Opportunity Class Placement Test

Mathematical Reasoning

Explained answers for Practice Test 2

Janison.

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1 There were 72 people on the bus at the start.

Adding 15 more people:

72 + 15 = 87

The number after the bus stop was not 87. It was only 68 because some people got off.
The number who got off was:

87 − 68 = 19

So the correct answer is **D** 19

2 Break starts at 10:10 am and finishes at 10:30 am.
Break is 20 minutes long, because 10:30 am is 20 minutes after 10:10 am.

Lunch starts at 11:40 am and finishes at 12:35 pm.
Lunch is 20 + 35 = 55 minutes long, because:

- from 11:40 am to midday is 20 minutes, as there are 60 minutes in an hour
- from midday to 12:35 is 35 minutes.

Tip: Another way to find the length of the lunch break is to see that 11:40 am to 12:35 pm is 5 minutes less than an hour. This is 60 – 5 = 55 minutes.

The time spent altogether on break and lunch is 20 + 55 minutes = 75 minutes.

So the correct answer is **B** 75 minutes

3 Opposite sides of a rectangle have equal length, so the rectangle has two 2 metre sides and two 3 metre sides. The distance once around the rectangle once is:

2 m + 3 m + 2 m + 3 m = 10 m

Antony walks around 4 times completely. This distance is:

4 × 10 m = **40 m**

After this, he is back at X.
Then he walks along the next three sides in the same direction. This distance is:

2 m + 3 m + 2 m = **7 m**

In total, Antony walks **40 m** + **7 m** = 47 m.

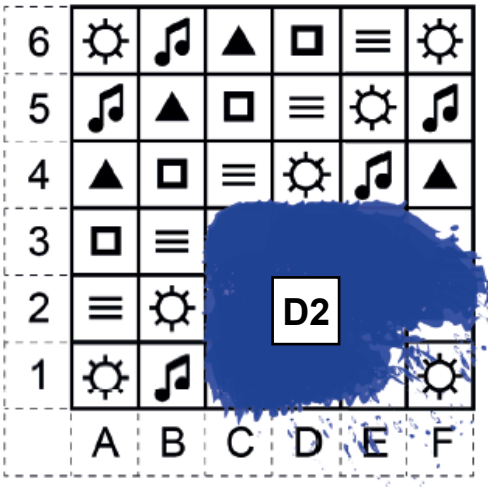
So the correct answer is **E** 47 m

4 The following pattern repeats across each row (left to right) and down each column (top to bottom):

after sun ☼ is musical notes ♫
after musical notes is triangle ▲
after triangle is square ◻

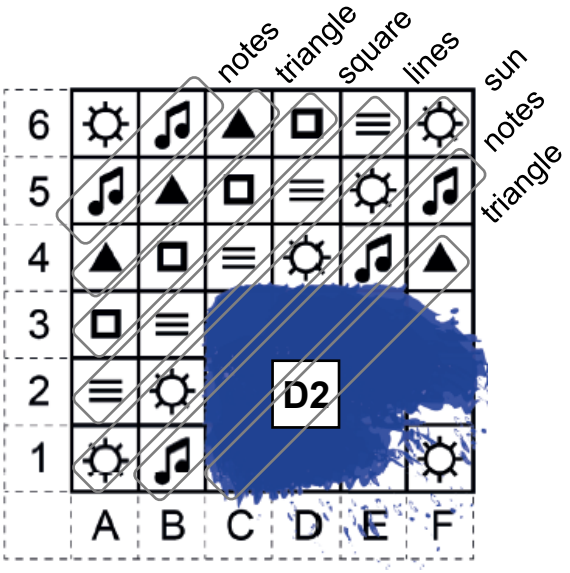
after square is lines ≡
and after lines is sun.

The position of D2 is shown below:



This is two spaces to the right of a sun (and also two spaces below a sun).
The image two spaces to the right of a sun (or two spaces below a sun) is always a triangle.

