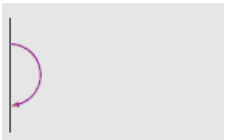
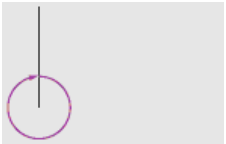
Mathematics
Topic 4: Geometry

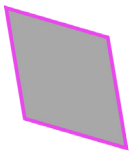
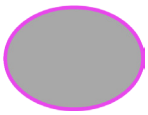
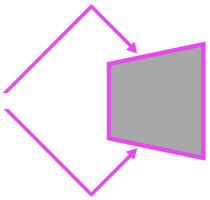
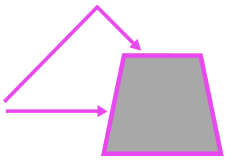
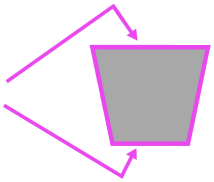
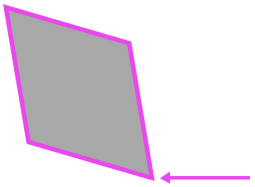
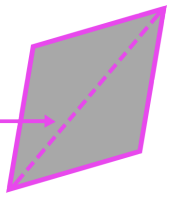
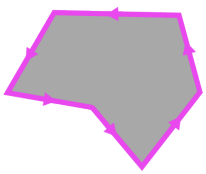
Topic 4: Geometry

1. Match the names and descriptions with the pictures of **angles**. Write your answers in the grid below.

	Name of angle		Description
a)	right angle	1	A full circle: 360 degrees
b)	straight angle	2	A straight line: 180 degrees
c)	acute angle	3	Bigger than a right angle, but smaller than a straight angle: between 90 and 180 degrees
d)	obtuse angle	4	Bigger than a straight angle, but smaller than a revolution: between 180 and 360 degrees
e)	reflex angle	5	Exactly quarter of a circle, as if a vertical line is intersecting a horizontal line: 90 degrees
f)	revolution	6	Smaller than a right angle: between 0 and 90 degrees

It looks like:	Name of angle	Description and size
1. 		
2. 		
3. 		
4. 		
5. 		
6. 		

2. Match the descriptions of **geometrical terms and shapes** with the pictures. Write your answers in the grid below.

Description of shape:		**Picture and name:**	
a)	Sides that are touching each other	1	 This is a polygon.  This is *not* a polygon because the sides are not straight lines.
b)	The point at which two sides meet (plural: vertices)	2	opposite sides 
c)	Sides that are facing each other	3	adjacent sides 
d)	A straight line connecting two opposite vertices	4	parallel sides 
e)	A flat, closed shape with only straight lines for sides	5	 vertex
f)	The distance all the way around the boundary of the shape	6	Diagonal vertex 
g)	Opposite sides that are parallel to each other	7	Perimeter 

Write answers here:

a)	b)	c)	d)	e)	f)	g)

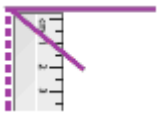
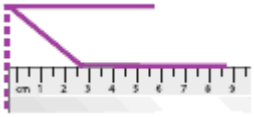
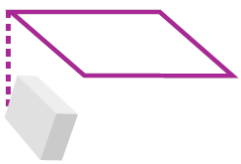
3. Put the sentences in the correct order to make **instructions on drawing a square**.

a)	To create the right angles (to draw the perpendiculars) tear the corner off a regular sheet of paper. The corner is 90 degrees.
b)	Draw a straight line with a ruler. Measure how long it is.
c)	Join the two new lines to create the fourth side.
d)	Measure all three lines to make sure they are the same length.
e)	Put that corner against your first line and draw the perpendicular line along the side of the paper, to make sure the next side is at a right angle.
f)	Draw two lines perpendicular to the first line, one at each end.

