

Lesson 7

Word problems

Objectives

Consolidate the rapid recall of multiplication facts up to 10×10 , and quickly derive associated division facts (Y7)

Vocabulary

product

Objectives

Solve word problems (Y7)

Solve simple problems about ratio and proportion (Y7)

Vocabulary

prime, consecutive
litre, metre
euro

Resources

OHTs 7.1a and b and 7.2
(Plenary)

class set of calculators

Springboard 7 Unit 15

Resource sheet 7.3 (Plenary)

By the end of the lesson

pupils should be able to:

- solve a range of word problems.

Framework supplement of examples pages 2–20

Level 4

Oral and mental starter

10 minutes

Practise the recall of multiplication facts up to 10×10 . Build on the main teaching of lesson 2.

Discuss with pupils strategies to help them learn multiplication facts, for example:

- $7 \times 8 = (7 \times 7) + 7$; $7 \times 8 = (5 \times 8) + (2 \times 8)$
- 7×8 : double 7 (14), double 14 (28) and double 28 = 56
- Doubling the 3 times table gives the 6 times table.

Demonstrate patterns, links between related facts and squares.

Extend questioning to include division, drawing out links:

$$8 \times 7 = 56 \quad 7 \times 8 = 56 \quad 56 \div 8 = 7 \quad 56 \div 7 = 8$$

Q How many sixes are there in 54?

Ask further similar questions.

Apply this knowledge to simple mental problems.

Q It costs 15p to park a car for 8 minutes. How much will it cost to park for 16 minutes? ... 24 minutes? ... 40 minutes?

Q Six eggs cost 70p. How much will 30 eggs cost?

Main teaching

35 minutes

OHT 7.1a and **b** list a set of word problems. Questions 1–4 can be solved in one step. The rest are multi-step problems.

Select a problem. Ask pupils to read the question. Clarify any vocabulary. Through questioning, help pupils to build up a strategy to solve the problem.

Q What am I being asked to do/calculate?

Q What information am I given?

Encourage pupils to summarise this by writing down or marking key words or numbers.

Q What calculation do I need to do?

Insist that pupils write down the calculation, for example 56.7×9 .

Q How will I do that calculation: in my head, by writing or using a calculator?

Q What is the answer? Does it make sense? How can I check it?

To give pupils confidence, ask them to work in pairs and to pick two problems to solve. Clarify any vocabulary.

Invite a pair to explain their solution. Sort out any errors or misconceptions using other pupils' responses.

Move on to further questions.

Problems involving money and other real-life situations are included in Springboard 7 Unit 15 pages 491 and 492.

The Framework supplement of examples pages 2–20 list a range of suitable problems.

Plenary

15 minutes

Pick one of the multi-step questions on **OHT 7.1a** and **b**.

Invite pupils to describe the process of solving the problem.

Emphasise the need to:

- write down the calculation before completing it, especially when using a calculator;
- interpret the answer in the context of the question;
- check the answer;
- include the correct units in the answer.

You may want to use the adapted test question on **OHT 7.2** to consolidate the work. **Resource sheet 7.3** lists some questions taken from mental tests.

Problems

- 1** In a school hall there are 38 chairs in a row.
How many chairs are there in 23 rows?

- 2** A group of 534 people is going on a coach trip.
Each coach can carry 52 people.
How many coaches are needed?

- 3** Find the cost of 208 bottles of cola at 35p
per bottle.

- 4** I have cut 65 cm from a 3.5 m length of rope.
How much rope is left?

- 5** How many 28p stamps can I buy for £5?
How much change will I get?

- 6** Six friends went to a restaurant.
The total cost of the set menu for the group
was £75.
How much would the set menu cost for eight
people?

- 7** For every eight biscuits in a box, five of them
are chocolate.
There are 40 biscuits in the box.
How many of them are chocolate biscuits?

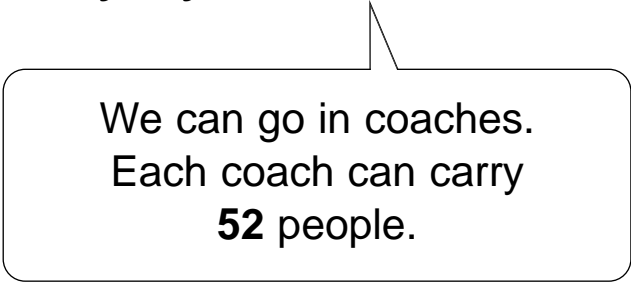
Problems

- 8** When a travel agent changes money he charges £2 and then gives 1.5 euros for each £1.
I have £50 to change.
How many euros will I receive?
- 9** A soup recipe uses four large carrots in each $\frac{1}{2}$ litre of soup.
How many large carrots do I need to make 3 litres of soup?
- 10** The sum of two prime numbers is 45.
What are the numbers?
- 11** Find two consecutive numbers with a product of 1406.
- 12** In a school, three classes each have 28 pupils, one class has 29 pupils and four classes each have 30 pupils.
How many pupils are there altogether?
What is the mean class size?

Coaches

- (a) A club wants to take 3000 people on a journey to London.

The club secretary says:



We can go in coaches.
Each coach can carry
52 people.

How many coaches do they need for the journey?

Show your working.

2 marks

- (b) Each coach costs £420.

How much is each person's share of the cost?

