

Name _____

Date _____

5.3 Drawing lines and quadrilaterals — worked answers

Draw parallel and perpendicular lines, and quadrilaterals, using a ruler and a protractor. · 104 questions

A · Fluency — Name the quadrilateral, classify the angle.

- 1 Which quadrilateral is being described? *Four equal sides and four right angles.*
Answer: square
That describes a **square**.
- 2 Which quadrilateral is being described? *Four equal sides and four right angles. Both pairs of opposite sides are parallel.*
Answer: square
Both clues point to a **square**.
- 3 Which quadrilateral is being described? *Four right angles, with opposite sides equal.*
Answer: rectangle
That describes a **rectangle**.
- 4 Which quadrilateral is being described? *Four right angles, with opposite sides equal. Both pairs of opposite sides are parallel.*
Answer: rectangle
Both clues point to a **rectangle**.
- 5 Which quadrilateral is being described? *Four equal sides, with opposite angles equal.*
Answer: rhombus
That describes a **rhombus**.
- 6 Which quadrilateral is being described? *Four equal sides, with opposite angles equal. Both pairs of opposite sides are parallel.*
Answer: rhombus
Both clues point to a **rhombus**.
- 7 Which quadrilateral is being described? *Two pairs of parallel sides, with opposite sides and angles equal.*
Answer: parallelogram
That describes a **parallelogram**.
- 8 Which quadrilateral is being described? *Two pairs of parallel sides, with opposite sides and angles equal. It has no lines of symmetry unless it is a rhombus or rectangle.*
Answer: parallelogram
Both clues point to a **parallelogram**.

- 9 Which quadrilateral is being described? *Exactly one pair of parallel sides.*

Answer: trapezium

That describes a **trapezium**.

- 10 Which quadrilateral is being described? *Exactly one pair of parallel sides. The parallel sides may be different lengths.*

Answer: trapezium

Both clues point to a **trapezium**.

- 11 Which quadrilateral is being described? *Two pairs of equal sides next to each other.*

Answer: kite

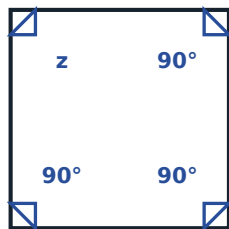
That describes a **kite**.

- 12 Which quadrilateral is being described? *Two pairs of equal sides next to each other. One pair of opposite angles is equal, and it has one line of symmetry.*

Answer: kite

Both clues point to a **kite**.

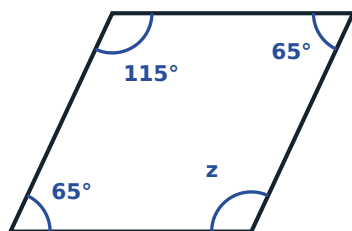
- 13 This parallelogram has three angles marked. Work out angle **z**, in degrees.



Answer: 90

The angles of a quadrilateral total 360° : $360 - 270 = 90^\circ$.

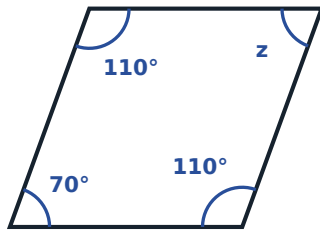
- 14 This parallelogram has three angles marked. Work out angle **z**, in degrees.



Answer: 115

The angles of a quadrilateral total 360° : $360 - 245 = 115^\circ$.

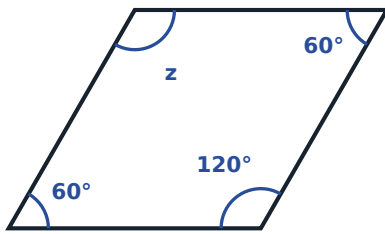
- 15** This parallelogram has three angles marked. Work out angle **z**, in degrees.



Answer: 70

The angles of a quadrilateral total 360° : $360 - 290 = 70^\circ$.

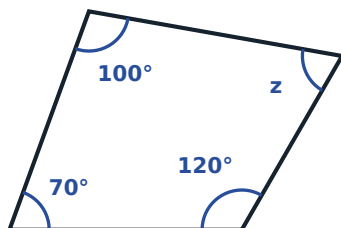
- 16** This parallelogram has three angles marked. Work out angle **z**, in degrees.



