

Unit 6

Direction and angle

Three daily lessons

*National
Numeracy Strategy*

Year 4
Spring term

Unit Objectives Year 4

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

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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
- OHT 6.1
- Squared paper
- Geo-strips
- 2 large rulers
- Large 45° set square
- Large clock face with movable hands
- Whiteboards
- Scissors
- Tracing paper

Year 3

Link Objectives

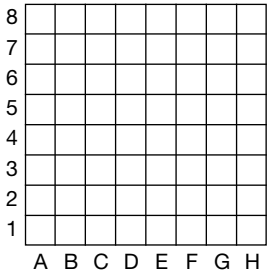
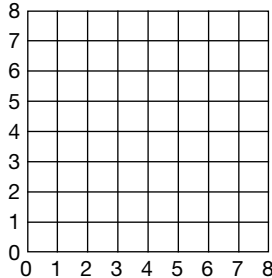
Year 5

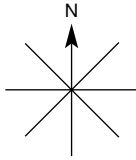
- Read and begin to write the vocabulary related to position, direction and movement: for example, describe and find the position of a square on a grid of squares with the rows and columns labelled.
- Recognise and use the four compass directions N, S, E, W.
- Make and describe right-angled turns, including 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.

- Recognise positions and directions: read and plot coordinates in the first quadrant.
- **Recognise perpendicular and parallel lines.**
- 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 degrees.
- Calculate angles in a straight line.

(Key objectives in bold)

department for
education and skills

| Planning sheet | Day One | Unit 6 <i>Direction and angle</i> | Term: <i>Spring</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>Describe and find the position of a square on a grid of squares.</p> <p>Recognise simple examples of horizontal and vertical lines.</p> <p>VOCABULARY vertical horizontal</p> <p>RESOURCES Whiteboards Two copies of OHT 6.1</p> | <ul style="list-style-type: none"> Display OHT 6.1. Revise and practise describing position using a grid of squares. Label the rows with numbers and the columns with letters.  <p>Name a square and ask a child to point to it, e.g. D3. Remind children that the letter on the <i>horizontal</i> axis is given first, then the number on the <i>vertical</i> axis. Repeat with other squares.</p> <ul style="list-style-type: none"> Mark a square, e.g. with a cross. Children identify its position by writing the letter and number on whiteboards. Repeat with other squares. Ask a child to secretly pick a square and write its position on their whiteboard. Divide the rest of the class into two teams. Choose one of the teams to ask a question in order to try to identify the square, e.g. is it in column B? Teams to ask questions alternately. The team who identifies the square first is the winning team. Can the children identify the square in five questions or less? If necessary, repeat with another child choosing a different square. Ask children to work with a partner. One child to choose a square and write it on their whiteboard without their partner seeing it, the other child to ask questions to try to identify the square. Children then swap roles. <div>Q Which questions helped you to identify your partner's square quickly?</div> | <p>Recognise positions and directions, e.g. describe and find the position of a point on a grid of squares where the lines are numbered.