2 marks

Mental mathematics questions

- 1** Multiply twelve by thirty.
- 2** What is forty-two divided by six?
- 3** What is twenty-one divided by three?
- 4** What is one quarter of thirty-two?
- 5** How many five-pence coins make forty-five pence?
- 6** A pen costs three pounds forty-nine. I buy two pens. How much change do I get from ten pounds?
- 7** What is the cost of four birthday cards at one pound and five pence each?
- 8** What is the cost of five cassettes at one pound ninety-nine pence each?
- 9** A tape costs three pounds ninety-nine. How much would five of these tapes cost?
- 10** Two tickets cost eight pounds. How much do five tickets cost?
- 11** A bag of oranges costs one pound forty-nine pence. How many bags could you buy with ten pounds?
- 12** Gary collects ten-pence coins. Altogether he has twelve pounds. How many ten-pence coins is that?

Lesson 8

Interpreting data

Objectives

Interpret diagrams and graphs, and draw simple conclusions (Y7)

Vocabulary

bar chart
mode, maximum

Resources

OHT 8.1

Objectives

Extract and interpret data in tables, graphs, charts and diagrams (Y6)

Interpret diagrams and graphs (including pie charts), and draw simple conclusions (Y7)

Vocabulary

pie chart

Resources

OHTs 8.2–8.4
Springboard 7 Unit 12
OHT 8.5 (Plenary)

By the end of the lesson

pupils should be able to:

- extract data from a variety of sources;
- interpret data and give a reason for any conclusion.

Framework supplement of examples pages 268–271

Level 4

Oral and mental starter

15 minutes

Display **OHT 8.1**.

Ask pupils to discuss the questions in pairs. Each pupil has to convince their partner that their answer is correct.

Allow pupils time and encourage them to check and reconsider their answers.

Distinguish between questions that require:

- reading information from the graph;
- deductions from the information;
- interpretation and explanation.

Main teaching

35 minutes

Display **OHT 8.2**.

Demonstrate how to find the distance from Hull to Exeter.

Ask pupils to answer the questions on the sheet and to compare their answers with their partner's.

Take feedback to ensure pupils can find the correct distances.

Model a written answer to the last part of the question.

Show **OHT 8.3**. Explain that it shows the number of different types of ticket sold.

Q How many different types of ticket are sold?

Ensure pupils understand that there are nine different types.

Q How many First-class saver tickets are sold?

Q How many return tickets are sold?

Q How many more Standard tickets than First-class tickets are sold?

Q Why do you think a lot of student tickets are sold?

Extend with further questions.

Show **OHT 8.4**.

Q Are there more men passengers than women passengers?

Q How many child passengers are there? What other information would we need to know to find the answer?

Q When is it better to use a pie chart than one of the other types of graph?

Explain your answer.

Consolidate using Springboard 7 Unit 12 pages 398–400.

Plenary

10 minutes

Display **OHT 8.5**.

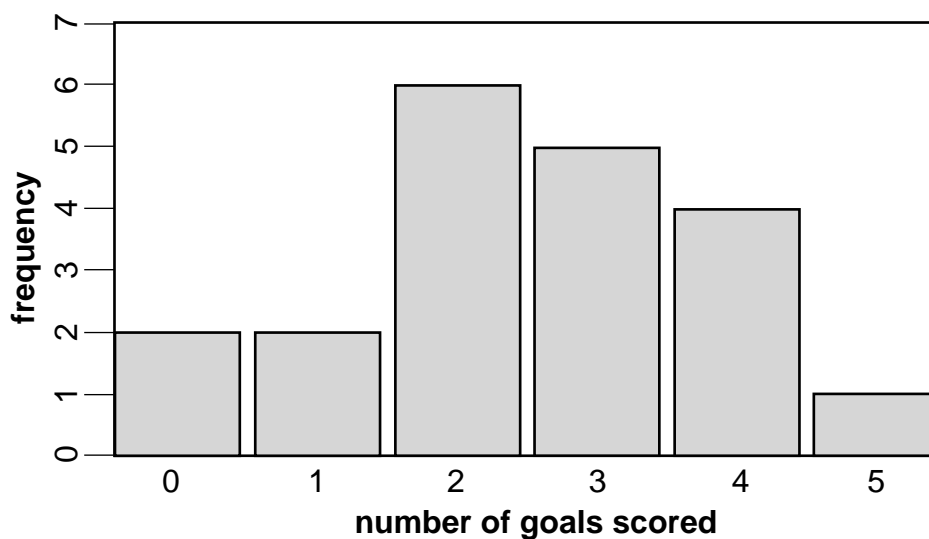
Ask pupils to discuss the six responses and decide whether they agree with them.

Take feedback, ensuring pupils give correct reasons for their comments.

Goals

Goals scored by Harriers

This bar chart shows the number of goals scored by Harriers in last season's matches.



- 1** What was the highest number of goals Harriers scored in a match?
- 2** How many matches in total did Harriers play?
- 3** In how many matches did Harriers score more than three goals?
- 4** What was the most common number of goals scored (mode)?
- 5** How likely are Harriers to score seven goals in a match when they play in the same league this season?

Distances

This table shows the distances between towns.

Distances in miles

Hull				
Exeter	305			
Bangor	199	289		
Dover	261	248	331	
	Hull	Exeter	Bangor	Dover

Which **two** towns are the **shortest distance** from each other?

Mrs Davis drove from Bangor to Exeter.

What is the distance between **Bangor** and **Exeter**?

Mrs Davis then drove from Exeter to Dover.

What is the distance between **Exeter** and **Dover**?

How far did Mrs Davis drive altogether?

Why is this answer different from the distance from Bangor to Dover in the table?

