Geometry with Technology

Use Geogebra to demonstrate the following theorems.

1. The interior angles of a triangle are supplementary.

2. The exterior angle of a triangle is equal to the sum of the two interior opposite angles.

3. If two parallel lines are cut by a transversal, the alternate and corresponding angles are equal, and the co-interior angles are supplementary.

4. In a right-angled triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides.

Geometry with Technology – links to demonstrations

1. The interior angles of a triangle are supplementary.

   https://www.geogebra.org/geometry/yh4tyeww

2. The exterior angle of a triangle is equal to the sum of the two interior opposite angles.

   https://www.geogebra.org/geometry/abvuk3hs

3. If two parallel lines are cut by a transversal, the alternate and corresponding angles are equal, and the co-interior angles are supplementary.

   https://www.geogebra.org/geometry/mmuk95ap

4. In a right-angled triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides.

   https://www.geogebra.org/geometry/surjegjx

Geometry Without Technology

1. Angle Sum of Triangle.

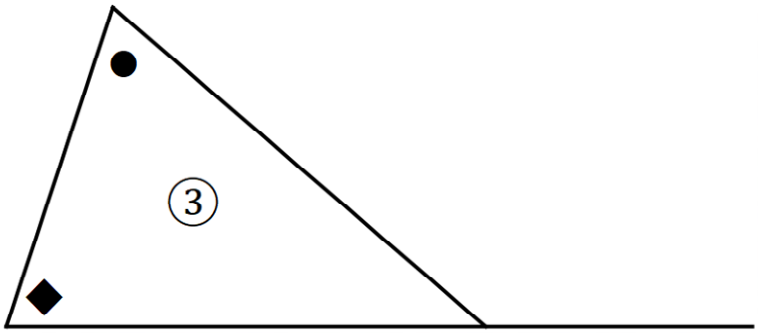
1.1 Use triangle ①. Tear the three corners and place each of the marked vertices next to each other along the line drawn below. What do you notice about the sum of the angles in a triangle?

_____

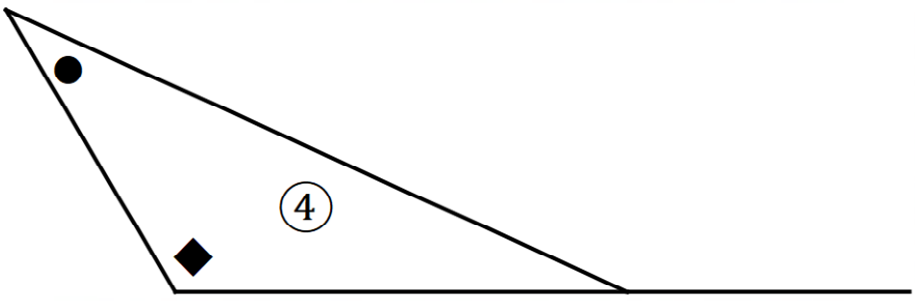
1.2 Now use triangle ② and do the same thing. What do you notice about the sum of the angles in an obtuse-angled triangle?

2. Exterior Angle of a Triangle.

2.1 Use triangle ③. Tear the marked corners and place them next to each other in the exterior angle. What do you notice?

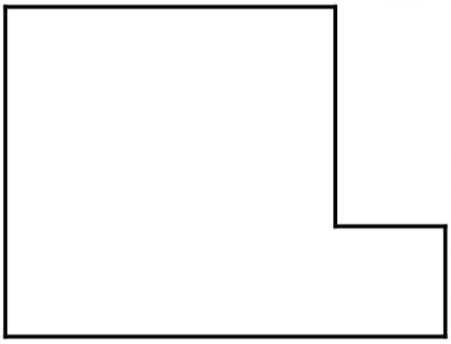


2.2 Repeat the same with obtuse-angled triangle ④.

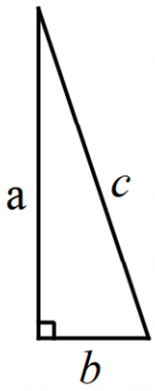


3. Pythagoras's Theorem.

3.1 Find the five pieces labelled ⑤. Using the two squares, check that they fill the shape below. Using the other three pieces, check that they fill the same shape below. This means that the two squares have the same area as the other three shapes together.

