

Unit 6

Angles and position

Three daily lessons

National
Numeracy Strategy

Year 4
Summer term

Unit Objectives

Year 4

- Use the eight compass directions, N, S, E, W, NE, NW, SE, SW. Page 108
- Recognise positions and directions, for example describe and find the position of a point on a grid of squares where the lines are numbered. Page 108
- Recognise simple examples of horizontal and vertical lines. Page 108
- Make and measure clockwise and anticlockwise turns, for example from SW to N or from 4 to 10 on a clock face. Page 110
- Begin to know that angles are measured in degrees and that: one whole turn is 360° or four right angles; a quarter turn is 90° or one right angle; half a right angle is 45° . Page 110
- Start to order a set of angles less than 180° . Page 110

This Unit Plan is designed to guide your teaching. You will need to adapt it to meet the needs of your class.

Resources needed to teach this unit:

- Activity sheet 6.1
- Activity sheet 6.2
- Activity sheet 6.3
- OHT 6.1
- OHT 6.2
- OHT 6.3
- OHP protractor
- Class set of protractors
- Whiteboards

Year 3

Link Objectives

Year 5

- Recognise and use the four compass directions N, S, E, W.
- Make and describe right-angled turns, including turns between the four compass points.
- **Identify right angles** in 2-D shapes and the environment.
- Recognise that a straight line is equivalent to two right angles.
- Compare angles with a right angle.

- Understand and use angle measure in degrees.
- Identify, estimate and order acute and obtuse angles.
- Use a protractor to measure and draw acute and obtuse angles to the nearest 5° .
- Calculate angles in a straight line.
- Recognise positions and directions: read and plot co-ordinates in the first quadrant; **recognise perpendicular and parallel lines.**

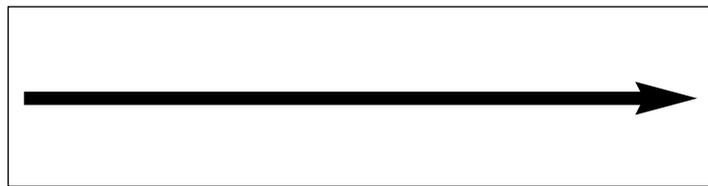
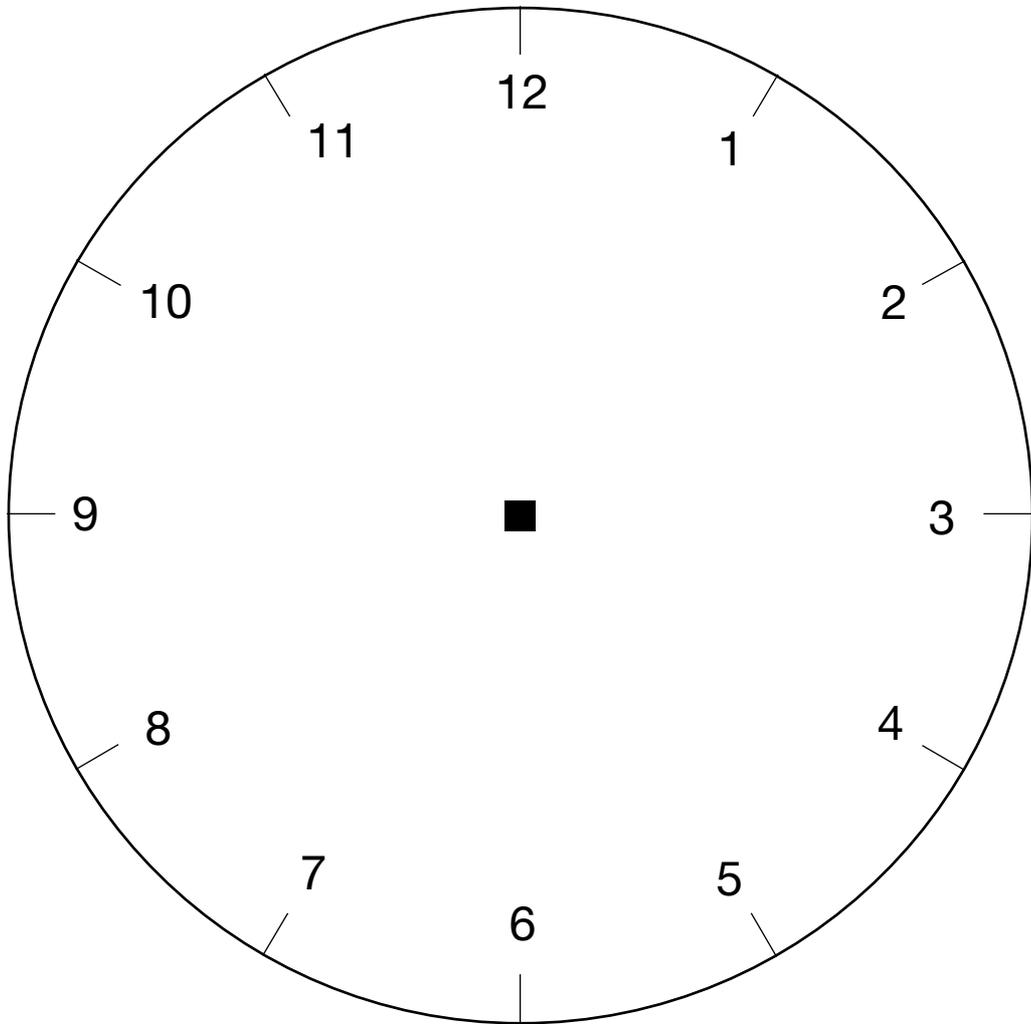
(Key objectives in bold)

