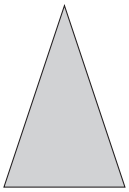
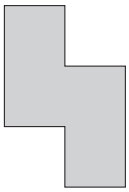
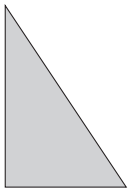
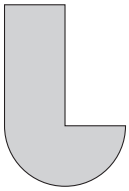
**1. 2014 MP5**

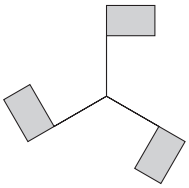
Which one of the following shapes has a line of symmetry?

(A) 

(B) 

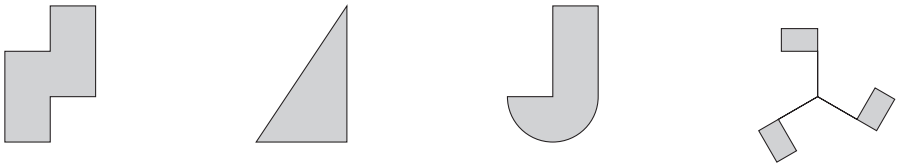
(C) 

(D) 

(E) 

▶ Shape (A)  has a line of symmetry.

None of the others have a line of symmetry, since for each one, its reflection



cannot be placed directly on top of the original,

hence (A).

**2. 2014 MP10**

Cecily is 10 years older than Naida. Naida is 6 years younger than Joycelyn. If Cecily is now 42, how old is Joycelyn?

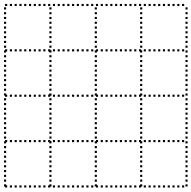
(A) 32 (B) 34 (C) 36 (D) 38 (E) 40

▶ This year Naida is $42 - 10 = 32$ and Joycelyn is $32 + 6 = 38$,

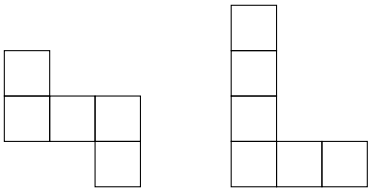
hence (D).

**3. 2014 MP15**

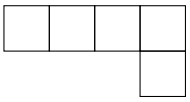
This $4 \times 4$ square grid can be covered by three shapes made from $1 \times 1$ squares. None of the shapes overlap.

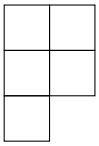


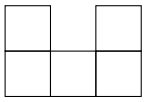
If two of the shapes are

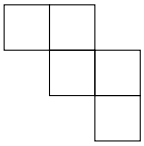


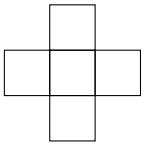
then the third shape is

(A) 

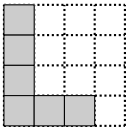
(B) 

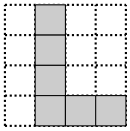
(C) 

(D) 

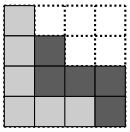
(E) 

▶ The 'L' can fit either with both arms along the sides of the square or with only the short arm.

(i) 

(ii) 

However, the 'S' will only fit in (i). The 'S' will fit in several positions, but only one position will keep the remaining space to be filled in one piece,



hence (B).

**4. 2014 MP20**

A party game played with a six-sided dice is fair if the chance of winning is equal to the chance of losing each time the dice is rolled. Which one of these games is fair?

(A) You win if you roll a 6.

(B) You win if you roll a 2 or a 5.

(C) You win if you roll a number greater than 4.

(D) You win if you roll a number less than 3.

(E) You win if you roll an odd number.

▶ For each game there are 6 possible numbers you can roll and each is just as likely. So a game will be fair if there are 3 winning rolls and 3 losing rolls.

| Game | (A) | (B) | (C) | (D) | (E) |
|---|---|---|---|---|---|
| Winning rolls | 6 | 2,5 | 5,6 | 1,2 | 1,3,5 |
| Losing rolls | 1,2,3,4,5 | 1,3,4,6 | 1,2,3,4 | 3,4,5,6 | 2,4,6 |

hence (E).

**5. 2014 MP25**

In this magic square, the even numbers

$$2, 4, 6, \ldots, 18$$

are placed so that the sums of the numbers in each row, column and diagonal are equal.

What is the sum of the two numbers in the shaded squares?

| | | |
|---|---|---|
| | 18 | |
| 14 | | 6 |
| | | 16 |

(A) 12 (B) 14 (C) 18

(D) 22 (E) 28

▶ The total of nine numbers in the square is

$$2 + 4 + 6 + 8 + 10 + 12 + 14 + 16 + 18 = 90.$$

Then each row, and each column, must add to 30. Looking at the last column and the middle row, the shaded squares can be filled in to make totals of 30.

| | | |
|---|---|---|
| | 18 | 8 |
| 14 | 10 | 6 |
| | | 16 |

The two shaded squares are $10 + 8 = 18$,

hence (C).

**6. 2014 MP27**

A number is *palindromic* if it reads the same forwards as backwards. For example, 686 is palindromic. How many numbers from 100 to 300 are palindromic?

▶ From 100 to 199 the numbers must start and end with 1. So 101, 111, 121, ... , 191, giving 10 palindromes. Similarly there are another 10 from 200 to 299, and 300 is not one. In total there are 20,

hence (20).