Train tickets

The ticket office at Exeter station keeps a record of the type of ticket it sells.

The tickets sold on a Friday in December are shown in the table below.

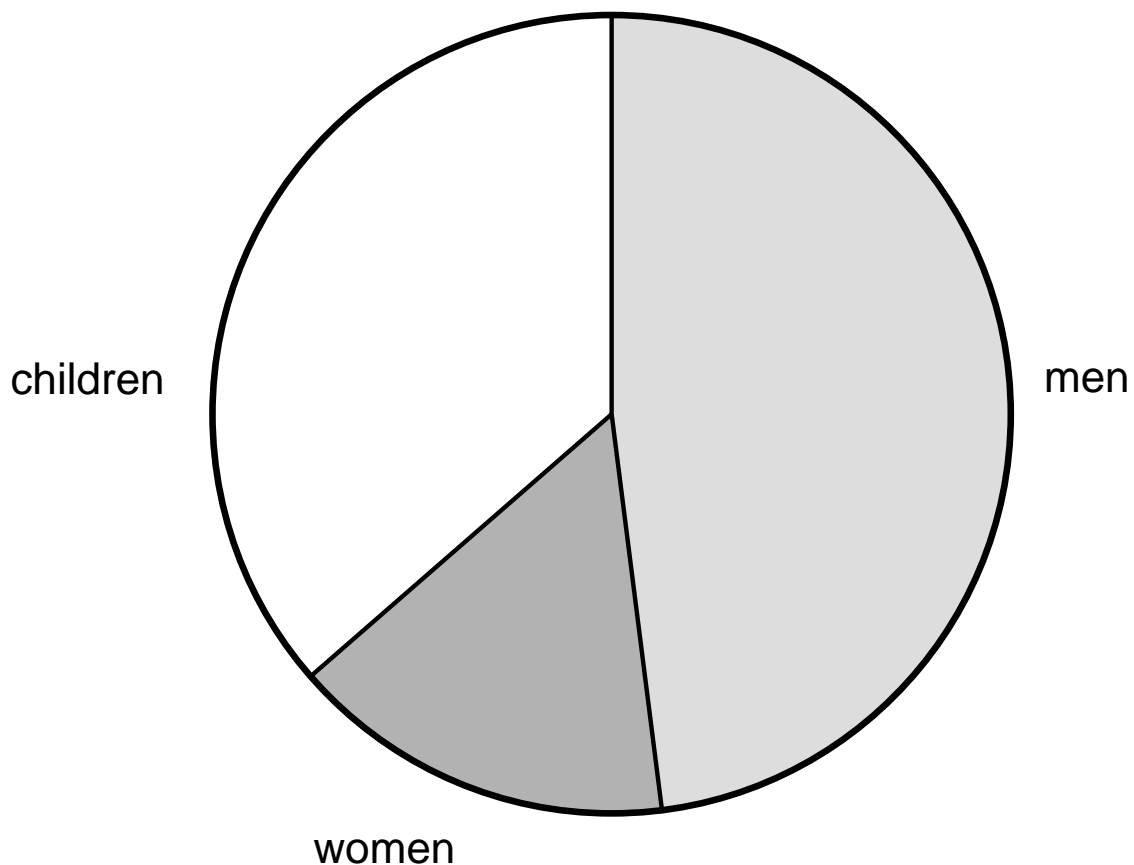
	First class	Standard	Student
Single	7	19	1
Return	12	24	53
Saver	11	37	36

Travellers

The ticket office also records whether each traveller is a man, a woman or a child.

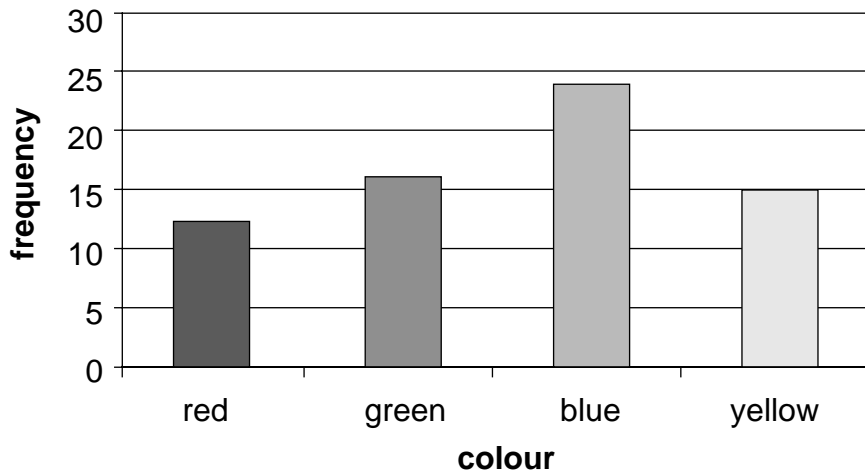
The results are shown in the pie chart.