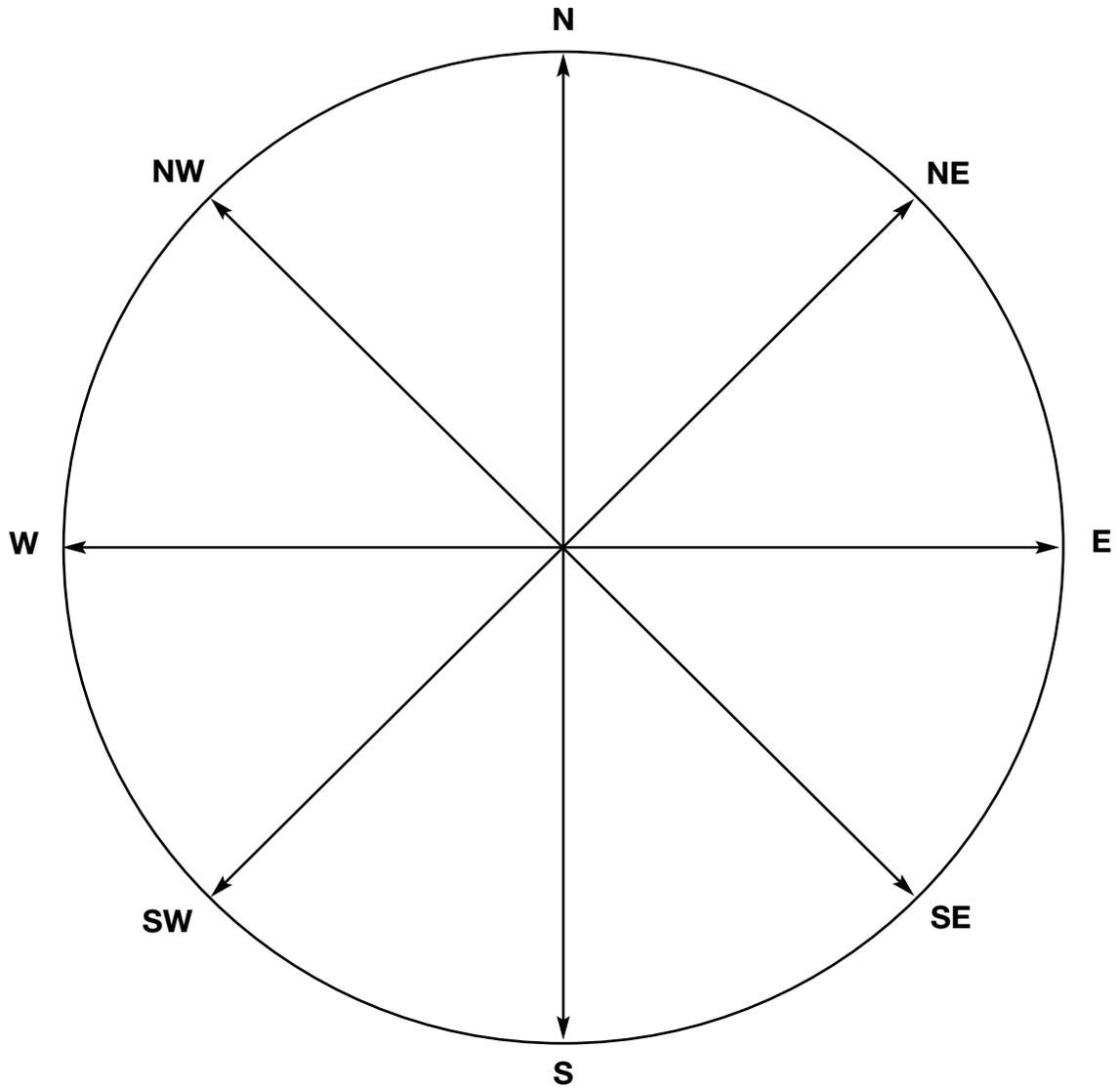
Planning sheet	Day One (page 1 of 2)	Unit 6 <i>Angles and position</i>		Term: <i>Summer</i>	Year Group: <i>4</i>
Oral and Mental		Main Teaching			Plenary
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities/Focus Questions	
<p>Count forwards and backwards in steps of constant size.</p>	<ul style="list-style-type: none"> Get the class to count on in 3s starting at zero, stopping at 36. Repeat. This time write all the multiples of 3 in a column on the board as the children count. <p>Q What is 10×3?</p> <p>Q How can we use the numbers in the column to help us to count in 30s?</p> <p>Ask the children to explain the answer and help them to use correct mathematical language.</p> <p>Agree that 30 is ten times bigger than 3, so each number will be ten times bigger.</p> <p>Ask the children to count in 30s. Record the numbers in a column next to the 3s column.</p> <ul style="list-style-type: none"> Tell the children to look at these numbers, then cover them up. <p>Q What comes after 30?</p> <p>Q What comes before 150?</p> <p>Ask other similar questions. After each question show the children the column to check their answers are correct.</p>	<p>Begin to know that angles are measured in degrees and that one whole turn is 360°, and a quarter turn is 90°.</p> <p>Start to order a set of angles less than 180°.</p> <p>VOCABULARY degree protractor clockwise</p> <p>RESOURCES Activity sheet 6.1 OHT 6.1 OHP protractor Set of semi-circular protractors</p>	<ul style="list-style-type: none"> Remind the children that angles show amounts of turn. <ul style="list-style-type: none"> Q What unit of measurement do we use for angles? Q What is the correct mathematical notation? On the board, write: degree $^\circ$. Confirm the children can read 30° and 90° and recognise that 30° is a smaller angle than 90°. <p>Q Where else do we hear/use this vocabulary/notation?</p> <p>Explain that 'degrees' is also used as a unit to measure temperature, i.e degrees Centigrade ($^\circ\text{C}$). The spelling and notation are the same but the meaning is different.</p> <p>Q Does anyone know how many degrees there are in one whole turn?</p> <p>Confirm they know one whole turn is 360°.</p> Give out a semi-circular protractor to each child. Name the instrument. Ask the children to discuss in pairs what they can see. Take feedback. Show the OHP protractor and ensure through questioning that the children recognise the values marked from 0°–180° and that the protractor represents half a turn. Highlight the centre point of rotation and the straight line along the bottom. Ask the children to identify 90° on the protractor to confirm that a right angle is 90°. Explain how the scale on a protractor works from left to right and/or right to left and that it is important when reading the protractor not to mix these directions but keep to one direction. <p>Q Why do we describe the direction as clockwise? Does anyone know the name for the opposite direction?</p> Ask the children to find 0° on the left-hand side and by using their finger move 30° clockwise. Demonstrate this using the OHP protractor. Ask the children to move around clockwise to 60°. <p>Q How many more degrees do we need to turn to get to 90°?</p> <p>Collect responses and confirm the answer is 30°. Remind the children they moved from 0° to 30°, 30° to 60° and 60° to 90° in a clockwise direction.</p> <p>Q What fraction of a right angle is 30°?</p> <p>Establish that 30° is $\frac{1}{3}$ of a right angle or 90°.</p> Ask the children to point to the 0° again on the left-hand side, and move their fingers round 60°, then to 120°. 	<ul style="list-style-type: none"> Return to the numbers 0 to 36 and 0 to 360 generated at the start of the lesson. <p>Link these numbers to the angles on the clock. Point to 4 on the clock face.</p> <p>Q How many degrees does the minute hand turn through to move from 12 to 4 clockwise?</p> <p>Collect answers. Link the 120 to $4 \times 3 = 12$ and $4 \times 30 = 120$</p> <p>Q If the minute hand moves from 2 to 4, through how many degrees has it moved?</p> Confirm this is 60° by demonstrating on the OHT that the hand moves from 60° to 90° (30°) and 90° to 120° (another 30°) <p>Q What happens when I move the hand on the clock from 6 to 9, from 12 to 1, 3 to 9?</p> Make sure that the children use the correct vocabulary in their answer. <p>By the end of the lesson children should be able to:</p> <ul style="list-style-type: none"> Know that; <ul style="list-style-type: none"> - one whole turn is 360° or four right angles; - a quarter turn is 90° or one right angle; Make and describe turns of 30°, 60° and 90° using the hand on a clock face. <p>(Refer to supplement of examples, section 6, page 110.)</p>	