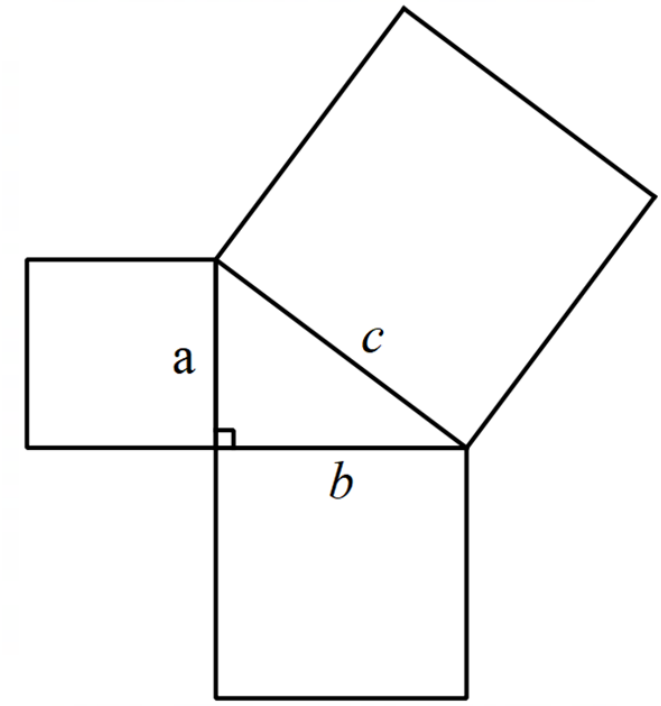


3.2 Use the triangle below. Place the squares against the sides labelled a and b. Now use the other three shapes against side c and see if you can get a square on that side.



3.3 What does this show?

4. Pythagoras's Theorem.



4.1 Find the five pieces labelled ⑥. Check that the square shape fits on the side marked a. Check that the four other shapes fit into the square on the side marked b.

4.2 Now use all five shapes to fill the square on the side marked c.

4.3 What does this show?

5. Quadrilaterals.

Use the pieces of a tangram labelled with the letters A to G to make the required quadrilateral. Once you've made it, draw a rough sketch showing how the pieces must be placed.

5.1 Use C and E to make a square.

5.2 Use F and G to make a trapezium.

5.3 Use C, E, and F to make a rectangle.

5.4 Use C, E, and G to make a square.

5.5 Use C, D, and E to make a parallelogram.

5.6 Use A, C, E, and F to make a square.

5.7 Use A, C, E, and G to make a rectangle.

5.8 Use A, B, C, E, and F to make a rectangle.

5.9 Use C, D, E, F, and G to make a parallelogram.

5.10 Use C, D, E, F, and G to make a trapezium.

5.11 Use C, D, E, F, and G to make a rectangle.

5.12 Use all seven pieces to make a square.

Problem Solving with Three Dimensional Shapes

1. In the examples below, you have been given some shaded squares that form part of a net for a cube. Each square must share an edge with at least one other square. A square may not be attached by a vertex (corner) only.

   List all the squares that could be used to complete a net of a cube.

1.1

A	B	C	D	E	F
G					H
I	J	K	L		M
N	O	P	Q	R	S

1.2

A	B	C	D	E	F
G	H		I	J	K
L					M
N	O	P	Q	R	S

1.3

A	B	C	D	E
F	G		H	I
J				K
L	M		N	O
P	Q	R	S	T

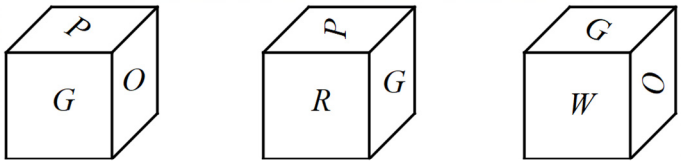
1.4

A	B	C	D	E
F	G		H	I
J		K	L	M
N	O		P	Q
R	S	T		U
V	W	X	Y	Z

1.5

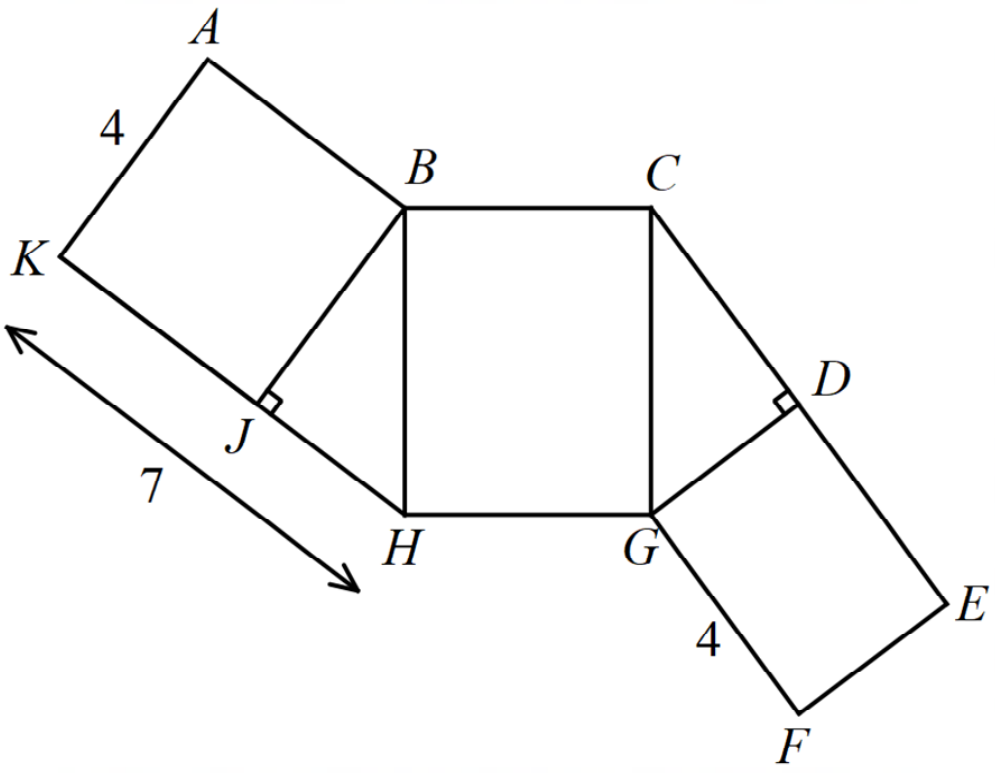
A	B	C	D	E
F	G		H	I
J	K	L	M	N
O				P
Q	R	S	T	U