Another way to find the answer is to notice that the symbols repeat along diagonal lines:



D2 is in a line of triangles.

So the correct answer is **C** ▲

5 Look for a pattern in the sequence. Each number is 6 more than the number before it:

5 + 6 = 11
11 + 6 = 17
17 + 6 = 23
and so on.

We can find the 10th number by adding 6 the correct number of times.

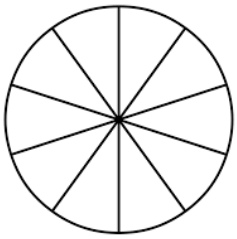
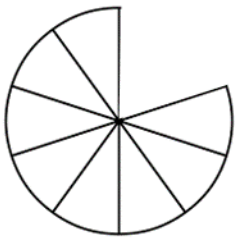
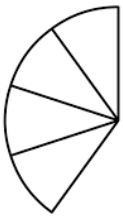
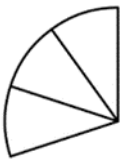
The 5th number is 29, so:
the 6th number is 29 + 6 = 35
the 7th number is 35 + 6 = 41
the 8th number is 41 + 6 = 47
the 9th number is 47 + 6 = 53
the 10th number is 53 + 6 = 59.

So the correct answer is **B** 59

Tip: The 10th number is five numbers after the 5th number, 29, so we need to add 6 five times to 29. We can find the answer in just two steps:

5 × 6 = 30
29 + 30 = 59

6 The table shows what happens, with pictures.

Action	**Cake remaining**
Melissa cuts the cake into 10 equal pieces.	Each piece is $\frac{1}{10}$ (one tenth) of the whole cake. 
John gets 2 pieces.	After this, there are 8 pieces left: 
Sue gets half of what is left. Half of 8 is 4, so Sue gets 4 pieces.	After this, there are 4 pieces left: 
Melissa eats 1 piece.	After this, there are 3 pieces left: 

The fraction of cake left is three tenths.

So the correct answer is **C** $\frac{3}{10}$

7 We can answer the question in two steps:

Step 1: find the total cost of the drinks.
Step 2: find the cost of one drink.

Step 1:
Total cost = $20 − $8 = $12.

Step 2:
8 drinks cost £12 altogether, so one drink costs $12 ÷ 8.
8 goes into 12 one and a half times, because 12 = 8 + 4, so $12 ÷ 8 is one and a half dollars.

Alternatively, we can divide 12 by 8 by halving 12 three times (because 8 = 2 × 2 × 2):

$12 ÷ 2 = $6
$6 ÷ 2 = $3
$3 ÷ 2 = $1.50

So the correct answer is **E** $1.50

8 The diagram shows a dot plot. Each dot represents one person.

Kalou:
Three or more lengths means 3, 4, 5, 6, 7 or 8 lengths.
The total number of people swimming three or more lengths is:
7 + 5 + 3 + 2 + 1 + 0 = **18**

Jade:
Fewer than three lengths means 0, 1 or 2 lengths.
The total number of people fewer than three lengths is:
0 + 7 + 6 = **13**

The difference between the numbers Kalou and Jade calculate is:

18 − **13** = 5

So the correct answer is **B** 5

9 When a digit increases by 1, the number increases by the value of that digit's place.
For example, in the first number the *tens* digit increases by 1, so the number increases by 10.

The table shows the changes to the numbers.

Number before change	**Number after change**	**Description of change**
24 680	24 690	increases by 10
48 001	49 001	increases by 1000
63 918	63 919	increases by 1
81 234	91 234	increases by 10 000
99 899	99 999	increases by 100

The greatest increase is 10 000.

So the correct answer is **D** 81 234

10 There are three shapes, and each shape has four possible colours.

We could write out all of the possibilities (red fish, blue fish, and so on) and count them. We can save time by using letters to represent the shapes (F, G, L) and the colours (R, B, Y, P).
There are 12 possibilities:

FR	FB	FY	FP
GR	GB	GY	GP
LR	LB	LY	LP

So the correct answer is **D** 12

Tip: We can find the answer without writing down all the possibilities. Since there are four possible colours for each of the three shapes, there are 3 × 4 = 12 different surfboards.