</p> <p>Recognise simple examples of horizontal and vertical lines.</p> <p>VOCABULARY coordinates origin diagonal vertices</p> <p>RESOURCES Squared paper</p> | <ul style="list-style-type: none"> On a second copy of OHT 6.1 put a cross on the grid at a point where two lines intersect and ask children to give its position. Discuss suggestions, then introduce numbering the lines on each axis. Record the coordinates on the board, e.g. (3,2). Explain that these ordered numbers are called the <i>coordinates</i> of the point marked on the grid.  <p>Emphasise that:</p> <ul style="list-style-type: none"> coordinates are always written in brackets, with a comma between the numbers, the number on the horizontal axis is always written first, then the number on the vertical axis, (0,0) is called the <i>origin</i>. <ul style="list-style-type: none"> Write a different coordinate on the board and ask a child to point to its position on the grid. Repeat with other coordinates. Write the coordinates (1,3) and (3,1) on the board and ask a child to point to each position. Emphasise that the points are in different positions, although the numbers are the same. Stress the importance of the order of the numbers in each pair. Ask children to draw an 8 × 8 grid on squared paper and number the axes from 0 to 8. Write the following coordinates on the board: (0,5), (2,3), (4,1), (5,0). Children mark each point with a cross on their grids then join them together with a ruler. Discuss the line and establish that it is a straight line that is <i>diagonal</i>. <div>Q Which other points lie on this diagonal line? Q Which points would form another line?</div> <ul style="list-style-type: none"> Ask children to draw a square on their grid and write down the coordinates of the four vertices. In pairs, each child gives their partner three of their coordinates which the partner uses to draw the square to identify the missing coordinate. Repeat using other squares. | <ul style="list-style-type: none"> Put a cross on (1,1) on the OHT grid. <div>Q What are the coordinates of this point? Q Which other coordinates describe points on the same vertical line? Q Which points would join horizontally to the first point? Q Which point would make a rectangle with the other three points?</div> <ul style="list-style-type: none"> Mark three points on the grid to represent the vertices of a triangle. Ask children to give the coordinates. <div>Q What shape would be made by joining the points together?</div> <p>HOMEWORK – Ask children to find out about the eight compass points for the next lesson.</p> <p>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; Understand that (3,2) describes a point 3 squares along from the origin and 2 squares up; Recognise that (4,1) and (1,4) describe different points; Know that rows on a grid are described as horizontal, columns as vertical, and lines joining opposite corners as diagonals. <p>(Refer to supplement of examples, section 6, page 108.)</p> |

