Shape, space and measures 2

contents

There are four lessons in this unit, **Shape, space and measures 2**.

objectives

The objectives covered in this unit are:

- Estimate and use a protractor to measure acute and obtuse angles.
- Use the labelling conventions for angles.
- Know the sum of angles at a point, on a straight line, and in a triangle.
- Identify parallel and perpendicular lines.
- Recognise properties of rectangles.
- Classify triangles (isosceles, equilateral, scalene).
- Recognise positions; read and plot coordinates in the first quadrant.
- Find coordinates of points determined by geometric information.
- Solve problems and investigate in shape, space and measures.
- Explain and justify methods and conclusions.

Using the lesson plans in this unit

These lesson plans supplement the *Springboard 7* materials for Key Stage 3 pupils working toward level 4 in mathematics. All the lessons are examples only. There is no requirement to use them. If you decide to use the lessons, you will need to prepare overhead projector transparencies (OHTs) and occasional resource sheets for pupils to use.

The lessons consolidate work at level 3 and extend into level 4. They are suitable for a group of pupils or a whole class. Whatever the size of the group, the pupils are referred to as 'the class'.

Each lesson will support about 30 to 40 minutes of direct teaching. To help match the time to your timetable, each plan refers to 'other tasks' for pupils, based on *Springboard 7* resources. Select from these, textbook exercises or your own materials to provide practice and consolidation in the main part of a lesson and to set homework. Aim to choose tasks that vary in their level of demand, to suit pupils' knowledge, confidence and rate of progress.

Although the 'other tasks' are listed for convenience at the end of the main part of the lesson, they can be offered at any point, especially between the 'episodes' that form the main activity.

The lesson starters are of two kinds: practice starters and teaching starters. The former are opportunities to rehearse skills that will be needed later in the lesson. Teaching starters introduce an idea that is then developed in the main activity.

You will need to tell pupils what they will learn in the lesson, either in the starter or at the beginning of the main activity. Use the plenary to check pupils' learning against the lesson's objectives and to draw attention to the key points that pupils should remember.

Interactive teaching programs (ITPs)

Interactive teaching programs are interactive animated visual aids that can be used with a laptop and data projector or with an interactive whiteboard. As extra support for this unit, you may find it useful to download and use this ITP from the website www.standards.dfes.gov.uk/numeracy:

for lesson S2.4: *Coordinates*

S2.1 Measuring angles

objectives

- Estimate and use a protractor to measure acute and obtuse angles.
- Use the labelling conventions for angles.
- Solve problems in shape, space and measures.
- Explain and justify methods and conclusions.

starter

Vocabulary
north
south
east
west
turn
clockwise
right angle
degrees

Resources
OHT S2.1a

Remind the class that one whole turn is four right angles. Ask pupils to stand up and face north. Show them which direction it is and face north yourself. Tell them to follow your instructions and to copy you.

Q **Turn to face west. How far did we turn?** (a quarter turn, or a right angle)

Q **Turn to face east. How much did we turn that time?** (a half turn, or two right angles)

Repeat for some other turns, then ask the class to sit down. Say that turns are also measured using *degrees*. Write on the board: 1 right angle = 90 degrees = 90°. Explain that the symbol ° stands for degree.

Demonstrate a half turn.

Q **How many right angles did I turn?** (two) **How many degrees did I turn?** (180°)

Write on the board: 2 right angles = 180°. Repeat for three and four right angles.

Sketch on the board an eight-point compass, and remind the class that north-east is halfway between north and east.

Q **Imagine turning from north to north-east. How many degrees would you turn?** (45°)

Q **How many degrees are there between south-east and south-west?** (90°) **Between south and north-west?** (135°)

Q **Imagine facing north. Turn clockwise through two right angles. Which direction are you facing now?** (south)

Q **Imagine facing east. Turn clockwise through three right angles. Which direction are you facing now?** (north)

Show and guide the class through the problem on **OHT S2.1a**.

main activity

Vocabulary
angle
protractor (180°)
acute
obtuse
reflex

Place a protractor on the projector. Tell the pupils that it is called a *protractor* and is used for measuring and drawing angles. Explain that it has two measuring scales: an inner one and an outer one. Each scale starts at 0° and ends at 180°, and is labelled in intervals of 10°. Point out the zero line, connecting the centre of the protractor to 0° on either side.

Display **OHT S2.1b**. Point to the first angle.

Resources

transparent ruler and protractor
rulers and protractors for pupils
blank OHT
mini-whiteboards
OHT S2.1b
Resource S2.1c

Q Do you think that this angle is more or less than 45°? Estimate its size.

Record some of the estimates.

Demonstrate how to measure the first angle, explaining to the class what to do. Place the zero line on one arm of the angle, making sure that the protractor covers the other arm. Slide the protractor along until the centre point is at the meeting point of the two arms of the angle. Use the scale that starts at zero on the first arm of the angle. Read the position of the other arm on the scale.

Q What is the size of the angle? (e.g. 40°)

Write 40° between the arms of the angle.

Repeat the process, measuring several different angles.

Give out copies of **Resource S2.1c**. Ask pupils to work in pairs. One pupil should measure the even-numbered angles and the other pupil the odd-numbered angles. Pupils should then swap sheets and check each other's angles.

Show the class how to use a ruler and protractor to draw an acute angle of a given size, explaining what to do. Draw a short line about 7 cm long on a blank OHT. Place the zero line of the protractor on the drawn line, with the centre of the protractor at one end. Call this end Y. Use the scale that starts at zero on the line. Mark the required angle with a point. Use the ruler to join the marked point to the point Y to form the angle.

Ask pupils to use a ruler and protractor to draw an angle of 65°. Repeat with other angles.

Draw an acute angle on the board, labelling its arms ABC. Tell the class that it can be referred to as angle ABC or angle CBA, reading from the end of one arm, to the meeting point of the two arms, to the end of the other arm.

Q Is this angle more or less than a right angle? Estimate its size.

Tell the class that angles less than 90° are called *acute angles*. Write *acute* beside the angle. Invite a pupil to measure it with a protractor. Ask pupils to sketch another acute angle on their whiteboards.

Draw an obtuse angle on the board and label its arms.

Q Is this angle more or less than a right angle? Is it more or less than two right angles?

Establish that it lies between 90° and 180°. Tell the class that angles between 90° and 180° are called *obtuse angles*. Write *obtuse* beside the angle. Ask the class to estimate the size of the angle and invite a pupil to measure it.

Draw a reflex angle on the board and label its arms.

Q Is this angle more or less than two right angles?

Tell the class that angles more than 180° are called *reflex angles*. Write *reflex* beside the angle.

other tasks

Springboard 7
Unit 14

Unit 14 section 2: Measuring angles

Unit 14 section 3: Naming and estimating angles

plenary

Resources
OHTs S2.1d, S2.1e
OHP protractor
mini-whiteboards

Display **OHT S2.1d**. Work through the questions with the class, inviting pupils to explain their reasoning.

Ask pupils to estimate the sizes of angles *a*, *c*, *d* and *f*, and to write their estimates on their whiteboards. Look out for pupils who forget to include the degree symbol. Invite individual pupils to the projector to measure these angles with the protractor in order to check the estimates.

Display **OHT S2.1e**. Work through the questions, asking pupils to explain their reasoning.

Remember

- One whole turn is the same as four right angles.
- Angles that are less than 90° are called acute angles.
- Angles between 90° and 180° are called obtuse angles.
- Angles that are more than 180° are called reflex angles.

S2.2 Properties of triangles and rectangles

objectives

- Identify parallel and perpendicular lines.
- Recognise properties of rectangles.
- Classify triangles (isosceles, equilateral, scalene).
- Solve problems and investigate in shape, space and measures.
- Explain and justify conclusions.

