nexamind EDUCATION

Name _____ Date _____

5.1 A sum of 360° — worksheet

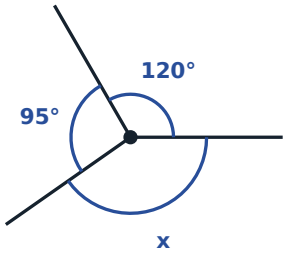
Know that the angles around a point total 360°, derive that the angles of a quadrilateral also total 360°, and use both to calculate missing angles. · 116 questions · Show your working.

Remember

- A full turn is **360°**, so the angles **around a point** total 360°.
- A straight line is half a turn, so the angles **on a straight line** total 180°.
- The angles of a **triangle** total 180°.
- The angles of a **quadrilateral** total 360° — draw one diagonal and it splits into two triangles.
- To find a missing angle: add the ones you know, then subtract from the total.
- Acute < 90°; right = 90°; obtuse is between 90° and 180°; reflex > 180°.
- Check your answer is sensible: does it look about the right size in the diagram?

A · Fluency — Find the missing angle in each diagram.

1 Work out the size of angle **x**, in degrees.



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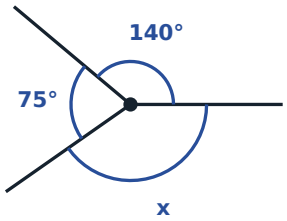

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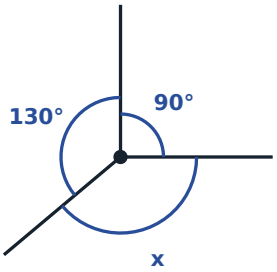

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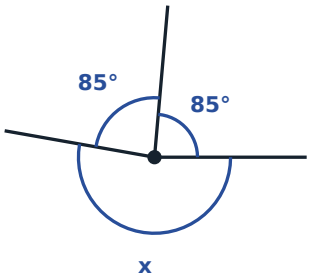

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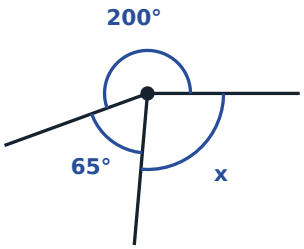

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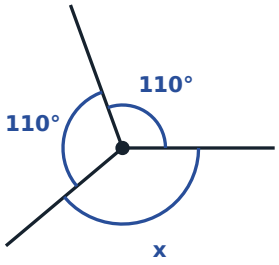

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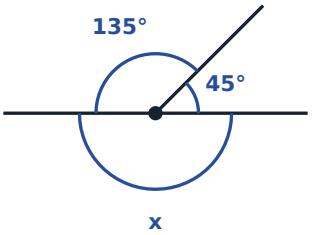

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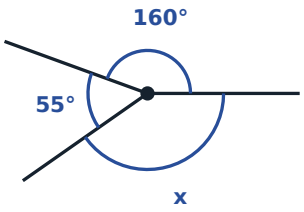

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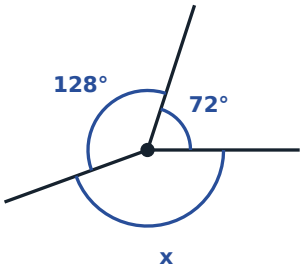

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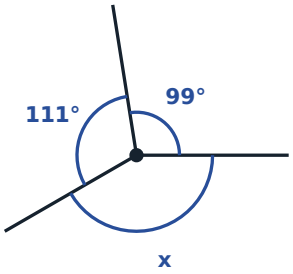

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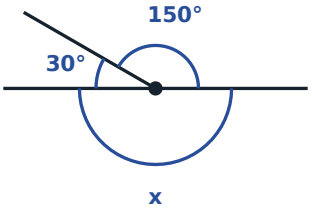

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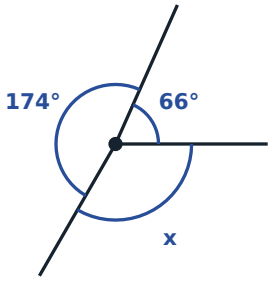

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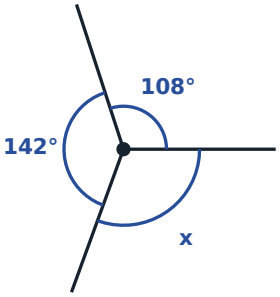

