







Work out the sizes of the unknown angles. 2 Give reasons for your answers. a) 92° 47° b) 58° 25° **c)** z35° d) **√**31° 28° w





Work out the unknown angles.

3

4



Sort the triangles into the table. А 95°

5



0 acute angles	1 acute angle	2 acute angles	3 acute angles

Are any of the columns empty? Why?

6 37° p

> Do you agree with Ron? _____ Explain your answer.

What is the size of the third angle?









Work out the sizes of the unknown angles.



Are the statements true or false? a) Every isosceles triangle is equile **b)** Every equilateral triangle is isosceles. c) A right-angled triangle can be equilateral. d) A right-angled triangle can be isosceles. Explain your answers to a partner. Two angles in a triangle are 43° and 74°. Is the triangle isosceles? _____ Show your workings. One angle in an isosceles triangle is 29°. What could the other angles be? Give two possible answers. Angle b is twice the size of angle a. 10 Work out the size of angle c.

at	lei	ra	l.









































25°

92°

47°



28° w



Work out the unknown angles.

3



- a) Two angles in a triangle are 42° and 57°.What is the size of the third angle?
- b) Two of the angles in a triangle are 12°.What is the size of the third angle?
- c) One of the angles in a triangle is 38°. Another angle is twice the size of the first angle.

What is the size of the third angle?



81

156







a) 68° 44 ⁰ 68° *b* = a =b) 59° 62° 59 d =c =Talk about your reasons with a partner. Dexter is working out the unknown angles in triangles. 28° Do you agree with Dexter? No Explain your answer.

152+2=76 Eado missing angle is 76°

Work out the sizes of the unknown angles.



Work out the sizes of the unknown angles.



Are the statements true or false? a) Every isosceles triangle is equilateral. false **b)** Every equilateral triangle is isosceles. true c) A right-angled triangle can be equilateral. also d) A right-angled triangle can be isosceles. true Explain your answers to a partner. Two angles in a triangle are 43° and 74°. Is the triangle isosceles? ____ Show your workings. 43+74 = 117 180-117 = 63 One angle in an isosceles triangle is 29°. What could the other angles be? Give two possible answers. 29° and 122° or 75.5° and 75.5°

Angle b is twice the size of angle a. Work out the size of angle c.

Talk about it with a partner.













$$a = \boxed{71^{\circ}} \text{ because } \underbrace{\text{vertically}}_{a \text{ consists angles are equal}}_{b = \boxed{16^{\circ}} \text{ because } \underbrace{\text{angles in}}_{a \text{ brangle}} \underbrace{\text{sum bs 180^{\circ}}}_{a \text{ brangle}} \underbrace{\text{sum bs 180^{\circ}}}_{a \text{ brangle}} \underbrace{\text{sum bs 180^{\circ}}}_{b \text{ couse}} \underbrace{\text{angles on}}_{a \text{ straight}} \underbrace{\text{line} \quad \text{sum bs 180^{\circ}}}_{b \text{ couse}} \underbrace{\text{in} \quad \text{an isossele}}_{a \text{ brangle}} \underbrace{\text{two angles are equal}}_{a \text{ brangle}} \underbrace{\text{two angles are equal}}_{a \text{ brangle}} \underbrace{\text{sum bs 180^{\circ}}}_{a \text{ brangle}}$$













<u>Reasoning and Problem Solving</u> <u>Properties of Shape – Year 6</u>

About This Resource

This resource is aimed at Year 6 Expected and has been designed to give children the opportunity to consolidate the skills they have learned in Summer Block 1: Properties of Shape.

The questions are based on a selection of the same 'small steps' that are addressed in the block, but are presented in a different way so children can work through the pack independently and demonstrate their understanding and skills.

Small Steps

Measure with a protractor Introduce angles Calculate angles Vertically opposite angles Angles in a triangle Angles in a triangle – Special cases Angles in a triangle – Missing angles Angles in a quadrilateral Angles in regular polygons Draw shapes accurately Nets of 3D shapes

National Curriculum Objectives

Mathematics Year 6: (6G2a) <u>Compare and classify geometric shapes based on their</u> properties and sizes and find unknown angles in any triangles, quadrilaterals, and <u>regular polygons</u> Mathematics Year 6:(6G4b) <u>Recognise angles where they meet at a point, are on a</u> <u>straight line, or are vertically opposite, and find missing angles</u>

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Reasoning and Problem Solving - Consolidation Pack - Teaching Information

The Year 6 class from Forest Primary School are having a day out at South Sea Sailing Club.

They are learning all about the adventures you can have whilst sailing from Steve and Ali who own the sailing club.