| Planning sheet | Day Two | Unit 6 <i>Direction and angle</i> | Term: <i>Spring</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>Add and subtract a pair of two-digit numbers (crossing 10 but not 100 boundary).</p> | <ul style="list-style-type: none"> Ask 'quick-fire' questions for children to answer orally, starting from known facts, e.g. What is: $7 + 4?$ $17 + 4?$ $27 + 4?$ $27 + 14?$ $37 + 24?$ What is: $15 - 7?$ $25 - 7?$ $65 - 7?$ $65 - 17?$ $75 - 27?$ Ask questions for children to do using whiteboards, e.g. what is $48 + 26$? <div>Q How did you work it out?</div> <p>Discuss children's methods focusing on strategies such as rounding (48 to 50) then subtracting 2 from the sum; adding the tens first; adding 20 to 48, then adding 6.</p> <p>Repeat for other additions and subtractions of two-digit numbers which cross the tens boundary.</p> <ul style="list-style-type: none"> Write a set of eight addition and subtraction calculations (four of each) on the board, use two-digit numbers crossing the tens but not hundreds boundary. Ask children to work them out mentally and record the answers on their whiteboard as quickly as possible. Stop them after a given time. Ask whether any questions caused difficulties and discuss strategies for working them out. Model calculations that caused problems. | <p>Recognise positions and directions, e.g. describe and find the position on a grid of squares where the lines are numbered.</p> <p>Use the eight compass directions N, S, E, W, NE, NW, SE, SW.</p> <p>Make and measure clockwise and anticlockwise turns: e.g. from SW to N.</p> | <ul style="list-style-type: none"> Label the walls of the room N, S, E, W. Ask children to stand and face north, then turn to face east, south then west. <div>Q Did you turn <i>clockwise</i> or <i>anticlockwise</i>?</div> <p>Remind them that a clockwise turn is to the right like the hands of a clock.</p> <p>Ask the children to make a quarter turn to face south and repeat the question. Remind the children that a quarter turn is a <i>right-angled</i> turn. Ask them to make other turns to face different directions with questions involving the appropriate vocabulary.</p> <div>Q Face north then make a half turn clockwise. In which direction are you facing?</div> <div>Q Turn to face west. What sort of turn did you make?</div> <ul style="list-style-type: none"> Draw on the homework to introduce the other compass directions, e.g. ask the children to face north and turn clockwise through half a right angle. <div>Q Does anyone know which direction you are facing now?</div> <p>Establish that half-way between north and east is called north-east. Repeat for SE, SW, and NW. Give instructions for and ask questions about turns using the new points.</p> <div>Q Face SW. Turn anticlockwise through two right angles. In which direction are you facing?</div> <ul style="list-style-type: none"> Draw the following diagram on the board. Ask children to supply the unmarked directions and discuss to reinforce the new points. <div>  </div> <ul style="list-style-type: none"> Give out Activity sheet 6.1 and briefly revise the use of coordinates. In pencil, ask children to mark (3,5) very lightly with a cross, (6,7) with a dot and (6,3) with a tiny circle. Establish that the top of the page is north. <div>Q In which direction is: the cross from the dot; the circle from the dot?</div> <p>Ask them to erase the marks on the grid. Clarify the instructions on Activity sheet 6.1, then ask children to complete it.</p> | <ul style="list-style-type: none"> Discuss the activity. Check answers and correct any errors and misunderstandings. Use the grid to check children understand how to turn clockwise and anticlockwise in right angles. <div> <div>Q Face east from Splat. How many right angles would you turn through to face Ming?</div> <div>Q Face north-west from Fizz. Which spaceship would you see if you turned through one right angle clockwise?</div> <div>Q You are starting at Buzz. Through how many right angles would you turn to face from Clink to Fizz?</div> </div> <div> <p>By the end of the lesson the children should be able to:</p> <ul style="list-style-type: none"> Use the eight compass directions; Describe and find the position of a point on a grid of squares where the lines are numbered; Make clockwise and anti-clockwise turns and measure them in terms of right angles. <p>(Refer to supplement of examples, section 6, pages 108 and 110.)</p> </div> |
| <p>RESOURCES</p> <p>Whiteboards</p> | | <p>VOCABULARY</p> <p>north-east north-west south-east south-west clockwise anticlockwise rotate whole turn half turn quarter turn angle right angle</p> <p>RESOURCES</p> <p>Activity sheet 6.1</p> | | |