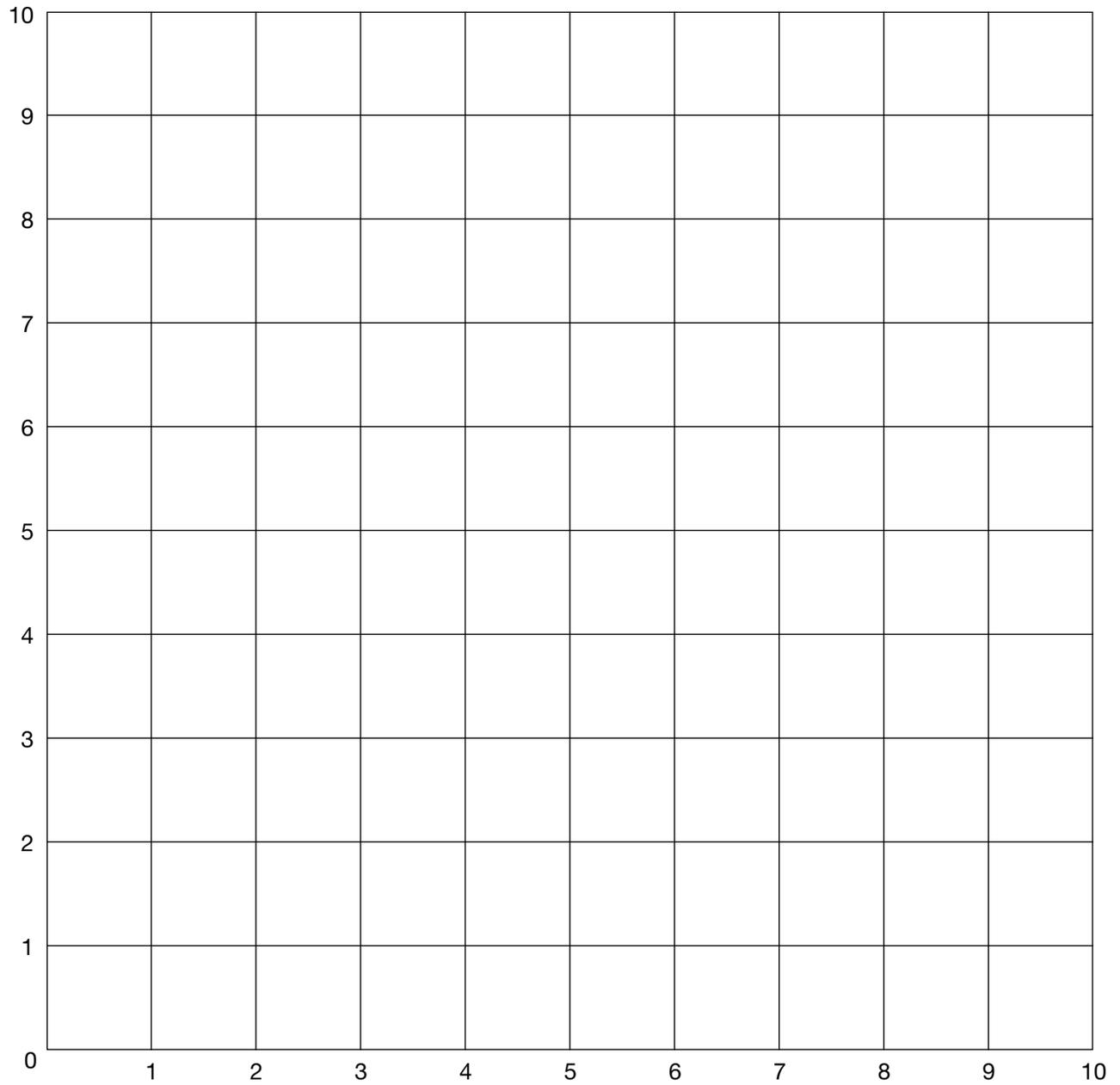
Planning sheet	Day One (page 2 of 2)	Unit 6 <i>Angles and position</i>		Term: <i>Summer</i>	Year Group: <i>4</i>
Oral and Mental		Main Teaching			Plenary
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities/Focus Questions	
			<div data-bbox="958 292 1783 336" style="border: 1px solid black; padding: 2px;">Q How many more degrees do we need to turn to get 180°?</div> <p>Collect responses and confirm the answer is 60°.</p> <p>Remind the children they moved from 0° to 60°, 60° to 120° and 120° to 180°, in a clockwise direction.</p> <div data-bbox="958 472 1783 517" style="border: 1px solid black; padding: 2px;">Q What fraction of 180° is 60°?</div> <ul style="list-style-type: none"> • Establish that 60° is $\frac{1}{3}$ of a straight line or 180°. • Give out Activity sheet 6.1 and show OHT 6.1. Place a minute hand on the OHT clock, pointing to 12. Write 0° above the 12, and get the children to record this on their clocks. Turn the hand clockwise to 3. <div data-bbox="958 687 1783 732" style="border: 1px solid black; padding: 2px;">Q Through what angle has the hand turned?</div> <ul style="list-style-type: none"> • Agree it's one right angle or 90°. Write 90° next to the 3, and get the children to record this on their clocks. Return the hand to 12 then rotate to 1. <div data-bbox="958 831 1783 876" style="border: 1px solid black; padding: 2px;">Q Through what angle has the hand turned?</div> <ul style="list-style-type: none"> • Remind children this is $\frac{1}{3}$ of 90° which is 30°. Get the children to record 30° on their clocks. • Repeat, gradually filling the face of the clock with the multiples of 30° from 0° to 360°. 		

