Worksheet - Position, direction and patterns

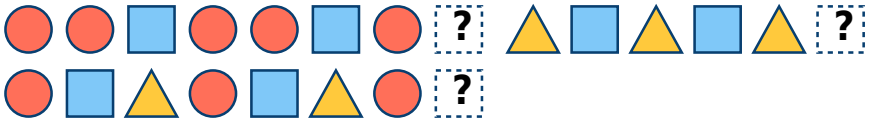
Year: Year 2 · 20

Show your working.

Question 1

Question 1 – Continue the shape pattern *(Section A · Practice)*

Say the unit of each pattern and draw (or say) the next two shapes.



Question 2

Question 2 – Number patterns *(Section A · Practice)*

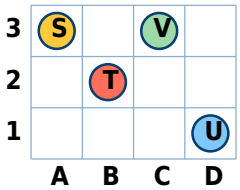
Find the rule for each number pattern and write the next two numbers.

a. 3, 6, 9, 12, __, __
b. 50, 45, 40, 35, __, __
c. 2, 4, 6, 8, __, __
d. 10, 20, 30, 40, __, __
e. 71, 68, 65, 62, __, __

Question 3

Question 3 – Where is it? *(Section A · Practice)*

Look at the grid. Use the position words to answer.

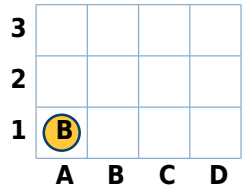


a. What is in square A3?
b. Where is T? Give the square.
c. Where is U?
d. Which letter is above T and to the right?
e. Which letter is on the bottom row?

Question 4

Question 4 – Give directions *(Section A · Practice)*

A bee starts in square A1 on the grid. Say where it finishes.



a. It moves 3 squares right.
b. It moves 2 squares up.
c. It moves 2 squares right and 1 square up.
d. It moves 3 squares right and 2 squares up.

Question 5

Question 5 – Turns *(Section A · Practice)*

Answer each question about turns. Imagine you are standing facing north.

a. You make a quarter turn clockwise. Which way do you face?
b. You make a half turn. Which way do you face?
c. You make a three-quarter turn clockwise. Which way do you face?
d. You make a whole turn. Which way do you face?
e. How many quarter turns make a half turn?

Question 6

Question 6 – Matchstick patterns *(Section A · Practice)*

Triangles are made with matchsticks. 1 triangle uses 3 sticks, 2 triangles in a row use 5 sticks, 3 triangles use 7 sticks.

Triangles	1	2	3	4	5
Sticks	3	5	7	__	__

a. Find the rule for the number of sticks.
b. Fill in the sticks for 4 and 5 triangles.
c. How many sticks are needed for 8 triangles? Continue the pattern.

Question 7

Question 7 – Making a bead necklace *(Section B · Real-life practice)*

Aisha is making a necklace with red, blue and yellow beads. She uses the pattern red, red, blue, yellow and repeats it. The necklace needs 20 beads. She threads the first 8

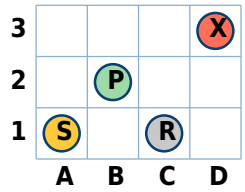
beads.

a. Write down the colours of the first 8 beads.
b. What colour is the 9th bead?
c. How many full units of the pattern are in 20 beads?
d. What colour is the last bead (the 20th)?

Question 8

Question 8 – The treasure map *(Section B · Real-life practice)*

Pirate Pete draws a map of the island on a grid with letters across the bottom and numbers up the side. The treasure is at D3. His ship is at A1. The palm tree is at B2 and the rock is at C1.



a. Which squares are the ship, the palm tree, the rock and the treasure in?
b. Pete walks from the ship 3 squares right. What does he find?
c. From there he walks 2 squares up. Where does he get to?
d. What moves does Pete need to go from the ship straight to the treasure?

Question 9

Question 9 – The robot dance *(Section B · Real-life practice)*

At the school disco the children play a robot game. The robot teacher gives the instructions: step forward 2, turn a quarter turn right, step forward 3, turn a half turn, step forward 1. The children start in the middle of the hall facing the stage.

a. How many steps do the children take altogether?
b. Add the quarter turn and the half turn. What fraction of a whole turn is that?
c. How many turns are in the instructions, and how many of them are half turns?
d. The teacher says, "Turn a whole turn." Where do you end up facing?

Question 10

Question 10 – Tiling the floor *(Section B · Real-life practice)*

Dad is tiling the kitchen floor with blue and white square tiles. He makes a border with the pattern blue, white, white, blue, white, white. The border is 18 tiles long. The row has been started.

a. What is the unit of the pattern?
b. How many full units are there in 18 tiles?

c. How many blue tiles are in the whole border?
d. What colour is the 10th tile?

Question 11

Question 11 – Saving money in a pattern *(Section B · Real-life practice)*

Ben is saving his pocket money in a money jar. In week 1 he saves 10p. In week 2 he saves 20p. In week 3 he saves 30p. He keeps going with the same pattern. Each time he saves 10p more than the week before.