| Planning sheet | Day Three | Unit 6 <i>Direction and angle</i> | | Term: <i>Spring</i> | Year Group: 4 |
|--|---|--|--|---|--|
| Oral and Mental | | Main Teaching | | | Plenary |
| Objectives and Vocabulary | Teaching Activities | Objectives and Vocabulary | Teaching Activities | | Teaching Activities / Focus Questions |
| Derive multiplication facts for the 8 times table by doubling the 4 times table. | <ul style="list-style-type: none">Ask the class to count in 4s to 40. Record the multiples on the board as they do so.<div><div>Q What is double 4?</div><div>Q What is 1 × 4?</div><div>Q So what is 1 × 8?</div></div>Use interactive whiteboard to show pattern.<p>Establish that any multiple of 8 can be found by doubling the same multiple of 4.</p>Ask the class to count in 8s by doubling the multiples of 4 shown on the board. Record these multiples on the board below the multiples of 4. Ask them to say the 8 times table.Ask random multiplication facts for the times 8 table for children to answer orally, using the multiples on the board for reference.Clear the board, then record the multiples of 8 in random order on the board. Point to a multiple at random and ask<div><div>Q How many 8s make this number?</div></div> <p>Repeat and finally get the children to say the 4 and 8 times tables.</p> | <p>Begin to know that angles are measured in degrees and that: one whole turn is 360 degrees or four right angles; a quarter turn is 90 degrees or one right angle; half a right angle is 45 degrees.</p> <p>Start to order a set of angles less than 180 degrees.</p> <p>VOCABULARY right angle degree</p> <p>RESOURCES Activity sheet 6.2 Two large rulers Large 45° set square Large clock face with movable hands Tracing paper Whiteboards Scissors</p> | <ul style="list-style-type: none"><div><div>Q What type of angles are in squares and rectangles?</div></div>Establish that each angle in a square and a rectangle is a right angle. With a piece of A4 paper (a rectangle) demonstrate that the four right angles fit together around a point.<div><div>Q How many degrees in one whole turn?</div></div><p>Get children to stand up and turn through on whole turn. Remind them that they have turned through 360 degrees.</p><div><div>Q How many right angles have they turned?</div></div><p>Draw out that four right angles is 360 degrees.</p><div><div>Q How many right angles in half a turn? How many degrees in two right angles?</div></div><p>Establish that half a turn is two right angles and this is 180 degrees.</p><div><div>Q What is half of 180 degrees?</div></div><p>Establish that this is 90 degrees and there are 90 degrees in one right angle.</p>Show a large 45 degree set square and establish that the angles are the same size as half a right angle.Use two large rulers to demonstrate a right angle, or 90 degrees. Make angles less than 90 degrees and greater than 90 degrees. | <div><div>Q Is this angle bigger than a right angle?</div><div>Q Is it smaller than a right angle?</div></div> <p>Compare angles with the corner of a square to confirm answers.</p> <p>Rotate the rulers slowly as you ask:</p> <div><div>Q How many degrees in: two right angles; half a right angle; a whole turn?</div></div> <ul style="list-style-type: none">On their whiteboards ask the children to draw angles less than 90 degrees; greater than 90 degrees; greater than 180 degrees. Ask them to make angles they estimate to be 45 degrees and hold them up.With the two rulers make an angle.<div><div>Q Is this angle smaller/bigger than 0, 90, 180, 360 degrees?</div></div><p>Get children to identify the interval that contains the angle.</p>Give out Activity Sheet 6.2.<div><div>Q What size is angle K?</div></div><p>Establish it is a right angle, 90 degrees. Ask children to put a ✓ or X in the boxes against each angle to say whether it is bigger or smaller than 90 degrees. Ask the children to cut out angle K and fold in half to make 45 degrees. Ask children to put a ✓ or X in the boxes to say whether the angles are bigger or smaller than 45 degrees. Show children how they can use tracing paper to compare angles, and answer the questions on the sheet.</p> | <ul style="list-style-type: none">Discuss the children’s answers. Check the order of the angles, correct any errors or misunderstandings.Use a large clock face with movable hands. Set the hands to 12 o’clock, then slowly rotate the minute hand to 12:15.<div><div>Q Through how many degrees has the minute hand moved?</div></div>Repeat for 180, 45 and 360 degrees. <div><p>By the end of the lesson the children should be able to:</p><ul style="list-style-type: none">Recognise that angle is measured in degrees and know that a quarter turn is 90 degrees or one right angle, a whole turn is 360 degrees or four right angles, a half turn is 180 degrees or two right angles, and half a right angle is 45 degrees;Order a set of angles less than 180 degrees;Recognise that the angles at the corners of squares are 90 degrees;Describe 90, 45, 180 and 360 degree turns of a minute hand on a clock face.<p>(Refer to supplement of examples, section 6, page 110.)</p></div> |