Write answers here:

1	2	3	4	5	6

4. Match the descriptions with the pictures to make instructions for **how to draw a parallelogram**. Write your answers in the grid below.

a)		1	join the first and third lines and rub out the temporary perpendicular
b)		2	draw a perpendicular from the first line using your ruler
c)		3	draw the third side perpendicular to the temporary perpendicular, equal in length to the first side (6cm)
d)		4	draw the first side (e.g. 6cm)
e)		5	draw an adjacent oblique side (e.g. 4cm)

Write answers here:

1	2	3	4	5

5. Draw a line between the beginnings and endings to make sentences about the **properties of a cuboid**.

A cuboid has 6	a different area.
Opposite sides are always	faces.
It has 3 pairs of	edges.
Each pair of sides can have	sides or faces.
Two pairs of sides can be exactly the same and	form right angles.
There are vertices or 8 corners that	have the same surface area.
There are 12	equal.

6. Choose the correct word from the list to fill the gaps in the text about the **properties of a right cylinder**.

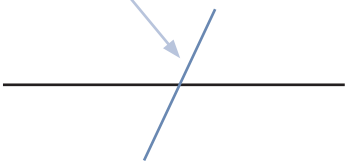
rectangle	radius	perpendicular	net cylinder
height	cylindrical	cylinder	circles

You have often seen three dimensional [a)] _____ objects. Here are some common examples: a can of beans or a can of cool drink. Perhaps you or your friends have pots of glue that are in the shape of a [b)] _____ . This is a mathematical definition: A regular cylinder is a three dimensional shape whose surface is formed by all [c)] _____ of a given [d)] _____ whose centres are on the same [e)] _____ line. Imagine if you have a heap of identical coins with holes exactly in the centre. Now if you thread all the coins together over a wooden rod, you would form a cylinder. Now let us make a container for the coins. The perpendicular [f)] _____ of the cylinder is constructed from a [g)] _____ . The top and bottom ends are circular discs. We use these components to make a [h)] _____ which can be rolled into a cylindrical container.

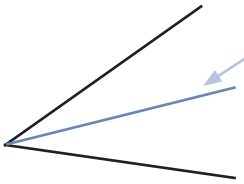
7. Use the words about **medians, bisectors and mediating lines** to label the pictures.

angle	bisector	mediator
vertex	vertical	opposite

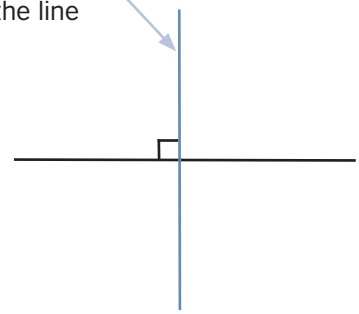
a) - cuts a line in half



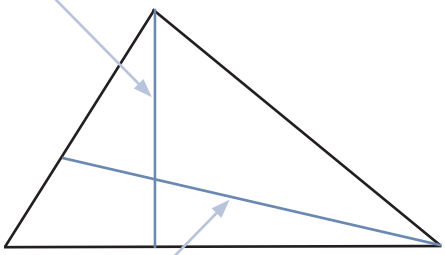
bisector - cuts c) in half



b) - the perpendicular bisector of the line



height - the d) distance from vertex to base of triangle



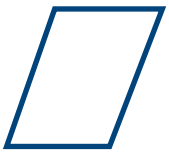
median - from e) to middle of f) side

8. Use the words about **geometrical figures** to label the pictures.

irregular quadrilateral	irregular trapezium	isosceles triangle	kite
parallelogram	rectangle	rhombus	square

a) .....

b) .....

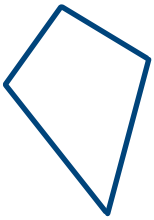


c) .....

d) .....

e) .....

f) .....

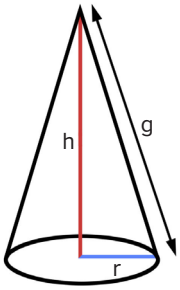
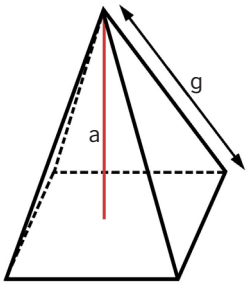


g) .....

h) .....