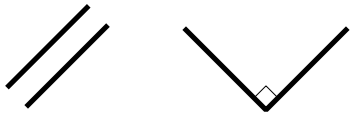
starter

Vocabulary
parallel
perpendicular

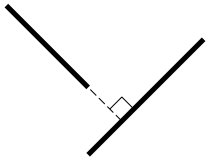
Resources
OHT S2.2a

Draw a pair of sloping parallel lines on the board. Tell the class that these lines are called *parallel lines*. Write *parallel* on the board. Explain that the lines never cross or meet, even if they are extended.

Draw a pair of perpendicular lines on the board. Tell the class that these lines meet at a right angle, and that they are called *perpendicular lines*. Write *perpendicular*.



Explain that these lines are also perpendicular.



Q What parallel and perpendicular lines can you see in the classroom?
(e.g. the edges of a sheet of paper)

Show **OHT S2.2a** and work through the questions with the class.

main activity

Vocabulary
horizontal
vertical
equilateral
isosceles
scalene
adjacent

Resources
drinking straws
ruler and scissors for each pupil
mini-whiteboards

Draw a square and a rectangle on the board, each with its diagonals. Ask:

Q What statements can you make about the sides or angles that apply to both the square and the rectangle?

Draw out that in both the square and the rectangle:

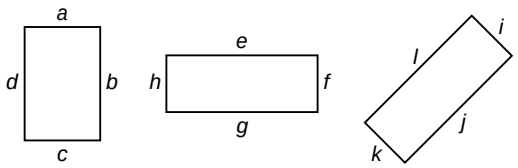
- there are four sides;
- opposite sides are equal and parallel;
- all four angles are equal;
- each angle is a right angle, or 90°, so that adjacent sides are perpendicular;
- the diagonals are equal and cut each other in half.

Say that a square is a special case of a rectangle, and that in the square only:

- all four sides are equal;
- the diagonals cut each other at right angles.

Tell the class that the line where the sea and the sky meet is called the *horizon*, and that lines which are parallel to the horizon are called *horizontal*. Draw some horizontal lines on the board and write *horizontal*. Explain that vertical lines are at right angles to horizontal lines. Draw some on the board and write *vertical*.

Draw three rectangles on the board and label the sides *a* to *l*.



Q **Which sides are horizontal?** (*a*, *c*, *e*, *g*) **Which are vertical?** (*b*, *d*, *f*, *h*)

Q **Which pairs of sides are parallel?** (*a*, *c*; *b*, *d*; *h*, *f*; *e*, *g*; *i*, *k*; *j*, *l*)

Q **Which sides are perpendicular to side *a*?** (*b, d* and *h, f*) **To side *d*?** (*a, c* and *e, g*) **To side *f*?** (*e, g* and *a, c*) **To side *k*?** (*j* and *l*)

Tell the class to close their eyes. Say:

Q **I want you to imagine a square. How many pairs of parallel lines can you see?**

Q **Imagine a rectangle. How many pairs of parallel lines can you see?**

Q **Imagine a regular hexagon. How many pairs of parallel lines can you see?** (3 pairs)

Say that you are now going to give the class instructions for making an imaginary 3-D shape with straws all the same length. Say:

> *Imagine a square made of four straws lying on a horizontal table top.*
> *Put a straw vertically at each corner of the square.*
> *Finish off with another square of straws on the top.*

Tell pupils to open their eyes and to answer questions using their whiteboards.

Q **How many horizontal squares are there in the shape you have made?** (2)
Q **How many horizontal straws are there?** (8)
Q **How many vertical straws are there?** (4)
Q **How many vertical squares are there?** (4)
Q **What is the name of the 3-D shape that you have made?** (a cube)

Give each pupil two drinking straws and a pair of scissors. Ask them to measure and cut off six shorter straws: three of length 4 cm and three of length 6 cm. They should keep safe the remaining pieces.

Now ask them to use any of their six straws to make a triangle. They should then sketch the triangle in their exercise books, labelling each side with its length.

Q **Now make some different triangles. How many different triangles can you make?**

Establish that four different triangles can be made altogether:
4 cm, 4 cm, 6 cm; 6 cm, 6 cm, 4 cm; 4 cm, 4 cm, 4 cm; and 6 cm, 6 cm, 6 cm.

Tell the class that there is a special name for triangles in which all three sides are equal. They are called *equilateral triangles*. There is also a special name for triangles in which two sides are equal and one is different. These are called *isosceles triangles*. Write *equilateral* and *isosceles* on the board.

Ask pupils to cut another two straws from their remaining pieces: one of length 2 cm and one of length 5 cm. Ask them to use any of their eight short straws to see if they can make triangles where three sides are different lengths. Establish that there are three possibilities:

2 cm, 4 cm, 5 cm; 2 cm, 5 cm, 6 cm; and 4 cm, 5 cm, 6 cm.

Tell the class that triangles in which all three sides are different lengths are called *scalene triangles*. Write *scalene* on the board.

other tasks

Springboard 7
Unit 8

Unit 8 section 1: Lines and rectangles

Unit 8 section 2: Triangles and coordinates

plenary

Resources
OHT S2.2b

Show the upper half of **OHT S2.2b**, a set of different triangles. Ask:

Q Which of the triangles are isosceles? Which are equilateral?

Ask pupils to explain why they think they are correct. Point to triangle C, and ask:

Q Why is this triangle not an isosceles triangle? (it does not have two equal sides) **What type of triangle is it?** (scalene)

Show the lower half of **OHT S2.2b**, a set of four-sided shapes in different orientations. Ask:

Q Which of the shapes are rectangles?

Again, ask pupils to explain why they think they are correct. Stress that all the shapes with four right angles are rectangles, including the squares.

Q Why is shape S not a rectangle? (its angles are not 90°)
Q Are any of the rectangles identical? (R and T)

Discuss how a rectangle remains a rectangle when rotated.

Remember

- Parallel lines are straight lines that never meet. Perpendicular lines meet at a right angle.
- Horizontal lines are parallel to the horizon. Vertical lines are perpendicular to the horizon.
- An equilateral triangle has three equal sides. An isosceles triangle has two equal sides. A scalene triangle has three sides of different lengths.

S2.3 Calculating angles

objectives

- Know the sum of angles at a point, on a straight line, and in a triangle.
- Solve problems and investigate in shape, space and measures.
- Explain and justify methods and conclusions.

starter

Vocabulary
add

Resources
mini-whiteboards

Write 90 on the board. Ask pupils to respond using their whiteboards.

Q **What do we add to 60 to make 90?**

Repeat with 30, 45, 15, 50.

Write 180 on the board.

Q **What do we add to 120 to make 180?**

Repeat with 90, 30, 135, 75.

Write 360 on the board.

Q **What do we add to 270 to make 360?**

Repeat with 315, 210.

main activity

Vocabulary
turn
degrees
right angle

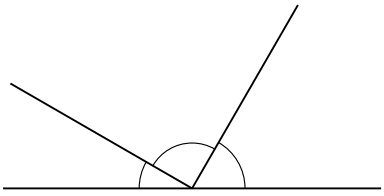
Resources
four transparent set squares
scalene triangle made from stiff paper, of a size to fit on an overhead projector
OHT S2.3a
Resource S2.3b

To remind the class, ask:

Q **How many degrees are there in a right angle?** (90°) **In half a turn?** (180°) **In a whole turn?** (360°)

Put two set squares together on the overhead projector to show that two right angles are equivalent to half a turn, and that they form a straight line. Repeat with four set squares, showing that four right angles around a point are equivalent to a full turn.

Draw this diagram on the board.