Answer: 120

The angles of a quadrilateral total 360° : $360 - 240 = 120^\circ$.

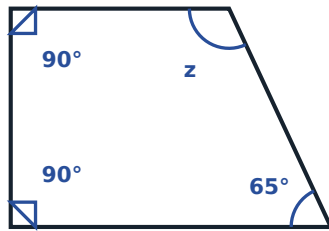
- 17** This quadrilateral has three angles marked. Work out angle **z**, in degrees.



Answer: 70

The angles of a quadrilateral total 360° : $360 - 290 = 70^\circ$.

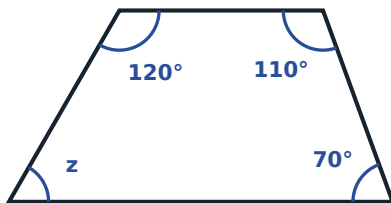
- 18** This quadrilateral has three angles marked. Work out angle **z**, in degrees.



Answer: 115

The angles of a quadrilateral total 360° : $360 - 245 = 115^\circ$.

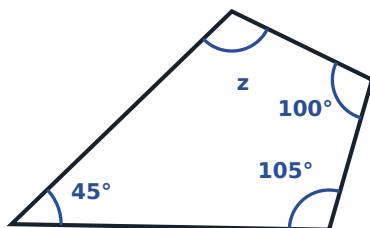
- 19** This quadrilateral has three angles marked. Work out angle **z**, in degrees.



Answer: 60

The angles of a quadrilateral total 360° : $360 - 300 = 60^\circ$.

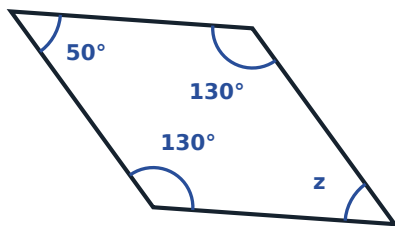
- 20** This quadrilateral has three angles marked. Work out angle **z**, in degrees.



Answer: 110

The angles of a quadrilateral total 360° : $360 - 250 = 110^\circ$.

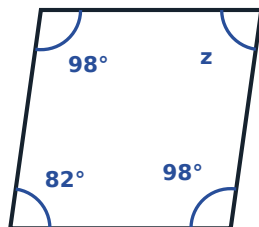
- 21** This parallelogram has three angles marked. Work out angle **z**, in degrees.



Answer: 50

The angles of a quadrilateral total 360° : $360 - 310 = 50^\circ$.

- 22** This parallelogram has three angles marked. Work out angle **z**, in degrees.



Answer: 82

The angles of a quadrilateral total 360° : $360 - 278 = 82^\circ$.

- 23** An angle measures 35° . What type of angle is it?

- ☐ acute
- ☐ right
- ☐ obtuse
- ☐ reflex

Answer: acute

Acute is less than 90° ; right is exactly 90° ; obtuse is between 90° and 180° ; reflex is more than 180° . So 35° is acute.

- 24** An angle measures 90° . What type of angle is it?

- ☐ acute
- ☐ right
- ☐ obtuse
- ☐ reflex

Answer: right

Acute is less than 90° ; right is exactly 90° ; obtuse is between 90° and 180° ; reflex is more than 180° . So 90° is right.

25 An angle measures 128° . What type of angle is it?

- ☐ acute
- ☐ right
- ☐ obtuse
- ☐ reflex

Answer: obtuse

Acute is less than 90° ; right is exactly 90° ; obtuse is between 90° and 180° ; reflex is more than 180° . So 128° is obtuse.

26 An angle measures 72° . What type of angle is it?

- ☐ acute
- ☐ right
- ☐ obtuse
- ☐ reflex

Answer: acute

Acute is less than 90° ; right is exactly 90° ; obtuse is between 90° and 180° ; reflex is more than 180° . So 72° is acute.