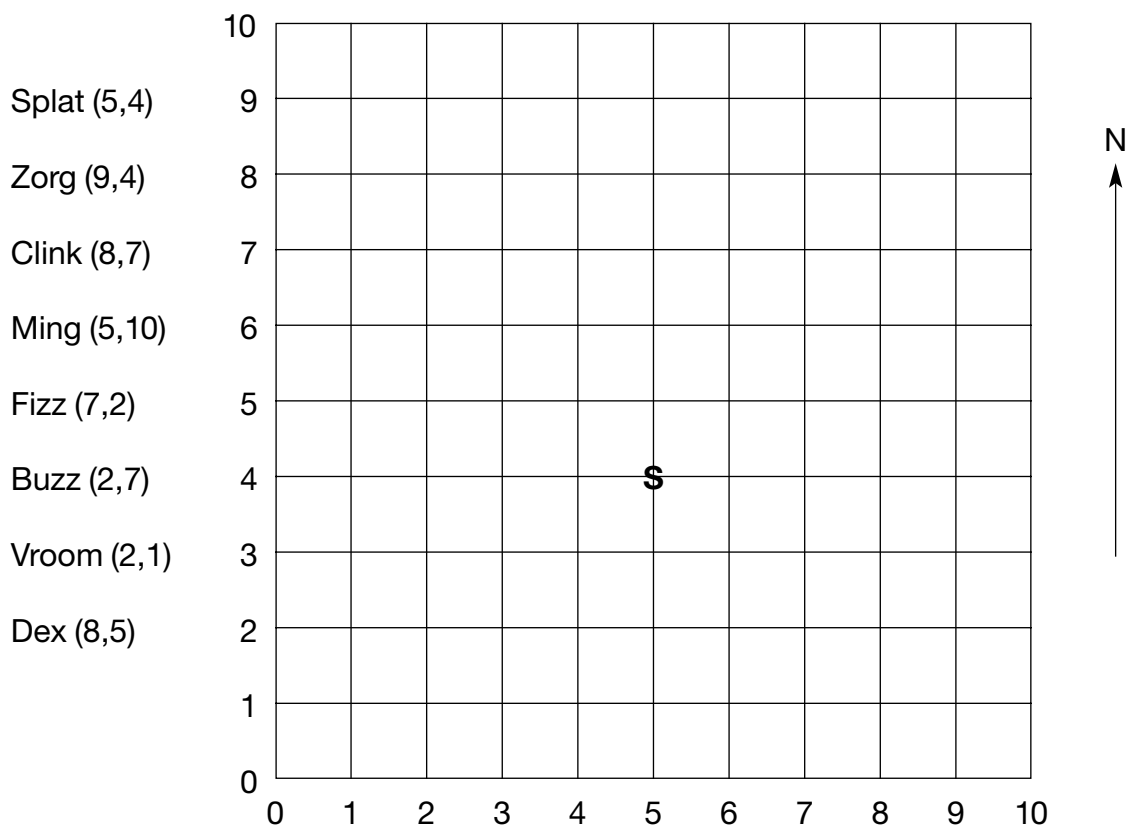
Find the Aliens

Alien spaceships have landed secretly on Earth.

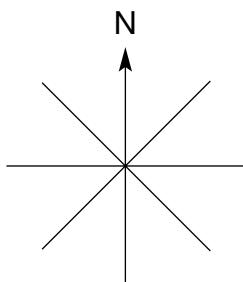
You can find them by marking their positions on the grid.

Write the initial letter for each spaceship in the position shown by its co-ordinates.

(The first one, Splat, is done for you.)

