Opportunity Class Placement Test

Mathematical Reasoning

Explained answers for Practice Test 3

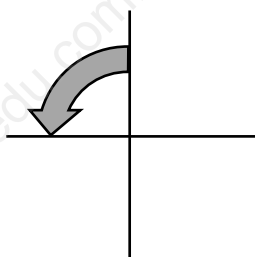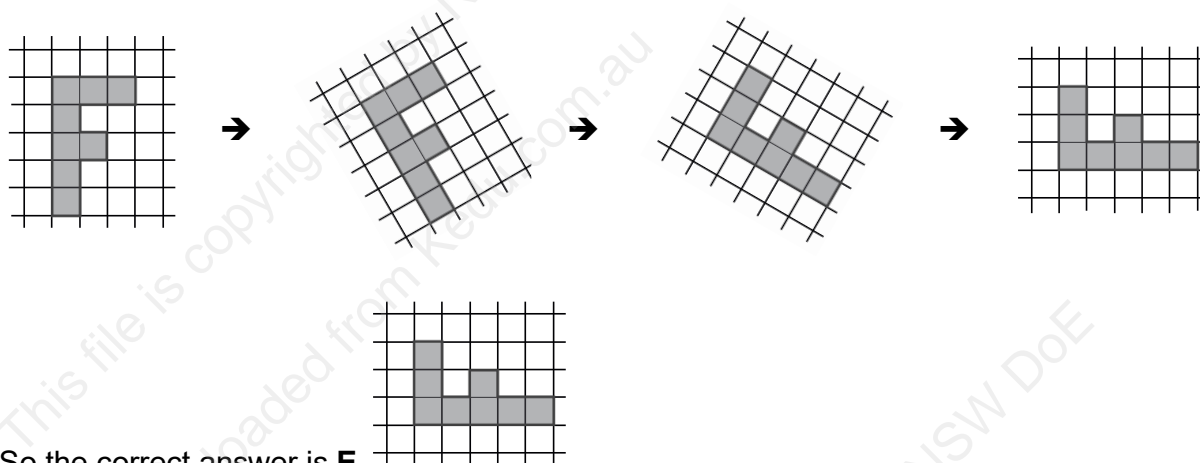**1** A quarter-turn anti-clockwise is a turn like this:

The diagrams show the F-shape gradually being turned a quarter-turn anti-clockwise:

So the correct answer is **E**

2 The total mass on the left is 12 kg + 14 kg = 26 kg.
The mass on the right is 19 kg.

Method 1:
On the left is 26 kg.
On the right is 19 kg + 5 kg + 7 kg = 31 kg.
This would not balance the scales.

Method 2:
On the left is 26 kg + 9 kg = 35 kg.
On the right is 19 kg + 16 kg = 35 kg.
This would balance the scales.

Method 3:
On the left is 26 kg + 8 kg = 34 kg.
On the right is 19 kg + 8 kg = 27 kg.
This would not balance the scales.

So the correct answer is **B** method 2 only

3 The distance on the map is the difference between the measurements on the ruler at Nyla's house and Oscar's house.
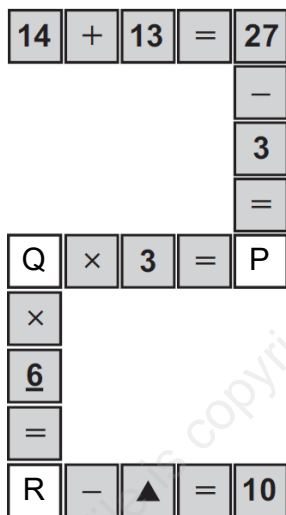These are 40 mm and 150 mm.
The difference is 150 mm – 40 mm = 110 mm.

There are 10 mm in 1 cm, so 110 mm = 11 cm.

1 cm on the map represents 10 m in real life.
So 11 cm on the map represents 11 × 10 m = 110 m in real life.

So the correct answer is **A** 110 m

4 The missing numbers are labelled P, Q and R in the diagram below:

14	+	13	=	27
				−
				3
				=
Q	×	3	=	P
×				
6				
=				
R	−	▲	=	10

P can be calculated first: 27 − 3 = 24.

