ART LESSONS & EXERCISES

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STARTING UP WITH GEOMETRY.

DEFINITION OF GEOMETRY

Geometry is the branch of mathematics that deals with the measurements and relationships of lines, angles, surfaces and solids.

Geometry comes from Greek: geo = earth; metry = to measure. So geometry means to measure the earth.

LINE SEGMENTS.

DEFINITION OF LINE SEGMENTS.

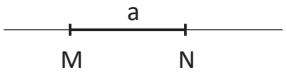
A line segment is a part of a line that is bounded by two **endpoints**.

The segment AB is a part of the line m.
A and B are the endpoints.

The very first thing we measure in geometry is a line segment.

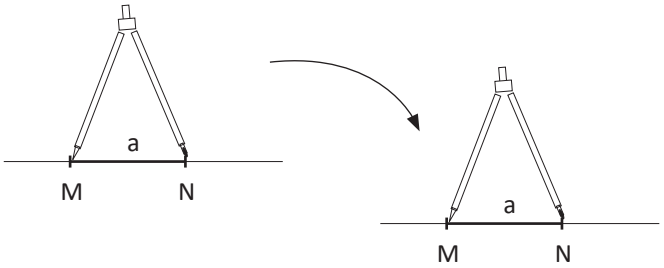
LABELLING IN GEOMETRY.

In Geometry we always label points with capital letters and lines with small letters. We can label a segment using the capital letters for the endpoints.
Small letters are for lines, sides of a polygon and they can also be used to label segments. We can also label the segment MN as segment a:



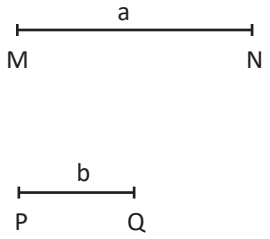
COPYING SEGMENTS.

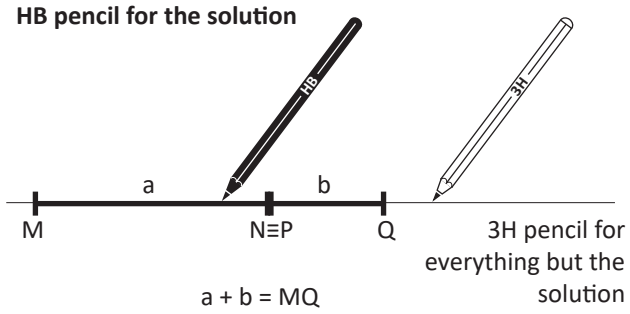
To copy a segment we need to measure the segment and transfer that measurement to another line.



ADDING SEGMENTS

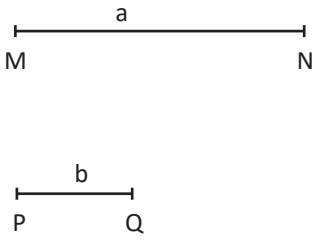
To add segments we need to copy one segment **after the other together on the same line**:

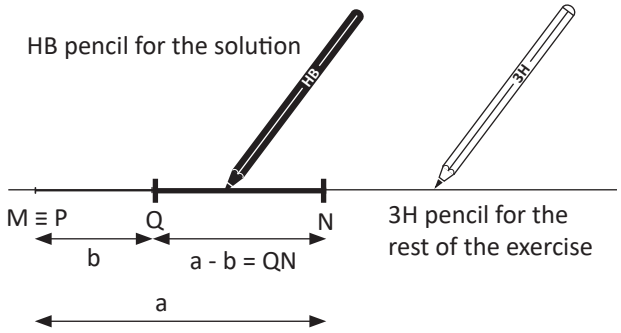




SUBTRACTING SEGMENTS

To subtract segments we need to copy the shortest segment **inside** the longest, so the solution is the rest.





STARTING UP WITH GEOMETRY: LINE AND LINE SEGMENTS - PRACTISE.

1. This is a 3H line. Draw a similar one on the right.

2. This is an HB line. Draw a similar one on the right.

3. Here you are an HB line after a 3H line. Draw them equal again on the right.

4. Here you are a line segment $\overline{AB}$ in the line m. Copy it again in the right gap.
   Watch the thickness of the lines.