9. Match the information on pyramids and cones with the pictures. Write your answers in the correct space in the grid below.

a) a cone
b) a square pyramid
c) circles, getting smaller to a point
d) circle, radius r
e) curved, angled to a point
f) line 'a' in the diagram
g) line 'g' in the diagram
h) line 'h' in the diagram
i) line 'g' in the diagram
j) square
k) squares, getting smaller to a point
l) four triangular sides angled to a point

Characteristics:				
Name:	1		2	
Base:	3		4	
Sides:	5		6	
Horizontal cross sections:	7		8	
Perpendicular height	9		10	
Slant height	11		12	

10. Match the words about **geometry** with their correct definition. Write your answers in the grid below.

a)	enclosed	1	For all time in the future, or for as long as you can imagine.
b)	equilateral	2	At no time in the past or in the future.
c)	forever	3	Exactly like another object, or way of doing something.

d)	intuitive	4	Clear, obvious, or noticeable.
e)	many-sided	5	Surrounded by something and separated from what is outside.
f)	never	6	Describing something whose sides are all the same length.
g)	non-perpendicular	7	The position of two things that are next to each other.
h)	rectangular	8	Something that has two long sides and two short sides forming four right angles.
i)	same	9	A line that is not completely upright and straight.
j)	side by side	10	A shape with many different parts or edges.
k)	visible	11	A way of doing something, especially a planned or established way, based on your feelings rather than on facts or evidence.

Write your answers here:

a)	b)	c)	d)	e)	f)	g)	h)	i)	j)	k)

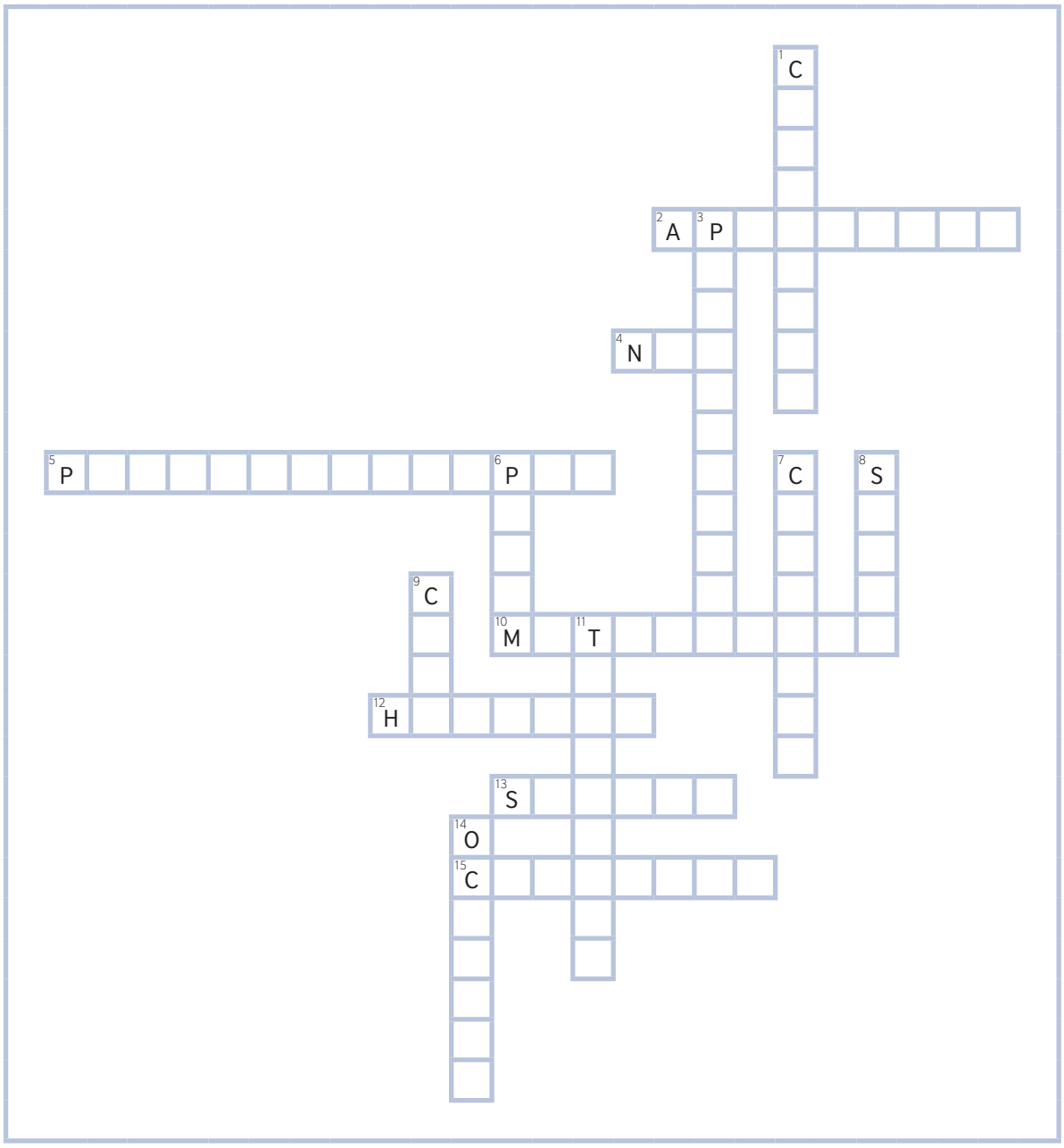
11. Complete the crossword by answering the following questions. All the correct answers are about **shapes and instruments**.