Then Q × 3 = 24, so Q = 8.

Then 8 × 6 = R, so R = 48.

Then 48 − ▲ = 10, so ▲ = 48 − 10 = 38.

So the correct answer is **C** 38

5 $1\frac{3}{4}$ is $\frac{3}{4}$ above 1 but only $\frac{1}{4}$ below 2.

$1\frac{1}{2}$ is $\frac{1}{2}$ above 1 and also $\frac{1}{2}$ below 2.

$2\frac{2}{3}$ is $\frac{2}{3}$ above 2 but only $\frac{1}{3}$ below 3.

$2\frac{1}{3}$ is $\frac{1}{3}$ above 2 and $\frac{2}{3}$ below 3.

$2\frac{1}{2}$ is $\frac{1}{2}$ above 2 and also $\frac{1}{2}$ below 3.

Now compare $\frac{1}{4}, \frac{1}{3}$ and $\frac{1}{2}$

$\frac{1}{2}$ of a whole is one of two equal parts of the whole.
$\frac{1}{3}$ of a whole is one of three equal parts, so it is smaller than $\frac{1}{2}$

$\frac{1}{4}$ of a whole is one of four equal parts, so it is smaller than $\frac{1}{3}$

So the correct answer is **A** $\frac{1}{4}$

6 The numbers are:

- 11 thousands = 11 000
- 11 hundreds = 10 hundreds + 1 hundred = 1 thousand + 1 hundred: 1100
- 11 tens = 10 tens + 1 ten = 1 hundred + 1 ten = 110
- 11 ones = 11

11 000 + 1100 + 110 + 11 = 12 221

So the correct answer is **D** 12 221

7 Rounding each price to the nearest dollar:

$6.45 is closer to **$6** than to $7
$2.35 is closer to **$2** than to $3
$8.85 is closer to **$9** than to $8

Adding the rounded prices together:

$6 + **$2** + **$9** = $17

The estimated change from $20 is $20 – 17 = $3.

So the correct answer is **D** $3

8 Each of the two identical objects contains 6 rows of 4 cubes.
This is 6 × 4 = 24 cubes.
The number of cubes in two of these objects is 24 × 2 = **48** cubes.

The smaller object contains 4 cubes. (Although we can only see 3 cubes, there must be another hidden cube holding these three together.)

Using **48** cubes, the number of smaller objects Andrea can make is 48 ÷ 4 = 12.

So the correct answer is **D** 12

9 Each layer contains 6 bricks. We can divide 26 by 6 to find the number of whole layers.
26 ÷ 6 = 4 with remainder 2 (because 4 × 6 = 24).

As are only 2 bricks left after this, Maisy cannot complete the fifth layer.
She is working on the fifth layer when she lays her last brick.

So the correct answer is **B** 5th

10 We can think about each statement in turn.

Statement 1:

It is possible for Oliver to pick a red, yellow or green disc, so it is not certain that he will pick a blue disc.
Statement 1 is incorrect.

Statement 2:
The number of blue discs is 8.
The number of discs that are not blue is 5 + 2 + 1 = 8.
As there are equal numbers of discs that are blue and not blue, it is equally likely that Oliver picks a blue disc or does not pick a blue disc.
Statement 2 is correct.

Statement 3:
The box contains a yellow disc, so although it is not very likely for Oliver to pick a yellow disc, it is possible.
Statement 3 is correct.

So the correct answer is **D** statements 2 and 3

11 Adding two blocks raises the water level from 100 mL to 150 mL.
This is an increase of 150 mL − 100 mL = 50 mL.
One block would raise the water level by half of this: 50 mL ÷ 2 = 25 mL.

Five blocks would raise the water level by 5 × 25 mL = 125 mL.
So the water level rises to 150 mL to 150 mL + 125 mL = 275 mL.