27 An angle measures 155° . What type of angle is it?

- ☐ acute
- ☐ right
- ☐ obtuse
- ☐ reflex

Answer: obtuse

Acute is less than 90° ; right is exactly 90° ; obtuse is between 90° and 180° ; reflex is more than 180° . So 155° is obtuse.

28 An angle measures 90° . What type of angle is it?

- ☐ acute
- ☐ right
- ☐ obtuse
- ☐ reflex

Answer: right

Acute is less than 90° ; right is exactly 90° ; obtuse is between 90° and 180° ; reflex is more than 180° . So 90° is right.

29 An angle measures 15° . What type of angle is it?

- ☐ acute
- ☐ right
- ☐ obtuse
- ☐ reflex

Answer: acute

Acute is less than 90° ; right is exactly 90° ; obtuse is between 90° and 180° ; reflex is more than 180° . So 15° is acute.

30 An angle measures 99° . What type of angle is it?

- ☐ acute
- ☐ right
- ☐ obtuse
- ☐ reflex

Answer: obtuse

Acute is less than 90° ; right is exactly 90° ; obtuse is between 90° and 180° ; reflex is more than 180° . So 99° is obtuse.

31 An angle measures 5° . What type of angle is it?

- ☐ acute
- ☐ right
- ☐ obtuse
- ☐ reflex

Answer: acute

Acute is less than 90° ; right is exactly 90° ; obtuse is between 90° and 180° ; reflex is more than 180° . So 5° is acute.

32 An angle measures 89° . What type of angle is it?

- ☐ acute
- ☐ right
- ☐ obtuse
- ☐ reflex

Answer: acute

Acute is less than 90° ; right is exactly 90° ; obtuse is between 90° and 180° ; reflex is more than 180° . So 89° is acute.

33 An angle measures 91° . What type of angle is it?

- ☐ acute
- ☐ right
- ☐ obtuse
- ☐ reflex

Answer: obtuse

Acute is less than 90° ; right is exactly 90° ; obtuse is between 90° and 180° ; reflex is more than 180° . So 91° is obtuse.

34 An angle measures 179° . What type of angle is it?

- ☐ acute
- ☐ right
- ☐ obtuse
- ☐ reflex

Answer: obtuse

Acute is less than 90° ; right is exactly 90° ; obtuse is between 90° and 180° ; reflex is more than 180° . So 179° is obtuse.

35 An angle measures 200° . What type of angle is it?

- ☐ acute
- ☐ right
- ☐ obtuse
- ☐ reflex

Answer: reflex

Acute is less than 90° ; right is exactly 90° ; obtuse is between 90° and 180° ; reflex is more than 180° . So 200° is reflex.

36 An angle measures 270° . What type of angle is it?

- ☐ acute
- ☐ right
- ☐ obtuse
- ☐ reflex

Answer: reflex

Acute is less than 90° ; right is exactly 90° ; obtuse is between 90° and 180° ; reflex is more than 180° . So 270° is reflex.

37 An angle measures 315° . What type of angle is it?

- ☐ acute
- ☐ right
- ☐ obtuse
- ☐ reflex

Answer: reflex

Acute is less than 90° ; right is exactly 90° ; obtuse is between 90° and 180° ; reflex is more than 180° . So 315° is reflex.

38 An angle measures 181° . What type of angle is it?

- ☐ acute
- ☐ right
- ☐ obtuse
- ☐ reflex

Answer: reflex

Acute is less than 90° ; right is exactly 90° ; obtuse is between 90° and 180° ; reflex is more than 180° . So 181° is reflex.

39 An angle measures 44° . What type of angle is it?

- ☐ acute
- ☐ right
- ☐ obtuse
- ☐ reflex

Answer: acute

Acute is less than 90° ; right is exactly 90° ; obtuse is between 90° and 180° ; reflex is more than 180° . So 44° is acute.

- 40** An angle measures 135° . What type of angle is it?

☐ acute
☐ right
☐ obtuse
☐ reflex

Answer: obtuse

Acute is less than 90° ; right is exactly 90° ; obtuse is between 90° and 180° ; reflex is more than 180° . So 135° is obtuse.