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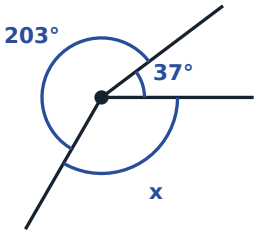

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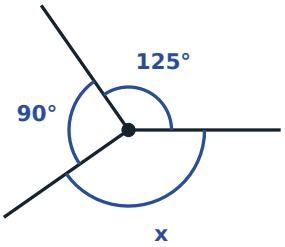

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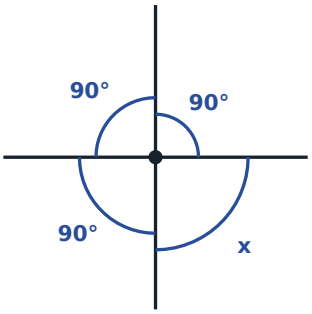

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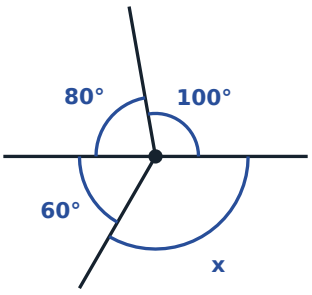

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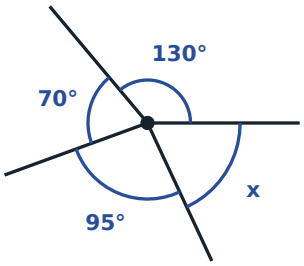

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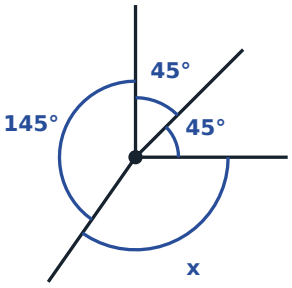

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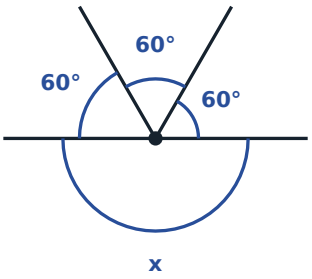

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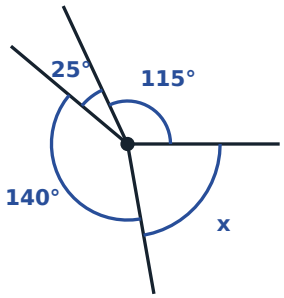

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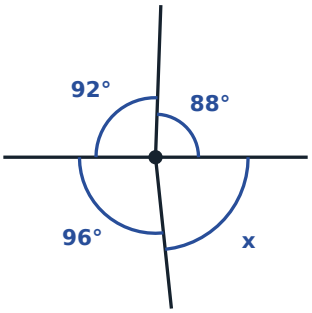

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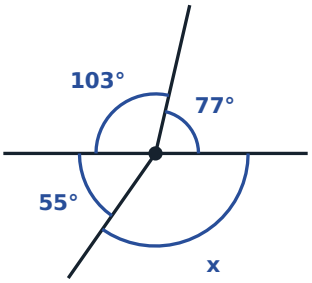
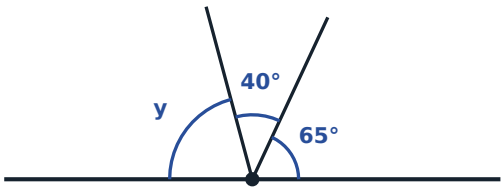


24 Work out the size of angle **y**, in degrees.



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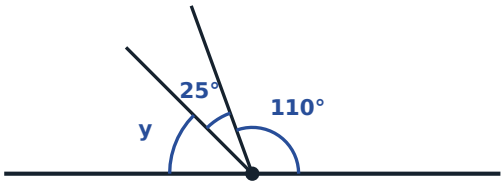

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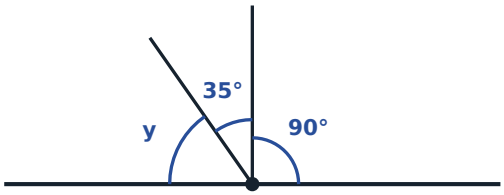

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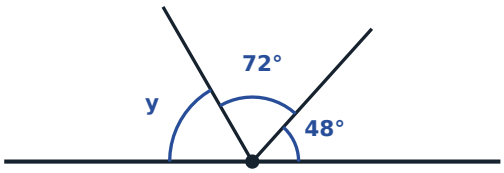

