





## Smartphone use

The spreadsheet shows the population (in millions) and the number of smartphone users (in millions) for a range of countries in Asia. The data has been sorted by country name.





Column A 	Column B 	Column C 	Column D 
Country	Population (in millions)	Number of smartphone users (in millions)	Proportion of smartphone users
Bangladesh	166.735	8.921	
Indonesia	266.357	67.57	
Japan	125.738	65.282	
Malaysia	31.571	20.98	
Pakistan	200.663	23.228	
Philippines	105.341	28.627	
Thailand	68.416	30.486	
Turkey	81.086	44.771	
Vietnam	96.357	29.043	





1. Which operation on columns B and C will determine the correct values in Column D?





For each country:





- (a) Divide the Column B value by the Column C value:  $B/C$
- (b) Divide the sum of the Column B and Column C values by the Column C value:  $(B + C)/C$
- (c) Divide the Column C value by the Column B value:  $C/B$
- (d) Divide the Column B value by the sum of the Column B and Column C values:  $B/(B + C)$

2. The data for the proportion of smartphone users (expressed as a percentage) has been added to the spreadsheet in Column D. In addition, we provide this table sorted by population, sorted by number of smartphone users, and sorted by proportion of smartphone users (in ascending order each time).

Column A 	Column B 	Column C 	Column D 
Country	Population (in millions)	Number of smartphone users (in millions)	Proportion of smartphone users
Bangladesh	166.735	8.921	5%
Indonesia	266.357	67.57	25%
Japan	125.738	65.282	52%
Malaysia	31.571	20.98	38%
Pakistan	200.663	23.228	12%
Philippines	105.341	28.627	27%
Thailand	68.416	30.486	45%
Turkey	81.086	44.771	55%
Vietnam	96.357	29.043	30%

Column A 	Column B 	Column C 	Column D 
Country	Population (in millions)	Number of smartphone users (in millions)	Proportion of smartphone users
Malaysia	31.571	20.98	38%
Thailand	68.416	30.486	45%
Turkey	81.086	44.771	55%
Vietnam	96.357	29.043	30%
Philippines	105.341	28.627	27%
Japan	125.738	65.282	52%
Bangladesh	166.735	8.921	5%
Pakistan	200.663	23.228	12%
Indonesia	266.357	67.57	25%

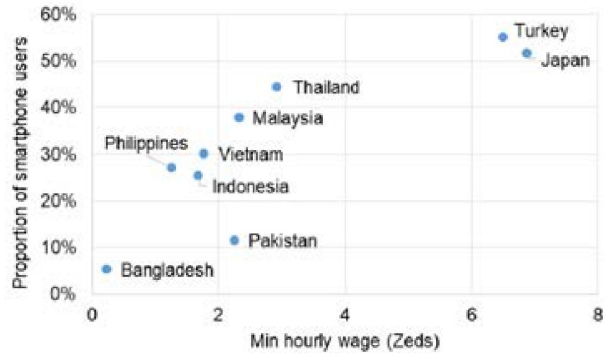
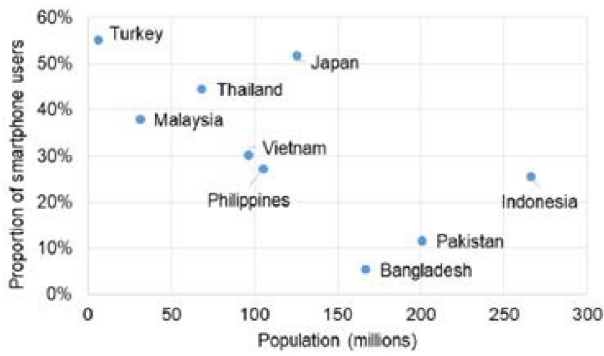
Column A 	Column B 	Column C 	Column D 
Country	Population (in millions)	Number of smartphone users (in millions)	Proportion of smartphone users
Bangladesh	166.735	8.921	5%
Malaysia	31.571	20.98	38%
Pakistan	200.663	23.228	12%
Philippines	105.341	28.627	27%
Vietnam	96.357	29.043	30%
Thailand	68.416	30.486	45%
Turkey	81.086	44.771	55%
Japan	125.738	65.282	52%
Indonesia	266.357	67.57	25%