Q **How many angles are marked?** (three)

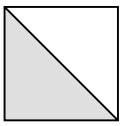
Q **One of the angles is 30° and another is 90°. Which are these angles?**

Invite a pupil to identify and label the two angles.

Q **How can we calculate the other angle?**

Establish that the sum of all three angles is 180°, since the three angles form a straight line. By finding the sum of the two known angles, and subtracting the total from 180°, we can find the third angle. With the class, work out 90° + 30° = 120°, then 180° – 120° = 60°.

Explain that a square can be cut in half to get two identical triangles. Draw a square on the board, with one diagonal, and one triangle shaded.



Point to the shaded triangle and ask:

Q What is the size of each of the angles of this triangle?

Establish that one of the angles is 90°. Since the two triangles are identical, each of the other angles is 45°, or half a right angle.

Q What is the sum of the three angles? (180°)

Tell the class that the sum of the angles of any triangle is 180°. Say that you will show them why. Place the paper triangle on the OHP and identify the three angles. Tear off each angle from the triangle and fit them together on the overhead projector to form a straight line. Say that, whatever the size or the shape of the triangle, the three angles can always be fitted together on a straight line. Tell pupils that they should remember that the three angles of a triangle add up to 180°. It is a useful fact from which they can derive more facts.

Draw an equilateral triangle on the board. Remind the class that the three sides are equal and the three angles are equal.

Q What is the size of one of the angles of the equilateral triangle? (one third of 180°, or 60°)

Show **OHT S2.3a**. Refer to triangle A. Remind pupils how to use a protractor to measure an angle by measuring one of the angles yourself. Emphasise how to position the protractor and how to choose which scale to use. Write the size of the angle on the board. Invite pupils to measure the other two angles and to write their sizes in degrees on the board.

Q What do we expect the sum of these three angles to be? (180°) **Why?** (they are angles in a triangle)

Add up the three measurements with the class and discuss how the accuracy of each measurement can affect the answer.

Refer to triangle B. Say that two of the angles have already been measured. One is 90° and the other is 25°. Ask pupils to identify which these two angles are.

Q How can we find out the size of the third angle without measuring it?

Establish that the sum of all three angles is 180°. By finding the sum of the first two angles, and subtracting the total from 180°, we can find the third angle. With the class, work out 90° + 25° = 115°, then 180° – 115° = 65°.

Repeat with triangles C and D.

Give out **Resource S2.3b**. Ask pupils to work in pairs to find the size of the missing angle in each of the triangles.

other tasks

Springboard 7
Unit 14

Unit 14 section 5: Calculations involving angles

plenary

Resources
Resources S2.3c, S2.3d

Give out copies of **Resources S2.3c and S2.3d**. Work through the questions with the class. For each problem, get pupils first to study the question and identify and mark on the diagram the information that they are given. Then ask them to think about any geometric facts that could be useful and to mark these on the diagram as well.

Stress that when they are calculating angles – for example, on a straight line, in a triangle, or around a point – they should show their working. Show pupils how to do this in relation to each of the questions on the resource sheets.

Remember

- The sum of the angles in a triangle is 180°.
- The sum of the angles on a straight line is two right angles or, 180°.
- The sum of the angles around a point is 360°.
- The angles in an equilateral triangle are each 60°.

S2.4 Coordinates

objectives

- Recognise positions; read and plot coordinates in the first quadrant.
- Find coordinates of points determined by geometric information.
- Solve problems and investigate in shape, space and measures.
- Explain and justify methods and conclusions.

starter

Vocabulary
right
left
top
bottom
above
below
diagonally opposite

Resources
mini-whiteboards

Say that this lesson is about finding and describing positions. Ask pupils to write the words CAT and DOG in two columns, side by side.

C D
A O
T G

Q Which letter is between D and G?
Q Which letter is to the right of A? To the left of G?
Q Which letter is directly above O? Directly below A?
Q Which letter is diagonally opposite T?

Tell the class to close their eyes. Say that you are going to give them two more words, and will then ask some questions. You want them to think of the answers in their heads but not say them aloud. Say, pausing briefly at the end of each sentence:

Imagine the words COW and HEN in two columns, side by side, printed in the air in front of you. COW is on the left and HEN is on the right.
Which letter is directly above the E? Which letter is directly below the O?
Which letter is to the left of the H? Which letter is to the right of the W?
Which letter is diagonally opposite N?

Tell pupils to open their eyes. Repeat the last questions for them to answer. (If pupils have difficulty visualising, repeat the activity, but this time allow them to keep their eyes open and to sketch the information on their whiteboards.)

main activity

Vocabulary
grid, grid lines
horizontal axis (*x*-axis)
vertical axis (*y*-axis)
coordinates
origin

Resources
mini-whiteboards
cm squared paper
OHTs S2.4a, S2.4b, S2.4c
ITP *Coordinates* (optional)

Show **OHT S2.4a**. Point to the *grid lines* and explain that lines drawn like this are called a *grid*. Point to the numbers and say that the lines are labelled to help describe positions of things on the grid – as, for example, on a map. Point out the *horizontal axis* and *vertical axis*. Say that the horizontal numbers tell us how far along, and the vertical numbers tell us how far up.

Q Look along the horizontal axis to the line at 4. What places are on it? (the mine and the gallows)

Q Look up the vertical axis to the line at 3. What places are on it? (the camp and the swamp)

Repeat for other lines.

Q Look at the treasure. How far is it along? (1 unit) **How far is it up?** (5 units)

Explain that the position ‘one along, five up’ is written as (1, 5) and that 1 and 5 are called the *coordinates* of the point where the treasure is. Write (1, 5) and *coordinates* on the board. Repeat for other positions.

Clean the board and ask pupils to look at the map.

Q What place is at (3, 6)? (the beach)

Repeat for other coordinates.

Show **OHT 2.4b**. Tell pupils that the horizontal axis is known as the *x-axis*, and the vertical axis as the *y-axis*. The axes should always be labelled. Point out the labels on the OHT. Explain that the coordinates are always listed in the same order, first the *x-coordinate*, then the *y-coordinate*. In the pair (3, 5), for example, the *x*-coordinate is 3, and the *y*-coordinate is 5. Say that the point where the axes cross each other is the point (0, 0) and is called the *origin*.

Point to a corner of one of the squares, and ask:

Q What is the *x*-coordinate of this point? And the *y*-coordinate?

Ask pupils to write on their whiteboards the coordinates of the other three corners of the square. Repeat with the other square.

Give out centimetre squared paper. Ask pupils to use their rulers and to draw and label two axes, each from 0 to 8. Then ask them to draw a square of their own, and to label each of the corners with the coordinates.

Q Three of the corners of a square are at (0, 3), (0, 5) and (2, 5). Where is the fourth corner? (2, 3)

Q Three of the corners of a square are at (6, 3), (8, 5) and (6, 7). Where is the fourth corner? (4, 5)

Ask pupils to discuss the next question in pairs. Tell them that there is more than one possible answer.

Q Where are the other two corners of a square, if two of the corners are at (4, 2) and (4, 6)? [(0, 2) and (0, 6), or (8, 2) and (8, 6), or (2, 4) and (6, 4)]

You could, if you wish, support this section of the lesson by using the ITP *Coordinates*, downloaded from www.standards.dfes.gov.uk/numeracy. Select options and ask questions to consolidate pupils’ understanding.

Show **OHT 2.4c**. Explain that grid lines are not always drawn, as in this diagram. Work though the questions on the OHT with the class. After each question, ask pupils to explain how they worked out the answer.

other tasks

Springboard 7
Unit 8

Unit 8 section 2: Triangles and coordinates

Unit 8 section 3: Fun with coordinates

plenary

Resources
OHT S2.4d

Show **OHT S2.4d**. Point out the spot on the top corner of each tile.