11 We can answer the question in two steps:

Step 1: use Amina's scales to find the mass of the pen
Step 2: use the mass of the pen to work out Y

Step 1:
Five divisions on Amina's scales represent 40 g.
So one division represents 40 g ÷ 5 = 8 g.
The arrow shows that the mass of the pen is 2 × 8 g = 16 g.

Step 2:
The arrow shows the mass of the pen, which is 16 g.
So on these scales, four divisions represent 16 g.
So one division represents 16 g ÷ 4 = 4 g.
Y is six divisions from 0, so it represents 6 × 4 g = 24 g.

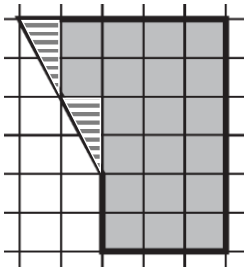
So the correct answer is **B** 24 g

12 The areas can be compared by counting squares.

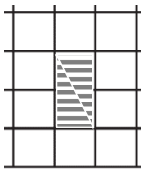
X covers **21** whole squares.

Y covers 22 whole squares and 4 half squares. 4 half squares equal 2 whole squares. So Y covers **24** squares altogether.

Z covers 20 whole squares and some part squares. The part squares are shown shaded with stripes below.



The part squares make two identical triangles which can be joined together to make 2 whole squares:



So Z covers **22** squares altogether.

X covers the smallest number of squares and Y covers the largest number of squares.

So the correct answer is **B** X, Z, Y

13 One kilogram is 1000 g.
Half a kilogram is 500 g.

We need to find how many 25 g make 500 g.

2 packets of nuts weigh 2 × 25 g = 50 g.
500 g is 10 times as heavy as 50 g.
So 20 packets of nuts weigh 10 × 50 g = 500 g.

So the correct answer is **C** 20

14 Think about each statement in turn.

Statement 1:
Shamira has more $5 notes than $20 notes.
So she is more likely to take a $5 note than a $20 notes.
So statement 1 is correct.

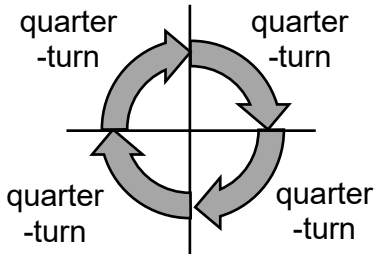
Statement 2:
Four of Shamira's notes are $5 notes, and four are not.
These are equal numbers, so she is equally likely to take a $5 note or not to take a $5 note.
So statement 2 is correct.

Statement 3:
When Shamira takes a note, it is possible that she will take a $5 note.
So it is not certain that she will take a note worth more than $5.
So statement 3 is incorrect.

So the correct answer is **C** statements 1 and 2 only

15 An acute angle is any angle less than a quarter-turn.

A complete revolution is a full turn. It equals four quarter-turns:



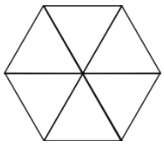
(This is true for a clockwise revolution or an anticlockwise revolution.)

If Maxine's angle is almost a quarter-turn each time, she can make almost a complete revolution in four turns.
To make at least a complete revolution (one full turn or more), she must make a fifth turn.
This is the smallest possible number of turns.

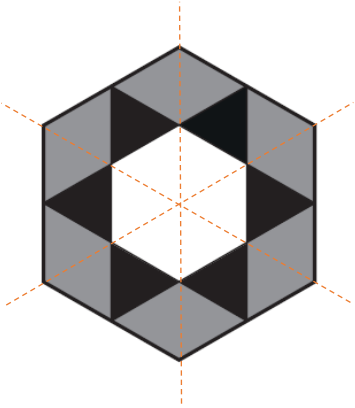
So the correct answer is **D** 5

16 The diagram shows **6** triangles.
Each grey rhombus has the same area as two black triangles.
There are 6 rhombuses, which have the same area as 2 × 6 = **12** triangles.