So the correct answer is **B** 275 mL

12 On the graph, 5 divisions represent 10 drinks.
So 1 division represents 10 ÷ 5 = 2 drinks.

The graph shows these numbers of drinks sold:

    tea 6
    coffee 20
    juice 30
    water 50

The total shown in the graph is 6 + 20 + 30 + 50 = 106.

To reach the target, the restaurant needs to sell 150 − 106 = 44 more drinks.

So the correct answer is **A** 44

13 Following the instructions five times:

- 53 is odd, so add 1 to get 54
- 54 is even, so divide by 2 (which is the same as halving) to get 27
- 27 is odd, so add 1 to get 28
- 28 is even, so divide by 2 to get 14
- is even, so divide by 2 to get 7

So the correct answer is **B** 7

14 Shape P is made of two small squares.
As the area of two small squares is 2 cm^2, the area of one small square is 1 cm^2.

Shape Q is made of 15 small squares.
So the area of shape Q is 15 cm^2.

So the correct answer is **C** 15 cm^2

> **Tip:** We could count the small squares in Q one by one, but there is a quicker way. Q is made of 5 rows of 3 squares each, so there are 5 × 3 = 15 squares altogether.

15 4 bananas weigh the same as 6 apples.
So 2 bananas weigh the same as 3 apples (half as much).

We can work out how many apples have the same weight as the fruit in each bag:

> **Tip:** An alternative method is to work out how many bananas have the same weight as the fruit in each bag.

Bag	Number of bananas in bag	Number of apples that weigh the same as the bananas	Number of apples in bag	Fruit in bag weighs the same as…
1	10	10 bananas = 4 + 4 + 2 bananas which weigh the same as 6 + 6 + 3 apples = 15 apples	9	15 + 9 = 24 apples
2	6	6 bananas = 6 + 2 bananas which weigh the same as 6 + 3 apples = 9 apples	12	9 + 12 = 21 apples
3	16	16 bananas = 4 + 4 + 4 + 4 bananas which weigh the same as 6 + 6 + 6 + 6 = 24 apples	3	24 + 3 = 27 apples

So the correct answer is **E** All three bags have different weights.

16 We can think about each statement in turn.

Statement 1:

A parallelogram has four sides. Opposite sides are parallel and opposite sides have the same length.

A rhombus has four sides. Opposite sides are parallel and opposite sides have the same length because all four sides have the same length.

So a rhombus is a special type of parallelogram.

Statement 1 is correct.

Statement 2:

A kite has four sides. In a kite, there are two sides of equal length that are next to each other. The other two sides also have equal length

Some rectangles are squares, but other rectangles do not have equal length sides next to each other.

So not all rectangles are kites. (Only rectangles that are squares are also kites.)
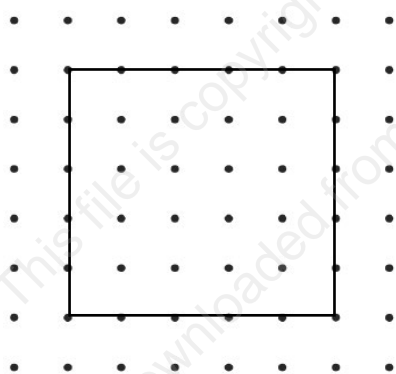
Statement 2 is incorrect.

Statement 3:

A quadrilateral is any four-sided shape. Not all 4-sided shapes are squares.

Statement 3 is incorrect.

So the correct answer is **A** statement 1 only

17 If a side of the square is 10 m long, then the number of posts along one side is 6, as shown below. (This makes five 2 m gaps along one side.)

There are four sides of the square, but the total number of posts is not 4 × 6, because each corner post is part of two sides.

The total number of posts is 4 corner posts plus 4 more posts on each side, which is 5 × 4 = 20 posts altogether.

So the correct answer is **B** 20

18 On each thermometer, every 5 °C there are five divisions shown by longer markings. So one large division represents 1 °C.

Every 1 °C there are 2 divisions shown by shorter markings. So one small division represents $\frac{1}{2}$ °C.

The outside thermometer shows a temperature of $6\frac{1}{2}$ °C. The inside thermometer shows a temperature of 24 °C.