Q **On tile 3, what are the coordinates of the corner with a spot?** (5, 6)

Q **On tile 4, what are the coordinates of the corner with a spot?** (7, 8)

Q **On tile 10, what are the coordinates of the corner with a spot?** (19, 20) **Explain how you worked out your answer.**

Q **One pupil said: 'One tile in the pattern has a spot in the corner at (50, 50).' Explain why the pupil is wrong.** (the *x*-coordinate of a corner with a spot is always one less than the *y*-coordinate)

Point out the × on each tile. Draw a table on the board. Invite pupils to fill in the coordinates of the corners with a ×.

Tile number	Coordinates of the corner with a ×
1	(……, ……)
2	(……, ……)
3	(……, ……)
4	(……, ……)

Q **On tile 7, what are the coordinates of the corner with a cross on?** (14, 13)

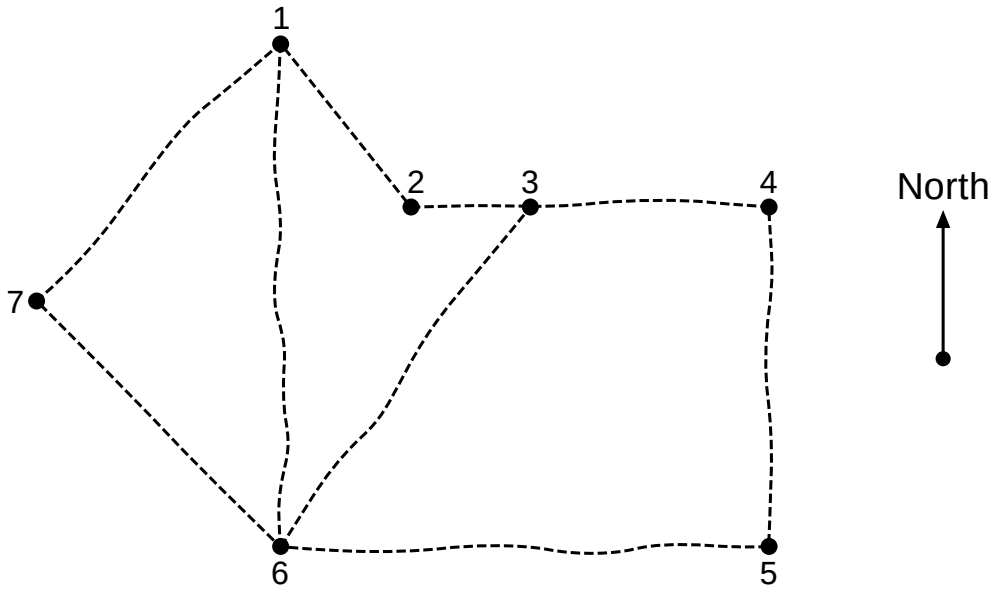
Q **Which tile has a cross in the corner at (24, 23)?** (tile 12)

Remember

- The horizontal axis is the *x*-axis.
- The vertical axis is the *y*-axis.
- A pair of coordinates is written as (*x*, *y*).

OHT S2.1a

The map shows 7 towns and the roads between them.



- Go south from town 1 to another town.
  Then go east to a different town.
  In which town are you? town .....

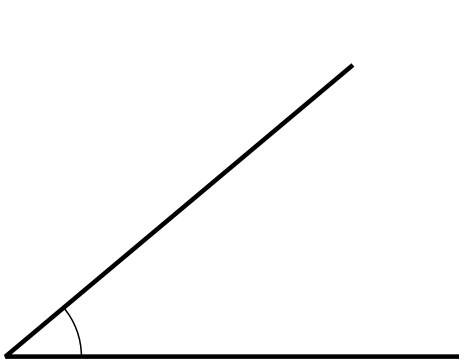
- Complete the missing directions.

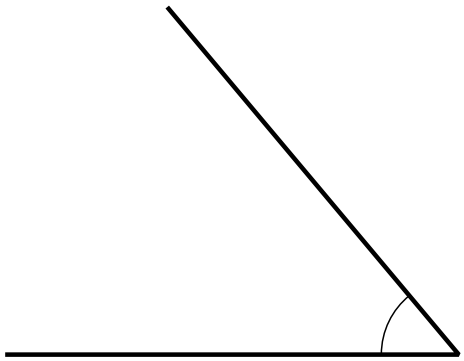
  Start at town 5. Go north to town 4.
  Go ..... to town 3.

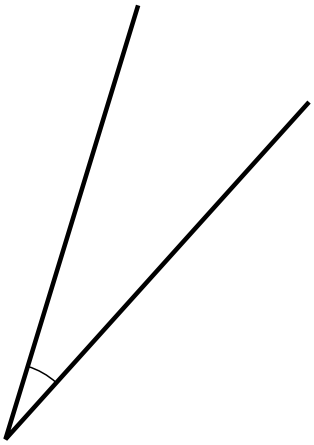
  Start at town 6. Go north-west to town 7.
  Then go ..... to town 1.

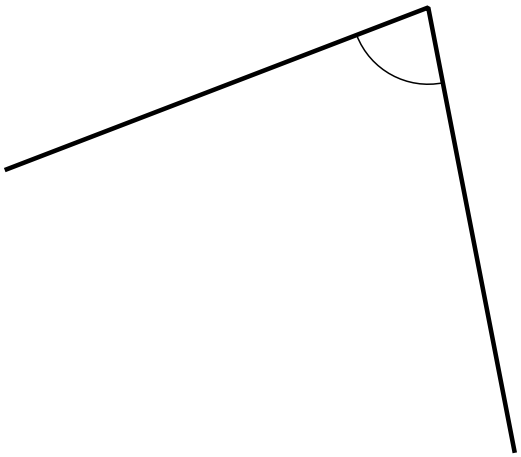
- Town 3 is west of where Steve lives.
  In which town does Steve live? town .....