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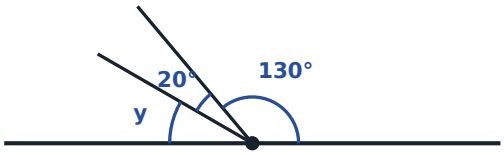

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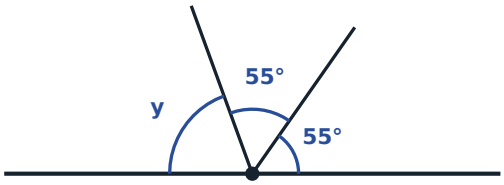

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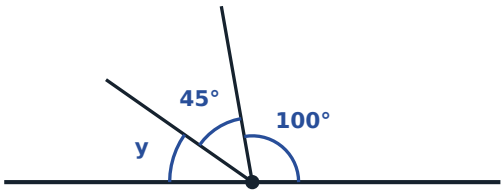

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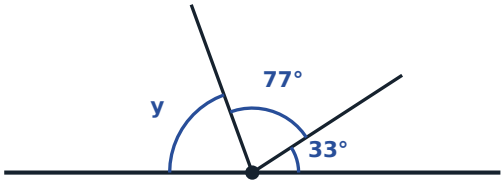

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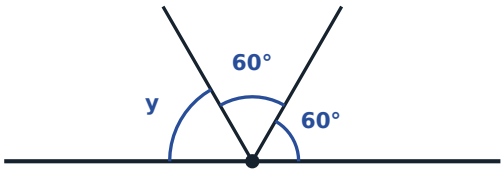

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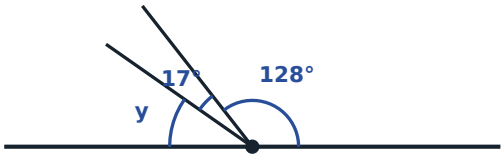

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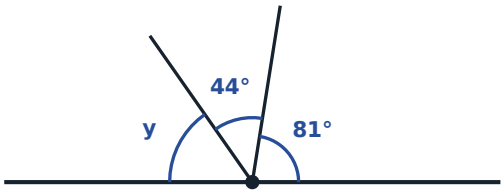

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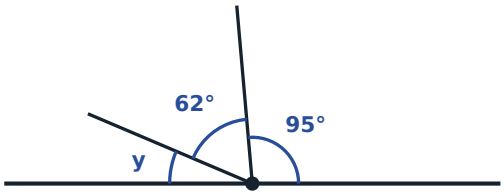

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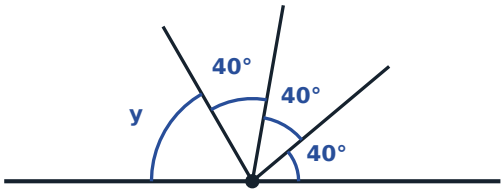

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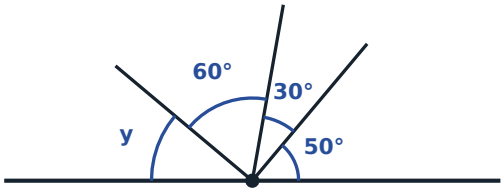

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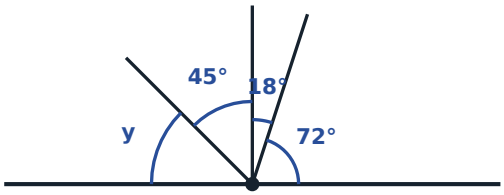

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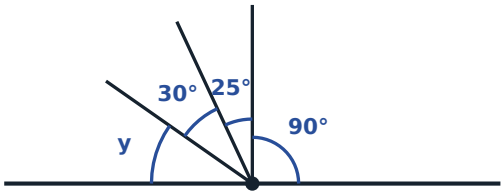
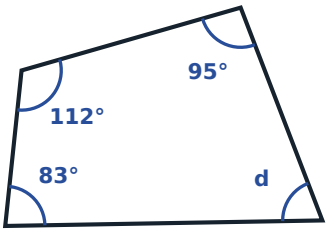


40 The four angles of this quadrilateral are shown. Work out angle **d**, in degrees.



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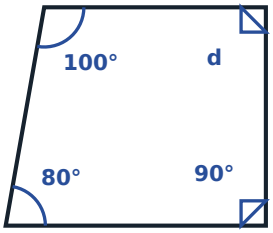