The white area in the centre has the same area as **6** triangles:



One way to see this is to think about cutting the shape into two identical halves. The dashed lines show some of the possible cuts:



So the number of triangles needed to fill the whole hexagon is **6** + **12** + **6** = 24.

So the correct answer is **C** 24

17 A rhombus has four equal sides.
The perimeter is the total length of its sides: 4 × 9 cm = **36 cm**.

A rectangle has two pairs of equal sides.
Two of the sides are each 14 cm long, which is 28 cm altogether.

The perimeter of the rectangle is **36 cm**, which is 28 cm + width + width.

So width + width = 36 cm − 28 cm = 8 cm. The width is 8 cm ÷ 2 = 4 cm.

So the correct answer is **A** 4 cm

18 12 can be written as 4 × 3.

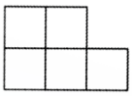
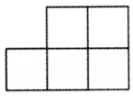
35 can be written as 5 × 7.

So 12 × 35 = 4 × 3 × 5 × 7.

The missing part in 4 × ▲ × 7 is 3 × 5, which is 15.
So 12 × 35 = 4 × 15 × 7.

So the correct answer is **E** 15

19 Erin's view shows three blocks.
The views in the direction of B, D and E all show five blocks:

B  D  E 

So she must be looking in direction A or C.

In view A, there are two blocks on the left and one block on the right.
In view C, there is one block on the left and two blocks on the right.

A  C 

So the correct answer is **C** C

20 1 hour is 60 minutes, so:
2 hours are 120 minutes
4 hours are 240 minutes
8 hours are 480 minutes
and 9 hours are 540 minutes.

So 555 minutes = 9 hours + 15 minutes.

7 hours after 5:55 am is 12:55 pm.
2 hours after 12:55 pm is 2:55 pm.
15 minutes after 2:55 pm is 3:10 pm.

So the correct answer is **D** 3:10 pm

21 Panu:
Two halves make 1.
So four halves make 2, and **five** halves make $2\frac{1}{2}$.

Quinn:

Three thirds make 1.
So six thirds make 2, and **seven** thirds make $2\frac{1}{3}$.

Rita:
Four quarters make 1, and two quarters make a half.
So **six** quarters make $1\frac{1}{2}$.

Panu is thinking of the smallest number, **five**, and Quinn is thinking of the largest number, **seven**.

So the correct answer is **A** Panu's, Rita's, Quinn's

22 The table shows which of the ways are possible.

Statement	**Result of adding the first two numbers**	**Result of adding the third number**	**Possible to make 100?**
1. Add three even numbers.	Even + even = **even**	**Even** + even = **even**	Yes (for example, 70 + 20 + 10)
2. Add two even numbers and one odd number.	Even + even = **even**	**Even** + odd = **odd**	No (because 100 is even)
3. Add two odd numbers and one even number.	Odd + odd = **even**	**Even** + even = **even**	Yes (for example, 1 + 1 + 98)
4. Add three odd numbers.	Odd + odd = **even**	**Even** + odd = **odd**	No (because 100 is even)

So the correct answer is **C** 1 and 3 only

23 A colour is more likely to be picked if there are more marbles of that colour.

Find the number of marbles for each statement:

A. There are **7** blue or red marbles. (This is 3 + 4.)
B. There are **8** yellow marbles.
C. There are **15** marbles that are not green. (This is 25 − 10.)
D. There are **22** marbles that are not blue. (This is 25 − 3.)
E. There are **11** marbles that are neither red nor green. (These are the blue and yellow marbles: 3 + 8.)

The least likely event has the smallest number of marbles of the correct colour(s).

So the correct answer is **A** The marble is either blue or red.