Across

2. The machines, tools, or equipment needed for doing something technical or scientific.
4. An arrangement of shapes that are joined together and can be folded to create a geometrical construction (for example, a cross shape that can be used to build a cube).
5. A prism with six faces, all parallelograms, similar to a cube but with slanting sides.
10. A single match, especially after it has been burnt.
12. A geometric shape with six straight sides.
13. An object that is shaped like a ball.
15. An object shaped like a tube that is empty inside.

Down

1. A piece of equipment used for drawing circles, consisting of two thin parts joined in the shape of the letter V.
3. Objects that are shaped like half a circle and are used for measuring and drawing angles.
6. A solid object that has a regular shape and can be cut into slices that all have the same shape.
7. Pieces of card or paper cut out for making shapes.
8. A small thin piece of a material such as wood or plastic.
9. An object like a box with six square sides that are all the same size.
11. A thin pointed piece of wood or plastic used for removing bits of food from between your teeth.
14. A shape with eight straight sides.


1 C
2 A
3 P
4 N
5 P
6 P
7 C
8 S
9 C
10 M
11 T
12 H
13 S
14 O
15 C

12. Find the words about **geometry** in the word search.

U S P J B M N U E R I E C Y L O Q U A N A L Y S E E T E O E Y F N S S R D A R V L A P E C H A X I D S L E O O J S E S S I S N S M I V R E C N S C O S E E N R P G A S S S F O L R V J E E A K W G X R I T R E G F D S N H O Y L Z A D K C C P M N E B O E F I V M E E T A W V E N I Y G O W V A Z G U R M P T A V V S A Q E G E U C T E N X P S E N N E R S O J F Z O T E O E L D R K A D D A T R N H E W K E W Y E P Y L H M F T E S J Q Y E P C M U A T A G Y V N O E Z T S R O T A T E E T O L C N A N R L C O N S T R U C T	analyse apply compare construct cross cut discover extend mark meet pass recognise rotate trace