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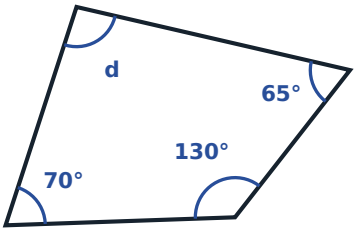

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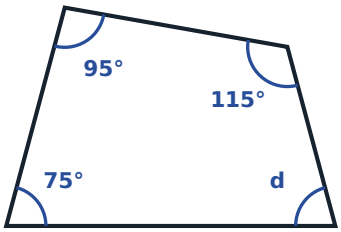

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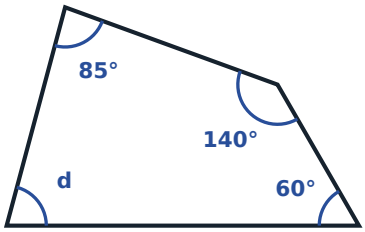

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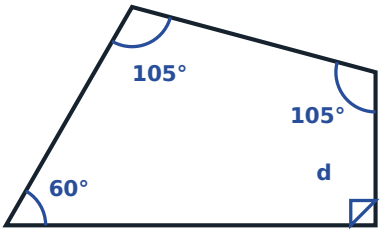

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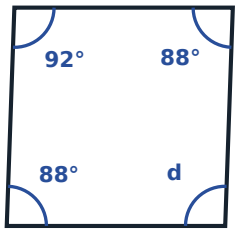

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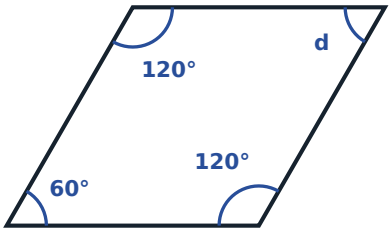

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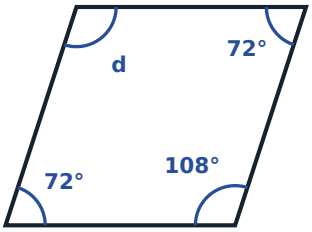

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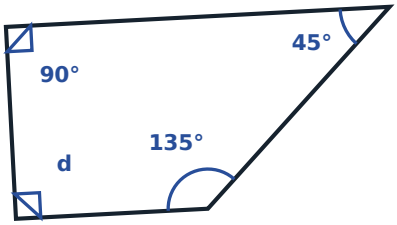

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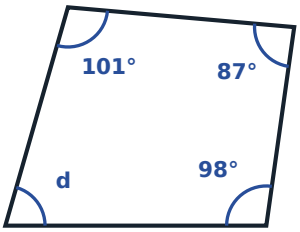

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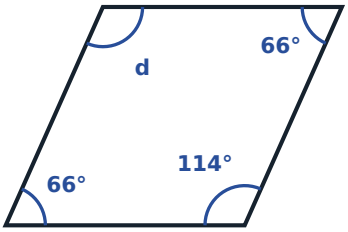

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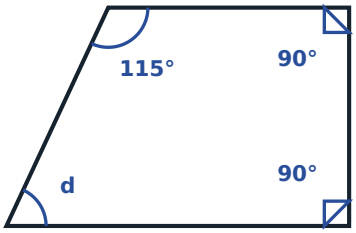

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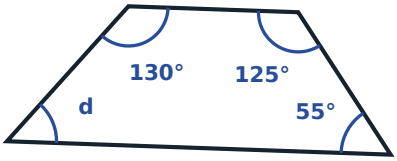
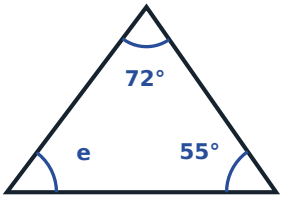
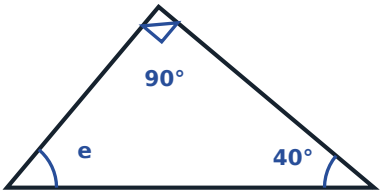


54 Work out angle **e** in this triangle, in degrees.



55 Work out angle **e** in this triangle, in degrees.



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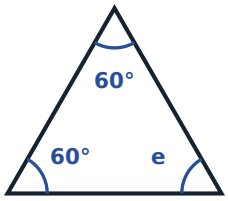