Travellers



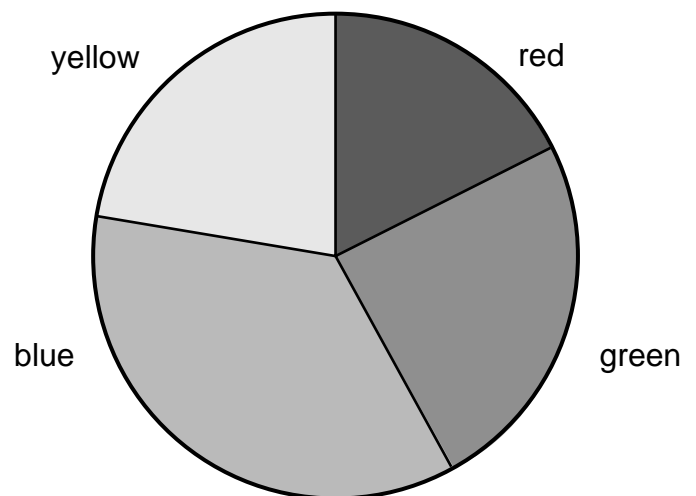
Favourite colour

John and Sandip collected some data on favourite colour from a group of children.



John's bar chart

Sandip's pie chart



Children's comments

I think the pie chart is best as you can easily see which is the most popular.

I think the bar chart is better as you can compare easily.

About half of the children chose blue.

Yellow and green are about the same in popularity.

I could work out how many children were asked from the pie chart.

Red is the least popular colour and it is easy to see from both diagrams.

Lesson 9

Shapes and angles

Objectives

Use correctly the vocabulary for lines, angles and shapes (Y7)

Vocabulary

scalene triangle,
isosceles triangle,
parallelogram, pentagon,
square, rhombus
parallel, equal
prism, sphere, cube

Resources

OHTs 9.1–9.3 (you may want to make card cut-outs from OHT 9.3)

3-D shapes – cones, spheres and cubes

Objectives

Use correctly the vocabulary for lines, angles and shapes (Y7)

Know the sum of angles at a point, on a straight line and in a triangle (Y7)

Vocabulary

as above

Resources

OHTs 9.4a and b

By the end of the lesson

pupils should:

- know how many degrees there are at a point, in a quarter turn, and on a straight line;
- be able to solve simple problems involving the calculation of angles.

Framework supplement of examples page 182

Level 4

Oral and mental starter

15 minutes

Use **OHT 9.1** to show shapes in less familiar orientations.

Ask pupils to name the shapes: rectangle, isosceles triangle, square. Pupils can check their answers as you rotate the OHT to show the shape in a more familiar orientation.

Discuss and establish the properties of each of the shapes. Note that a square satisfies the criteria for both a rectangle and a rhombus.

OHT 9.2 shows 2-D representations of some 3-D shapes: cone, sphere and cube. Check that pupils recognise them.

Have solid shapes available to emphasise the link.

Ask pupils to sketch some other 3-D shapes, for example a square-based pyramid.

Use **OHTs 9.3a–d** for a hide and reveal activity. Cover one of the shapes on the OHP then gradually reveal the shape. Pupils attempt to recognise and name the shape as it is revealed.

Q Why do you think it is a ...?

Q Why can it not be a ...?

Main teaching

35 minutes

Select one of the 2-D shapes from the lesson starter.

Ask pupils to write down the name of the shape and describe its properties using the key mathematical vocabulary – angles, lengths and diagonals.

Discuss pupils' responses. Clarify any misunderstandings.

Move on to talk about the sizes of the angles.

Q Is this angle greater or less than a right angle?

Spend a short time honing pupils' mental calculation skills using:

- pairs of angles that make 90° (right angle);
- pairs of angles on a straight line that add up to 180° .

Extend the work using **OHTs 9.4a** and **b**, which includes multi-step calculations involving angles at a point and angles in a triangle.

Model how to set out a calculation and state the reasons for an answer.

Plenary

10 minutes

Clarify any misunderstandings or errors from the previous exercise.

Ask pupils to visualise and name a shape that you describe. Take suggestions after each piece of information.

The shape I can see has five faces.

Three of the faces are rectangles.