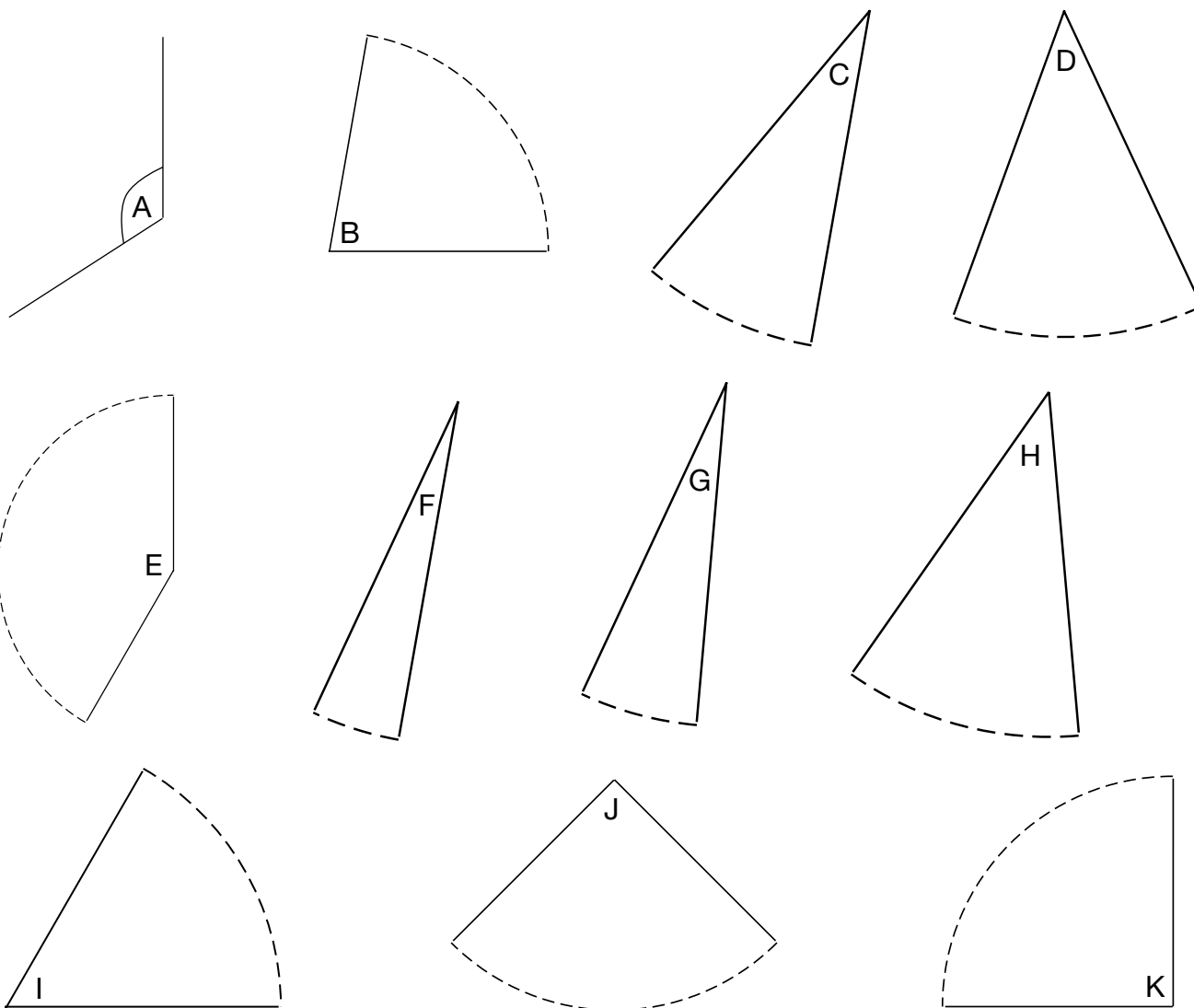


Mark the missing compass directions on this diagram.



1. Which spaceship is north of Splat?
2. Which spaceship is north-east of Fizz?
3. Which spaceship is north-west of Clink?
4. In which direction is Dex from Clink?
5. In which direction is Splat from Buzz?
6. In which direction is Vroom from Clink?
7. Describe the direction of Zorg in relation to three other spaceships.

Angle questions



Each angle is marked with a letter. Use the letters in your answers. Use the tracing paper if you need to.

| Angle | A | B | C | D | E | F | G | H | I | J | K |
|------------------------|---|---|---|---|---|---|---|---|---|---|---|
| Bigger than 90 degrees | | | | | | | | | | | |
| Bigger than 45 degrees | | | | | | | | | | | |

- Which angle measures 90 degrees?
- Which angle measures 45 degrees?
- Which is the smallest angle?
- Which is the largest angle?
- Put the angles in order of size from smallest to largest. Use the letters, to record your answer.

Coordinate Grid