One way to find the difference is to jump up from $6\frac{1}{2}$ °C to 24 °C in steps. From $6\frac{1}{2}$ °C to 7 °C is a jump of $\frac{1}{2}$ °C. From 7 °C to 24 °C is a jump of 17 °C (because 24 − 7 = 17). So the temperature difference is $17\frac{1}{2}$ °C.
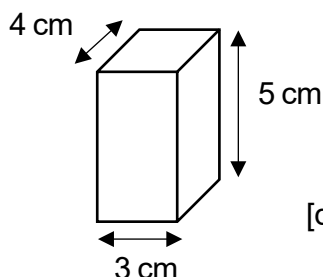
So the correct answer is **E** $17\frac{1}{2}$ °C

19 Each block has its greatest height when its longest edges are vertical (up and down).

The first block has its greatest possible height, 5 cm, if it is turned to make its 5 cm edges vertical:

4 cm

5 cm

3 cm

[diagram not to scale]

The second block has its greatest height when its 5 cm edges is vertical.

The third block has its greatest height when its 7 cm edges are vertical.

The stack is tallest when all three blocks have their greatest heights.
Then the total height of the stack 5 cm + 5 cm + 7 cm = 17 cm.

So the correct answer is **D** 17 cm

20 The number of identical small squares in square X is 64.

The number of identical triangles in square Y is 8.

X and Y have the same area, so 64 small squares have the same area as 8 triangles.
The number of small squares with the same area as one triangle is 64 ÷ 8 = 8.

In Y, three triangles are shaded.
These have the same area as 3 × 8 = 24 squares.

Myo has already shaded 8 small squares in X.
To make the shaded areas the same in X and Y, she must shade 24 − 8 = 16 more small squares in X.

So the correct answer is **C** 16

> **Tip:** To find the number of small squares in X quickly, we can see that it is 8 × 8 (because there are 8 rows containing 8 squares each).

21 The grid contains 6 × 6 = 36 squares.
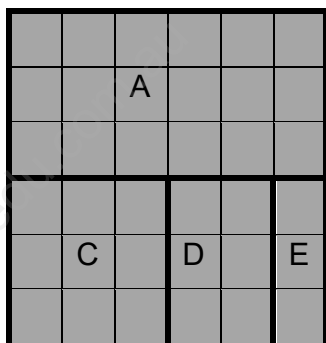So Fran needs to use shapes that have 36 squares altogether.

The shapes have these numbers of squares:
A   18
B   12
C   9
D   6
E   3

Shapes A, C, D and E have 18 + 9 + 6 + 3 = 36 squares altogether.

They can cover the grid like this:

Shape B is not used.

So the correct answer is **B** shape B

22 The sum of the numbers is 25, so:

$8 +$ $+ 4 + 5 +$ $+ 2 = 25$

Adding up the known numbers, we get

$19 +$ $+$ $= 25$
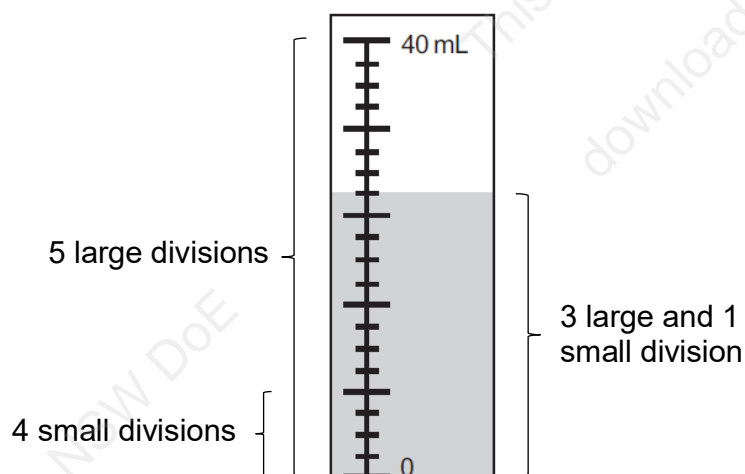
and so

 $+$ $= 25 − 19 = 6$

Now we need two whole numbers that add to 6 and have the largest possible difference.
Pairs of numbers that add to 6 are: 5 and 1, 4 and 2, 3 and 3.
The largest possible difference is $5 − 1 = 4$.

