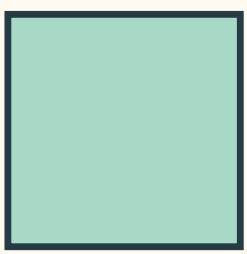
MATHS FIELD GUIDE · GRADE 5

Shape properties, not appearances

OPENING PROBLEM

Is this both a rectangle and a rhombus?



4 equal

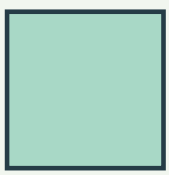
02 Sort shapes by a property that always holds
03 Rules and worked cases
04 Sort the quadrilateral cards
05 Compare the models
06 Follow the faces through a fold
07 Check your reasoning

ILLUSTRATED PROBLEM SHEET

Sort shapes by a property that always holds

One shape can belong to more than one family.

1



4 equal

Is this both a rectangle and a rhombus?

Yes. It has four right angles and four equal sides.

2

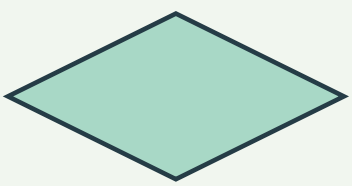


right angles

Does a rectangle need four equal sides?

No. It needs four right angles. Opposite sides have matching lengths.

3

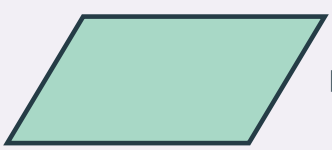


4 equal

Must a rhombus have four right angles?

No. Equal sides do not fix a right angle.

4



parallel pairs

Which sides must stay parallel?

Both pairs of opposite sides. Adjacent sides may have different lengths.

Four right angles
a rectangle, possibly a square.

Four equal sides in a quadrilateral
a rhombus, possibly a square.

CHAPTER PROBLEM

Does turning a rectangle change its class?

No. The side and angle relationships stay the same.

MATHS REFERENCE · GRADE 5

Shape properties, not appearances

A polygon is a closed flat shape made from straight line segments. A quadrilateral has four sides.

We classify shapes using properties that every member must have, not their colour or orientation.

Cases to recognise

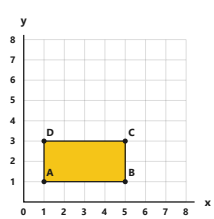
Situation	What to do and why
Square or rhombus? Four equal sides plus four right angles	Both names fit. A square satisfies both sets of properties.
Only one pair of opposite sides is parallel	It cannot be a parallelogram, which requires both pairs.

Read the model

Inspect a grid shape

A rectangle has four right angles and two pairs of parallel opposite sides.

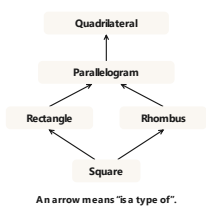
This grid rectangle spans four units across and two up. Opposite sides match in length.



A square belongs to more than one class

A square has four right angles and four equal sides.

It is a rectangle because it meets the rectangle definition. It is also a rhombus because all its sides are equal.



polygon A closed flat shape with straight sides.
quadrilateral A polygon with four sides.
property A feature used to describe or classify a shape.
parallel Lines in the same plane that never meet.



A (-3, 2)
A' (3, 2)

Reflect A(−3,2) in the y-axis.

The height stays two. Three units left becomes three units right, so A' = (3,2).

WORKED INVESTIGATION

Sort the quadrilateral cards

Use properties to sort a square. Its four right angles put it in the rectangle group, and its four equal sides put it in the rhombus group.

Look at this part	What it tells you
Rectangle test	four right angles
Rhombus test	four equal sides
Square	passes both tests

Work it through

Draw a 2 by 5 rectangle. It has four right angles but unequal adjacent sides, providing a rectangle outside the square group.

Catch the mistake

A square standing on a corner still passes both tests. Turning the card changes its orientation, not its sides or angles.

Compare the cases

Turn it, keep the properties

Turning a square does not change its side lengths or angles.

“Diamond” is not a separate mathematical class that replaces square or rhombus.

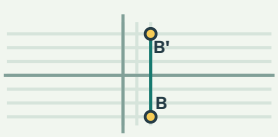
Parallel does not mean equal angle size

A parallelogram has two pairs of parallel opposite sides.

It need not have right angles. Every rectangle is a parallelogram, but not every parallelogram is a rectangle.

Change one condition

Draw a slanted rhombus with an acute angle. It supplies the opposite counterexample: a rhombus that is not a rectangle.