Week	1	2	3	4	5	6
Saved (p)	10	20	30	__	__	__

a. Find the rule for the pattern.
b. How much does Ben save in weeks 4, 5 and 6?
c. How much does he save in week 6 compared with week 1?
d. In which week does he first save more than 45p?

Question 12

Question 12 – Seats in a theatre *(Section B · Real-life practice)*

In the school hall there is a play. The seats are in rows. The first row has 4 seats, the second row has 6 seats and the third row has 8 seats. The pattern carries on. The hall has 6 rows in total.

a. Find the rule.
b. How many seats are in each of rows 4, 5 and 6?
c. How many more seats are in row 6 than in row 1?
d. The first row has seats numbered A, B, C and D. A child sits in the seat that is 2 places to the right of A. Which seat is that?

Question 13

Question 13 – Counting steps on the stairs *(Section B · Real-life practice)*

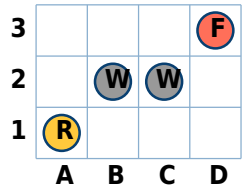
Maya counts the steps on the stairs of the library. She counts in 3s on the way up and in 5s on the way down the long stairs. She starts at 0.

a. Count in 3s to 24. Write the numbers.
b. How many numbers did you say?
c. Count back in 5s from 40 to 0. Write the numbers.
d. Which number between 10 and 20 is in both counts?

Question 14

Question 14 – The robot maze *(Section C · Problem solving)*

Rob the robot is in a maze on a grid. He starts at square A1. He must reach the flag in square D3. The squares B2 and C2 have walls that he cannot cross. He can only move right and up.



a. Which squares have walls?
b. Rob goes right 3 squares. Where does he get to? Is it safe?
c. Then he goes up 2 squares. Where does he finish?
d. Write the whole journey as directions.
e. Rob says he can get to the flag by going up 2, then right 3. Is it possible? Explain.

Question 15

Question 15 – Growing flower beds *(Section C · Problem solving)*

The school gardener plants flowers in beds that grow bigger. The first bed has 5 flowers. The second bed has 8 flowers. The third bed has 11 flowers. She continues the pattern and plants 6 beds.

Bed	1	2	3	4	5	6
Flowers	5	8	11	__	__	__

a. Find the rule of the pattern.
b. Fill in the number of flowers for beds 4, 5 and 6.
c. How many flowers are in all 6 beds?
d. The gardener has 70 flowers. Does she have enough? Explain.
e. How many flowers are left over, or how many more does she need?

Question 16

Question 16 – The cube tower pattern *(Section C · Problem solving)*

Ali builds towers from cubes. Tower 1 has 2 cubes, tower 2 has 4 cubes and tower 3 has 6 cubes. He builds towers 1 to 5 in a row. Tower 5 is on the right of the line.

Tower	1	2	3	4	5
Cubes	2	4	6	__	__

a. Find the rule.
b. How many cubes are in tower 4 and tower 5?
c. Which two towers are next to the middle tower (tower 3)?
d. How many cubes does Ali use for all 5 towers?
e. Ali says tower 10 will have 21 cubes. Is he right? Explain.

Question 17

Question 17 – A walk round the school *(Section C · Problem solving)*

Class 2 go on a walk around the school grounds. They start at the main gate and follow instructions from their teacher. They walk 10 steps forward, then turn a quarter turn right, then walk 6 steps. They turn a quarter turn left and walk 4 steps. Then they turn a half turn and walk 4 steps back.

a. How many steps do the children walk before the half turn?
b. How many steps do they walk altogether?
c. Which turns are quarter turns? How many quarter turns are there?
d. After the half turn and 4 steps, are the children back at the place where they turned left? Explain.
e. Do the children end up at the main gate? Explain.

Question 18

Question 18 – Wallpaper design *(Section C · Problem solving)*

Sara is designing a wallpaper border for her bedroom. The pattern has a star, a heart, a star, a moon. It repeats along 40 cm of the wall. Each picture takes 5 cm of space.

a. How many pictures are in the 40 cm border?
b. How many units of the pattern is that?
c. How many stars are in the border?
d. What is the 7th picture?
e. Sara needs 2 more units. How many more pictures and how many more cm?

Question 19

Question 19 – The class bus journey *(Section C · Problem solving)*

A bus travels on a straight road between town squares. It starts at the school, goes 3 stops forward, drops off some children, and then goes 2 stops backwards to the library. Then it goes forward 4 stops to the park, and finally 1 stop backwards.

a. How many stops does the bus travel forwards in total?
b. How many stops does the bus travel backwards in total?
c. Where does the bus finish, compared with the school, in stops forward?
d. Is the bus ahead of the school or behind it? Explain.
e. How many stops are there between the library and the park?

Question 20

Question 20 – Challenge: pattern puzzles *(Section D · Challenge)*

Otto has set you some tricky pattern puzzles. Explain your answers.

a. A pattern starts 2, 5, 8, 11. What is the 8th number? Continue the pattern.
b. A shape pattern is circle, square, triangle, repeated. What is the 20th shape? Explain.
c. A child starts at A1 on a grid. She moves right 2, up 3, left 1, down 2. Where does she finish?
d. Ali says, "Counting in 4s from 0 gives 12 and 15." Is he right? Which number is wrong?