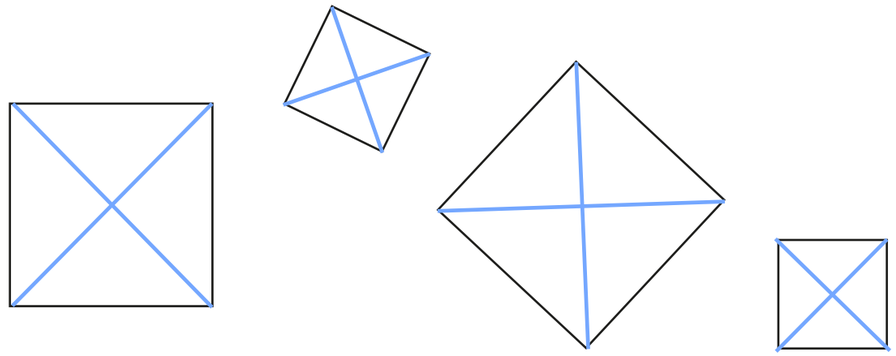
Understand and use the properties of diagonals of quadrilaterals

1 Here are four squares.

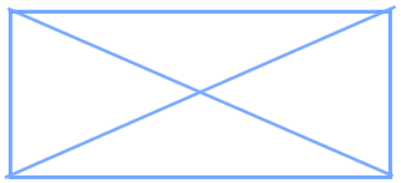


a) Join opposite corners of each square.

b) What do you notice about where the diagonal lines intersect?

They intersect at right angles. The diagonals are perpendicular.

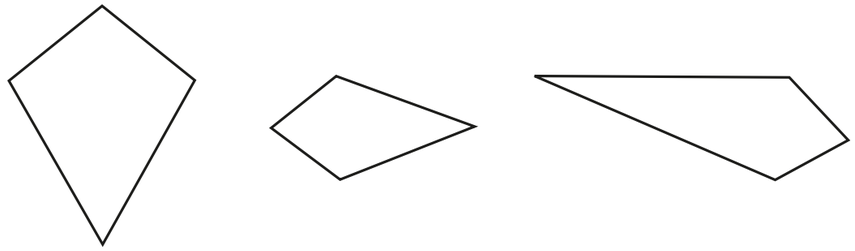
2 Show that the diagonals of a rectangle do not meet at right angles.



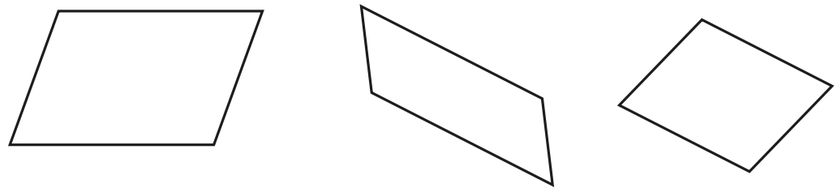
3 Do the diagonals of each shape intersect at right angles?

Here are some shapes to test.

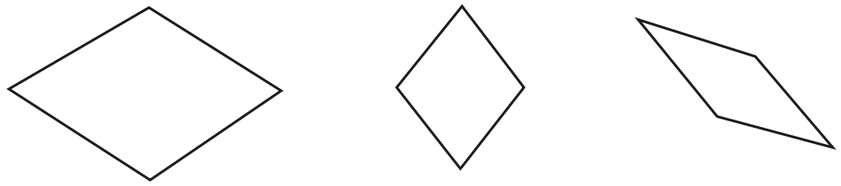
kites



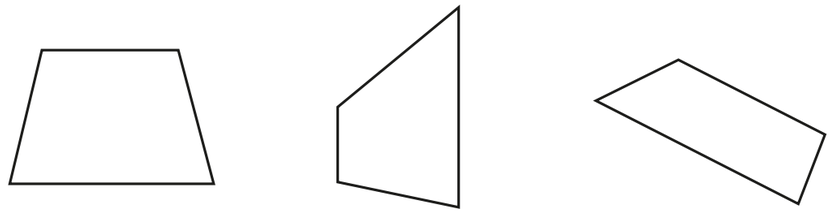
parallelograms



rhombuses



trapeziums

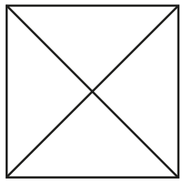


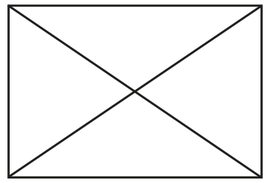
Complete the table.

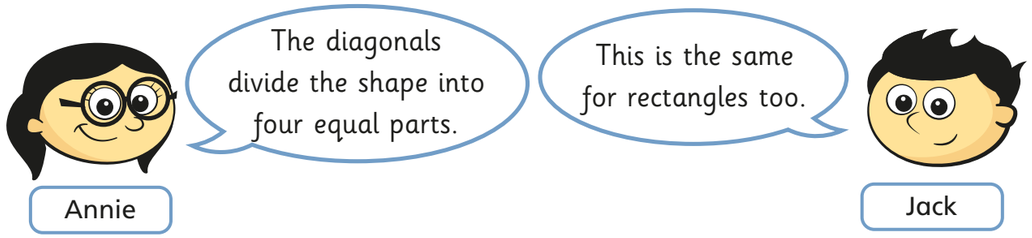
Shape	Diagonals intersect at 90° Yes or No
kite	yes
parallelogram	no
rhombus	yes
trapezium	no

4 Annie draws the diagonals of a square.

Jack draws the diagonals of a rectangle.



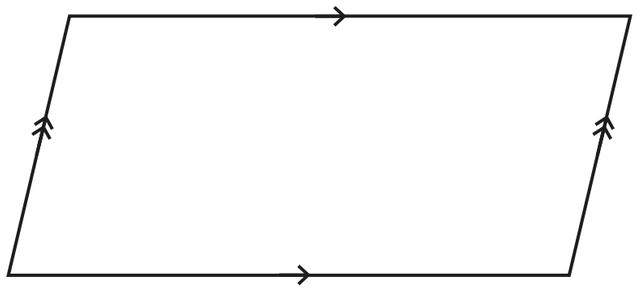




Prove that Jack is correct.

Various answers.

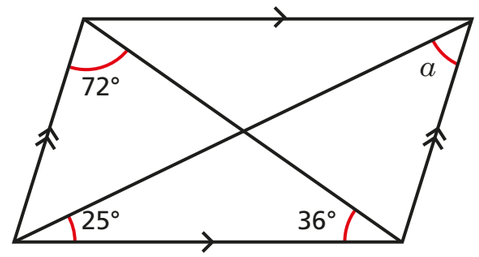
5 Do the diagonals of a parallelogram bisect the angles? NO



Explain your answer.

Various answers.

6 Find the size of angle a.

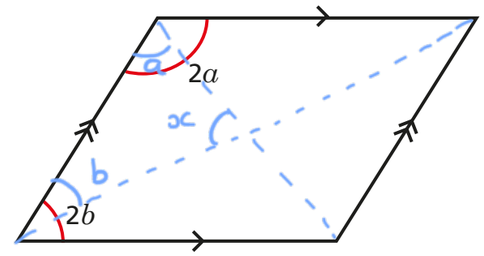


Show all your workings.

$a =$ 47° °

7 Prove that the diagonals of a rhombus intersect at right angles.

You can assume that a diagonal bisects each angle.



Show all your workings.

$2a + 2b = 180$ because co-interior angles sum to 180.

$\Rightarrow a + b = 90$

$x = 180 - (a + b)$

$= 180 - 90$

$= 90$ $\therefore$ the diagonals intersect at right angles.