Column A 	Column B 	Column C 	Column D 
Country	Population (in millions)	Number of smartphone users (in millions)	Proportion of smartphone users
Bangladesh	166.735	8.921	5%
Pakistan	200.663	23.228	12%
Indonesia	266.357	67.57	25%
Philippines	105.341	28.627	27%
Vietnam	96.357	29.043	30%
Thailand	68.416	30.486	45%
Malaysia	31.571	20.98	38%
Thailand	68.416	30.486	45%
Japan	125.738	65.282	52%
Turkey	81.086	44.771	55%

For each of the following statements, identify if they are **True** or **False**.

- The country with the largest population also has the largest number of smartphone users.
- The country with the fewest number of smartphone users also has the smallest population.
- The country with the highest proportion of smartphone users also has the smallest population.
- The country with the median proportion of smartphone users is also the country with the median number of smartphone users.

3. The two graphs below plot the proportion of smartphone users per country in terms of either the Population (in millions) and the Minimum hourly wage (in Zeds) for each country. Study the different graphs and answer the question.



For which variable (population or minimum hourly wage) does the proportion of smartphone users in a country increase as the variable value increases? Explain your reasoning.

Exercise 2

Calc. : ✓

## Always sometimes never

Statements that people make can generally be grouped into three different categories:

- Statement that are **ALWAYS** true;
- Statement that are **SOMETIMES** true; and
- Statement that are **NEVER** true.

The statement: “A number that is divisible by 4 is also divisible by 2” is **ALWAYS** true because 2 is a factor of 4.

The statement: “A number that is divisible by 9 is also divisible by 6” is **SOMETIMES** true. For example, 36 is divisible by 9 and by 6, but 27 is divisible by 9, but not divisible by 6.

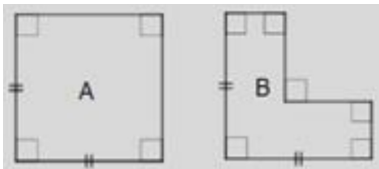
The statement: “The sum of two odd numbers is odd” is **NEVER** true because the sum of two odd numbers is always even.

1. For each statement, indicate if it is **always true**, **sometimes true** or **never true**.

- A 14-year old girl was at least once in her life half her current height.
- A 14-year old girl is taller than a 10-year old girl.

2. For each statement, indicate if it is **always true**, **sometimes true** or **never true**.

- When a whole number is multiplied by itself the answer is even.
- Doubling a whole number produces an even number.
- Halving an odd whole number produces a whole number.
- $3x + 1 = \frac{6x + 2}{2}$ .



- The perimeter of figure A is greater than the perimeter of figure B.
- If a coin is flipped 50 times it will land heads up 25 times.

3. Each of the following statement is **SOMETIMES TRUE**.

For each statement provide an example of when the statement is true and when the statement is not true.

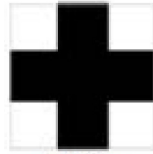
- The person with the largest number of coins has the largest amount of money.
- $A - B = B - A$ .
- If you add the same number to the numerator (top) and the denominator (bottom) of a fraction, the fraction value increases.

### Tiling

A tiler is tiling the floor. He has two different tiles that he can use, tile A and tile B.

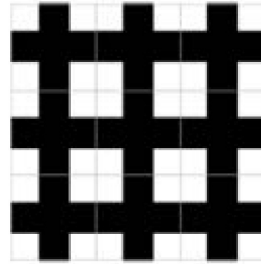
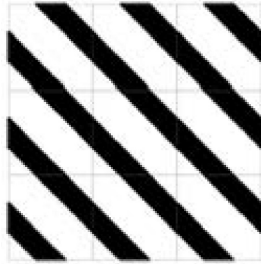