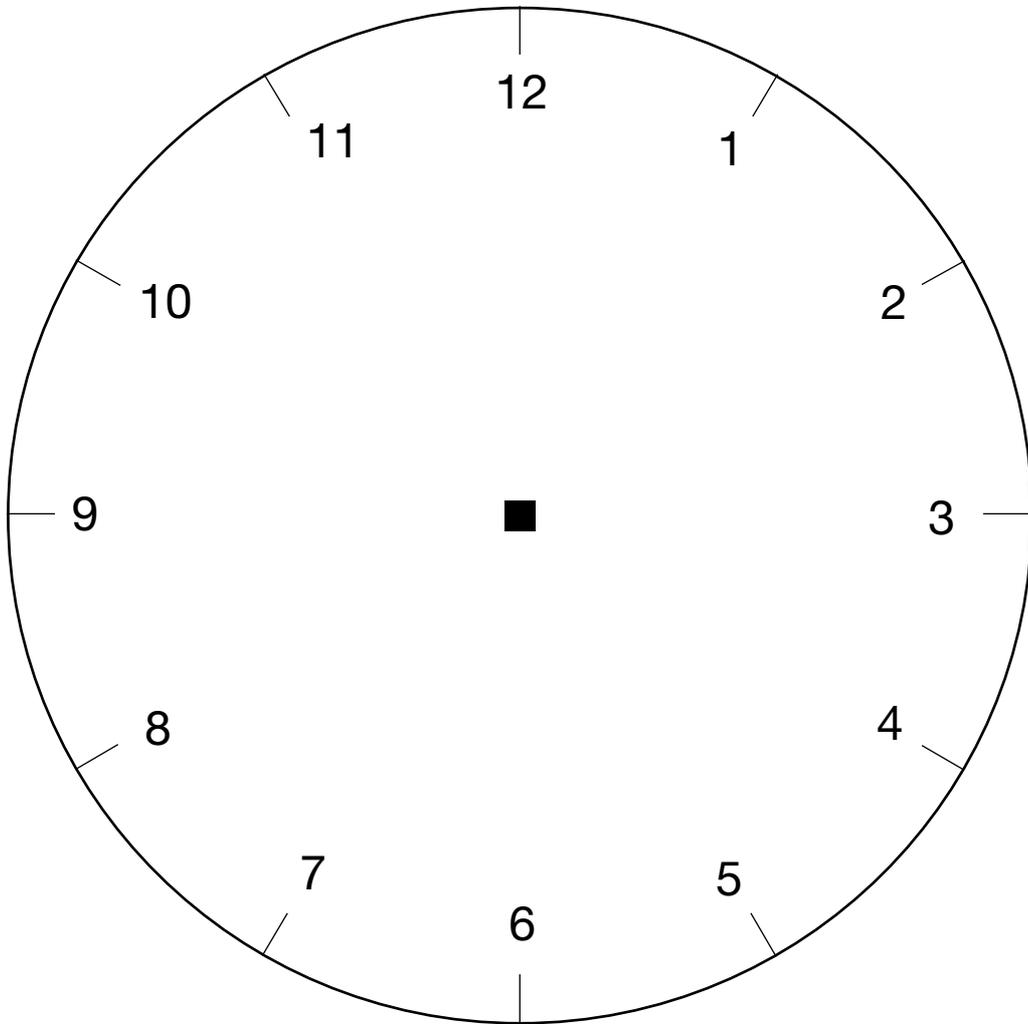
Planning sheet	Day Two	Unit 6 <i>Angles and position</i>	Term: <i>Summer</i>	Year Group: <i>4</i>
Oral and Mental		Main Teaching		Plenary
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities/Focus Questions
<p>Recognise and know 'half of'.</p> <p>Count forwards and backwards in steps of constant size.</p> <p>VOCABULARY double halve</p> <p>RESOURCES Whiteboards</p>	<ul style="list-style-type: none"> Write 360 on the board. <div data-bbox="353 331 745 379" style="border: 1px solid black; padding: 2px;"> <p>Q What is half of 360?</p> </div> <ul style="list-style-type: none"> The children write and show their answers on whiteboards. Agree it is 180. Write this on the board. <div data-bbox="353 496 745 544" style="border: 1px solid black; padding: 2px;"> <p>Q What is half of 180?</p> </div> <ul style="list-style-type: none"> Collect answers and repeat halving to generate: 360, 180, 90, 45. Draw a number line on the board, as shown below: <div data-bbox="353 699 745 802" style="text-align: center;"> </div> <div data-bbox="353 842 745 906" style="border: 1px solid black; padding: 2px;"> <p>Q What number is half way between 180 and 360?</p> </div> <p>Record 270 on the number line and with the children find the mid points between 90 and 180, 180 and 270, 270 and 360.</p> <p>Count up from 0 to 360 using the numbers on the number line. With the children, establish that these numbers increase in steps of 45. Explain that they will be used later in the lesson and will be on the board to help them.</p>	<p>Begin to know that angles are measured in degrees.</p> <p>Make and measure clockwise and anti-clockwise turns.</p> <p>VOCABULARY turn quarter half rotate degrees</p> <p>RESOURCES OHT 6.1 OHT 6.2 Activity sheet 6.2</p>	<ul style="list-style-type: none"> Show OHT 6.1 annotated from day 1. Remind children of the angles made by turning clockwise from 12 o'clock to other times such as 5 o'clock. <div data-bbox="1061 355 1783 419" style="border: 1px solid black; padding: 2px;"> <p>Q What angle would the hand turn through when moving clockwise from 2 o'clock to 6 o'clock?</p> </div> <p>Remind the children to count up in 30° steps if it helps.</p> <p>Ask a series of questions about the turn the hand makes. Collect responses and correct any mistakes or misunderstandings.</p> <ul style="list-style-type: none"> Show OHT 6.2. Ask the children what the N means at the top of the diagram. Remind them of the points of a compass and with the class complete the OHT by identifying S, E, W and SE, SW, NE, NW. <div data-bbox="1061 651 1783 715" style="border: 1px solid black; padding: 2px;"> <p>Q What size of angle is represented by an anticlockwise turn from N to W?