2. The faces of a cube are painted in six different colours, green (G), red (R), orange (O), pink (P), blue (B), and white (W). Three views of the cube are shown below.

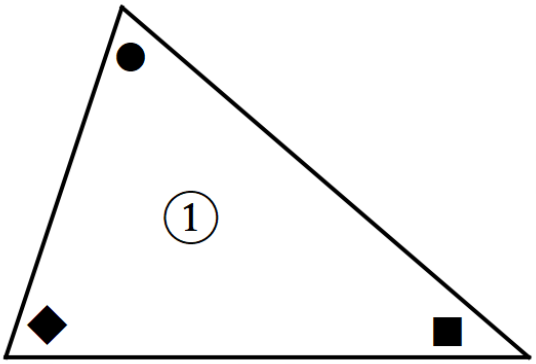


What colour is on the face opposite the face painted blue?

3. The net below consists of three rectangles and two triangles. AK = FG = 4 units and KH = 7 units.



Determine the volume of the triangular prism formed by the net.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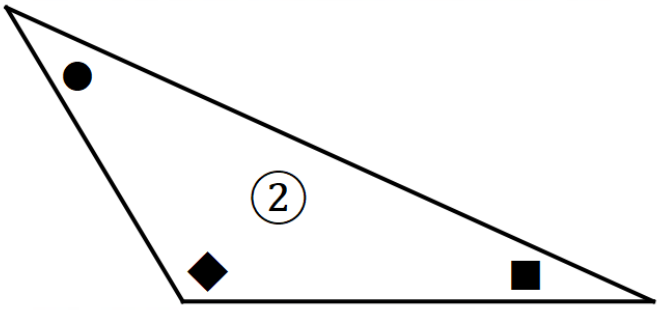