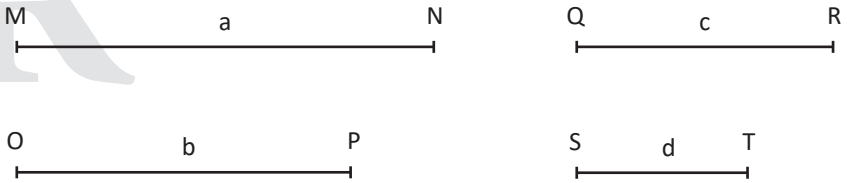
5. Here you are two segments $\overline{AB}$ and $\overline{CD}$ together, so $\overline{AD} = \overline{AB} + \overline{CD}$. Draw it again.

5. Label the next segments. Remember that capital letters are used for points.

5. Create in the gap below your own original composition, abstract or figurative, drawing with a ruler line segments with **different thicknesses**. Use the pencils **3H** and **HB** in order to get different line thicknesses.

OPERATIONS WITH SEGMENTS 1 - PRACTISE

Exersice 1. Given the segments a, b, c and d, do the operations indicated below.



a + b

TOTAL		Concept (0,6)	
		Neatness (0,1)	
		Precision (0,1)	
		Labels (0,1)	
		HB (0,1)	

b + c

O

TOTAL		Concept (0,6)	
		Neatness (0,1)	
		Precision (0,1)	
		Labels (0,1)	
		HB (0,1)	

a + d

TOTAL		Concept (0,6)	
		Neatness (0,1)	
		Precision (0,1)	
		Labels (0,1)	
		HB (0,1)	

a - d

TOTAL		Concept (0,6)	
		Neatness (0,1)	
		Precision (0,1)	
		Labels (0,1)	
		HB (0,1)	

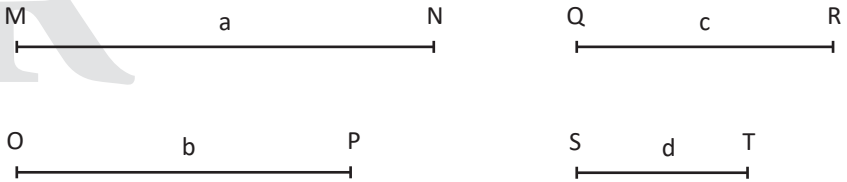
(a + b) - d

TOTAL		Concept (0,6)	
		Neatness (0,1)	
		Precision (0,1)	
		Labels (0,1)	
		HB (0,1)	
		TOTAL MARK	

SCORING ACTIVITY

OPERATIONS WITH SEGMENTS 2 - ACTIVITY

Exersice 2.1. Given the segments a, b, c and d, do the operations below (5 points).



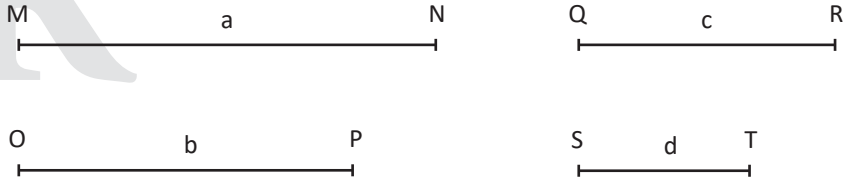
a + b	TOTAL		Concept (0,6)	
			Neatness (0,1)	
			Precision (0,1)	
			Labels (0,1)	
			HB (0,1)	
b + c	TOTAL		Concept (0,6)	
			Neatness (0,1)	
			Precision (0,1)	
			Labels (0,1)	
			HB (0,1)	
a + d	TOTAL		Concept (0,6)	
			Neatness (0,1)	
			Precision (0,1)	
			Labels (0,1)	
			HB (0,1)	
a - d	TOTAL		Concept (0,6)	
			Neatness (0,1)	
			Precision (0,1)	
			Labels (0,1)	
			HB (0,1)	
(a + b) - d	TOTAL		Concept (0,6)	
			Neatness (0,1)	
			Precision (0,1)	
			Labels (0,1)	
			HB (0,1)	

Exercise 2.1. Draw an artistic composition made of segments (5 points).