</p> </div> <p>Confirm that the children can identify the angle as 90°. Repeat asking other questions that involve angles of 90°. Emphasise the direction of turn.</p> <div data-bbox="1061 815 1783 855" style="border: 1px solid black; padding: 2px;"> <p>Q What size of angle is represented by a clockwise turn from N to NE?</p> </div> <p>Establish that this is 45°, which is half of 90°. Remind the children that they counted up in 45s at the start of the lesson.</p> <div data-bbox="1061 962 1783 1002" style="border: 1px solid black; padding: 2px;"> <p>Q What size of angle is represented by a clockwise turn from SE to W?</p> </div> <p>Refer to the OHT to identify the angle and agree that the size of the angle is 135°. Repeat asking other questions, changing the direction of the turn.</p> <div data-bbox="1061 1106 1783 1145" style="border: 1px solid black; padding: 2px;"> <p>Q If I face N and turn 45° anticlockwise, what direction will I face?</p> </div> <ul style="list-style-type: none"> Demonstrate this turn on the OHT and agree the answer is NW. Repeat asking similar questions involving multiples of 45°. Give out Activity sheet 6.2. Clarify the instructions if necessary and ask the children to complete it. You might want to break it up into smaller steps for the lower ability group. Collect answers and correct any mistakes or misunderstandings. 	<ul style="list-style-type: none"> Show OHT 6.2 with the eight compass points identified. <p>Point to N and move clockwise to E.</p> <div data-bbox="1861 419 2186 483" style="border: 1px solid black; padding: 2px;"> <p>Q What size of angle do we turn through from N to E?</p> </div> <p>Agree it is 90°.</p> <ul style="list-style-type: none"> Ask the children to give two directions which involve a turn of 90° either clockwise or anticlockwise, e.g. NW to SW. Point to SE and move anticlockwise to S. <p>Make sure they use correct mathematical language.</p> <div data-bbox="1861 783 2186 847" style="border: 1px solid black; padding: 2px;"> <p>Q What size of angle represents this turn?</p> </div> <p>Ask the children to give two directions which involve a turn of 45°.</p> <div data-bbox="1832 1002 2186 1353" style="border: 1px solid black; padding: 5px;"> <p>By the end of the lesson the children should be able to:</p> <ul style="list-style-type: none"> Know that half a right angle is 45°; Make and describe turns using compass directions, e.g. face west, turn clockwise 45° and say in which direction they are facing. <p>(Refer to supplement of examples, section 6, page 110.)</p> </div>