24 The table shows the values of □ + 4 and □ + □ for whole numbers starting from 0.

□	□ + 4 (bigger than 8)	□ + □ (less than 14)	Possible?
0	4 ×	0 ✓	No
1	5 ×	2 ✓	No
2	6 ×	4 ✓	No
3	7 ×	6 ✓	No
4	8 ×	8 ✓	No
5	9 ✓	10 ✓	**Yes**
6	10 ✓	12 ✓	**Yes**
7	11 ✓	14 ×	No

Tip: Instead of doing all of the calculations shown in the table, we could start by noticing that:

- if □ + 4 is bigger than 8, then □ is bigger than 4
  if □ + □ is less than 14, then □ is less than 7.

The only whole numbers that are bigger than 4 and also less than 7 are 5 and 6.

There are only two possible numbers, 5 and 6.

So the correct answer is **A** 2

25 We can answer the question in two steps:

Step 1: add up the masses of all the lumps
Step 2: divide the total mass by 2

Step 1:
Adding up each row gives:
200 g
50 g
15 g
6 g
3 g
The total mass is 200 + 50 + 15 + 6 + 3 = **274 g**.

Step 2:
Dividing **274 g** by 2 is the same as halving it.
We could split 274 g into 200 g, 70 g and 4 g and then halve each part:
half of 200 g is 100 g
half of 70 g is 35 g
half of 4 g is 2 g.
So half of 274 g is 100 g + 35 g + 2 g = 137 g.

Tip: A quicker way is to imagine using the lumps to make two equal piles.

Each pile contains one of these lumps: 100 g, 5 g, 2 g, 1 g. These add up to 108 g.

These lumps are now left over: 50 g, 5 g, 2 g, 1 g. These add up to 58 g. Put half of this, 29 g, into each pile.

Each pile now has 108 g + 29 g = 137 g.

So the correct answer is **B** 137 g

26 Charles counts from 4 to 7, which is a total jump of 3.
Three jumps of $\frac{1}{3}$ equal a jump of 1.
So **nine** jumps of $\frac{1}{3}$ equal a jump of 3.

Julie counts from 6 to 8, which is a total jump of 2.
Four jumps of $\frac{1}{4}$ equal a jump of 1.
So **eight** jumps of $\frac{1}{4}$ equal a jump of 2.

So the correct answer is **D** Charles makes 1 more jump than Julie.

27 Think about each column of the graph.

3 words have 2 letters each.
These words have 3 × 2 = **6** letters altogether.

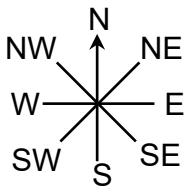
6 words have 3 letters each.
These words have 6 × 3 = **18** letters altogether.

2 words have 4 letters each.
These words have 2 × 4 = **8** letters altogether.

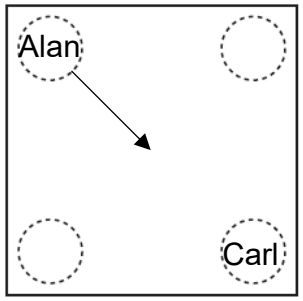
The total number of letters is **6** + **18** + **8** = 32

So the correct answer is **E** 32

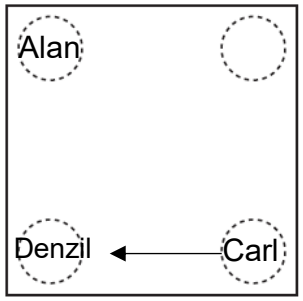
28 To answer this question, we need to use compass directions:



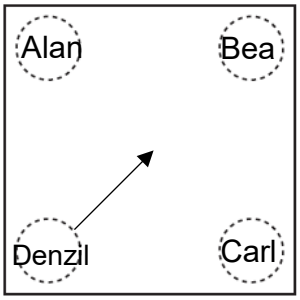
Alan is facing south-east (SE) and he can see Carla.
There is only one position where a person can face SE and see another person, as shown below.