OHT S2.1b

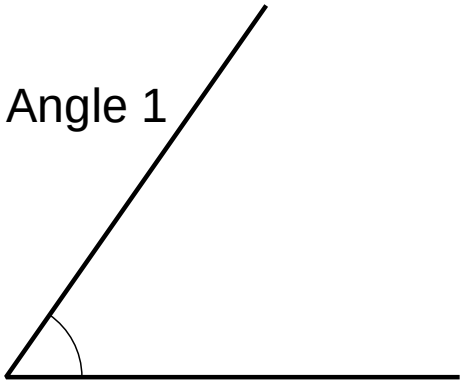


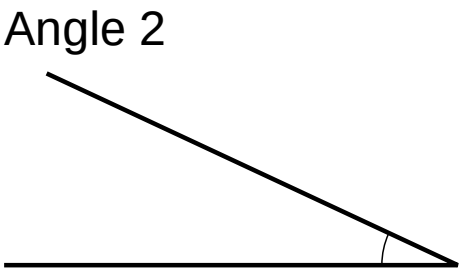


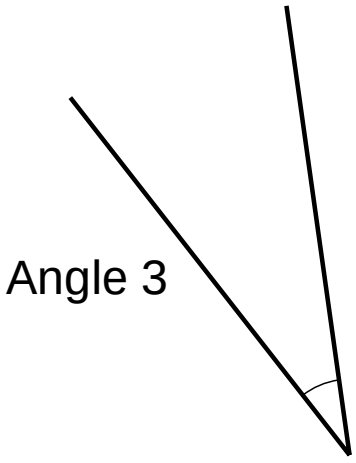


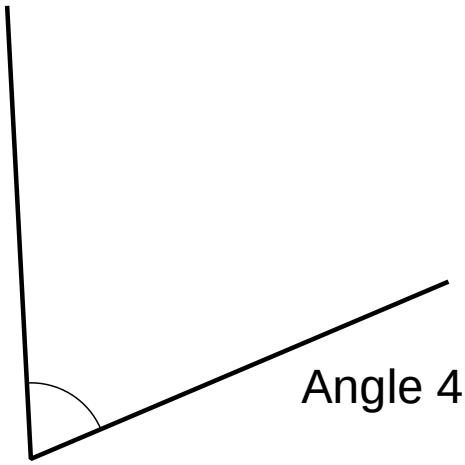


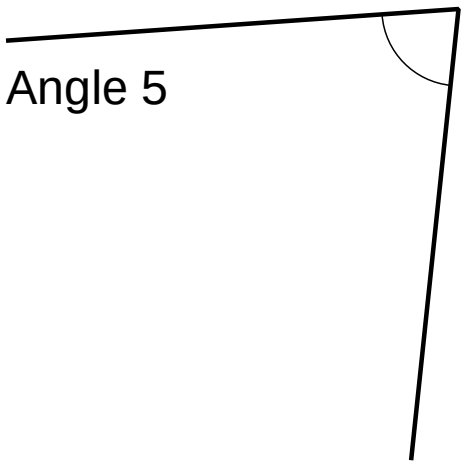
OHT S2.1c

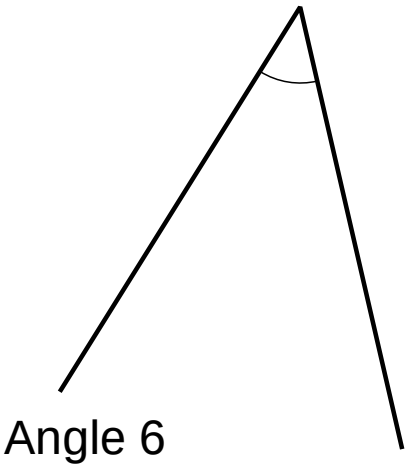






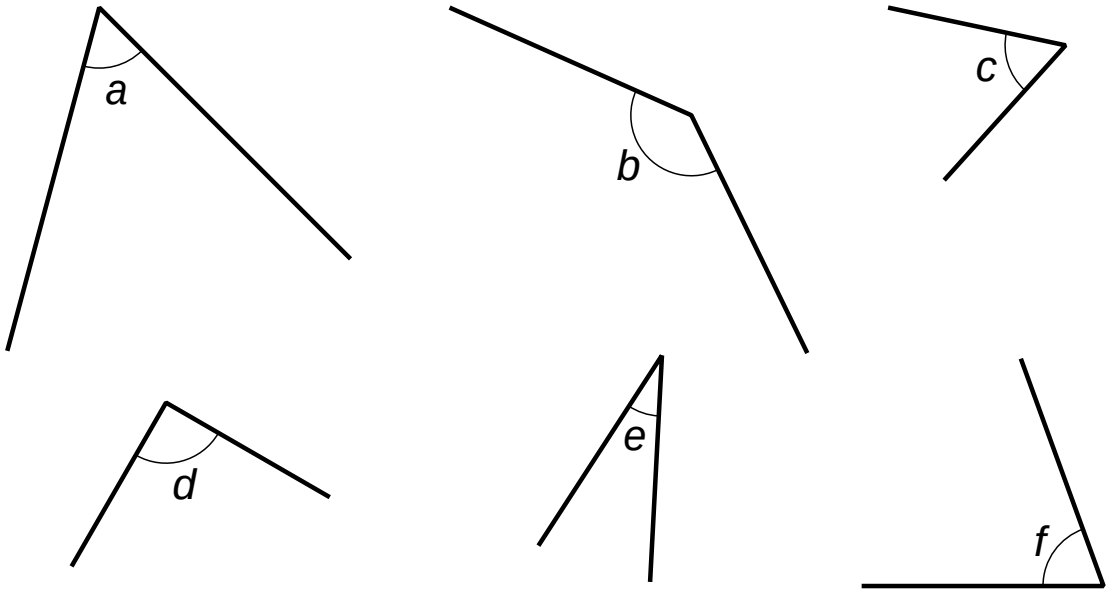






OHT S2.1d

Look at these six angles.



Which is the smallest angle? .....

Which is a right angle? .....

Which is an obtuse angle? .....

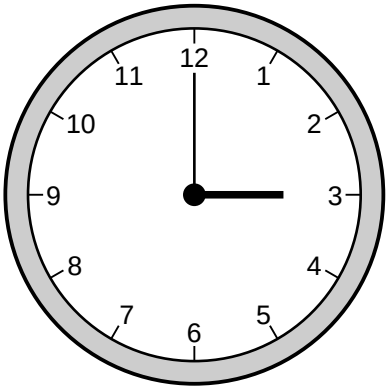
Which two angles are the same size? ..... and .....

Which angle measures 30°? .....

Which angle measures 140°? .....

OHT S2.1e

The time on this clock is 3 o’clock.



What is the size of the angle between the hands:

at 3 o’clock? ..... degrees

at 1 o’clock? ..... degrees

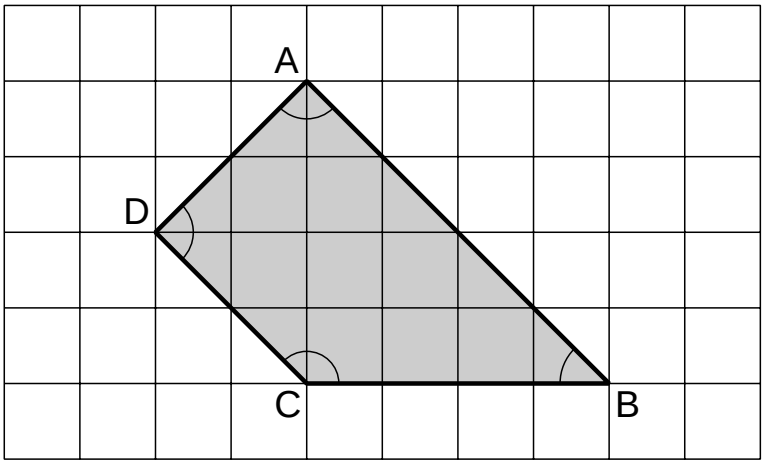
at 5 o’clock? ..... degrees

at 8 o’clock? ..... degrees

at half past 4? ..... degrees

OHT S2.2a

Here is a shape on a square grid.



For each sentence, put a tick (✓) if it is true.

Put a cross (✗) if it is not true.