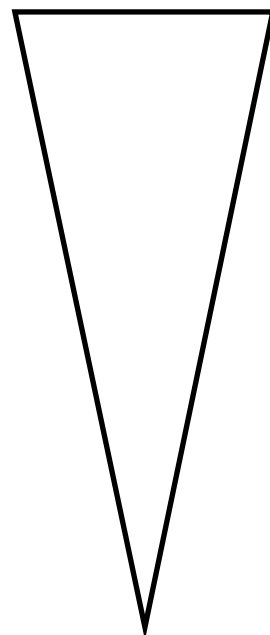
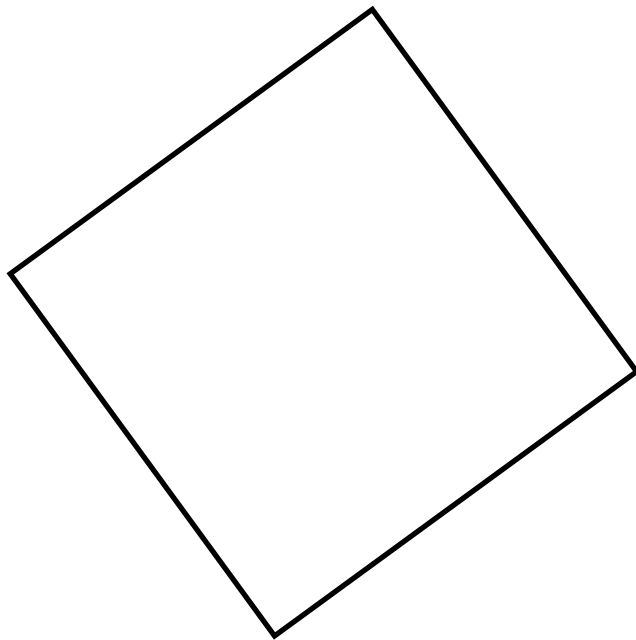
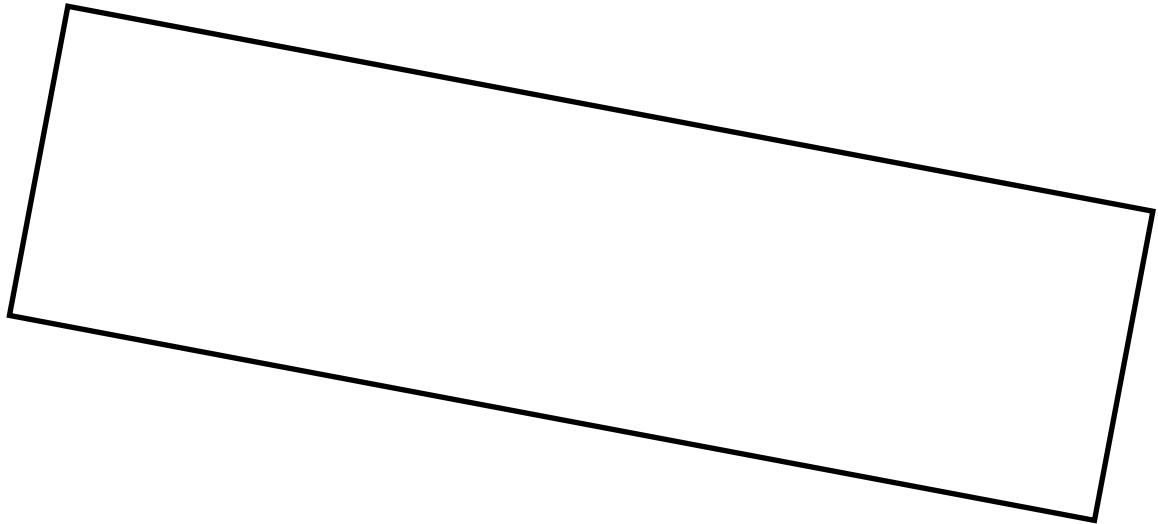
Two of the faces are parallel.

The two parallel faces are triangles.

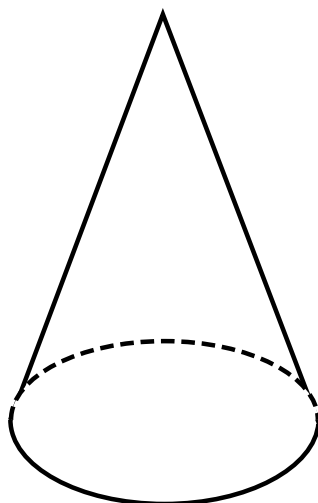
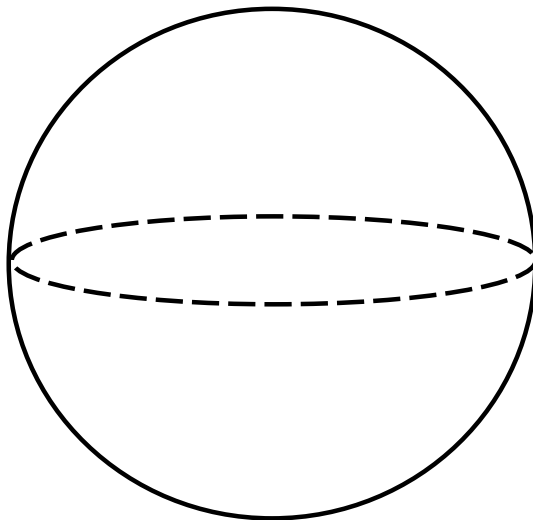
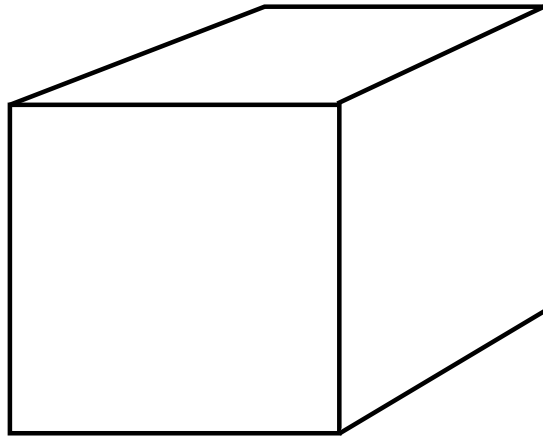
A particular kind of chocolate comes in a box of this shape.

What is it? (a triangular prism)