Carla is facing west (W) and can see Denzil. So Denzil must be at the position shown:



Bea must be in the position shown below. The arrow shows the direction Denzil is looking so that he can see Bea.

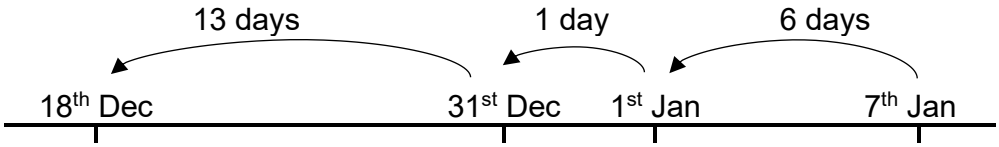


Denzil is facing north-east (NE).

So the correct answer is **A** north-east.

29 6 days before 7th January is 1st January.
7 days before 7th January is the last day of December, which is 31st December.
20 days before 7th January is 13 days before 31st December, which is **18th December**.

The number line shows the same information:

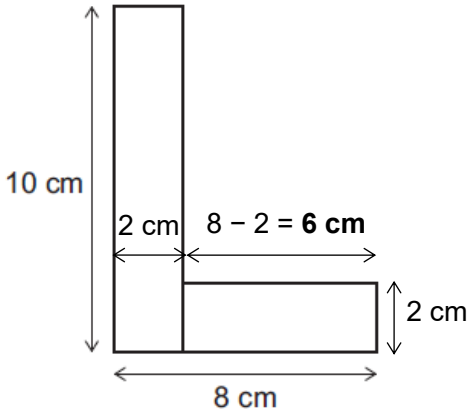


21 days before Tuesday 7th January is exactly 3 weeks before, so it is another Tuesday.
20 days before 7th January is one day later, so it is a **Wednesday**.

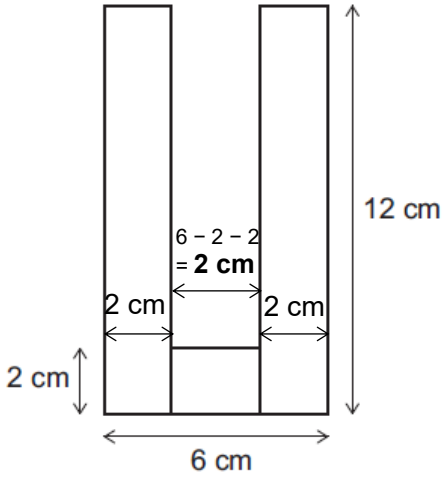
So the correct answer is **D** Wednesday 18th December

30 Every strip is 2 cm wide.

The L shape is made of two strips.
One strip is **10 cm** long, as shown in the diagram.
We can work out that the other strip is **6 cm** long:



The U shape is made of three strips.
The two long strips are **12 cm** long, as shown in the diagram.
We can work out that the other strip is **2 cm** long:



The length of Lachlan's original strip of paper equals the total length of the five strips in the L and U shapes:

10 cm + **6 cm** + **12 cm** + **12 cm** + **2 cm** = 42 cm.

So the correct answer is **B** 42 cm

31 The three smallest digits are 0, 1 and 2.
The smallest 3-digit number made from these three digits is **102**.
(120, 201 and 210 are all larger. Numbers starting with 0, such as 021, are actually 2-digit numbers.)

The three largest digits are 7, 8 and 9.
The largest 3-digit number made from these three digits is **987**.
(978, 897, 879, 798 and 789 are all smaller.)

The sum of the two numbers is **102** + **987** = 1089.

So the correct answer is **A** 1089

32 Check whether each set is possible.
Wednesday is the easiest day to think about because it only has whole pictures.

Set X:
If the picture graph represents set X, then:

- 2 pictures represent 16 butterflies (on Wednesday)
- so 1 picture represents 8 butterflies
- and half a picture represents **4** butterflies.