Planning sheet	Day Three	Unit 6 <i>Angles and position</i>		Term: <i>Summer</i>	Year Group: 4
Oral and Mental		Main Teaching			Plenary
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities/Focus Questions	
<p>Derive doubles of whole numbers, multiples of 10 and multiples of 100.</p>	<ul style="list-style-type: none"> Recite the 2 times table. Repeat to build up speed. Remind the children that doubling is the same as multiplying by 2. <p style="border: 1px solid black; padding: 2px;">Q What is double 6, double 8?</p> <p>Encourage the children to respond quickly without having to refer to the 2 times table.</p> <ul style="list-style-type: none"> <p style="border: 1px solid black; padding: 2px;">Q If double 4 is 8, what is double 40?</p> <p>Establish the relationship and extend to double 400 and 4000. Repeat asking quick fire questions.</p> <ul style="list-style-type: none"> <p style="border: 1px solid black; padding: 2px;">Q What is double 24?</p> <p>Remind the children that 24 is $20 + 4$ and double 24 is $40 + 8 = 48$</p> <p style="border: 1px solid black; padding: 2px;">Q What is double 240?</p> <p>Ensure the children can use double 24 to double 240, and then 2400.</p> <ul style="list-style-type: none"> Repeat with other numbers. Discuss strategies and relationships. 	<p>Make and measure clockwise and anti-clockwise turns.</p> <p>Recognise position and directions.</p> <p>Recognise simple examples of horizontal and vertical lines.</p> <p>VOCABULARY rotate degree angle measure horizontal vertical</p> <p>RESOURCES OHT 6.3 Activity sheet 6.3</p>	<ul style="list-style-type: none"> Show OHT 6.3. Remind the children of the co-ordinate system for identifying points and the importance of the order of the two numbers. Identify two points on the grid which use the same numbers, e.g. (2, 5) and (5, 2). <p style="border: 1px solid black; padding: 2px;">Q What are the co-ordinates of these two points?</p> <p>Record the co-ordinates (2, 5) and (5, 2) on the board. Remind the children about the compass points from the previous lesson and ask:</p> <p style="border: 1px solid black; padding: 2px;">Q What points could I go through if I moved north of (5, 2)?</p> <p>Collect these points and record them on the board.</p> <p style="border: 1px solid black; padding: 2px;">Q Why is the first number always a 5?</p> <p>Agree that all the points north and south of (5, 2) will have the first number as 5, as all the points lie on the vertical line above the 5. Reinforce the meaning of vertical if necessary.</p> <p style="border: 1px solid black; padding: 2px;">Q What can you tell me about the points that are east and west of (2, 5)?</p> <p>Establish the second number is always a 5 and why this is so. Refer to the 'horizontal' line and reinforce the vocabulary.</p> <p style="border: 1px solid black; padding: 2px;">Q Give me some points that lie north-east of (3, 3).</p> <p>Collect responses and ask the children to describe the pattern in the co-ordinates.</p> <p style="border: 1px solid black; padding: 2px;">Q What is the opposite direction to north east? Q What points will lie in this direction?</p> <p>Repeat using different starting points and compass points, e.g. the points south east of (7, 4).</p> <ul style="list-style-type: none"> Give out Activity sheet 6.3. Ask the children to work through the first question. Collect answers and demonstrate the answer using OHT 6.3. Ask the children to complete the other questions. Collect responses and correct any mistakes and misunderstandings. <p>Ask a pair of children to read out the instructions for their shape and represent their shape on OHT 6.3.</p>	<ul style="list-style-type: none"> Ask the children to stand and face the front. Say this represents North. Give instructions, e.g. turn 90° clockwise. <p style="border: 1px solid black; padding: 2px;">Q What direction are you facing now?</p> <ul style="list-style-type: none"> Ensure the children recognise this is East. Give other instructions. Ask the children to face the front of the class, say this represents 12 o'clock. Give instructions, e.g. turn clockwise to 2 o'clock. <p style="border: 1px solid black; padding: 2px;">Q Through what size of angle did you turn?</p> <p>Ensure the children recognise this is a turn of 60°. Repeat with other turns using clockwise and anticlockwise directions.</p> <ul style="list-style-type: none"> Show OHT 6.3. Point to a position on the grid, e.g. (3, 6). <p style="border: 1px solid black; padding: 2px;">Q What are the co-ordinates of points on the horizontal line through this point?</p> <ul style="list-style-type: none"> Ensure the children understand which lines are horizontal and which are vertical and they can identify the co-ordinates correctly. <p style="border: 1px solid black; padding: 2px;">By the end of the lesson the children should be able to:</p> <ul style="list-style-type: none"> Describe and find the position of a point on a grid of squares where the lines are numbered; Recognise and identify simple examples of horizontal and vertical lines; Use the eight compass directions. <p>(Refer to supplement of examples, section 6, page 108.)</p>	