Glossary

acute angle	/əˈkjuːt ˈæŋg(ə)l/ noun [C] an acute angle is less than 90 degrees.
adjacent	/əˈdʒeɪs(ə)nt ˈæŋg(ə)l/ a side or angle next to another side or angle: adjacent angle.
along	/əˈlɒŋ/ adv prep moving on or beside a line.
analyse	/ˈænəlaɪz/ verb [T] to examine something in detail in order to understand or explain it.
angle	/ˈæŋg(ə)l/ noun [C] the shape that is made where two straight lines join or cross each other.
apothem	/ˌæpəðem/ noun [C] a perpendicular from the center of a regular polygon to one of its sides.
apparatus	/ˌæpəˈreɪtəs/ noun [C/U] the machines, tools, and equipment needed for doing something, especially something technical or scientific.
apply (the formula)	/əˈplaɪ (ðiˈfɔː(r)mjələ)/ to use a particular plan or method for dealing with a problem or for achieving a result.
area	/ˈeəriə/ noun [C] the amount of space that the surface of a place or shape covers. Area is expressed in square units, such as square kilometres or square miles.
base	/beɪs/ noun [C] the bottom part, edge, or surface of something.
bisecting line	/ˌbaɪˈsektɪŋ laɪn/ a long thin mark dividing something into halves in mathematics: bisector.
circle	/ˈsɜː(r)k(ə)l/ noun [C] a round shape consisting of a curved line that completely encloses a space and is the same distance from the centre at every point. Something in the shape of a circle is circular.
circumference	/sə(r)ˈkʌmf(ə)rəns/ noun [C/U] the distance measured around the edge of a circle or a round object or area.
compare	/kəmˈpeə(r)/ verb [I/T] consider how things or people are similar and how they are different.
	/ˈkʌmpəs/ noun [C/U] a piece of equipment used for finding your way, with a needle that always points north.
compasses	/ˈkʌmpəsɪz/ [plural] a piece of equipment used for drawing circles, consisting of two thin parts joined in the shape of the letter V.
complementary angle	/ˌkɒmplɪˈment(ə)ri ˈæŋg(ə)l/ noun [C] Two Angles are Complementary if they add up to 90 degrees (a Right Angle).
cone	/kəʊn/ noun [C] an object with a circular base that rises to a point. Something in the shape of a cone is conical.
construct	/kənˈstrʌkt/ verb [T] build shapes in maths like a square or a triangle.
corner	/ˈkɔː(r)nə(r)/ noun [C] the part of something square or rectangular where two edges meet.
cross	/krɒs/ verb [I/T] go from one side of something such as a road or river to the other.
cube	/kjuːb/ noun [C] an object like a box with six square sides that are all the same size.

cuboid	/ˈkjuːbɔɪd/ noun [C] a shape like a box that is similar to a cube, but with surfaces that are rectangles, not squares.
cut in half	/kʌt ɪn hɑːf/ verb [T] divide an area, or something else, into two parts.
cutting	/ˈkʌtɪŋ/ noun [C] pieces of card or paper cut out for making shapes.
cylinder	
cylindrical	
design	/dɪˈzaɪn/ noun [C] a pattern of simple geometric shapes that decorates something.
diagonal	/daɪˈægən(ə)l/ adj a diagonal line is straight and sloping and connects opposite corners of a flat shape.
discover	/dɪˈskʌvə(r)/ verb [T] find out something that you did not know before.
element	/ˈelɪmənt/ noun [C] an important basic part of something, like a plan or design.
enclosed	/ɪnˈkləʊzd/ adj surrounded by something and separated from what is outside.
equal sides	/ˈiːkwəl saɪdz/ two parts of a shape which are the same in size.
equilateral	/ˌiːkwɪlæt(ə)rəl/ describing something whose sides are all the same length.
expansion	/ɪkˈspænʃ(ə)n/ noun [U] the process of increasing in size and filling more space.
extend	/ɪkˈstend/ verb [I/T] increase the size of a line or area, especially by adding extra parts onto it.
exterior angle	/ɪkˈstɪəriə(r) ˈæŋg(ə)l/ the outside angle of a shape in maths, like a triangle.
figure	/ˈfɪgə(r)/ noun [C] a number or a shape in mathematics.
flat angle	/flæt ˈæŋg(ə)l/ the shape of two lines, whose angle is more than 90 degrees.
forever	/fərˈevə(r)/ adv for all time in the future, or for as long as you can imagine.
geometrical	/ˌdʒiːəˈmetrɪk(ə)l/ adj elating to the methods and principles of geometry.
graduated ruler	/ˈgrædʒuˌeɪtɪd ˈruːlə(r)/ a flat piece of wood with marks on it to show measurements.
have to be	/hæv tə, bi/ verb must, obliged to be.
height	/haɪt/ noun [C/U] the degree to which something is high or someone is tall.
hexagon	/ˈheksəgən/ noun [C] a geometric shape with six straight sides. Something in the shape of a hexagon is hexagonal.
hollow cylinder	/ˈhɒləʊ ˈsɪlɪndə(r)/ an object shaped like a wide tube, empty inside.