The picture graph could represent set X, because:

- Monday has 3 half-pictures, and 3 × **4** = 12 as shown in the table.
- Tuesday has 5 half-pictures, and 5 × **4** = 20 as shown in the table.

Set X is possible.

Set Y:
If the picture graph represents set Y, then:

- 2 pictures represent 24 butterflies (on Wednesday)
- so 1 picture represents 12 butterflies
- and half a picture represents **6** butterflies.

The picture graph cannot represent set Y, because:

- Monday has 3 half-butterfly pictures, and 3 × **6** = 18, but the table shows 28.
- Tuesday has 5 half-butterfly pictures, and 5 × **6** = 30, but the table shows 24.

Set Y is not possible.

Set Z:
If the picture graph represents set Z, then:

- 2 pictures represent 20 butterflies (on Wednesday)
- so 1 picture represents 10 butterflies
- and half a picture represents **5** butterflies.

The picture graph cannot represent set Z, because:

- Monday has 3 half-butterfly pictures, and 3 × **5** = 15, but the table shows 50.
- Tuesday has 5 half-butterfly pictures, and 5 × **5** = 25, but the table shows 20.

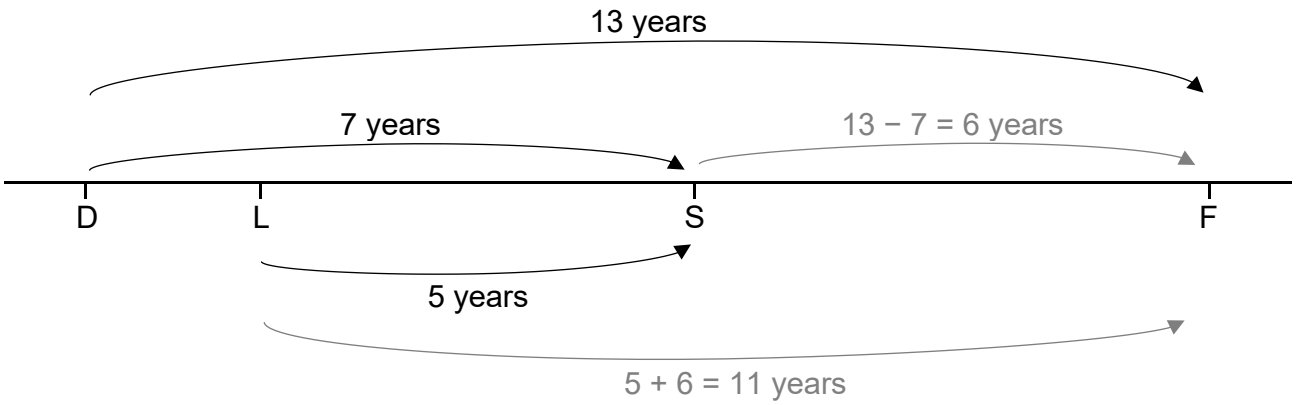
Set Z is not possible.

So the correct answer is **A** X only

33 Dave is 7 years younger than Sam, and Fred is 13 years older than Dave.
So Fred is 6 years older than Sam (since 13 − 7 = 6).

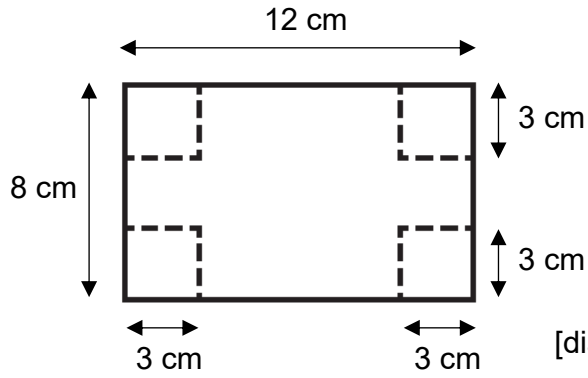
Fred is 6 years older than Sam, and Sam is 5 years older than Lisa.
So Fred is 11 years older than Lisa (since 6 + 5 = 11).