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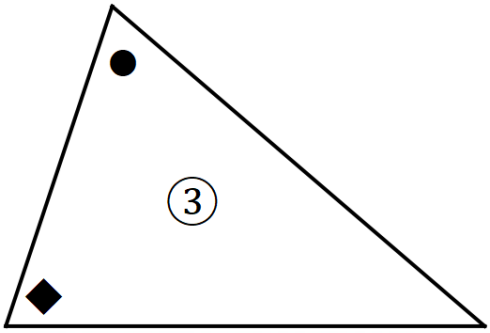
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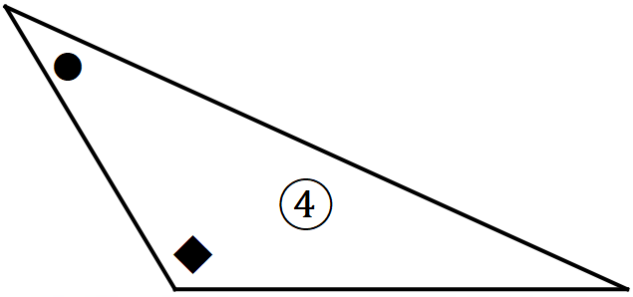
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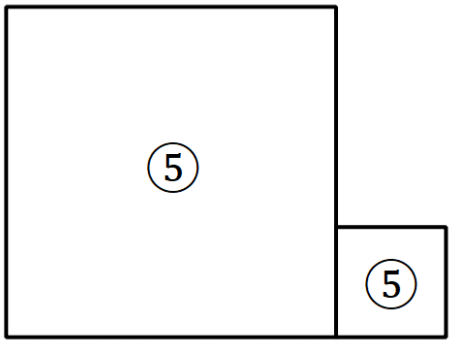
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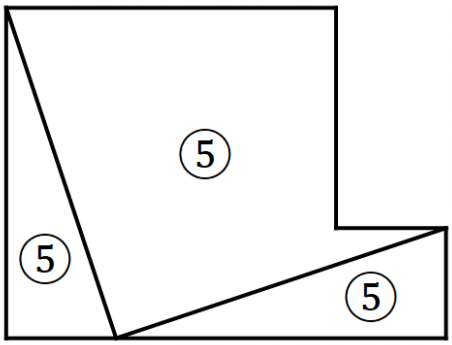
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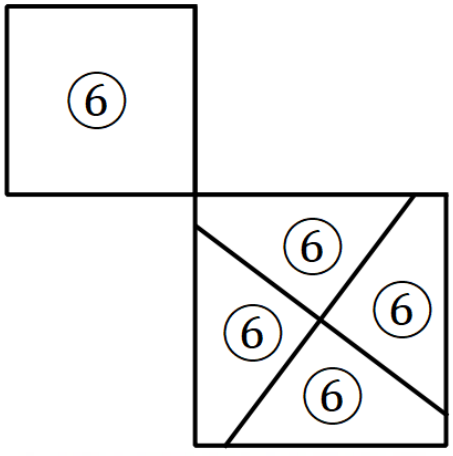
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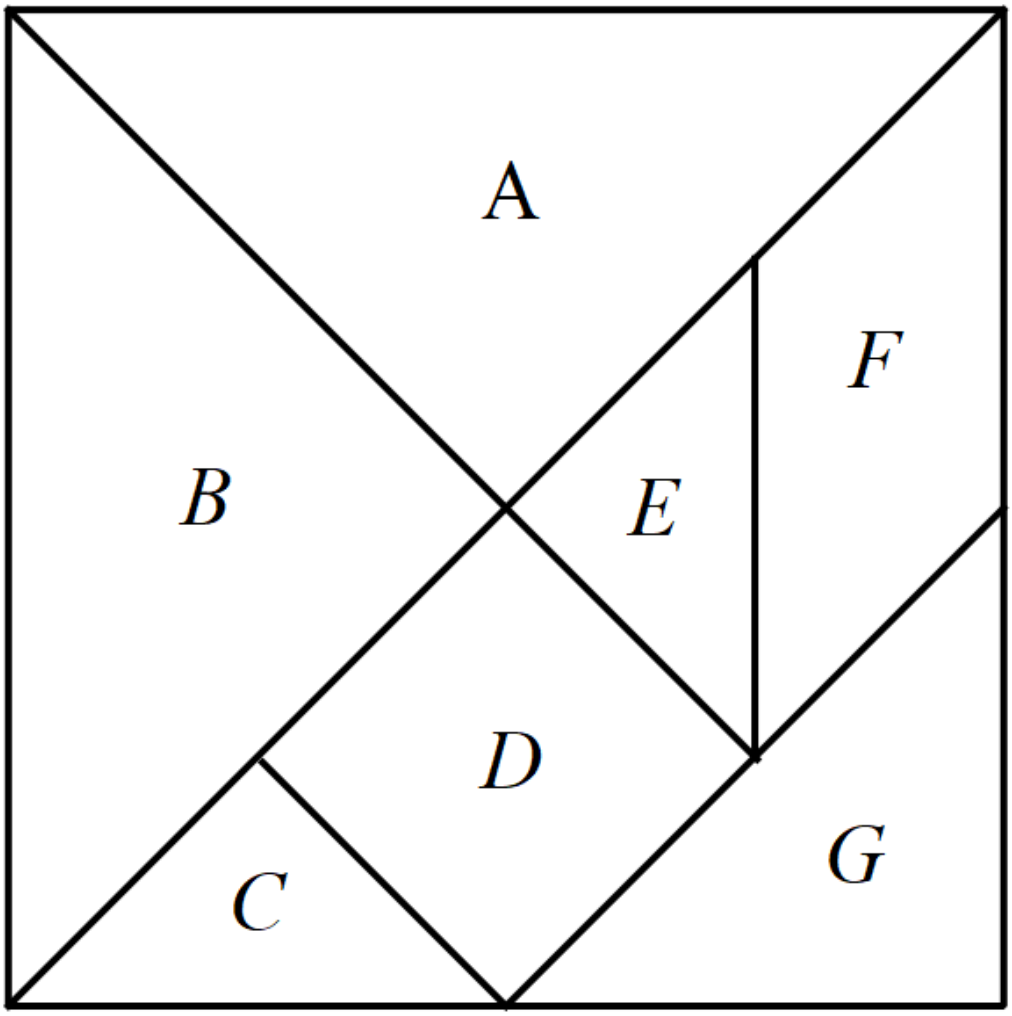
A
B
E
F
D
C
G