- 41** An angle measures 60° . What type of angle is it?

☐ acute
☐ right
☐ obtuse
☐ reflex

Answer: acute

Acute is less than 90° ; right is exactly 90° ; obtuse is between 90° and 180° ; reflex is more than 180° . So 60° is acute.

- 42** An angle measures 108° . What type of angle is it?

☐ acute
☐ right
☐ obtuse
☐ reflex

Answer: obtuse

Acute is less than 90° ; right is exactly 90° ; obtuse is between 90° and 180° ; reflex is more than 180° . So 108° is obtuse.

- 43** You draw a straight line and mark an angle of 40° on it. What is the angle on the other side, in degrees?

Answer: 140

Angles on a straight line total 180° : $180 - 40 = 140^\circ$.

- 44** You draw a straight line and mark an angle of 75° on it. What is the angle on the other side, in degrees?

Answer: 105

Angles on a straight line total 180° : $180 - 75 = 105^\circ$.

- 45** You draw a straight line and mark an angle of 110° on it. What is the angle on the other side, in degrees?

Answer: 70

Angles on a straight line total 180° : $180 - 110 = 70^\circ$.

- 46** You draw a straight line and mark an angle of 25° on it. What is the angle on the other side, in degrees?

Answer: 155

Angles on a straight line total 180° : $180 - 25 = 155^\circ$.

- 47** You draw a straight line and mark an angle of 90° on it. What is the angle on the other side, in degrees?

Answer: 90

Angles on a straight line total 180° : $180 - 90 = 90^\circ$.

- 48** You draw a straight line and mark an angle of 63° on it. What is the angle on the other side, in degrees?

Answer: 117

Angles on a straight line total 180° : $180 - 63 = 117^\circ$.

- 49** You draw a straight line and mark an angle of 12° on it. What is the angle on the other side, in degrees?

Answer: 168

Angles on a straight line total 180° : $180 - 12 = 168^\circ$.

- 50** You draw a straight line and mark an angle of 138° on it. What is the angle on the other side, in degrees?

Answer: 42

Angles on a straight line total 180° : $180 - 138 = 42^\circ$.

- 51** You draw a straight line and mark an angle of 55° on it. What is the angle on the other side, in degrees?

Answer: 125

Angles on a straight line total 180° : $180 - 55 = 125^\circ$.

- 52** You draw a straight line and mark an angle of 81° on it. What is the angle on the other side, in degrees?

Answer: 99

Angles on a straight line total 180° : $180 - 81 = 99^\circ$.

- 53** You draw a straight line and mark an angle of 28° on it. What is the angle on the other side, in degrees?

Answer: 152

Angles on a straight line total 180° : $180 - 28 = 152^\circ$.

- 54** You draw a straight line and mark an angle of 147° on it. What is the angle on the other side, in degrees?

Answer: 33

Angles on a straight line total 180° : $180 - 147 = 33^\circ$.

- 55** You draw a straight line and mark an angle of 5° on it. What is the angle on the other side, in degrees?

Answer: 175

Angles on a straight line total 180° : $180 - 5 = 175^\circ$.

- 56** You draw a straight line and mark an angle of 119° on it. What is the angle on the other side, in degrees?

Answer: 61

Angles on a straight line total 180° : $180 - 119 = 61^\circ$.

- 57** You draw a straight line and mark an angle of 72° on it. What is the angle on the other side, in degrees?

Answer: 108

Angles on a straight line total 180° : $180 - 72 = 108^\circ$.

- 58** You draw a straight line and mark an angle of 94° on it. What is the angle on the other side, in degrees?

Answer: 86

Angles on a straight line total 180° : $180 - 94 = 86^\circ$.

B · Reasoning — Using the instruments, and the shape families.

- 59** Which instrument do you use to measure an angle?

- ☐ ruler
- ☐ protractor
- ☐ compasses
- ☐ set square

Answer: protractor

A protractor measures angles in degrees.

- 60** A protractor has two scales. How do you know which one to read?

- ☐ Always read the outer one
- ☐ Always read the inner one
- ☐ Start from the zero that lies on one arm of the angle
- ☐ Read whichever is larger

Answer: Start from the zero that lies on one arm of the angle

Line one arm up with a zero, then count round on that same scale.