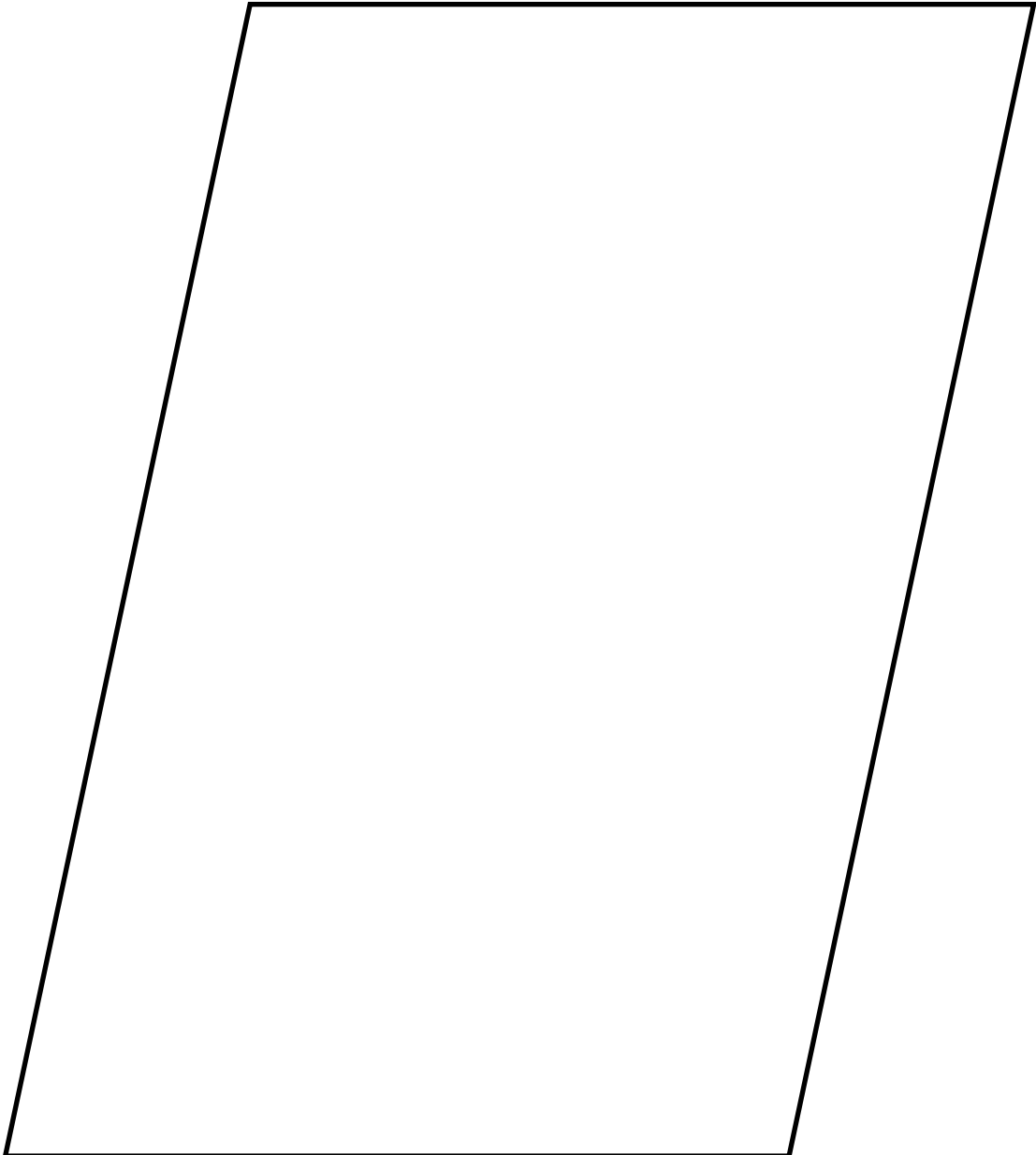
Shapes



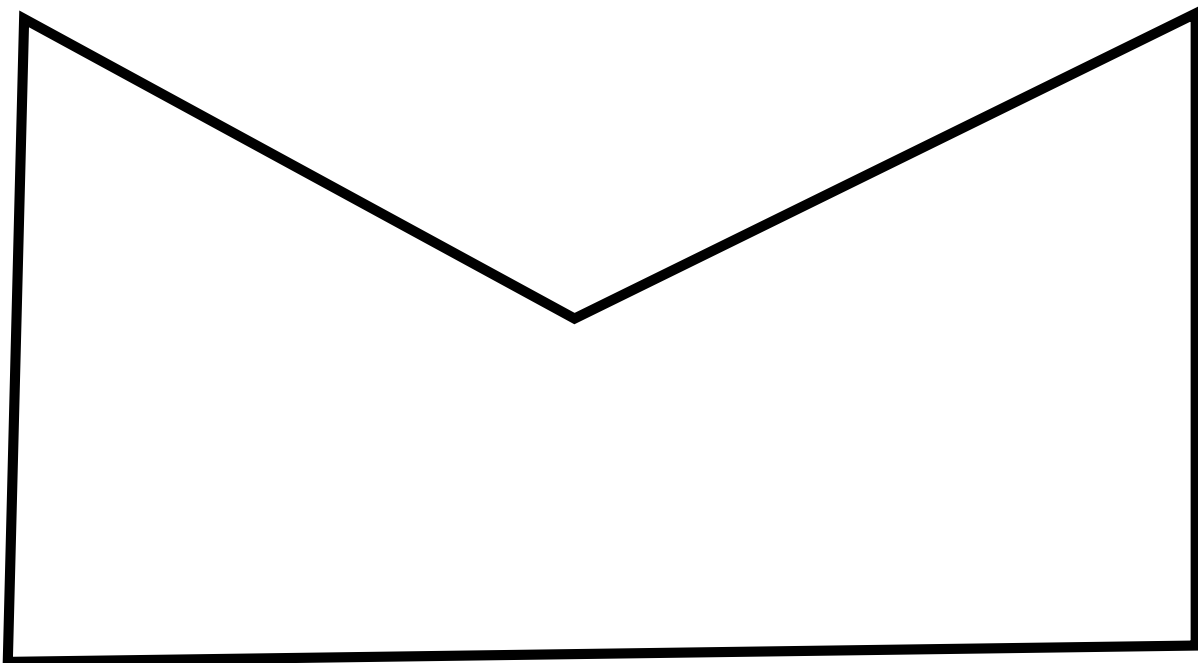
Solid shapes



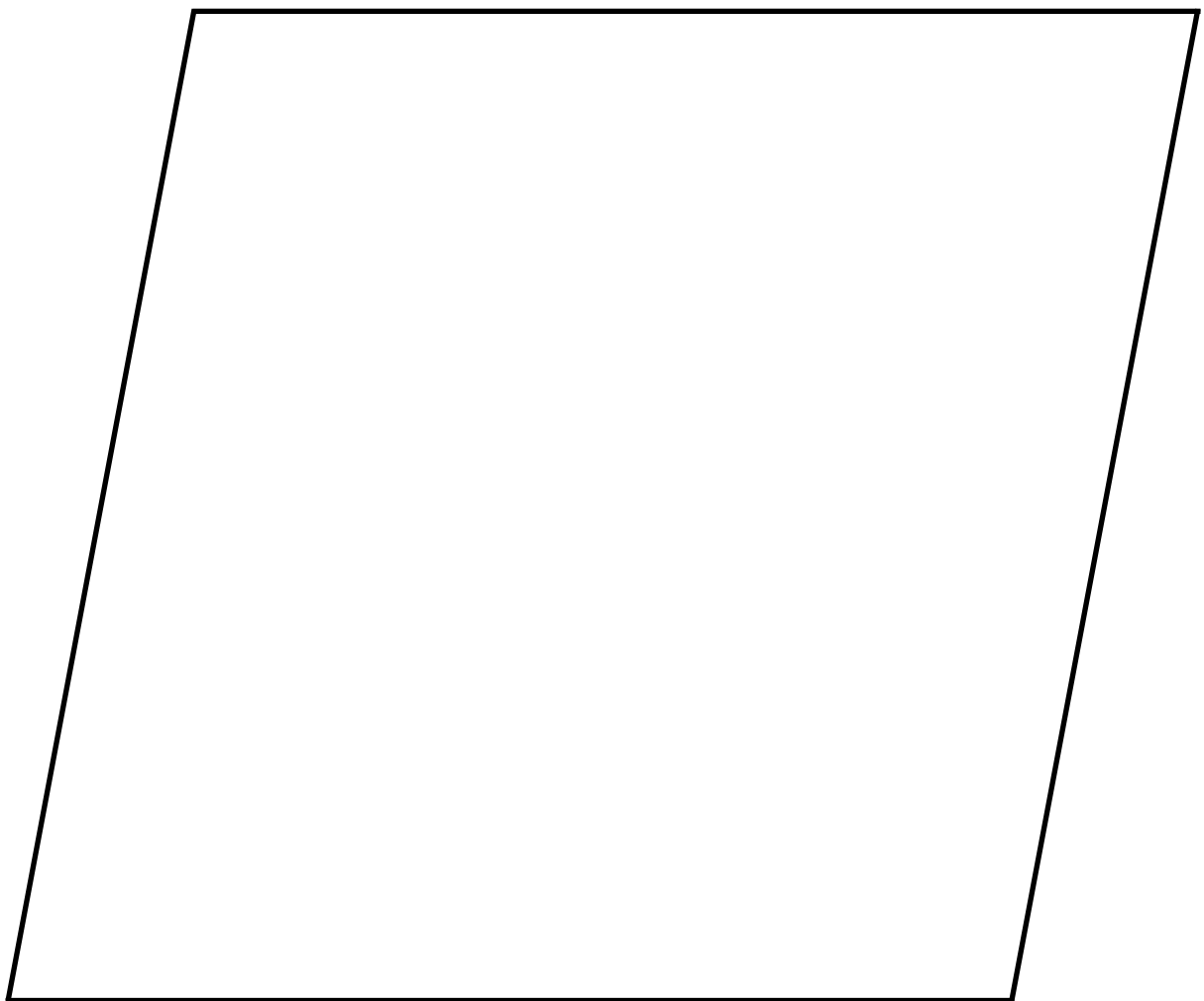
Hide and reveal



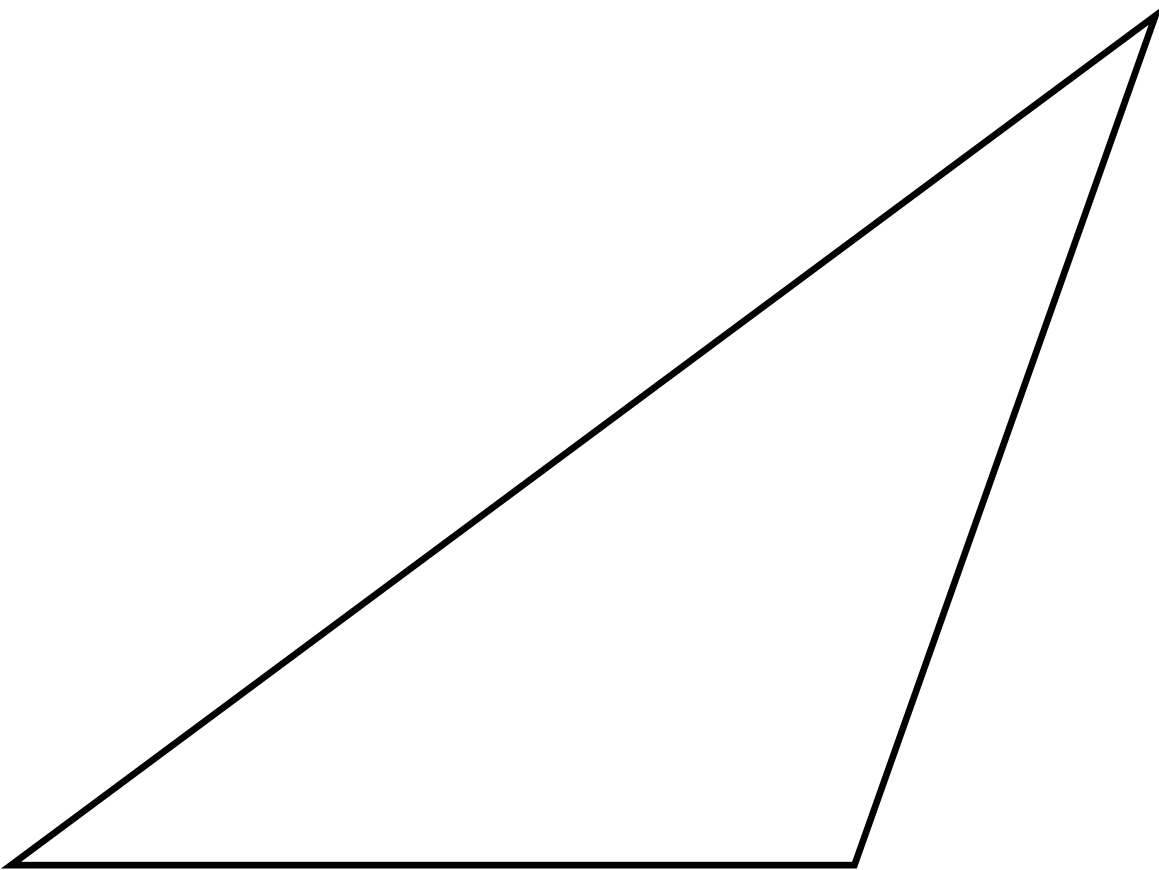
Hide and reveal



Hide and reveal



