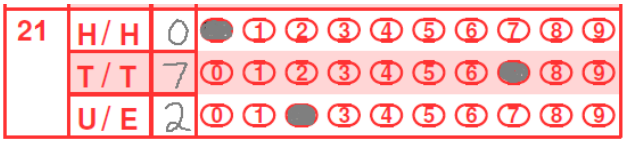
HOW TO COMPLETE THE ANSWER SHEET

The answers to all questions are integers from 0 to 999. Consider the following example question:

21. If $3x - 216 = 0$, determine the value of x.

The answer is 72, so you must complete the block for question 21 on the answer sheet as follows: shade 0 in hundreds row, 7 in the tens row, and 2 in the units row:



Write the digits of your answer in the the blank blocks on the left of the respective rows, as shown in the example; hundreds, tens and units from top to bottom. The three digits that you wrote down will not be marked, since it is only for your convenience — only the shaded circles will be marked.

PLEASE DO NOT TURN THE PAGE UNTIL YOU ARE TOLD TO DO SO

Part A: Four marks each

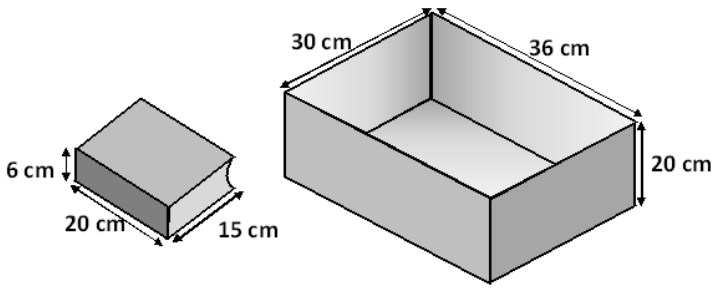
1. I have R4. How many sweets can I buy if one sweet costs 40c?

2. Calculate $2015 - (2015 - (2015 - (2015 - 1)))$.

3. At a certain school, break starts at 11:45 and ends at 12:12. How long is break, in minutes?

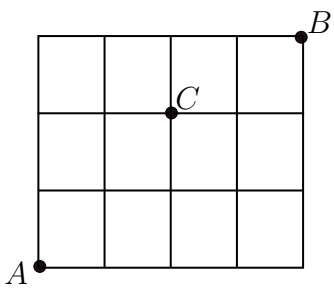
4. Steve was sorting 1 000 eggs into sizes. He got paid 20 cents for each egg that he sorted. For each egg that he broke while sorting he did not get paid and had to pay his employer R1. Steve was paid R176. How many eggs did Steve break?

5. The dimensions of a box and a book are, respectively, 36 cm × 30 cm × 20 cm and 20 cm × 15 cm × 6 cm, as shown in the diagram. What is the maximum number of books that can be packed into the box with no books sticking out?



Part B: Five marks each

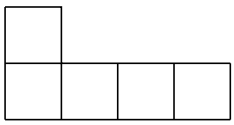
6. The diagram shows a rectangular network of paths. How many ways are there to move from point A to point B if we can only move up or right without moving through intersection C?

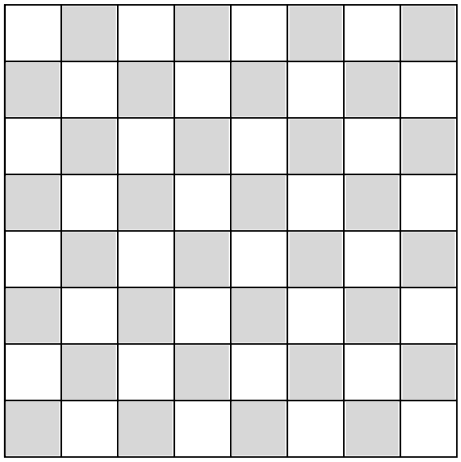


7. The nine digits $1, 2, 3, 4, 5, 6, 7, 8$ and 9 are each used exactly once in writing three 3-digit numbers. In each of the three numbers the middle digit is the largest. What is the smallest possible sum of these three numbers?