So the correct answer is **D** 4

23

On the scale, there are five large divisions between 0 and 40 mL.
So one large division represents 40 mL ÷ 5 = **8 mL**.

There are four small divisions every 8 mL.
So one small division represents 8 mL ÷ 4 = **2 mL**.

The water level is one small division after the third large division.
The third large division is at 3 × **8 mL** = 24 mL.
One small division above this is at 24 mL + **2 mL** = 26 mL.

So the correct answer is **C** 26 mL

24 To find the starting number, undo the steps in reverse order.

First, divide 40 by 2 (to undo multiplying by 2): 40 ÷ 2 = 20.

Next, subtract 4 from 20 (to undo adding 4): 20 − 4 = 16.

The starting number was 16.
Adding the digits, we get 1 + 6 = 7.

So the correct answer is **B** 7

25 Convert the grozzles to zots and then convert those zots to squigs.

20 grozzles are worth 4 times as much as 5 grozzles (because 20 is 4 × 5).
So if 5 grozzles are worth 3 zots, then:
20 grozzles are worth 12 zots (by multiplying both by 4).

12 zots are worth 6 times as much as 2 zots (because 12 is 6 × 2).
So if 2 zots are worth 9 squigs, then:
12 zots are worth 54 squigs (by multiplying both by 6).

So the correct answer is **C** 54 squigs

26 1.5 kilograms is $1\frac{1}{2}$ kg, which is 1500 g.

We can answer the question in two steps:

    Step 1: work out how many boxes each bag can hold
    Step 2: work out how many bags are needed to hold all the boxes

Step 1:
Each bag can hold 3 boxes, because:
    three boxes have mass 400 + 400 + 400 = 1200 g, which is less than 1500 g
    but four boxes have mass 1200 + 400 = 1600 g, which is more than 1500 g.

Step 2:
20 ÷ 3 = 6 with remainder 2, because 6 × 3 = 18.
So **6** bags can hold 18 boxes, and we need **1** more bag to hold the remaining 2 boxes.

So the correct answer is **D** 7

27 We can answer the question in four steps:

Step 1: Use the picture graph to find how many tyres Phil replaced
Step 2: Use the result of step 1 to work out the column graph's scale
Step 3: Use the column graph to find how many tyres Suzie replaced
Step 4: Find the number of pictures for Suzie on the picture graph.

Step 1:
The picture graph key shows that one picture represents 4 tyres.
So a half picture represents 2 tyres.
The picture graph shows two and a half pictures for Phil.
This represents 4 + 4 + 2 = **10** tyres.

Step 2:
On the column graph, the column for Phil is 2 divisions high on the scale.
This represents **10** tyres.
So 1 marking on the scale represents **5** tyres (half as many).

Step 3:
The column for Suzie is 3 divisions high.
This represents 3 × **5** = 15 tyres.

Step 4:
In the picture graph, one picture represents 4 tyres.
15 tyres = 4 + 4 + 4 + 3.
We need three whole pictures to represent 12 tyres and three-quarters of a picture to represent 3 tyres (because 3 tyres is $\frac{3}{4}$ of 4 tyres).

So the correct answer is **E**

28 We could call the six children P, Q, R, S, T and U.

P plays everyone else, so they play 5 matches.

Q plays 5 matches. We already counted the match with P, so we add 4 more matches to get 5 + 4 = 9.

R plays 5 matches. We already counted the matches with P and Q, so we add 3 more to get 9 + 3 = 12.

S plays 5 matches. We already counted the matches with P, Q and R, so we add 2 more to get 12 + 2 = 14.

T plays 5 matches. We already counted the matches with P, Q, R and S, so we add 1 more to get 14 + 1 = 15.

U plays 5 matches. We already counted all of their matches (against P, Q, R, S and T).