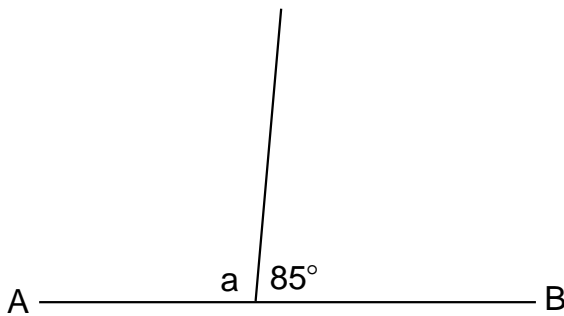
Hide and reveal



Angles

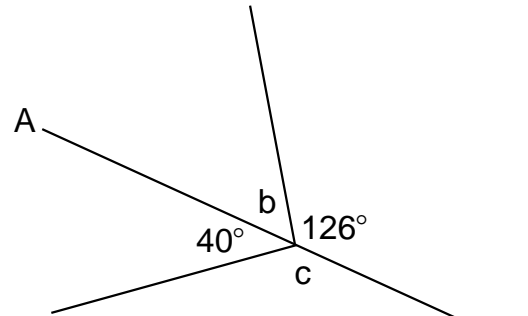
Work out each of the angles.

1 AB is a straight line.



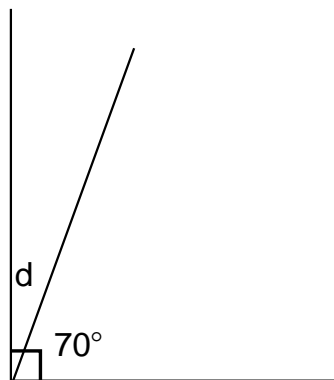
a =

2 AB is a straight line.