horizon	/həˈraɪz(ə)n/ noun [U] the line in the distance where the sky seems to meet the earth.
horizontal	/ˌhɒrɪˈzɒnt(ə)l/ adj straight and parallel to the ground.
hypotenuse	/haɪˈpɒtənjuːz/ noun [C] the longest side of a right-angled triangle.
interior angle	/ɪnˈtɪəriə(r) ˈæŋg(ə)l/ the inside angle of a triangle or other shape in maths.
intersect	/ˌɪntə(r)ˈsekt/ verb [I/T] if lines intersect, they join or cross each other.
intuitive method	/ɪnˈtjuːətɪv ˈmeθəd/ a way of doing something, especially a planned or established way, based on your feelings rather than on facts or evidence.
irregular	/ɪˈregjʊlə(r)/ adj not even, smooth, or straight in shape or appearance.
isosceles	/aɪˌsɒsəliːz/ adj a triangle in which two sides are the same length.
kite	
many-sided	/ˌmeni ˈsaɪdɪd/ adj describing a shape with many different parts or edges.
mark	/mɑː(r)k/ verb [I/T] write or draw words, letters, symbols on something for a particular purpose.
matchstick	/ˈmætʃˌstɪk/ noun [C] a single match, especially after it has been burnt.
measure	/ˈmeʒə(r)/ verb [I/T] find the exact size, amount, speed etc of something using a special tool or special equipment.
median	/ˈmiːdiən/ noun [C] a line drawn from a vertex in a triangle to the middle of the opposite side.
mediating line	/ˈmiːdieɪtɪŋ/ /laɪn/ noun [C] the perpendicular bisector of a line: mediator.
meet	/miːt/ verb [I/T] if two things meet, they touch or join each other.
net cylinder	
net of a cube	/net əv ə kjuːb/ noun [C] a geometrical construction of a cube on one plane or a 1-dimensional shape.
never	/ˈnevə(r)/ adv at no time in the past or in the future.
non perpendicular	/nɒn ˌpɜː(r)pənˈdɪkjʊlə(r)/ adj describing a line which is not completely upright and straight.
oblique	/əˈbliːk/ adj an oblique line is sloping, an oblique angle is any angle that is not 90°, 180°, or 270°.
obtuse	/əbˈtjuːs/ adj any angle that is between 90° and 180°.
octagon	/ˈɒktəgən/ noun [C] a shape with eight straight sides.
opposite	/ˈɒpəzɪt/ adj across from or on the other side of something.

parallel	/ˈpærəlel/ adj lines that are parallel are the same distance apart at every point along their whole length.
parallelepiped	/ˈpærəleləpɪpɪd/ noun [C] a prism with six faces, all parallelograms.
parallelogram	/ˌpærəˈleləˌgræm/ noun [C] a shape with four straight sides in which opposite sides are of equal length and are parallel to each other.
perimeter	/pəˈræmɪtə(r)/ noun [C] a limit that affects how a maths problem can be solved.
pass through	/pɑːs/ /θruː/ a line which crosses another is said to pass through that line.
perpendicular	/ˌpɜː(r)pənˈdɪkjʊlə(r)/ adj completely upright and straight.
point of intersection	/pɔɪnt əv ˈɪntə(r)ˌsekʃ(ə)n/ a particular moment, place, point in time where roads, lines etc join or cross each other.
polygons	/ˈpɒlɪgənaz/ noun plural flat shapes with three or more sides and angles: irregular polygons.
prism	/ˈprɪz(ə)m/ noun [C] a solid object that has a regular shape and can be cut into slices that all have the same shape. A prism usually has two or more sides shaped like a triangle.
protractors	/prəˈtræktə(r)z/ noun plural objects that are shaped like half a circle and are used for measuring and drawing angles.
Pythagoras theory	[paɪˈθægərəs ˈθɪəri/ noun a mathematical formula used to calculate the length of one side of a triangle, provided the length of at least 2 of the sides are known. The theorem states that the area of the square on a hypotenuse is equal to the sum of the areas of the triangles on the two smaller sides.
pyramid	
quadrilateral	/ˌkwɒdrɪˈlæt(ə)rəl/ noun [C] a flat shape with four sides such as a square.
radius	/ˈreɪdiəs/ noun [C] the distance from the centre of a circle to its edge, or a straight line from the centre to the edge.
ray	/reɪ/ noun [C] a line that crosses another line and the continuation of that line after the point of intersection.
recognise	/ˈrekəgnaɪz/ verb [T] know what the thing is that you are seeing because you have seen it before.
rectangle	/ˈrekˌtæŋg(ə)l/ noun [C] a shape with four straight sides and four angles of 90º.
rectangular	/rekˈtæŋgjʊlə(r)/ adj with the shape of a rectangle.
reflex angle	/ˈriːfleks//ˈæŋg(ə)l/ an angle that is between 180° and 360°.
relative position	/ˈrelətɪv//pəˈzɪʃ(ə)n/ having a particular quality when compared with something else, in this case the way that an object is placed.
revolution	/ˌrevəˈluːʃ(ə)n/ noun [C/U] the movement of something in a circle around something else, either once or continuously.
rhombus	/ˈrɒmbəs/ noun [C] a shape with four straight sides of equal length and angles that are not 90°. The more usual word is diamond.
right angle	/raɪt ˈæŋg(ə)l/ noun [C] an angle of 90°.