8. When 144 is divided by the positive integer n, the remainder is 11. When 220 is divided by n, the remainder is also 11. What is the value of n?

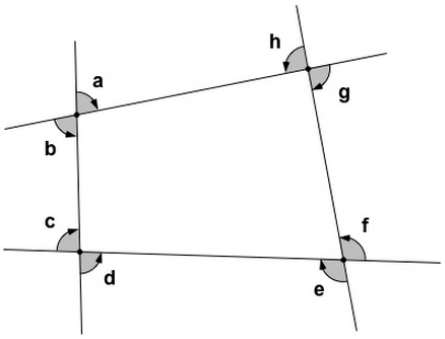
9. What is the maximum number of the shape below that can be placed on an 8×8 chessboard without any overlapping? The shape may be rotated or flipped.





10. Pyramids with square bases were built by stacking magnetic balls. A pyramid with a 1×1 base contains one ball, a pyramid with a 2×2 base contains five balls, a pyramid with a 3×3 base contains 14 balls, a pyramid with a 4×4 base contains 30 balls. How many balls are there in a pyramid with a 10×10 base?

11. The angles in the figure are measured in degrees. Find $a+b+c+d+e+f+g+h$.



12. I buy a number of chocolates which cost R25 each and cool-drinks which cost R9 each. I buy more chocolates than cool-drinks. How many cool-drinks do I buy if I pay R839?

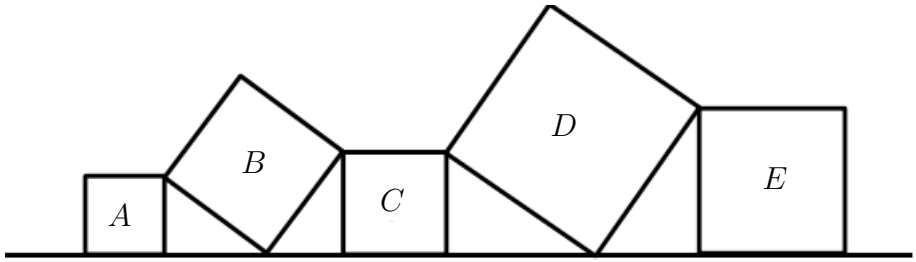
13. A magic square has the property that the sum of the numbers in every row, column and diagonal is the same constant k. What is the value of k for the magic square shown here?

		33
31	28	

14. Some balls were distributed into 2015 boxes which were arranged in a row as indicated below. Any four consecutive boxes always had a total of 30 balls. How many balls were there in the 2015th box?

	5	7		. . . . .	10	. . . . .		?
Box number: 1	2	3	4				2014	2015

15. Five squares (labelled A, B, C, D and E) are drawn along a straight line, each touching the next square at a vertex, as shown in the diagram. Square B has an area of 20. Square C has a side length of 4. Square D has double the area of square B. What is the area of square E?



Part C: Six marks each

16. The sums of three out of four numbers (omitting each of the four numbers in turn) are 20, 22, 24 and 27, respectively. What is the sum of the four numbers?

17. Let f be a function satisfying

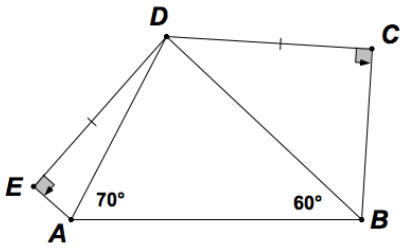
$$f(xy) = \frac{f(x)}{y}$$

for all positive real numbers x and y. If $f(500) = 3$, what is the value of $f(100)$?

18. The figure shows a large rectangle divided into nine smaller rectangles. The perimeters of five of the smaller rectangles are given. What is the perimeter of the large rectangle?

	18	
18	22	20
	16	

19. In the diagram, $DC = DE$, the angles at E and C are right angles and $EA + BC = AB$. Determine the size of angle EDC in degrees.



20. How many different numbers can be written as the product of two or more of the numbers $3, 4, 4, 5, 5, 6, 7, 7, 7$?