Angle A is a right angle. ☐

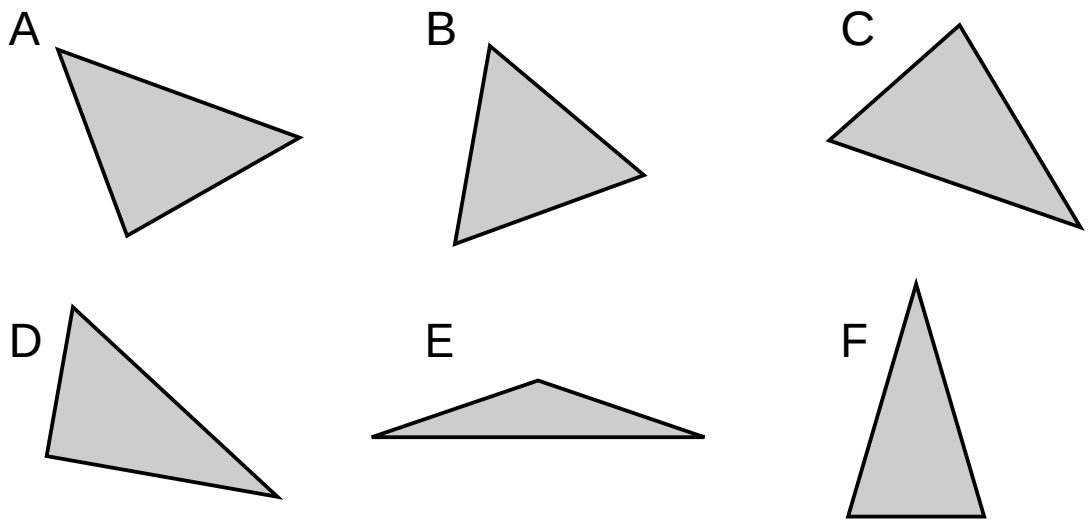
Angle C is an obtuse angle. ☐

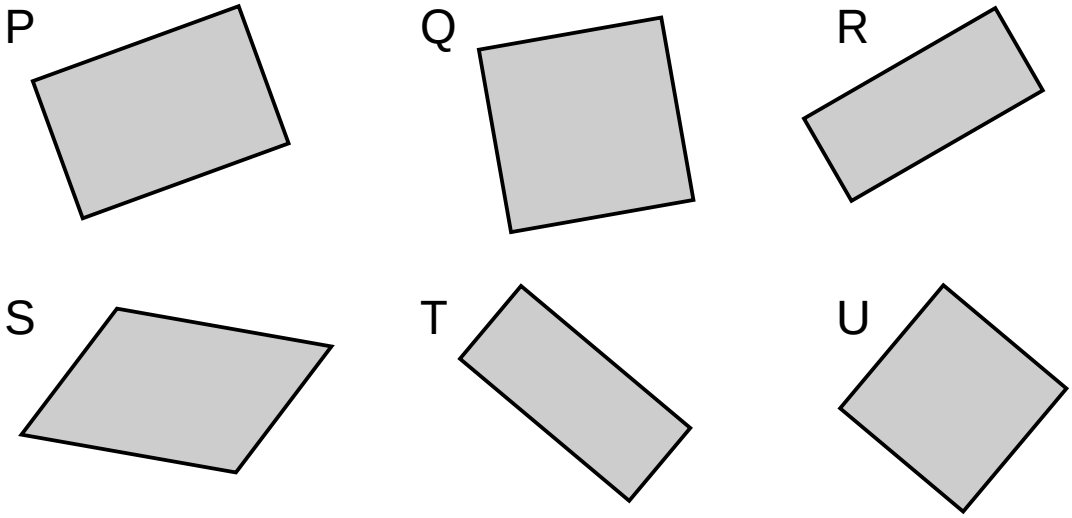
Angle D is an acute angle. ☐

Line AD is parallel to line BC. ☐

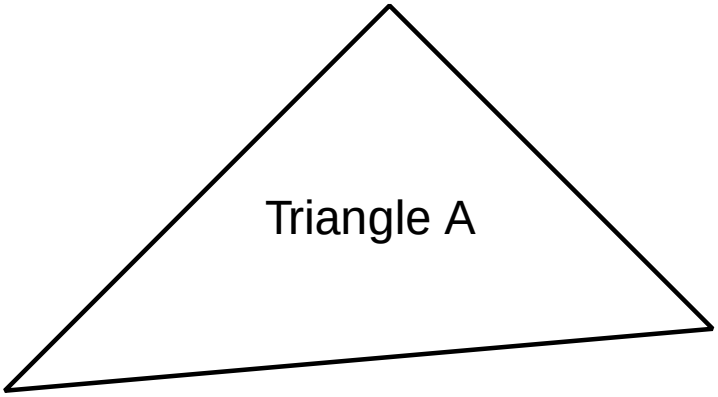
Line AB is perpendicular to line AD. ☐

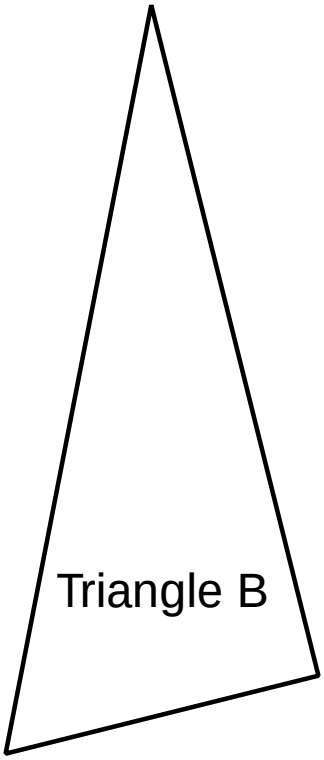
OHT S2.2b

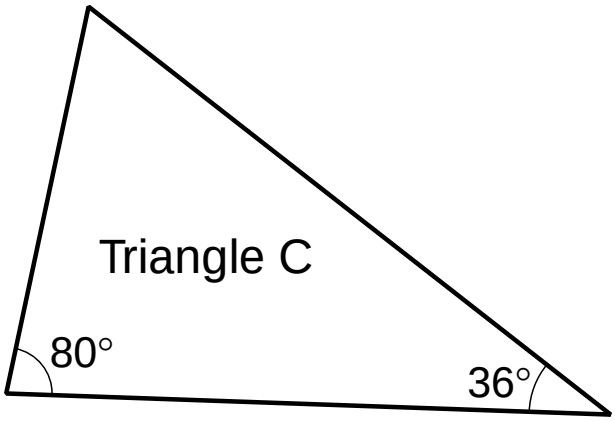


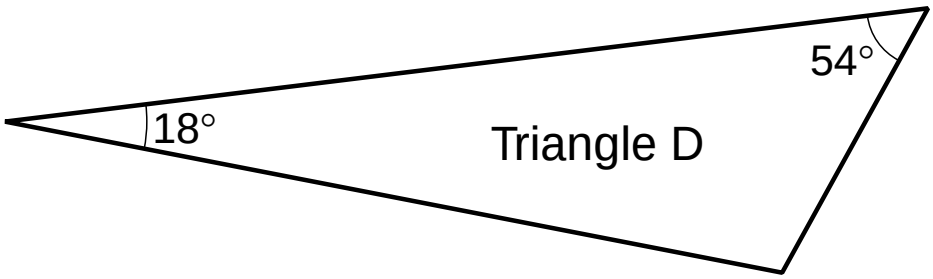


OHT S2.3a

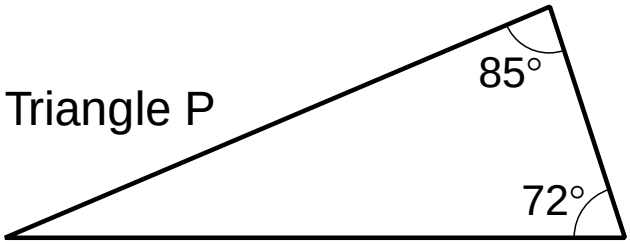


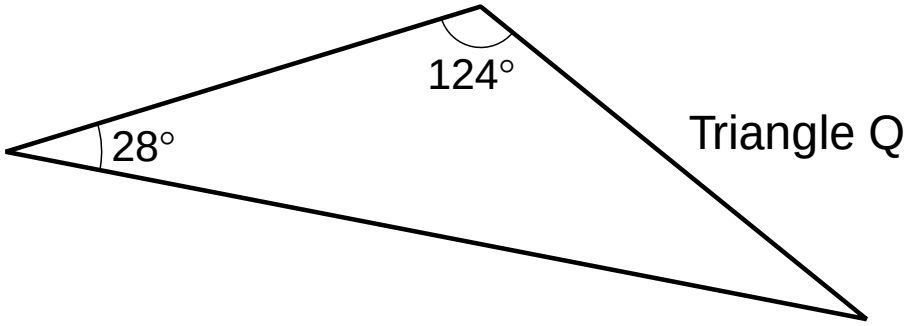


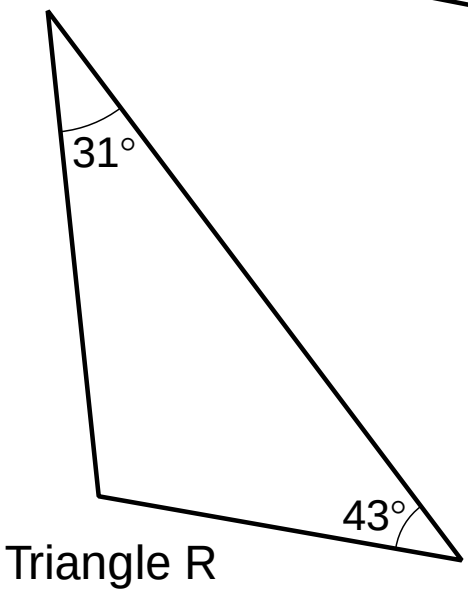


