1. 2014 UP5

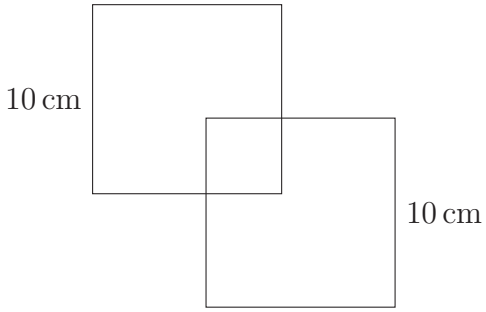
This week at my lemonade stand I sold \$29 worth of lemonade, but I had spent \$34 on lemons and \$14 on sugar. My total loss for the week was

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

▶ In dollars, the total amount spent was $34 + 14 = 48$, so the loss was $48 - 29 = \$19$, hence (C).

2. 2014 UP11

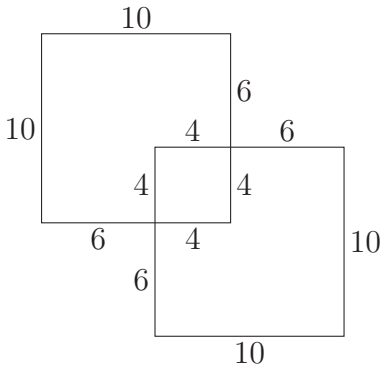
These two squares, each with a side length of 10 cm, overlap as shown in the diagram. The shape of the overlap is also a square which has an area of 16 square centimetres. In centimetres, what is the perimeter of the combined shape?



(A) 40 (B) 56 (C) 64 (D) 80 (E) 92

▶ *Alternative 1*

The small square has side 4 cm.



So the perimeter of the figure is $4 \times 10 + 4 \times 6 = 40 + 24 = 64$ cm, hence (C).

Alternative 2

The internal square has side 4 cm and perimeter 16 cm. The total perimeter of the two 10 cm squares is 80 cm. Subtracting the 16 cm perimeter of the internal square leaves $80 - 16 = 64$ cm,

hence (C).

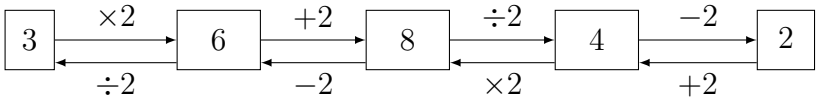
3. 2014 UP15

Sally thinks of a number, multiplies it by 2, adds 2, divides by 2 and then subtracts 2. Her answer is 2. What was her original number?

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

▶ The process can be visualised as in the following diagram.

Backtracking from the right, each step can be reversed. Then the boxes are filled in with 4, then 8, then 6, then 3.



hence (C).

4. 2014 UP21

In a competition between four people, Sally scored twice as many points as Brian and 30 points more than Corrie. Donna scored 50 points more than Brian. Which of the following statements is definitely true?

(A) Sally won the competition.

(B) Brian came last in the competition.

(C) Donna won the competition.

(D) Corrie beat Brian.

(E) Sally and Donna together scored more than Brian and Corrie.

▶ Make a table with some possibilities:

Sally	Brian	Corrie	Donna
30	15	0	65
40	20	10	70
50	25	20	75
60	30	30	80

Given the first row of the table, clearly (A), (B) and (D) are false.

Also, for every 10 point increase for Sally and Corrie, there is a 5 point increase in the scores of Brian and Donna. So Sally's score would overtake Donna's score when it passed 100.

Sally	Brian	Corrie	Donna
90	45	60	95
100	50	70	100
110	55	80	105

So (C) can be false. We are told that Sally scored 30 points more than Corrie and Donna scored 50 points more than Brian, and so together Sally and Donna always scored 80 points more than Corrie and Brian,

hence (E).

5. 2014 UP25

Five different whole numbers, chosen from the numbers from 1 to 30, add up to 30. What is the greatest possible value of the largest of these numbers?

(A) 6 (B) 10 (C) 15 (D) 20 (E) 26

▶ To make the largest number as large as possible, we make all the others as small as possible. The smallest four numbers from 1 to 30 are $1 + 2 + 3 + 4 = 10$, and so the largest the fifth can be is $30 - 10 = 20$,

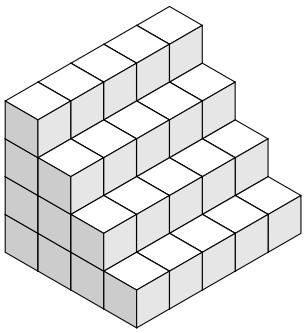
hence (D).

6. 2014 UP27

A cube is made up of 1 cm × 1 cm × 1 cm blocks and measures 12 cm × 12 cm × 12 cm. Sharyn is using the same set of blocks to make a set of stairs.

The picture shows how she started, making a set of stairs 4 blocks high, 4 blocks from front to back and 5 blocks wide.

Her finished set of stairs will use all the blocks and be 8 blocks high and 8 blocks from front to back. How many blocks wide will they be?



▶ The end of the staircase has $8 + 7 + \cdots + 2 + 1 = 36$ blocks. The number of blocks available is $12 \times 12 \times 12$.

$$\frac{12 \times 12 \times 12}{36} = \frac{12 \times 12 \times 4 \times 3}{12 \times 3} = \frac{12 \times 4}{1} = 48$$

So the width of the staircase is 48 blocks,

hence (48).