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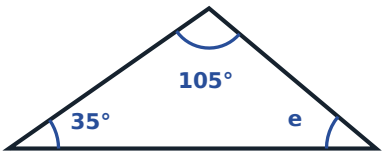

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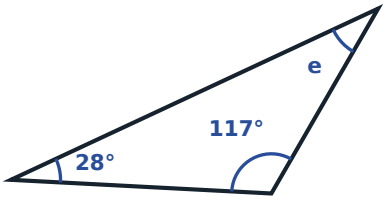

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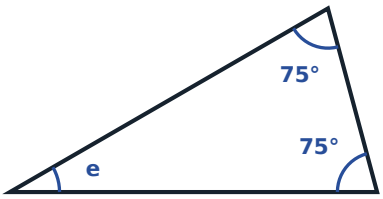

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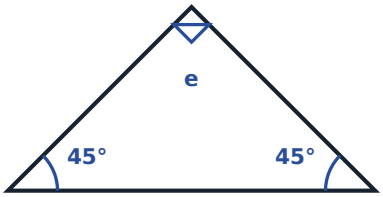

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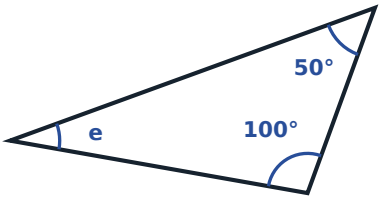
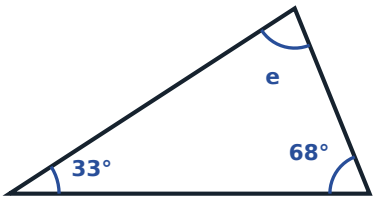


62 Work out angle **e** in this triangle, in degrees.



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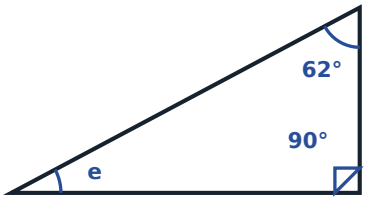

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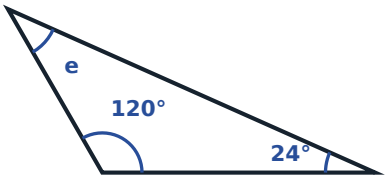

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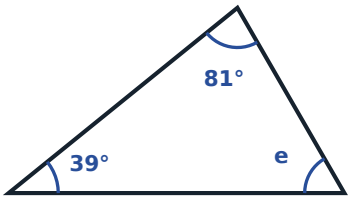


B · Reasoning — The totals, and why they are what they are.

66 What do the angles around a point add up to, in degrees?

67 What do the angles on a straight line add up to, in degrees?

68 What do the four angles of a quadrilateral add up to, in degrees?

69 What do the three angles of a triangle add up to, in degrees?

70 Why do the angles of a quadrilateral add to 360°?

- ☐ Because it has four sides
- ☐ Because it splits into two triangles, and 2 × 180° = 360°
- ☐ Because a full turn is 360°
- ☐ Because all its angles are 90°

71 Three angles meet at a point. Two of them are 150° and 130°. What type of angle is the third?

- ☐ Acute
- ☐ Right
- ☐ Obtuse
- ☐ Reflex

72 Three angles meet at a point. Two of them are 100° and 145°. What type of angle is the third?

- ☐ Acute
- ☐ Right
- ☐ Obtuse
- ☐ Reflex

73 Two angles meet at a point. One of them is 130°. What type of angle is the other?

- ☐ Acute
- ☐ Right
- ☐ Obtuse
- ☐ Reflex

74 Four equal angles meet at a point. How big is each one, in degrees?

75 Five equal angles meet at a point. How big is each one, in degrees?

76 Three equal angles lie on a straight line. How big is each one, in degrees?

77 A quadrilateral has four equal angles. How big is each one, in degrees?

78 Can a quadrilateral have three right angles and one angle of 100°?

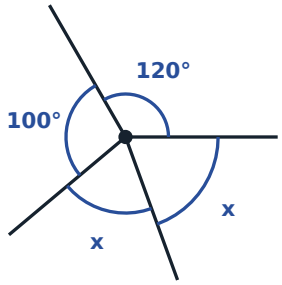
- ☐ Yes
- ☐ No

79 Can two angles at a point both be reflex?

- ☐ Yes
- ☐ No

C · Challenge — Equal angles, ratios and algebra.