The number line also shows this.
Black arrows show information given in the question and grey arrows show working.



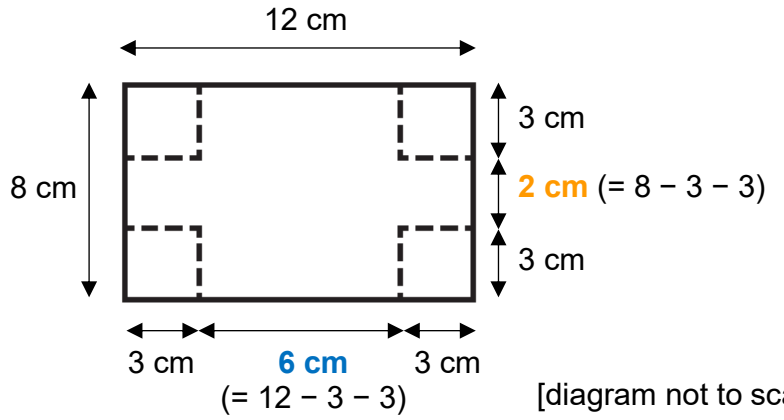
So the correct answer is **D** 11

34 Here is the card showing the measurements given:



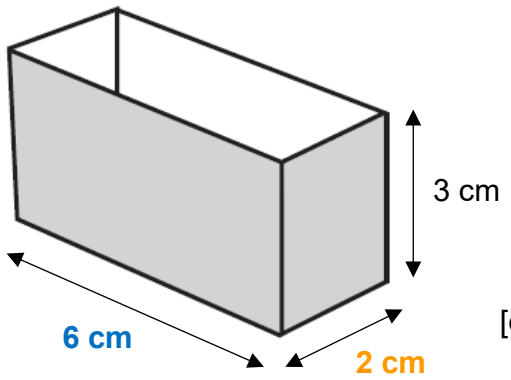
[diagram not to scale]

We can work out two more measurements, as shown below:



[diagram not to scale]

When this is folded into a box, the base is 6 cm by 2 cm. The height is 3 cm.



[diagram not to scale]

When the bottom of the box is filled with one layer of cubes, it contains 2 rows of 6 cubes (or 6 rows of 2 cubes). The number of cubes in this layer is 6 × 2 = **12** cubes.

The box is 3 cm high, so 3 layers of cubes fill it.
Three layers of cubes contain 3 × **12** = 36 cubes.

So the correct answer is **A** 36

35 As *N* appears twice in both *NAN* and *NUN*, it is helpful to think about what number *N* can represent.

The table shows the values of *A* and *U* for different values of *N*. Remember that each letter must be a whole number greater than 1.

Value of *N*	Value of *A* in *NAN*	Value of *U* in *NUN*	Possible?
2	9 (because 2 × 9 × 2 = 36)	Not a whole number (2 × whole number × 2 cannot make 18)	No
3	4 (because 3 × 4 × 3 = 36)	2 (because 3 × 2 × 3 = 18)	**Yes**
4	Not a whole number (4 × whole number × 4 cannot make 36)	Not a whole number (4 × whole number × 4 cannot make 18)	No
5	Not a whole number (5 × whole number × 5 cannot make 36)	Not a whole number (5 × whole number × 5 cannot make 18)	No
6	1 (because 6 × 1 × 6 = 36 – but *A* must be greater than 1)	Not a whole number (6 × whole number × 6 cannot make 18)	No

The table shows that *N* = 3, A = 4 and *U* = 2.
So *UNA* = 2 × 3 × 4 = 24.

So the correct answer is **B** 24

Tip: Since the correct answer is just one number, there must be only possible value of *UNA*. So when we find that *N* = 2 is possible, this must be the value of *N*. This means we do not have to check all of the values shown in the table.