Group:		Due date:
Project:	Title: **SEGMENTS**	**Mark:**

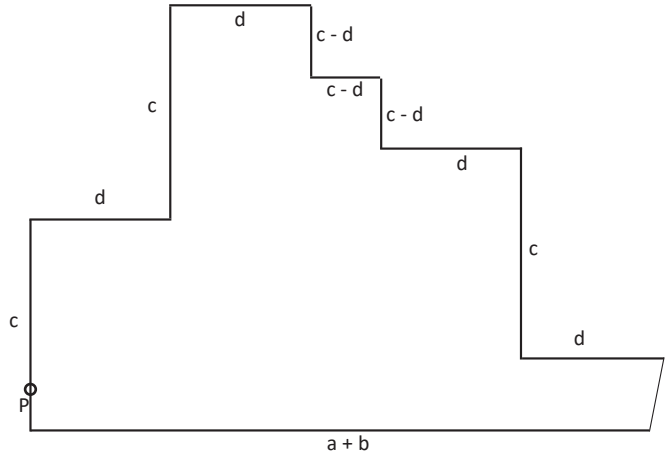
OPERATIONS WITH SEGMENTS 3 - EXTRA ACTIVITY

Exersice 3.1. Given the segments a, b, c and d, do the operations below.



a + b	TOTAL		Concept (0,6)	
			Neatness (0,1)	
			Precision (0,1)	
			Labels (0,1)	
			HB (0,1)	
b + c	TOTAL		Concept (0,6)	
			Neatness (0,1)	
			Precision (0,1)	
			Labels (0,1)	
			HB (0,1)	
a + d	TOTAL		Concept (0,6)	
			Neatness (0,1)	
			Precision (0,1)	
			Labels (0,1)	
			HB (0,1)	
a - d	TOTAL		Concept (0,6)	
			Neatness (0,1)	
			Precision (0,1)	
			Labels (0,1)	
			HB (0,1)	
(a + b) - d	TOTAL		Concept (0,6)	
			Neatness (0,1)	
			Precision (0,1)	
			Labels (0,1)	
			HB (0,1)	

Exercise 3.2. The following drawing illustrates the *measurements* of a building so ***the segments of the exercise 1 are the reference***. Draw it below with the segments of exercise 1 as measurements to be transfered.
Note: for this exercise you need to know how to trace *perpendicular* lines with the *set squares.*



TOTAL		Concept (0,6)	
		Neatness (0,1)	
		Precision (0,1)	
		Labels (0,1)	
		HB (0,1)	

P

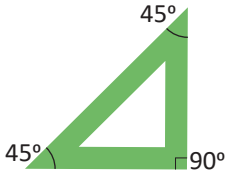
Group:		Due date:
Project:	Title: **OPERATIONS WITH SEGMENTS**	**Mark:**

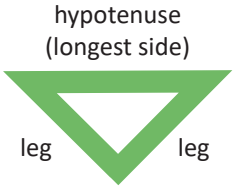
PARALLEL AND PERPENDICULAR LINES WITH THE SET SQUARES.

THE SET SQUARES OR TRIANGLES

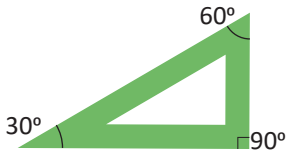
The set squares or triangles are tools to draw geometry. They have specific shapes with specific angles so they allow us to draw parallel and perpendicular lines. There are two set squares:

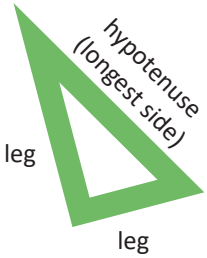
a) The 45º set square, which is an isosceles right triangle (two equal sides, two angles of 45º and one right angle)



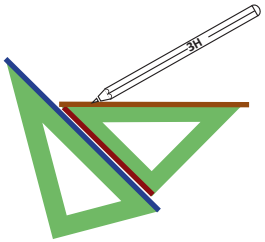


b) The 60º set square, which is a scalene right triangle (different sides and one right angle).





The usual arrangement of the set squares is the following:

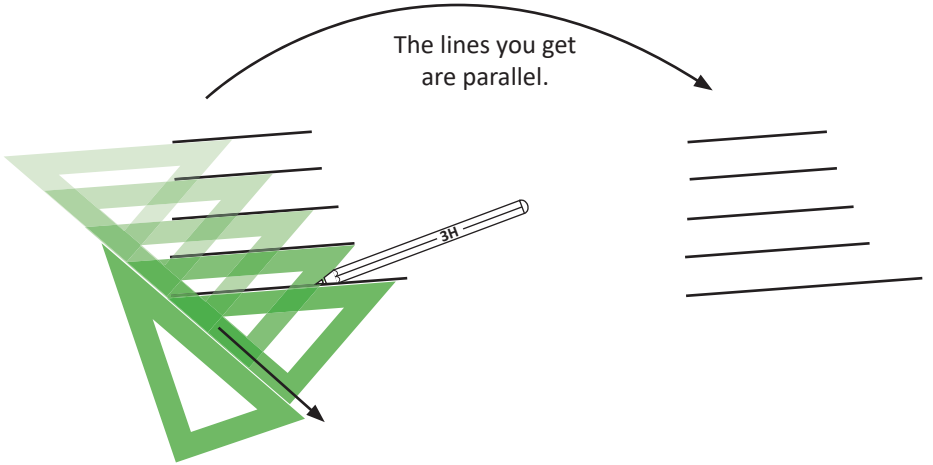


We always set **one leg of the 45º set square** against the **hypotenuse of the 60º set square** and we always draw lines with the **hypotenuse of the 45º set square.**

PARALLEL LINES

Lines are parallel when they don´t meet.

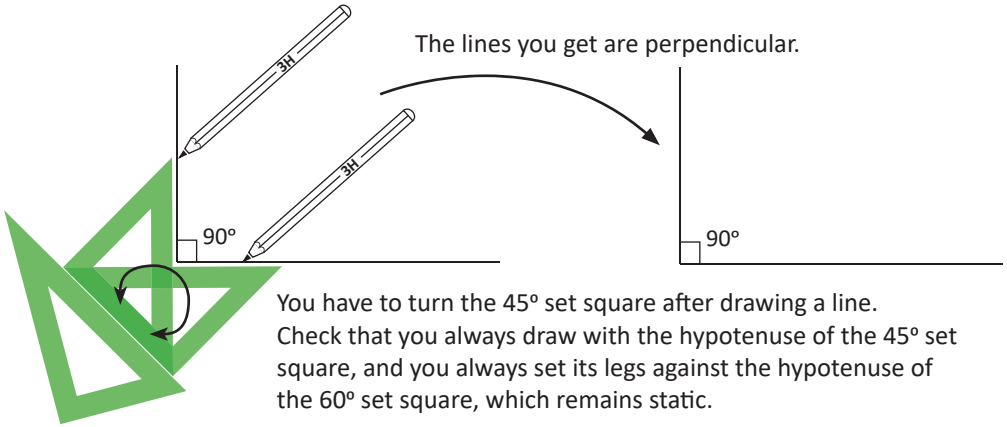
You can trace parallel lines with your set squares, following the next illustration:



PERPENDICULAR LINES

Perpendicular lines are lines which form an angle of 90º, that is, a right angle.

You can trace perpendicular lines with your set squares, following the next illustration:



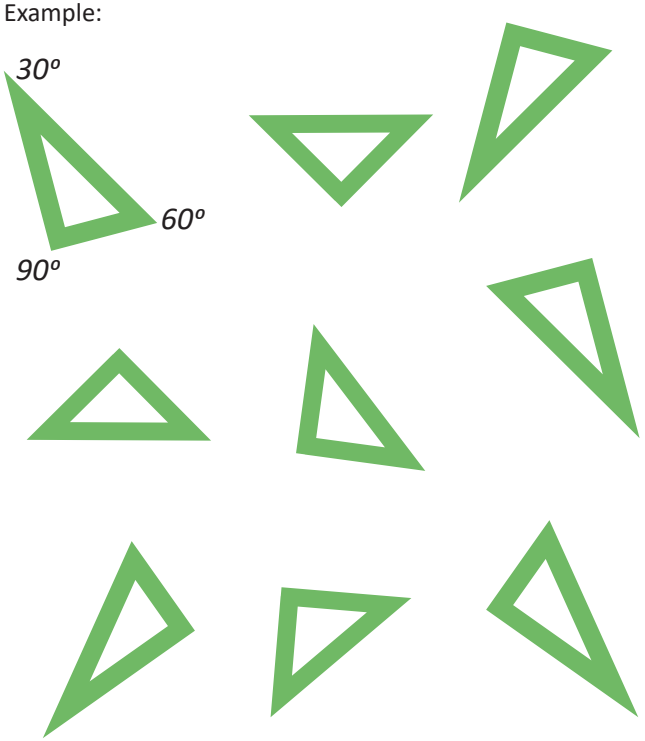
You have to turn the 45º set square after drawing a line. Check that you always draw with the hypotenuse of the 45º set square, and you always set its legs against the hypotenuse of the 60º set square, which remains static.