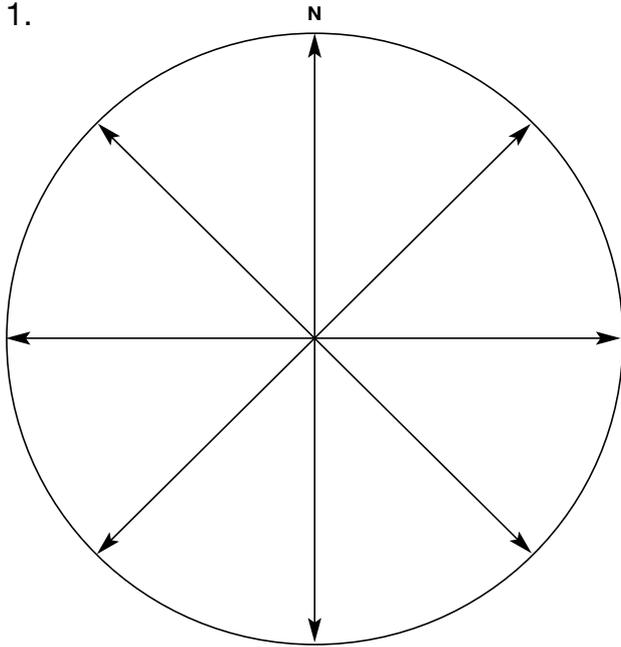








1.



Complete the compass points on the diagram.

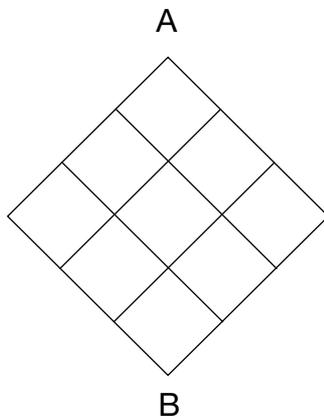
If I face E and then turn clockwise to face:

- (i) S, my angle of turn is _____
- (ii) SE, my angle of turn is _____
- (iii) SW, my angle of turn is _____
- (iv) W, my angle of turn is _____
- (v) NW, my angle of turn is _____

2.