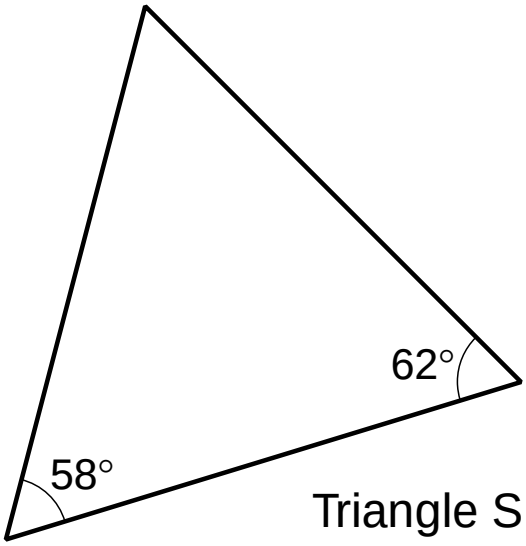


Resource S2.3b



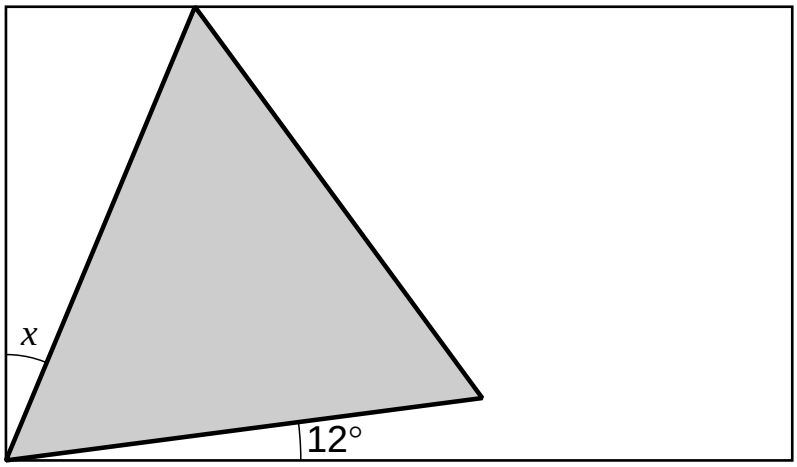






Resource S2.3c

Here is an equilateral triangle inside a rectangle.



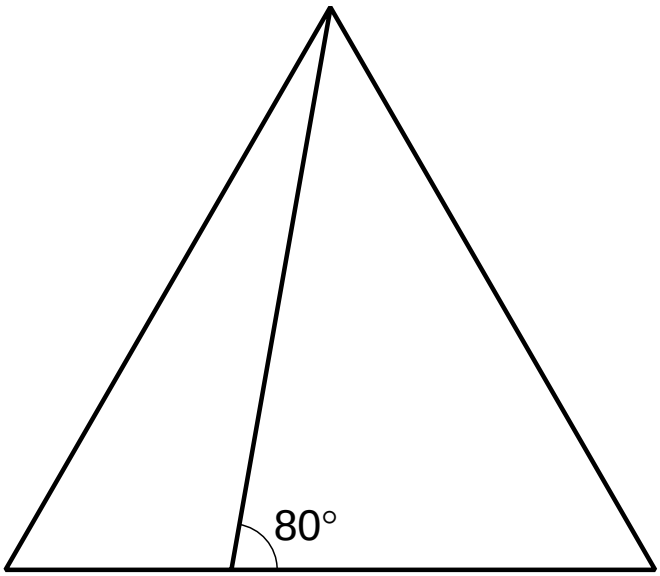
Not to scale

Calculate the value of angle x. ..... degrees

Show your working.

Resource S2.3d

The big triangle is an equilateral triangle.



One of the smaller triangles has an angle of 80°.

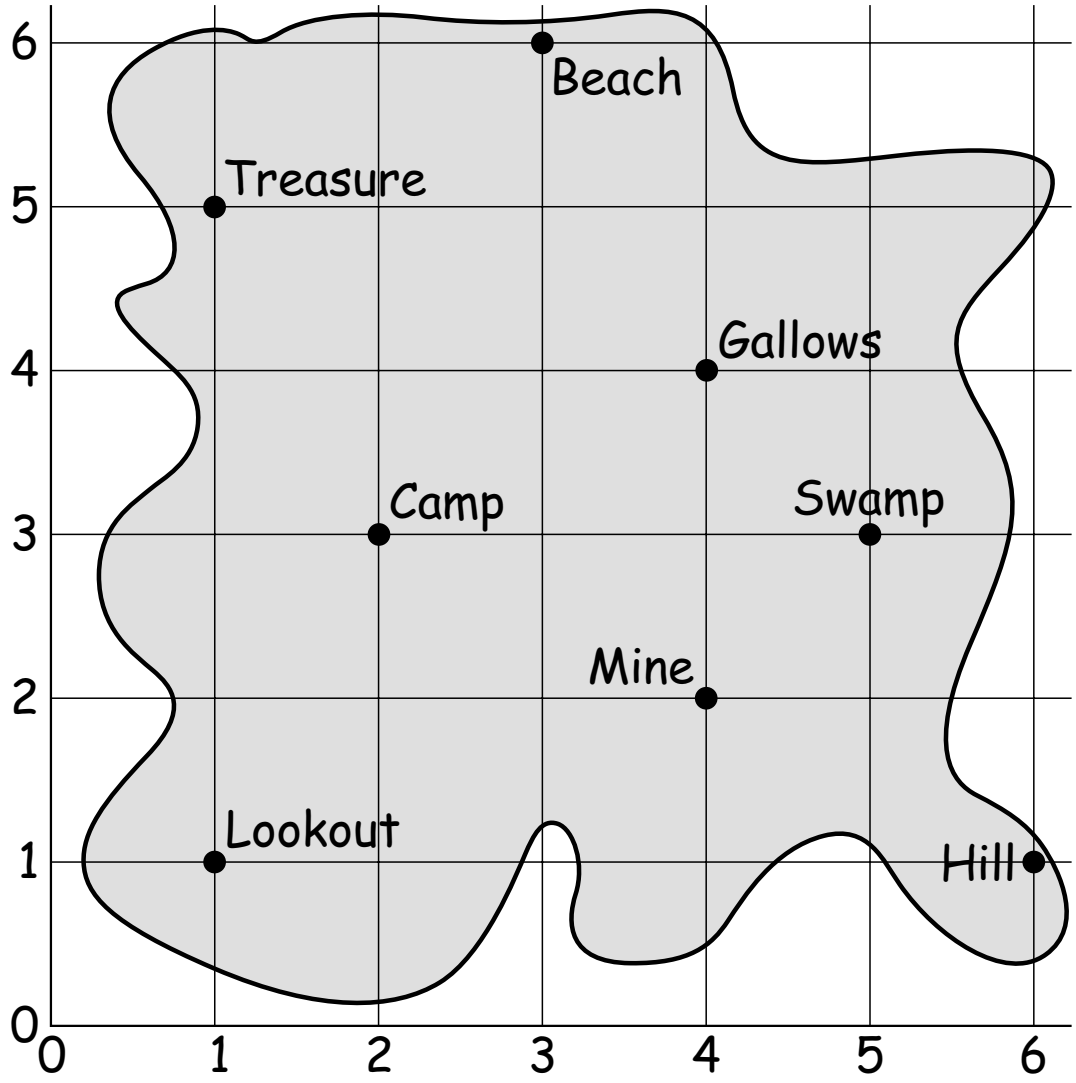
Calculate the value of each of the other two angles in this triangle.