PARALLEL AND PERPENDICULAR LINES. EXERCISES

SET SQUARES

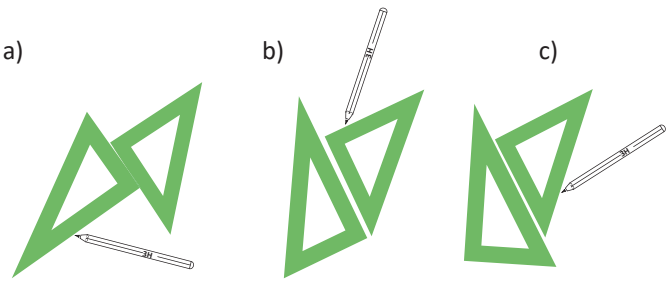
Write the measurement in degrees for the corresponding angles of the set squares.

Example:



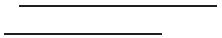
Choose the right option when working with the set squares.

a) b) c)

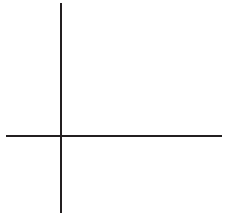


Test

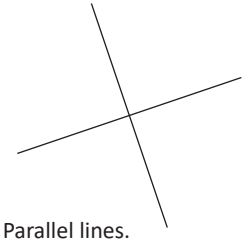
Recognise parallel and perpendicular lines and choose the right answer.



a) Parallel lines.
b) Perpendiicular lines.



a) Parallel lines.
b) Perpendiicular lines.



a) Parallel lines.
b) Perpendiicular lines.

a) Parallel lines.
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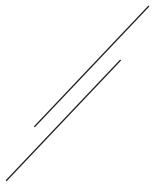
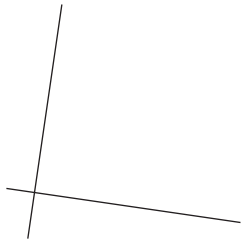


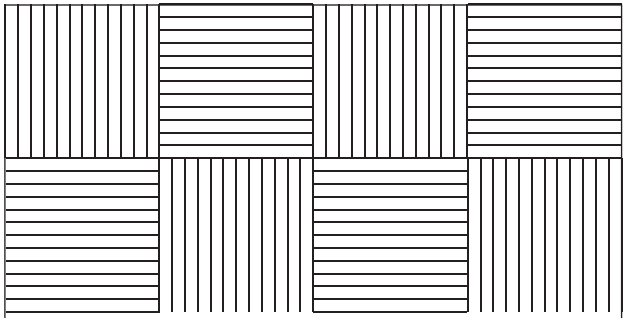
a) Parallel lines.
b) Perpendiicular lines.



a) Parallel lines.
b) Perpendiicular lines.

Drawing parallel and perpendicular lines.

Complete the next composition following the pattern made of parallel and perpendicular lines.
Use the rulers.



SET SQUARES, PARALLEL AND PERPENDICULAR LINES - PRACTISE 1

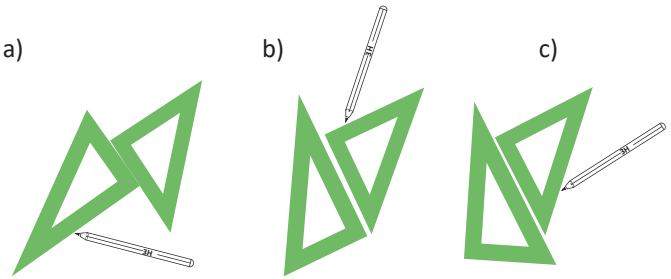
SET SQUARES

Write the measurement in degrees for the corresponding angles of the set squares.

Example:

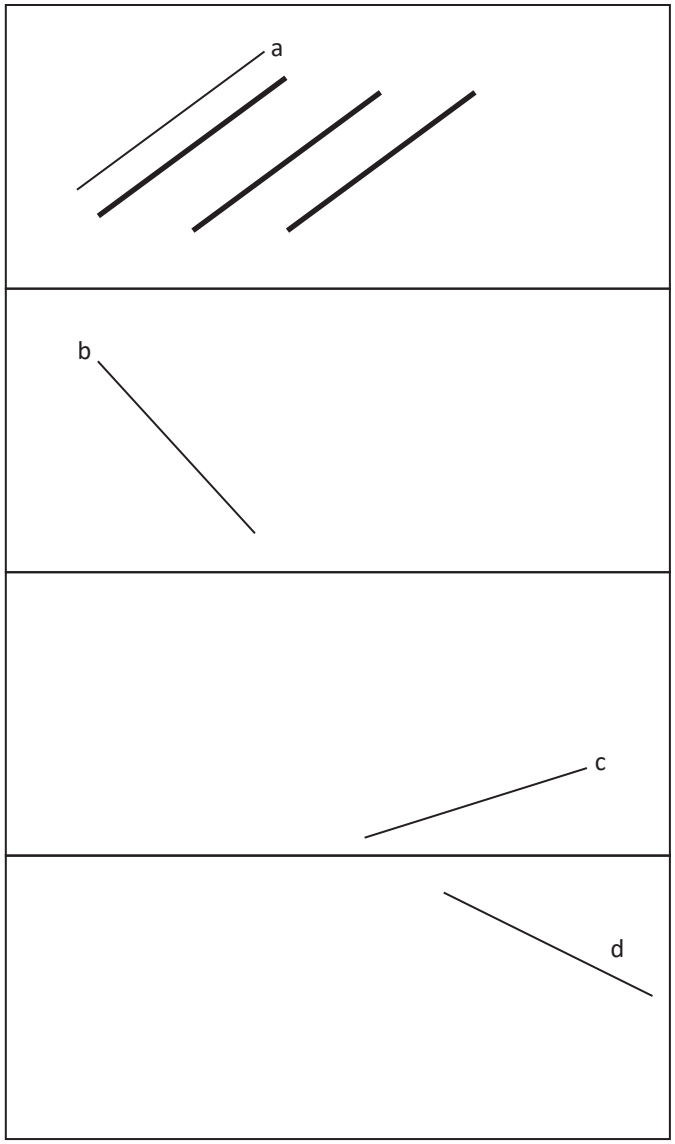
Choose the right option when working with the set squares.

a) b) c)



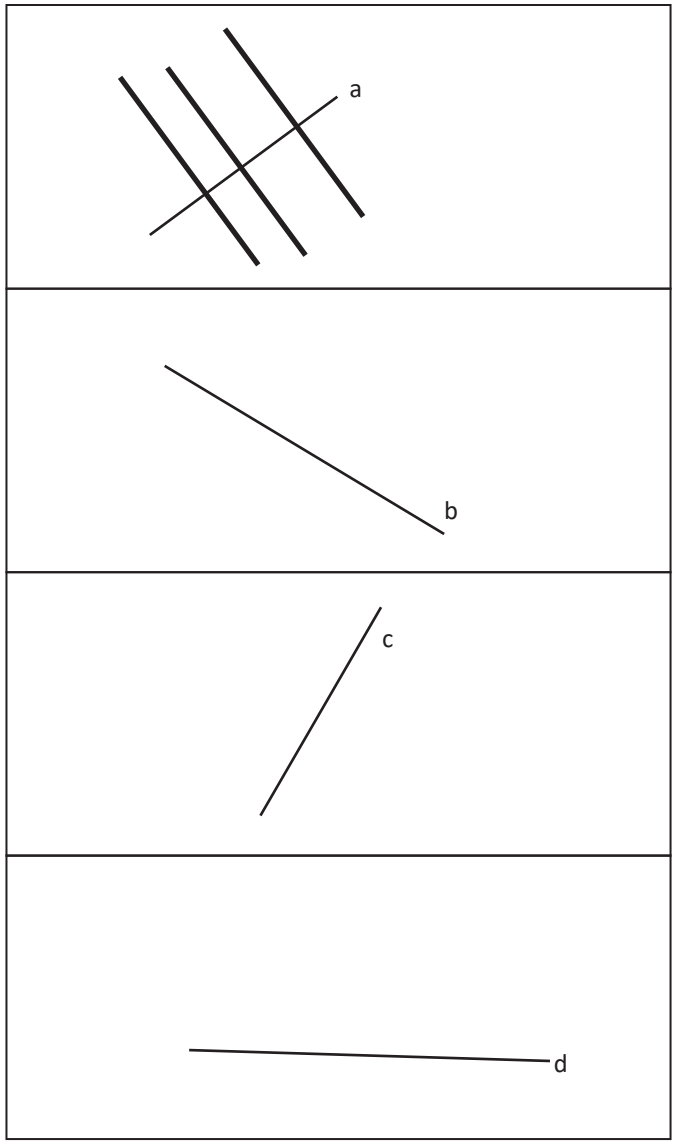
PARALLEL LINES

Trace three parallel lines to the lines b, c and d.
Watch the example for line a.



