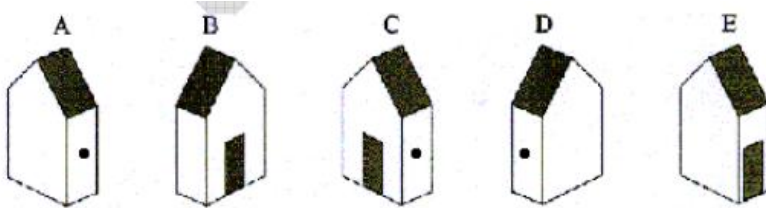
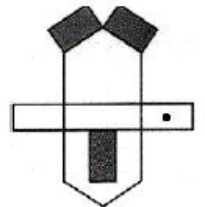
Alice then finds the total of all the numbers on the surface of the block. What is the largest total that Alice can get?

- (A) 66 (B) 68 (C) 72 (D) 74 (E) 76

P17. Chris constructed the brick on the picture using red and blue cubes of the same size. The outside of the brick is completely red, but all cubes used inside are blue. How many blue cubes did Chris use?

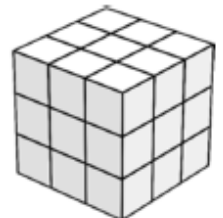
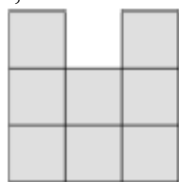


P18. The picture on the right has been drawn on paper and cut out to make a house. Which of the houses did it become?



P19. The $3 \times 3 \times 3$ cube in the picture is made of 27 small cubes.

How many small cubes do you have to remove to see the following result when viewing from the right, from above, and from the front?

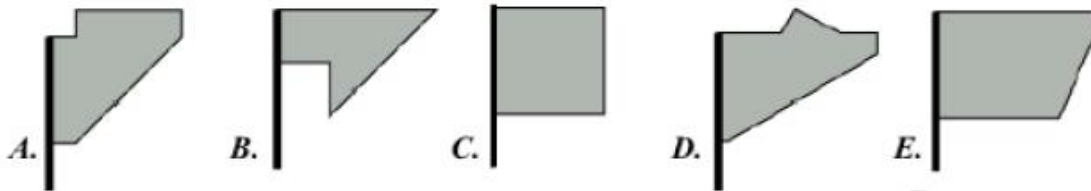


P20. A bar code is formed using 17 black and white bars (the first and last bars are black). The black bars are two types: wide and narrow. The number of white bars is 3 more than the number of wide black bars.



The number of narrow black bars is:

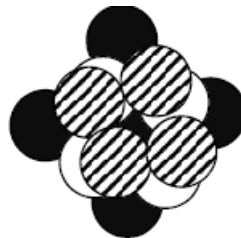
P21. From her window Karla looks at the wall of a house. There she can see the silhouette of a rectangular flag flying in the wind. At five different moments she draws the silhouette. Which of the 5 pictures cannot be right unless the flag is torn?



P22. In the shown triangle, first we join the midpoints of all the three sides. This way, we form a smaller triangle. We repeat this one more time with the smaller triangle, forming a new even smaller triangle, which we colour in red. How many triangles of the size of the red triangle are needed to cover completely the original triangle, without overlapping?



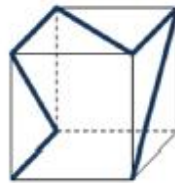
P23. Mary had equal numbers of white, black and striped tokens. She used some of the tokens to make the pile shown in the figure.



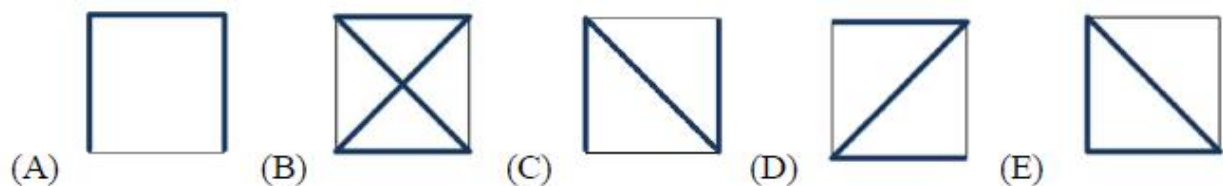
She still has five tokens which are not in the pile. How many black tokens did she have in total?

- (A) 5 (B) 6 (C) 7 (D) 10 (E) 15

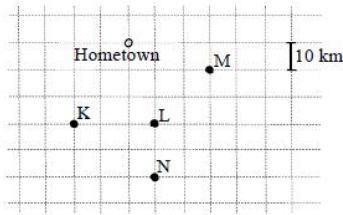
P24. A thin colourful ribbon is stuck on a transparent plastic cube (see the picture).



Which of the following pictures does not represent the cube as seen from any perspective?



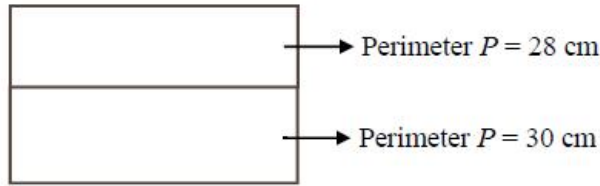
P25. Bob is going to visit four cities. He will start from and end up in his home town. The figure shows a map of the regions with the cities. The roads are only along the grid lines.



Bob wants to make the trip as short as possible. Which route should Bob follow?

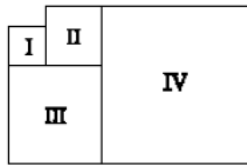
- (A) M,L,N,K (B) K,L,M,N (C) N,M,L,K (D) L,N,K,M (E) K,L,N,M

P26. A rectangle with a perimeter of 34 cm was divided into two smaller rectangles with perimeters 28 cm and 30 cm, as shown in the figure.

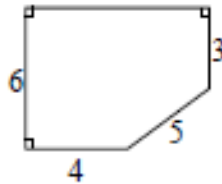


What is the area of the big rectangle?

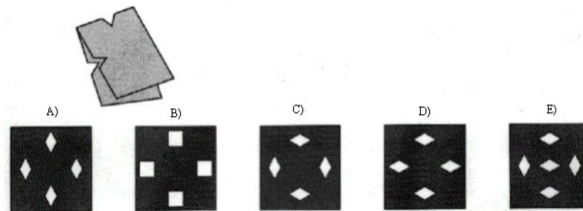
P27. Figures I, II, III and IV are squares. The circumference of square I is 16m and the circumference of square II is 24m.



P28. The figure at the right is a pentagon with three right angles and with side lengths as labeled. What is the area of the given figure?



P29. Which of the five square sheets corresponds to the folded sheet on the figure, which is cut, as shown?



P30. The net shown at the figure on the right is cut out and folded to form a cube. Which face is then opposite the face marked x?