- 61** You measure an angle that clearly looks acute and read 130° . What has gone wrong?

- ☐ Nothing
- ☐ You read the wrong scale
- ☐ The protractor is broken
- ☐ Acute angles cannot be measured

Answer: You read the wrong scale

$180^\circ - 130^\circ = 50^\circ$, which is acute. Always check the answer against how the angle looks.

- 62** How do you draw a line perpendicular to another?

- ☐ Measure 45° from it
- ☐ Measure 90° from it
- ☐ Draw it parallel
- ☐ Draw it any way you like

Answer: Measure 90° from it

Perpendicular means at a right angle.

- 63** How are parallel lines marked on a diagram?

- ☐ With a small square
- ☐ With matching arrows
- ☐ With dashes
- ☐ With a letter

Answer: With matching arrows

Matching arrowheads mean “these lines are parallel”.

64 How is a right angle marked on a diagram?

- ☐ With an arc
- ☐ With a small square
- ☐ With an arrow
- ☐ With a dot

Answer: With a small square

The little square means exactly 90° .

65 Which quadrilateral has four equal sides and four right angles?

Answer: square

A square is the only one with both properties.

66 Which quadrilateral has exactly one pair of parallel sides?

Answer: trapezium

That is the defining property of a trapezium.

67 Which quadrilateral has two pairs of equal sides next to each other and one line of symmetry?

Answer: kite

A kite's equal sides are adjacent, not opposite.

68 Is every square also a rectangle?

- ☐ Yes
- ☐ No

Answer: Yes

A rectangle needs four right angles, and a square has them. A square is a special rectangle.

69 Is every rectangle also a square?

- ☐ Yes
- ☐ No

Answer: No

A rectangle only needs its opposite sides equal, not all four.

70 Is every rhombus also a parallelogram?

- ☐ Yes
- ☐ No

Answer: Yes

A rhombus has two pairs of parallel sides, which is what a parallelogram requires.

C · Challenge — Angles inside the special quadrilaterals.

71 You are drawing a quadrilateral. You have drawn angles of 100° , 85° and 95° . What must the fourth angle be, in degrees?

Answer: 80

$360^\circ - 280^\circ = 80^\circ$.

72 You draw a parallelogram with one angle of 65° . What is the angle next to it, in degrees?

Answer: 115

Adjacent angles of a parallelogram lie between parallel lines, so they add to 180° : $180 - 65 = 115^\circ$.

- 73** You draw a parallelogram with one angle of 65° . What is the angle opposite it, in degrees?

Answer: 65

Opposite angles of a parallelogram are equal.

- 74** A rhombus has one angle of 110° . What is the angle next to it, in degrees?

Answer: 70

A rhombus is a parallelogram, so adjacent angles add to 180° .

- 75** A kite has angles of 100° , 70° and 70° . What is the fourth angle, in degrees?

Answer: 120

$360^\circ - 240^\circ = 120^\circ$.

- 76** A trapezium has two right angles and one angle of 115° . What is the fourth angle, in degrees?

Answer: 65

$360^\circ - 90^\circ - 90^\circ - 115^\circ = 65^\circ$.

- 77** A quadrilateral has four equal sides but no right angles. What is it?

Answer: rhombus

Equal sides without right angles makes a rhombus.

- 78** A quadrilateral has opposite sides equal and parallel, but no right angles and no equal adjacent sides. What is it?

Answer: parallelogram

That is exactly a parallelogram.

- 79** A parallelogram has one angle of 48° . What is the sum of its two obtuse angles, in degrees?

Answer: 264

Each obtuse angle is $180 - 48 = 132^\circ$, and $2 \times 132 = 264^\circ$.

- 80** A trapezium has one pair of parallel sides. One angle on a slanting side is 55° . What is the co-interior angle at the other end of that side, in degrees?

Answer: 125

The parallel sides make the two angles co-interior, so they add to 180° : $180 - 55 = 125^\circ$.