..... ° and ..... °.

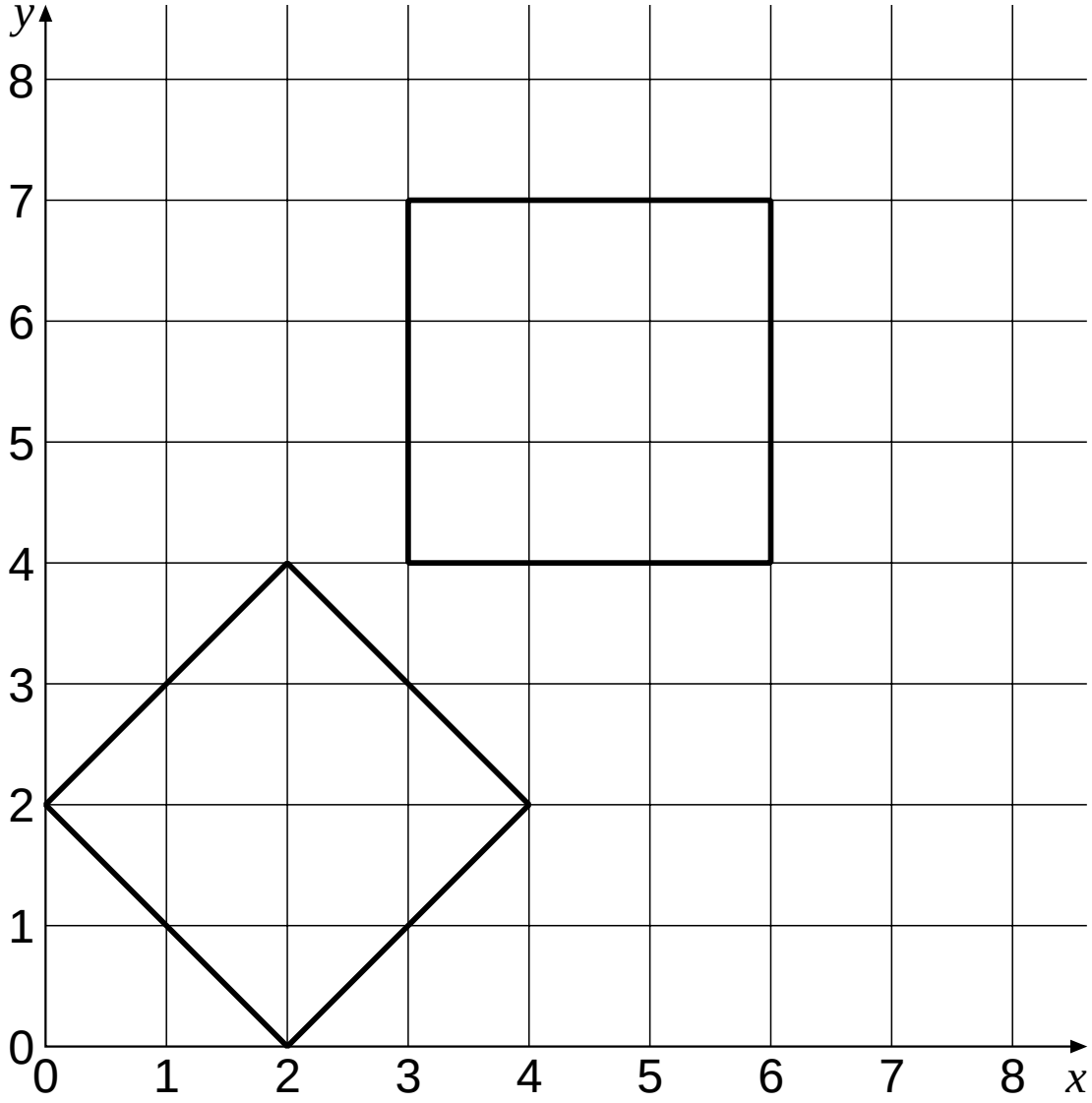
Calculate the value of each of the three angles in the other small triangle. Don't forget to write the units.

..... and ..... and .....

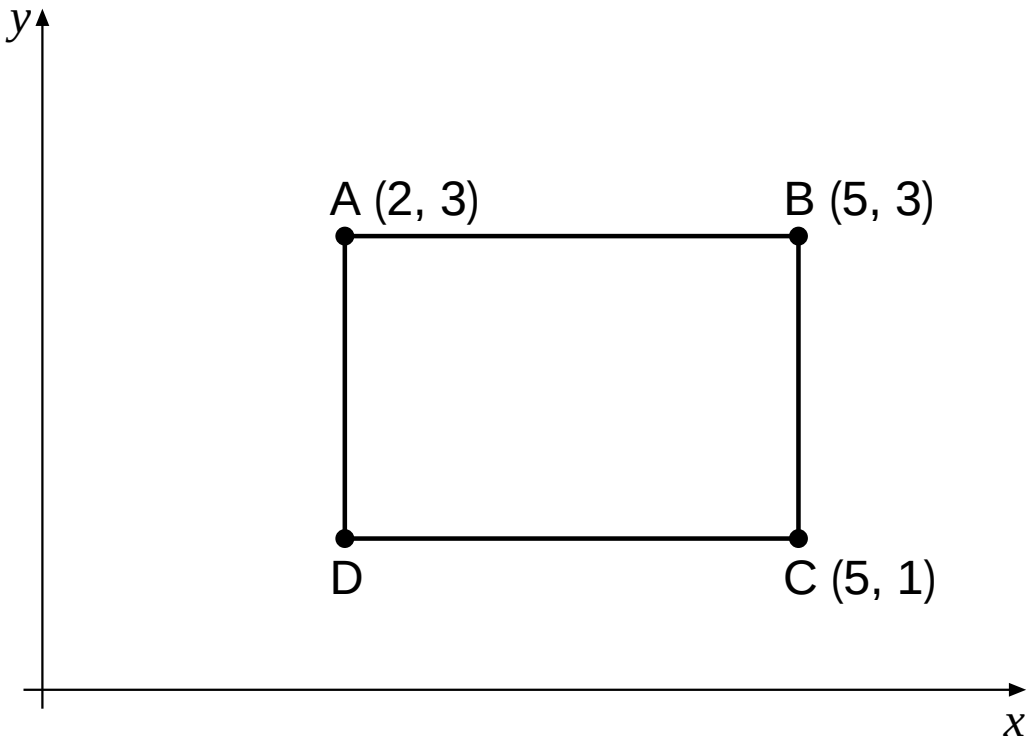
OHT S2.4a



OHT S2.4b



Look at the diagram.



The point K is halfway between points B and C.

What are the coordinates of point K? (..... , ...)

The point H is halfway between points A and B.

What are the coordinates of point H? (..... , ...)

Shape ABCD is a rectangle.

What are the coordinates of point D? (..... , ...)

OHT S2.4d

Here are some tiles on a grid, in a continuing pattern.

Each tile is numbered and marked in the top corner with a • and the right corner with a ×.