- (i) I face N and turn clockwise 45° to face _____
- (ii) I face S and turn anticlockwise 45° to face _____
- (iii) I face E and turn anticlockwise 90° to face _____
- (iv) I face W and turn anticlockwise 225° to face _____
- (v) I face NE and turn clockwise 135° to face _____

3.

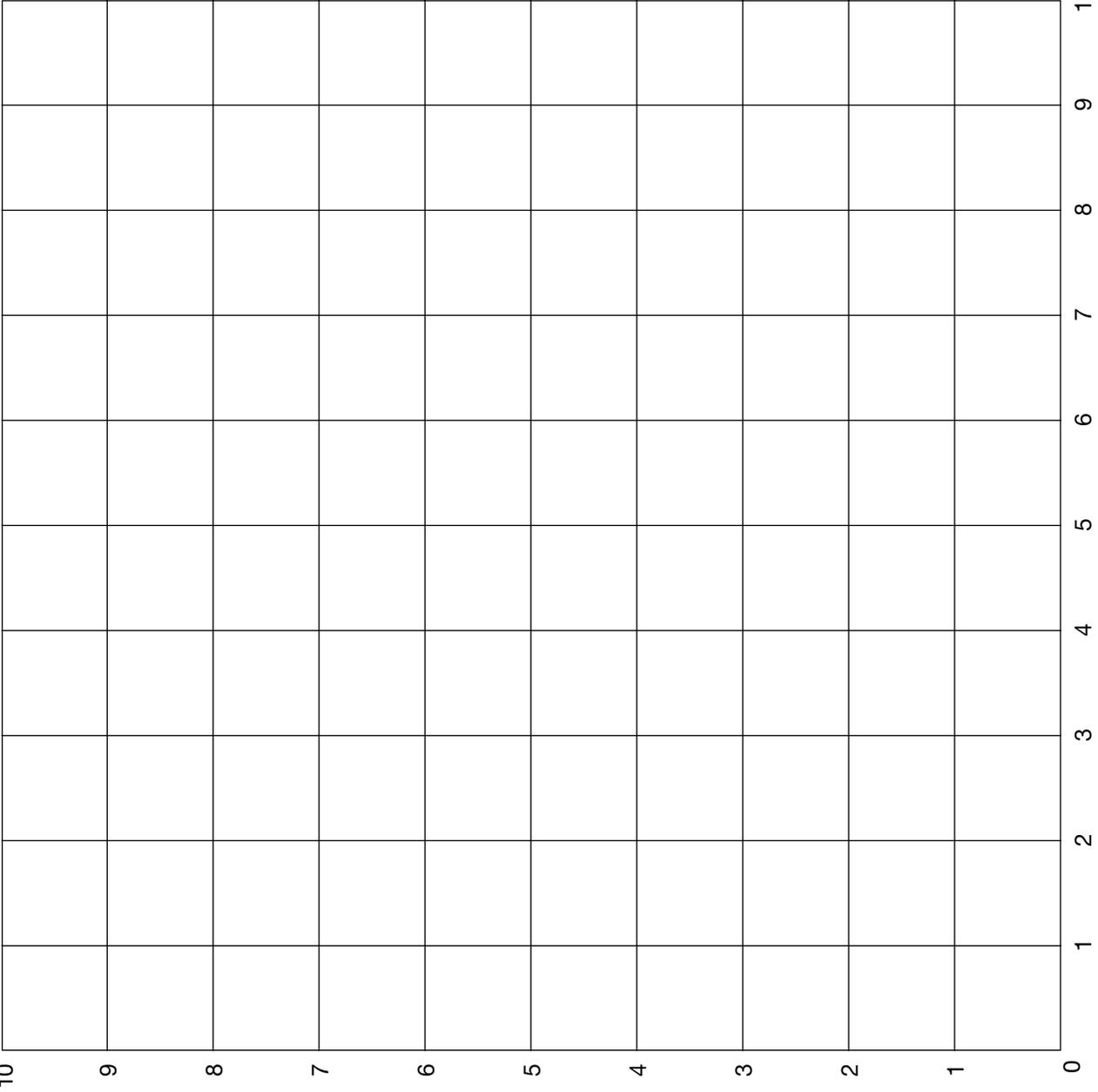


The route from A to B is NW, NW, NW, NE, NE, NE.

Give one other route from A to B

Give two routes from B to A

- (i) _____
- (ii) _____



Join up the points.

1. Start at (1, 8). Move E 2 points.
Move SW 2 points. Move N 2 points.
My shape is: _____
2. Start at (2, 5). Move SW 1 point. Move S 3 points.
Move E 2 points. Move N 3 points.
Move NW 1 point.
My shape is: _____
3. Start at (6, 3). Move NW 2 points.
Move S 3 points. Move SE 2 points.
Move N 3 points.
My shape is: _____
4. Draw a shape of your own. Write down the instructions to make your shape then pass the instructions to your partner to draw your shape.
Start at: _____
Move: _____
Move: _____
Move: _____
Move: _____
Move: _____