- 81** You are drawing a quadrilateral. You have drawn 62° , 118° and 62° . What must the fourth angle be, in degrees?

Answer: 118

$360 - 242 = 118^\circ$ — the shape is a parallelogram.

- 82** Can a trapezium have four right angles?

☐ Yes

☐ No

Answer: No

Four right angles would give two pairs of parallel sides, and a trapezium has exactly one pair.

- 83** Can a kite have four equal sides?

☐ Yes

☐ No

Answer: Yes

That kite is a rhombus — a rhombus is a special kite.

- 84** A rhombus has one angle of 145° . What is the sum of its two acute angles, in degrees?

Answer: 70

Each acute angle is $180 - 145 = 35^\circ$, and $2 \times 35 = 70^\circ$.

D · Word problems — Shapes and angles in real objects.

- 85** A gate is a rectangle. What is the size of each of its angles, in degrees?

Answer: 90

A rectangle has four right angles.

- 86** A tile is a rhombus with one angle of 60° . What is the angle next to it, in degrees?

Answer: 120

$180^\circ - 60^\circ = 120^\circ$.

- 87** A ramp is a trapezium. Two of its angles are 90° and 90° , and a third is 100° . What is the fourth, in degrees?

Answer: 80

$360^\circ - 280^\circ = 80^\circ$.

- 88** A window pane has four equal sides and four right angles. What shape is it?

Answer: square

Equal sides plus right angles means a square.

- 89** A road sign has exactly one pair of parallel sides. What shape is it?

Answer: trapezium

One pair of parallel sides defines a trapezium.

- 90** A picture frame is a parallelogram with one angle of 78° . What is the largest angle, in degrees?

Answer: 102

$180^\circ - 78^\circ = 102^\circ$.

- 91** A field is a quadrilateral with angles 88° , 97° and 104° . What is the fourth angle, in degrees?

Answer: 71

$360^\circ - 289^\circ = 71^\circ$.

- 92** A child's toy has two pairs of equal sides next to each other. What shape is it?

Answer: kite

Adjacent equal sides make a kite.

- 93** A shelf must be perpendicular to the wall. What angle do you set on your protractor, in degrees?

Answer: 90

Perpendicular means 90° .

- 94** Two shelves must be parallel. The first is at 15° to the floor. At what angle is the second, in degrees?

Answer: 15

Parallel lines make the same angle with any line that crosses them.

- 95** A designer draws a quadrilateral with three angles of 90° . What must the fourth be, in degrees?

Answer: 90

$360^\circ - 270^\circ = 90^\circ$ — it is a rectangle.

- 96** A banner is a kite with two angles of 55° and one of 130° . What is the fourth angle, in degrees?
Answer: 120
 $360^\circ - 240^\circ = 120^\circ$.
- 97** A ladder is set at 68° to the ground. You want to draw this accurately. What angle do you set on the protractor, in degrees?
Answer: 68
Draw the ground line first, then measure 68° up from it.
- 98** A garden bed has opposite sides parallel and all four sides equal, but no right angles. What shape is it?
Answer: rhombus
Equal sides, parallel opposite sides, no right angles.
- 99** A table top is a parallelogram with one angle of 105° . What is the smallest angle, in degrees?
Answer: 75
 $180 - 105 = 75^\circ$.
- 100** A flag is a quadrilateral with angles 110° , 70° and 110° . What is the fourth, in degrees?
Answer: 70
 $360 - 290 = 70^\circ$.
- 101** A bookshelf bracket must make a right angle with the wall. What angle does it make with a shelf that is perpendicular to the bracket, in degrees?
Answer: 90
Perpendicular means 90° .
- 102** A window is a quadrilateral with four right angles but not four equal sides. What shape is it?
Answer: rectangle
Four right angles without four equal sides is a rectangle.
- 103** You draw two lines that make an angle of 90° . What word describes them? Answer 1 if 'perpendicular', 0 if 'parallel'.
Answer: 1
Lines meeting at a right angle are perpendicular.
- 104** A designer draws a trapezium with angles 90° , 90° and 58° . What is the fourth angle, in degrees?
Answer: 122
 $360 - 238 = 122^\circ$.