Tile A

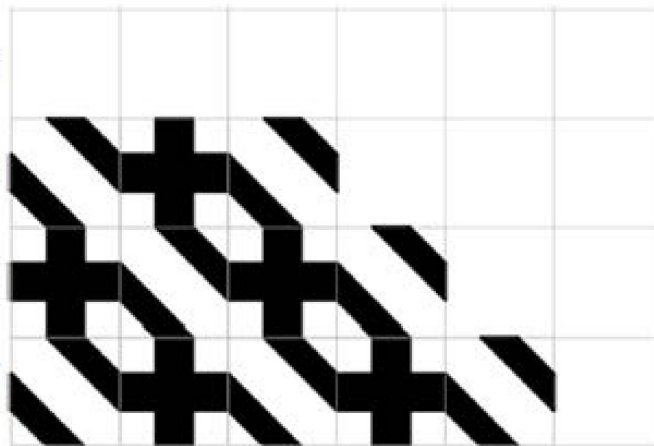


Tile B

Using only tile A he makes the left hand pattern below and using only tile B he makes the right hand pattern below.



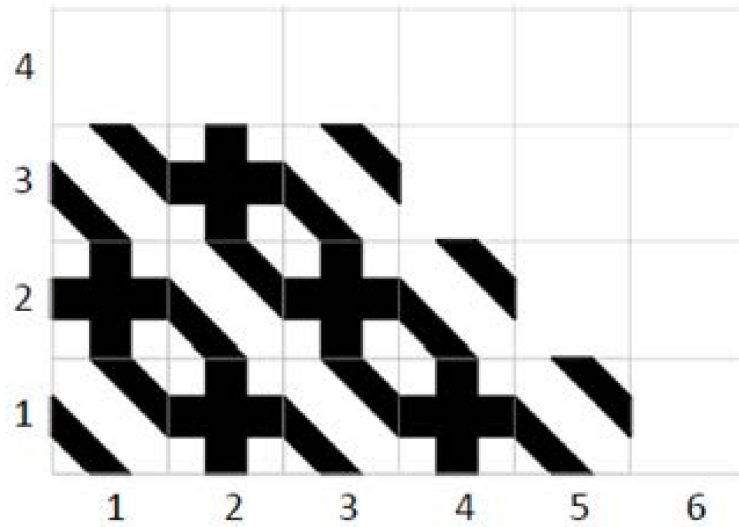
1. A tiling has been started below. The tiling pattern is created using a combination of the two tiles. The tiler continues to tile the floor by extending the pattern in the same way. Study the pattern, then extend it by drawing the correct tile in each of the 12 blank squares.



2. The tiler wants to make a set of instructions that he can give to people who want to make the same tiling pattern.

Fill the spaces with the following elements to complete the instructions that will produce the pattern below.

IF THEN ELSE TILE A TILE B



TILING INSTRUCTIONS

For row = 1 to 4

"First determine the left hand tile in the row"

IF the row is an odd numbered row

THEN the first tile is

ELSE the first tile is

"Complete the row by adding tiles"

IF the previous tile is

use

use

Next row

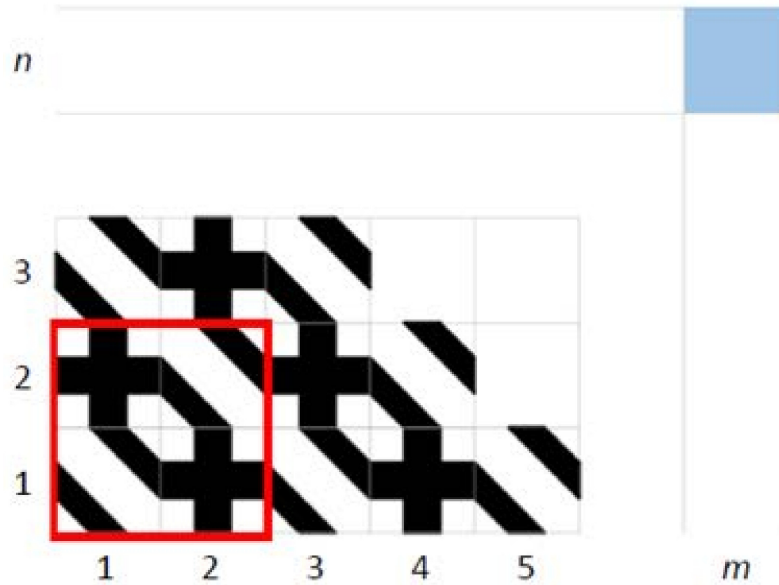
3. The tiler wants to be able to predict what tile will go in any position on the grid. For example, he wants to know what tile he will use in the marked position  $(m; n)$ . Study the tiling pattern and in particular the four tiles highlighted with a red border. Select ALL of the rules below that will correctly predict the tile that is needed for any grid position  $(m; n)$ .