B (2, -3)
B' (2, 3)

Reflect B(2,–3) in the x-axis.

The horizontal position stays two. The sign of the vertical coordinate changes.

SHAPE PROPERTIES, NOT APPEARANCES

Compare the models

Classify triangles too

A triangle may be described by sides: equilateral, isosceles or scalene.

It may also be described by angles: acute, right or obtuse. A right triangle can also be isosceles.

Use a clear definition

Here isosceles means at least two equal sides, so an equilateral triangle also qualifies.

Some school books use “exactly two”. State the convention before comparing classifications.

A picture is evidence, not a guarantee

For an exact claim, use stated properties, grid units or equal-length and angle markings.

Do not decide that an unmarked rough drawing must have equal sides simply because it looks that way.

Explain your reasoning

Why is every square a rectangle?

A square has all four right angles required by the rectangle definition.

Two more worked cases

Situation	Reasoning
A rectangle rotated 45°	Its angles and side lengths stay fixed. Its classification stays fixed too.
Disprove “all rectangles are squares”	Draw a 2 by 3 rectangle. Its adjacent sides differ in length.



P (0, 1)
Q (0, 4)

What happens to P and Q in the y-axis mirror?

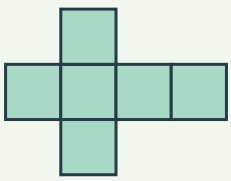
Both are on the mirror line. Each maps to itself.

ILLUSTRATED PROBLEM SHEET

Follow the faces through a fold

Six squares make a cube net only when the fold covers each face once.

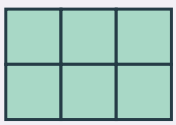
1



A strip of four makes the sides. What do the two spare squares cover?

One closes the top and one closes the bottom.

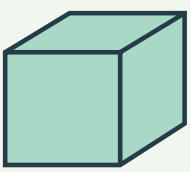
2



Can this two-by-three rectangle close into a cube?

No. Four squares meet at an interior corner, but only three cube faces meet at a vertex.

3

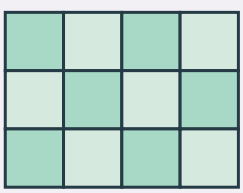


6 faces

How many edges does a cube have?

Six faces have four edges each. Each edge belongs to two faces, so 24 ÷ 2 = 12.

4



Cut a 4 by 3 rectangular face from card. Is this one face of a cube?

No. Cube faces are squares. It can be a face of a cuboid.

One square face
four edges.

Six cube faces
twelve distinct edges, as each edge is shared.

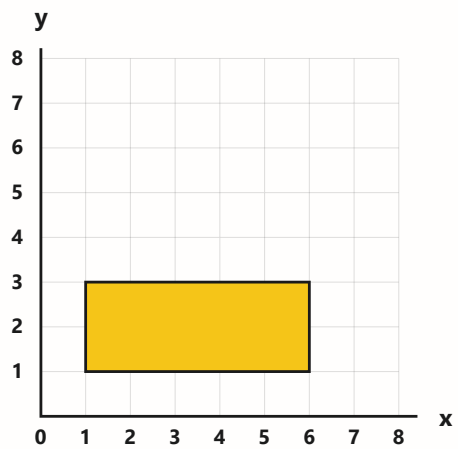
CHAPTER PROBLEM

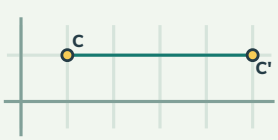
A quadrilateral has four equal sides and one right angle. Must it be a square?

Yes. A rhombus has opposite angles equal and adjacent angles summing to 180°. One right angle forces all four to be right angles.

QUESTION BANK · FOLD OR COVER THE RIGHT COLUMN

Check your reasoning

Try the problem	Solution and reasoning
01 Can the grid shape be a square? Explain. 	No. Its horizontal sides span five units and its vertical sides two units, so all four sides are not equal.
02 A quadrilateral has four equal sides and one right angle. What is its most specific name?	A square. A rhombus is a parallelogram, so the one right angle forces the other three.
03 In a cube net two squares share a full edge. Can they end up as opposite faces?	No. They meet along that same edge after folding.
04 Can four equal sides alone prove a square?	No. A rhombus with a 60° angle has four equal sides but lacks right angles.
05 What property makes every rectangle a parallelogram?	Each pair of opposite sides is parallel.



C (1, 1)
C' (5, 1)

Find the vertical mirror taking (1,1) to (5,1).

Halfway from x = 1 to x = 5 is x = 3. Each point is two units from that line.

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