So the total number of matches is 15.

So the correct answer is **A** 15

Tip: We could find the answer by making a table:

	P	Q	R	S	T	U
P		✓	✓	✓	✓	✓
Q			✓	✓	✓	✓
R				✓	✓	✓
S					✓	✓
T						✓
U						

The ticks show all of the *different* possible pairs of children (and some squares are grey, to show that a child cannot play themselves).
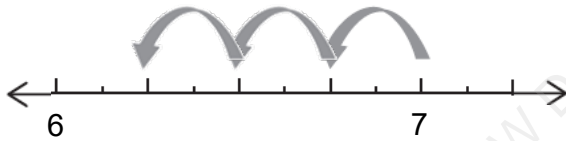
29 Four of these jumps would make a jump of 1, so the jump is $\frac{1}{4}$

The jumps go from higher numbers to lower numbers.

After 4 jumps starting from 9, we reach 8.
After another 4 jumps, we reach 7.

Now there are 3 more jumps left:

The last jump ends at $6\frac{1}{4}$

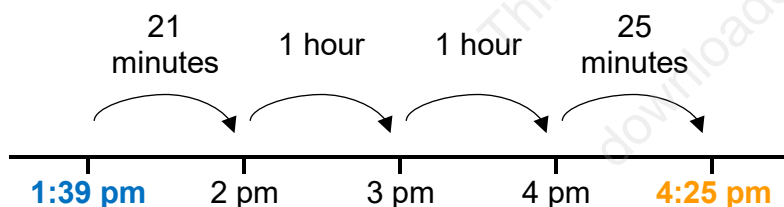So the correct answer is **A** $6\frac{1}{4}$

30 The bus that leaves Forster at 8:50 am arrives in Coffs Harbour at 1:39 pm:

	Forster to Coffs Harbour	
Forster	7:00 am	**8:50 am**
Wauchope	8:48 am	10:38 am
Kempsey	9:58 am	11:48 am
Coffs Harbour	11:49 am	**1:39 pm**

The bus that arrives in Forster at 9:19 pm leaves Coffs Harbour at 4.25 pm:

	Coffs Harbour to Forster	
Coffs Harbour	2:39 pm	**4:25 pm**
Kempsey	4:40 pm	6:26 pm
Wauchope	5:53 pm	7:39 pm
Forster	7:33 pm	**9:19 pm**

So they are in Coffs Harbour from **1:39 pm** until **7:33 pm**.

The time spent in Coffs Harbour is:

1 hour + 1 hour + 21 min + 25 min = 2 hours 46 minutes

So the correct answer is **A** 2 hours 46 minutes

31 If they both had the same number of cards, they would each have half of 250.
To halve 250, we can split it into 200 and 50 and halve each of these to get 100 and 25.

So half of 250 is 125.

Imagine giving Yarram and Brian 125 cards each.

Then if we give 1 of Brian's cards to Yarram, then Yarram has 126 and Brian has 124. This is a difference of 2.

If instead we give 2 of Brian's cards to Yarram, then Yarram has 127 and Brian has 123. This is a difference of 4.

Following this pattern, we need to give 9 of Brian's cards to Yarram to make a difference of 18 between them.

So Yarram has 125 + 9 = 134 cards (and Brian has 125 − 9 = 116 cards).

So the correct answer is **C** 134

32 When Romesh works alone, he takes from 8:45 am until 9:25 am.
This is 40 minutes.

When Linda works alone, she takes from 8:25 am until 9:05 am.
This is 40 minutes.

They take the same time to chop the vegetables, so they work at the same rate (speed).
So when they both work on Saturday, they will finish in half the time: 20 minutes.

They start at 8:35 am. The time 20 minutes later is 8:55 am.

So the correct answer is **A** 8:55 am

33 The table shows the information given in the question.
X represents the same amount saved on Tuesday, Wednesday and Friday.