right cylinder	/raɪt/ /ˈsɪlɪndə(r)/ noun [C] A cylinder which has bases aligned one directly above the other.
rotate	/rəʊˈteɪt/ verb [I/T] move in a circle around a fixed central point, or to move something in this way.
same	/seɪm/ adj exactly like another person, thing, or way of doing something.
scalene	/ˌskeɪliːn/ adj something with lines of different lengths.
segment	/ˈsegmənt/ noun [C] a part of a line or curve between any two points on it.
set square	/set//skweə(r)/ a flat plastic or metal tool with three straight sides and one right angle, used for drawing lines and measuring angles.
side to side	/saɪd baɪ saɪd/ phrase next to each other.
slant height	/slɑːnt haɪt/ the degree to which something is high and is at an angle that is not 90 degrees, or to make something do this.
slope	/sləʊp/ noun [C] the angle of a surface with one end higher than the other.
sphere	/sfɪə(r)/ noun [C] an object that is shaped like a ball.
square	/skweə(r)/ noun [C] a shape with four straight sides of equal length and four corners called right angles.
stick	/stɪk/ noun [C] a small thin piece of wood or plastic used for a particular purpose.
straight	/streɪt/ adv adj without a bend or curve.
sum of interior angles	/sʌm əv ɪnˈtɪəriə(r) ˈæŋg(ə)lz/ a total amount made by adding several inside angles.
supplementary angle	/ˌsʌplɪˈment(ə)ri ˈæŋg(ə)l/ noun [C] Two Angles are Supplementary if they add up to 180 degrees.
surface area	/ˈsɜː(r)fɪs ˈeəriə/ noun [U] the total area of a surface or surfaces, especially the outside surfaces of an object.
toothpick	/ˈtuːθˌpɪk/ noun [C] a thin pointed piece of wood or plastic used for removing bits of food from between your teeth.
trace	/treɪs/ verb [T] draw the outline of an object.
transversals	/ˌtrænzˈvɜː(r)sɜlz/ noun plural something placed sideways or at an angle across something.
trapezium	/trəˈpiːziəm/ noun [C] a shape with four straight sides, two of which are parallel.
triangle	/ˈtraɪæŋg(ə)l/ noun [C] a flat shape that has three straight sides and three angles, adj *triangular*.
vertex	/ˈvɜː(r)teks/ noun [C] the point that is opposite the base of a triangle, plural vertices.
vertical	/ˈvɜː(r)tɪk(ə)l/ adj standing, pointing, or moving straight up. Something that is horizontal is parallel to the ground or its base.
visible	/ˈvɪzəb(ə)l/ adj clear, obvious, or noticeable.

Key:

1.