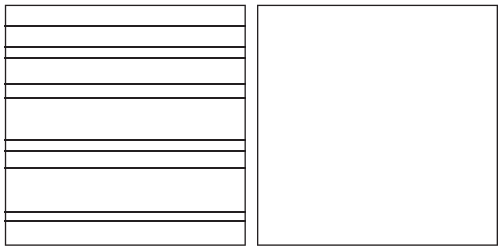
PERPENDICULAR LINES

Trace three perpendicular lines to the lines b, c, and d.
Watch the example for line a.

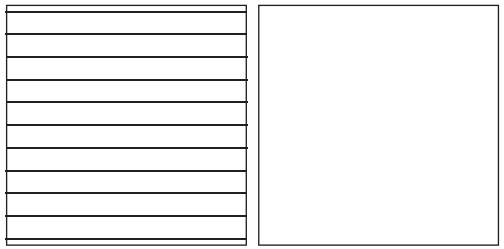


SET SQUARES, PARALLEL AND PERPENDICULAR LINES - PRACTISE 2.

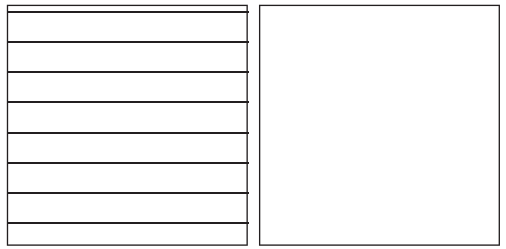
Copy the patterns of parallel lines following the examples and instructions given.



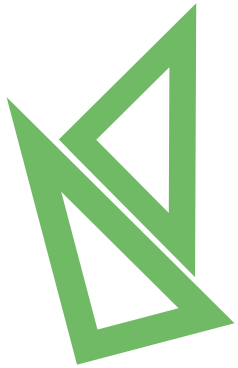
Horizontal parallel lines with any direction and with any separation you choose.

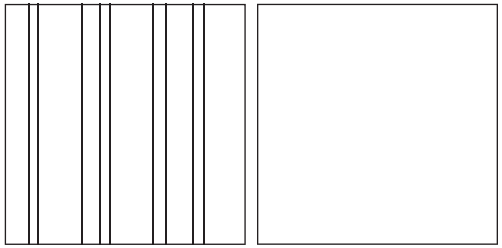


Horizontal parallel lines with *any equal separation*.

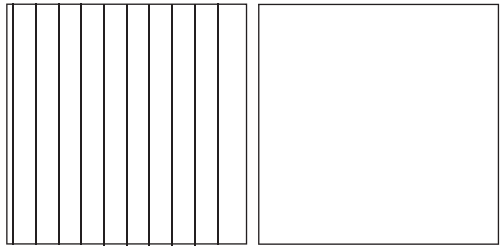


Horizontal parallel lines with 4 mm of separation.

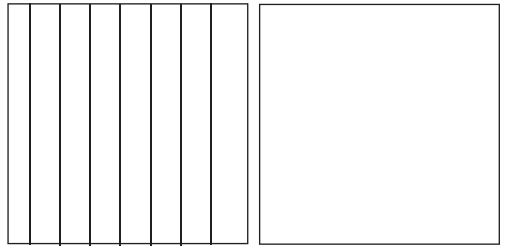




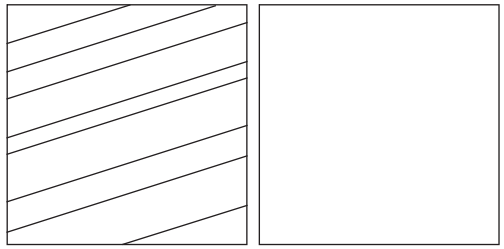
Vertical parallel lines with any direction and with any separation you choose.



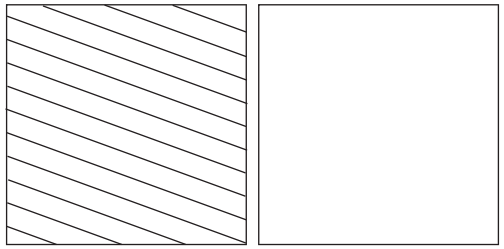
Vertical parallel lines with *any equal separation*.