Tile A

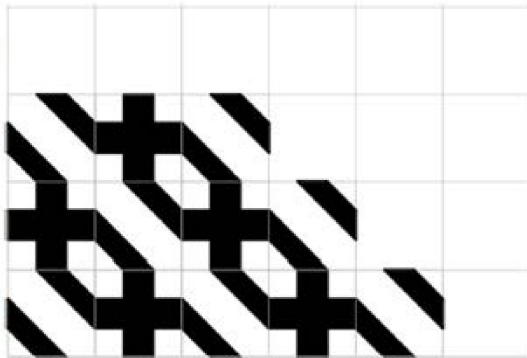
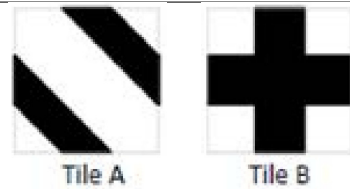


Tile B



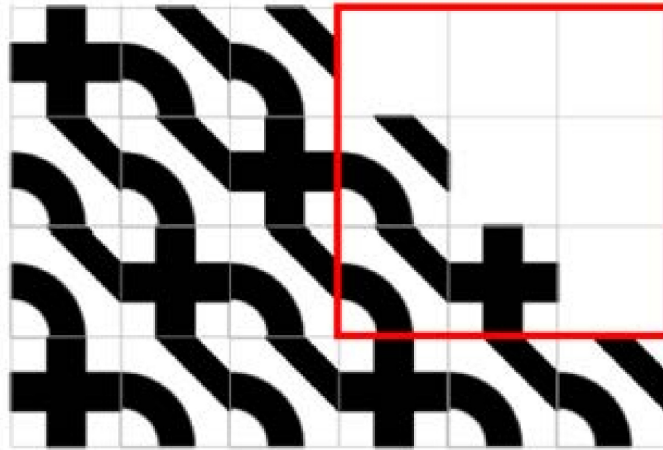
- (a) If  $m + n$  is odd use tile A, otherwise use tile B.
- (b) If  $m + n$  is even use tile A, otherwise use tile B.
- (c) If  $m \times n$  is odd use tile A, otherwise use tile B.
- (d) If  $m \times n$  is even use tile A, otherwise use tile B.
- (e) If  $m$  is odd and  $n$  is odd use tile A, otherwise use tile B.
- (f) If  $m$  and  $n$  are both odd or both even use tile A, otherwise use tile B.

Another way of describing the pattern is to simply write the letters for each time in the corresponding grid position. Study the use of letters to record the tiling pattern of the previous questions.



A	B	A			
B	A	B	A		
A	B	A	B	A	

The tiling pattern below is created using a combination of two tiles: B and C. Ameer continues to tile the floor by extending the pattern in the same way. Study the pattern.

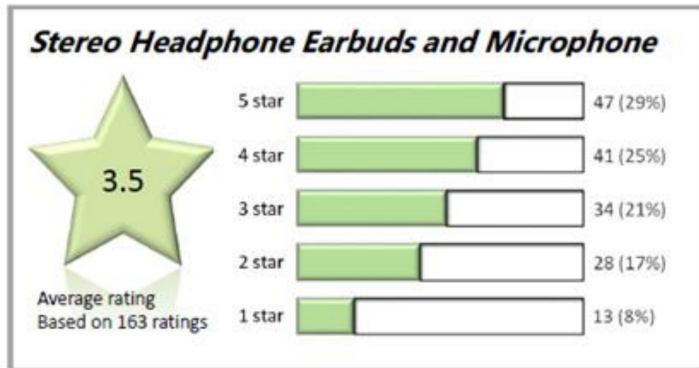


4. The red square on the grid below corresponds to the red square on the grid just above. Use the letters B and C to record the tile that goes in each position of the red square.

			—	—	—
			—	—	—
			C	—	—

Purchasing decision

Andrea is shopping online for a new pair of headphones. She has identified a pair that she likes. However, she notices that even though the total number of reviews is small, the product received many poor reviews: a total of 25% 1- and 2-star reviews.