Day	Mon	Tues	Wed	Thurs	Fri
Amount put in box that day	$12	$X	$X		$X
Amount in box at end of day	$12		$30		$80

The amount Cho saves on Tuesday and Wednesday altogether is $30 − $12 = $18.
On each of these days, she saves half of $18, which is **$9**.
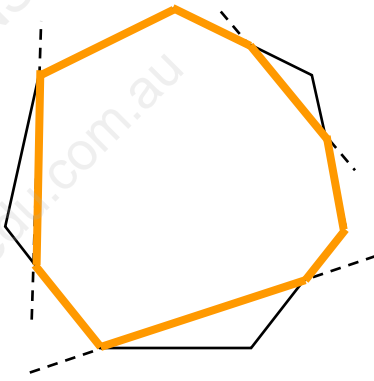She saves the same amount again on Friday.

The amount she saves on Thursday and Friday altogether is $80 − $30 = $50.
The amount she saves on Thursday is $50 − **$9** = $41.

So the correct answer is **E** $41

34 After the cuts, there are three triangles and another shape.

The three triangles have 3 sides each, and **9** sides altogether.
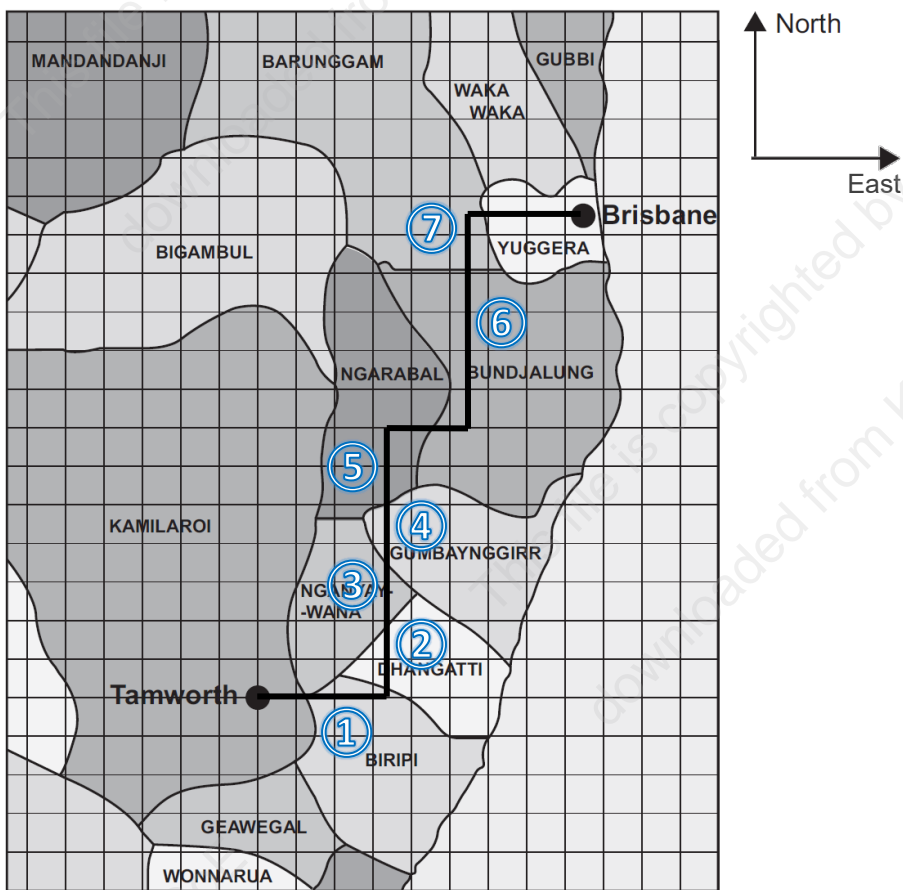
The other shape is the orange shape shown below:

This shape has **8** sides.

The total number of sides on the four pieces is **9** + **8** = 17.

So the correct answer is **E** 17

35 The route below shows how Shuyi can pass through 7 regions (not including Kamilaroi or Yuggera) by only travelling north or east.
Each of these regions is labelled with a number.

There are other slightly different routes which go through the same 7 regions, but there is no way of going through more than 7 regions.

So the correct answer is **D** 7