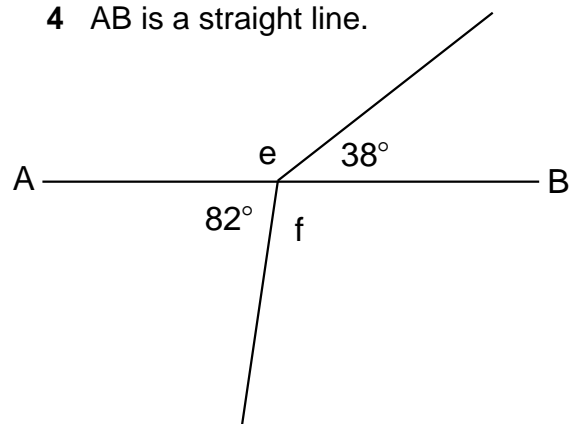
b = c =

3



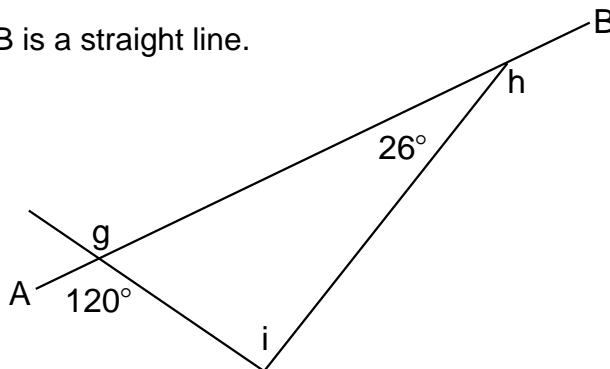
d =

4 AB is a straight line.



e = f =

5 AB is a straight line.



g = h = i =

Angles

Work out each of the angles. AB is a straight line.