To help with her decision to buy the product or not, Andrea studied the comments for the 1- and 2-star reviews and noticed that some of the reviews have nothing to do with the quality or the functioning of the product.

She grouped the responses for the 1- and 2-star reviews and summarised her findings in the table.

REASON	Number
Headphones arrived late	13
Headphones did not arrive at all	4
Cable was damaged or missing	7
One or both earbuds were broken	4
Packaging was unattractive	5
Wrong rating (good review, bad rating)	8

Andrea looked through all the reviewers comments and noticed that only the 1- and 2-star reviewers made comments about poor quality or about the product arriving late or not at all.

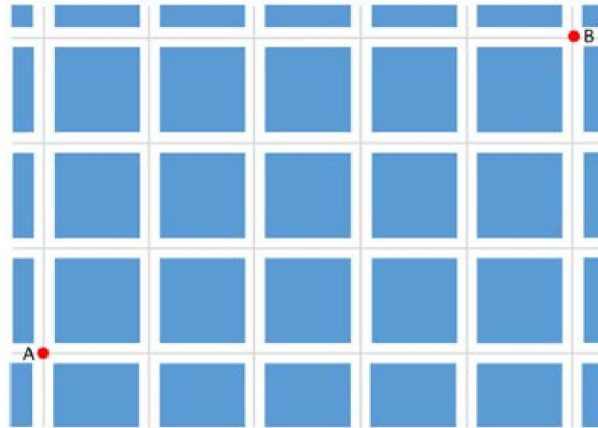
Use the information from above as well as a calculator to answer the questions.

1. What percentage of all of the reviews deal with poor quality of the product?
2. What percentage of the 1- and 2-star reviews deal with the product arriving late or not at all?
3. Andrea is concerned about the headphones arriving late or not at all. How likely is it that the product will arrive late or not at all? Express your answer as a fraction or percentage.

### Navigation

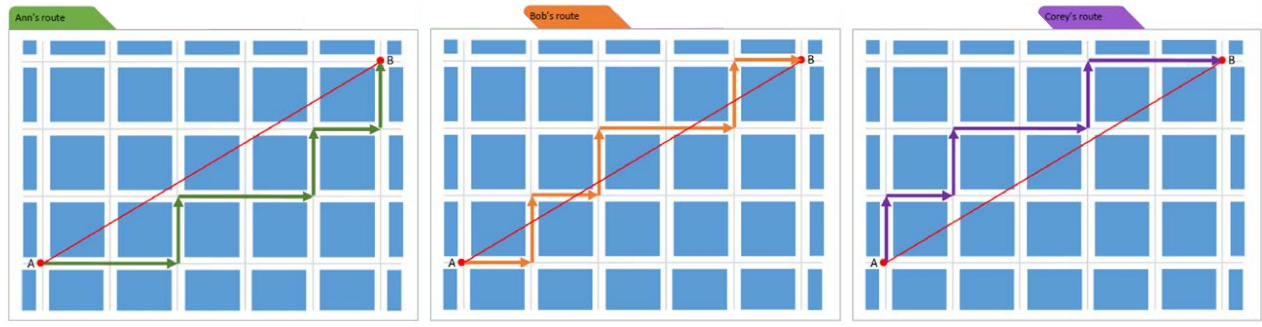
The shortest distance between two points is a straight line. It is, however, not usually possible to navigate along a straight line in a town. Look at the map below. The grey lines are the roads and the square blue blocks are the buildings.

In this exercise you will explore different strategies for planning a route from one point to another in this town.