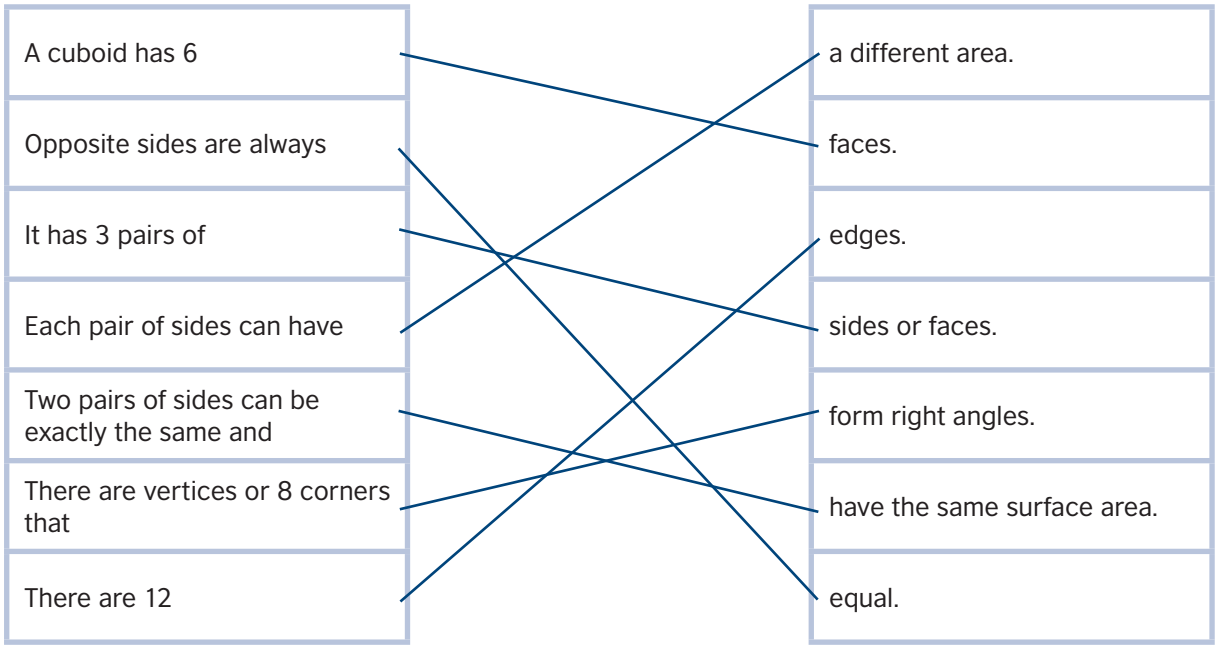
It looks like:	Name of angle	Description and size
1.	a) right angle	5) exactly quarter of a circle, as if a vertical line is intersecting a horizontal line: 90 degrees.
2.	b) straight angle	2) a straight line: 180 degrees.
3.	c) acute angle	6) smaller than a right angle: between 0 and 90 degrees.
4.	d) obtuse angle	3) bigger than a right angle, but smaller than a straight angle: between 90 and 180 degrees.
5.	e) reflex angle	4) bigger than a straight angle, but smaller than a revolution: between 180 and 360 degrees.
6.	f) revolution	1) a full circle: 360 degrees.

2. a) 3, b) 5, c) 2, d) 6, e) 1, f) 7, g) 4

3. 1 b), 2 a), 3 e), 4 f), 5 c), 6 d)

4. 1 a), 2 e), 3 b), 4 c), 5 a)

5.



6. a) cylindrical, b) cylinder, c) circles, d) radius, e) perpendicular, f) height, g) rectangle, h) net cylinder

7. a) bisector, b) mediator, c) angle, d) vertical, e) vertex, f) opposite

8. a) rectangle, b) square, c) parallelogram, d) rhombus, e) isosceles triangle, f) irregular trapezium, g) kite, h) irregular quadrilateral

9. 1 a), 2 b), 3 d), 4 j), 5 e), 6 l), 7 c), 8 k), 9 h), 10 f), 11 i), 12 g)

10. a) 5, b) 6, c) 1, d) 11, e) 10, f) 2, g) 9, h) 8, i) 3, j) 7, k) 4

11. **Across:** 2. apparatus, 4. net, 5. parallelepiped, 10. matchstick, 12. hexagon, 13. sphere, 15. cylinder,
Down: 1. compasses, 3. protractors, 6. prism, 7. cuttings, 8. stick, 9. cube, 11. toothpick, 14. octagon

12.