The sailing boats are all moored up ready for when they will be next used. When the wind blows it makes the boats change the direction that they are facing.

1. Approximately, what angle has each boat been moved by the wind?



Steve is giving the children a guided tour inside the workshop. He is showing them some of the navigational instruments that they use when they take the boats out on voyages. A compass is used to navigate a vessel in the correct direction. It displays north, east, south and west.



2a. If a boat is travelling North, what angle does it turn if it wants to travel West. Is there more than one answer? Explain why.

2b. Draw an angle anywhere on the compass to represent an angle of 45°.

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Reasoning and Problem Solving - Consolidation Pack - Year 6 Expected

Reasoning and Problem Solving – Properties of Shape – Year 6

Ali takes the children onto the biggest ship in the workshop. It doesn't get to go out to sea anymore and the children are blown away with how spectacular it is to be standing at the back of the ship in front of the magnificent helm (ships wheel).



There are 8 handles used to turn the wheel, the wheel can be turned a full 360°.

3a. What angle is between each handle?

3b. Simon turns handle 1 clockwise and it finishes at position 8. How many degrees did the handle move through?

3c. If Simon turns handle one 135°. What position could it finish at?

Viktor is looking at some of the vintage pieces of sailing equipment and he sees a pair of oars that were once used to assist a sailor to sail independently across the English Channel.

4a. He knows that angle a is 47°. Is it possible for him to calculate the other 3 angles? Prove it.



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Reasoning and Problem Solving – Consolidation Pack – Year 6 Expected

5a. Steve has asked the children to calculate the angles in this sail. No angles have been marked on this sail, is it possible to calculate the missing angles? Explain your answer.



5b. What are the missing angles in these sails?



Ali is telling the children all about lighthouses and what they are used for. A lighthouse emits light which enables boats to stay clear of dangerous cliffs/rocks when entering a harbour.

5c. This is a birds eye view showing where the light from the lighthouse is currently shining.

What is the size of the angle that is not covered by the lighthouse.





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During the summer months the sailing club also offers the opportunity to do windsurfing. Windsurfing is a surface water sport that combines surfing and sailing using a surf board and a sail.

The shape of the sail differs but can sometimes be a quadrilateral. Here are two examples of wind surfing sails.

6. Work out the missing angle in each sail.



6 equilateral triangular sails have been placed down on the floor with the point of the sails connected at the top. They have made a hexagon shape.

7. Using the angles of sail X, calculate the total of all the internal angles.



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Reasoning and Problem Solving – Consolidation Pack – Year 6 Expected

<u>Reasoning and Problem Solving – Properties of Shape – Year 6</u>

8a. Ali has set the children a task. Draw a sail for a boat following the instructions. The sail has 3 sides. The horizontal side is 6cm Angle 1 is a right angle Angle 2 is 50°

8b. What is the length of the vertical side?

8c. What is angle 3?



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Reasoning and Problem Solving - Consolidation Pack - Year 6 Expected

Steve is explaining all about safety whilst onboard a sailing boat. A first aid kit is an essential piece of equipment that every sail boat must have. Usually, only a few necessities are required as there is not much room on a sailing boat, so packing light is essential.

9a. Steve thinks that all of these nets will fold up to make a cube, is he correct? Explain why.



The children have had a great visit to the sailing club and can't wait to get back to school to tell the rest of the children all bout it.





Reasoning and Problem Solving - Consolidation Pack - Year 6 Expected

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1. 90° and 225°

2a. 90° anti-clockwise or 270° clockwise

2b. An angle which represent 45° for example North to North East or North East to East.

3a. <mark>45</mark>°

3b. <mark>315</mark>°

3c. 4 – clockwise or 6 – anti clockwise

4. Angle $a = 47^{\circ}$ so angle c will also be 47° as opposite angles are equal. Angles d and b together equals $360^{\circ} - 47^{\circ} - 47^{\circ} = 266^{\circ}$. $266^{\circ} \div 2 = 133^{\circ}$.

5a. It is an equilateral triangle therefore all the angles are equal. $180^{\circ} \div 3 = 60^{\circ}$.

5b. $a = 48^{\circ} (180 - 42 - 90 = 48)$ $b = 65^{\circ}$ $c = 65^{\circ} (180 - 50 = 130 \div 2 = 65)$

5c. 273° (180 - 47 - 46 = 87; 360 - 87 = 273)

6. a = 123° b = 60°

7. 120° x 6 = 720°

8a. An accurate drawing of a triangle. Ensuring that the horizontal line is 6cm and the angles are 90° and 50°. Allow for slight discrepancies.

8b. 7cm

8c. 40°

9. C is the only net that will make a cube.

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Reasoning and Problem Solving – Consolidation Pack ANSWERS