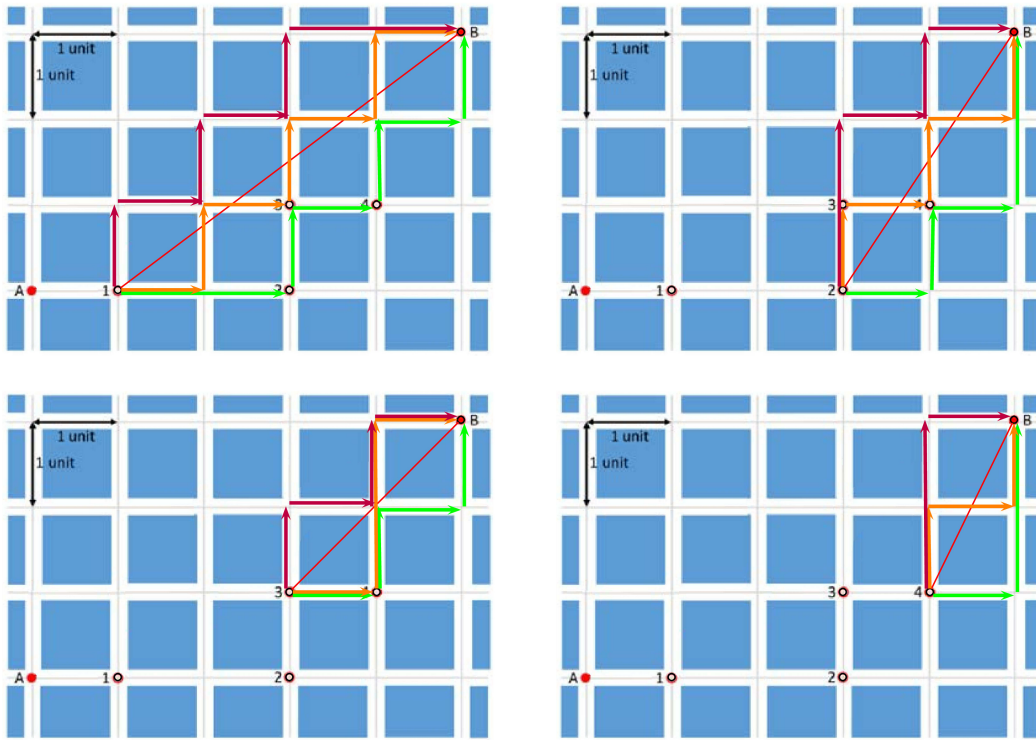
Ann, Bob and Corey have different ideas about how to determine the shortest route from A to B.

- Ann always moves right or up and stays below but as close as possible to the straight red line joining A and B (green line).
- Bob always moves right or up and tries to cross the straight red line joining A and B as often as possible (orange line).
- Corey always moves right or up and stays above but as close as possible to the straight red line joining A and B (purple line).



We now try those 3 strategies for different starting points marked on the map (1, 2, 3 and 4). If the point A is moved onto one of those 4 positions, the the route for each strategy for getting to B is shown and the distance recorded in the table below.

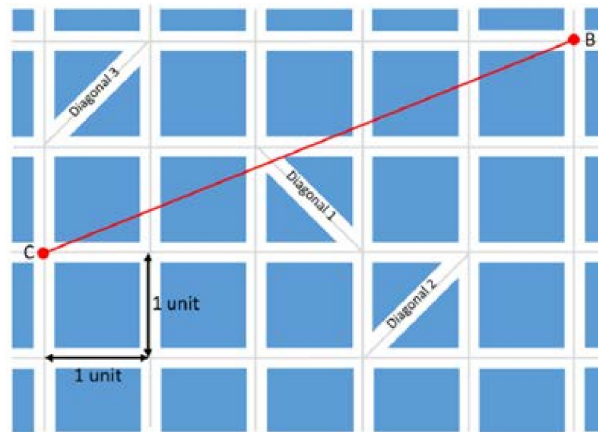
You will notice that irrespective of the starting position, Ann's route, Bob's route and Corey's route are all the same length for each route from A to B.



Position of A	Distance from A to B (in units)		
	Ann's route	Bob's route	Corey's route
1	7	7	7
2	5	5	5
3	4	4	4
4	3	3	3

1. Explain why all three strategies produce routes that are equal in length.

Three diagonal streets have been added to the map.



We know from the earlier work that without the diagonal streets, the shortest route from point C to point B will be 7 units long.

2. For each of the statements, select either **True** or **False** and provide a reason for your answer.
- (a) There exists a route from C to B that includes Diagonal 1 and is shorter than 7 units.
  - (b) There exists a route from C to B that includes Diagonal 2 and is shorter than 7 units.
  - (c) There exists a route from C to B that includes Diagonal 3 and is shorter than 7 units.