80 The 2 angles marked **x** are equal. Work out **x**, in degrees.



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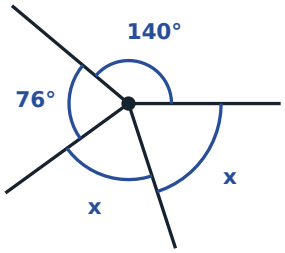

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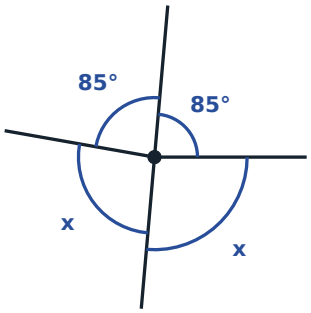
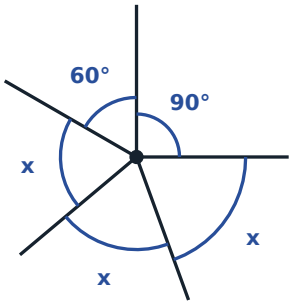


83 The 3 angles marked **x** are equal. Work out **x**, in degrees.



84 Two angles at a point are equal and the third is 140°. How big is each equal angle, in degrees?

85 In a quadrilateral, three angles are equal and the fourth is 120°. How big is each equal angle, in degrees?

86 The angles at a point are in the ratio 1 : 2 : 3. What is the largest angle, in degrees?

87 Angles of x°, (x + 30)° and (x + 60)° meet at a point. What is x?

88 A quadrilateral has angles x°, 2x°, 3x° and 4x°. What is x?

89 The angles at a point are in the ratio 2 : 3 : 4 : 6. What is the smallest angle, in degrees?

90 A quadrilateral has angles in the ratio 1 : 2 : 3 : 3. What is the largest angle, in degrees?

91 Angles of 2x°, 3x° and 4x° lie on a straight line. What is x?

92 A triangle has angles x°, (x + 20)° and (x + 40)°. What is x?

93 Three angles at a point are equal, and the fourth is 108°. How big is each equal angle, in degrees?

94 A quadrilateral has two right angles and two other equal angles. How big is each of those equal angles, in degrees?

95 Two angles at a point are in the ratio 5 : 7. What is the larger, in degrees?

96 A pupil says a quadrilateral can have two reflex angles. Is that possible?

☐ Yes

☐ No

D · Word problems — Turns, slices and real shapes.

97 A pizza is cut into three slices meeting at the centre. Two slices have angles of 150° and 120°. What is the angle of the third slice, in degrees?

98 A fan has 8 equally spaced blades meeting at the centre. What angle is between two neighbouring blades, in degrees?

99 A compass rose is divided into 4 equal directions. What is the angle between north and east, in degrees?

100 Three roads meet at a roundabout. Two of the angles between them are 115° and 130°. What is the third, in degrees?

101 A ramp meets the ground at 22°. What is the angle between the ramp and the ground on the other side, in degrees?

102 A kite-shaped garden has angles 70°, 110° and 70°. What is the fourth angle, in degrees?

103 A clock hand turns from 12 to 3. Through how many degrees has it turned?

104 A clock hand turns from 12 to 5. Through how many degrees has it turned?

105 A cake is cut into 5 equal slices. A slice is removed. What is the angle of the gap left, in degrees?

106 A window frame is a quadrilateral with angles 88°, 92° and 88°. What is the fourth angle, in degrees?

107 A skateboard ramp turns through 135°, then a further 90°. How much more turning is needed to complete a full turn, in degrees?

108 A pie chart has three sectors. Two are 90° and 144°. What is the third, in degrees?

109 A wheel has 12 equally spaced spokes. What is the angle between two neighbouring spokes, in degrees?

110 A gymnast turns through 540°. How many complete turns is that, plus how many degrees? Give the extra degrees.

111 A clock hand turns from 12 to 8. Through how many degrees has it turned?

112 A pie chart shows 4 hobbies. Three sectors are 60°, 100° and 110°. What is the fourth, in degrees?

113 A tent door is a quadrilateral with angles 105°, 75° and 105°. What is the fourth, in degrees?

114 Four paths meet at a point. Three of the angles between them are 85°, 95° and 100°. What is the fourth, in degrees?

115 A sail is a triangle with angles 90° and 34°. What is the third angle, in degrees?

116 A skate ramp is a quadrilateral with two right angles and one angle of 145°. What is the fourth, in degrees?