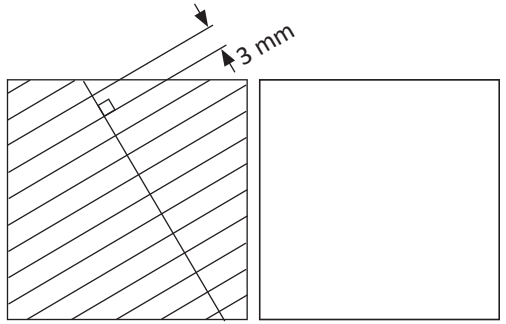
Vertical parallel lines with 4 mm of separation.



Parallel lines with any oblique direction and with any separation you choose.



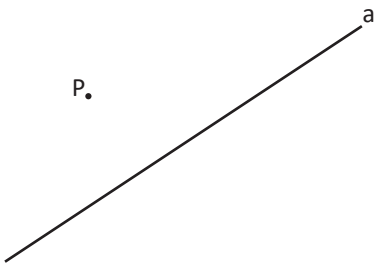
Parallel lines with any oblique direction and with a equal separation you choose.



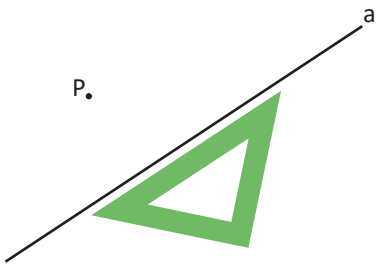
Parallel lines with any oblique direction and with 3 mm of separation.
You need a perpendicular line as reference for this separation.

PARALLEL LINE TO ANOTHER LINE THROUGH A GIVEN POINT WITH THE SET SQUARES.

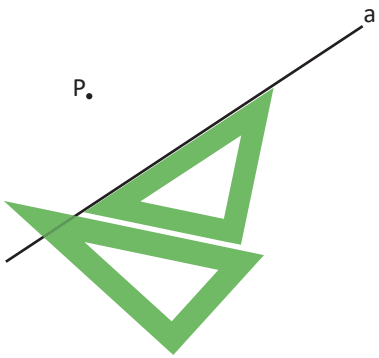
Draw a parallel line to the line a and passing through the point P.



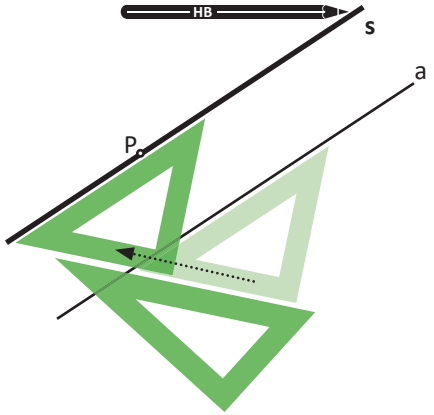
1 Align the hypotenuse of the 45º set square with the line a.



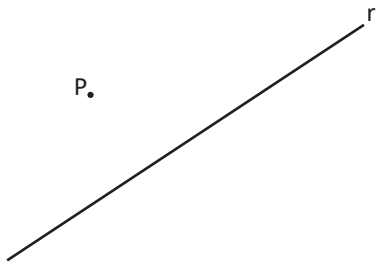
2 Put the hypotenuse of the 60º set square against the leg of the 45º set square.

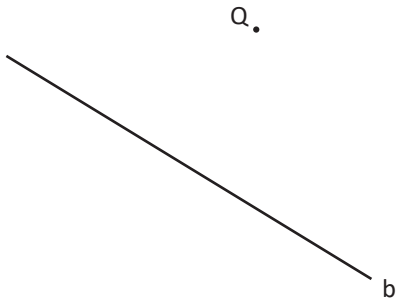


3 As the hypotenuse of the 45º set square is not passing through the point P, you have to move this set square until it reaches the point P.
The 60º set square must remain completely static. The line **s** is the solution.



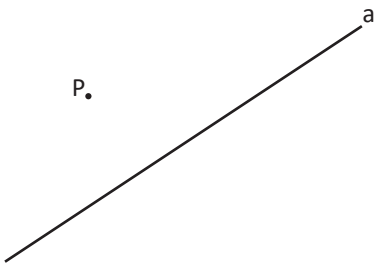
DO IT BY YOURSELF.
Trace a parallel line to the given lines through the given points for each case.



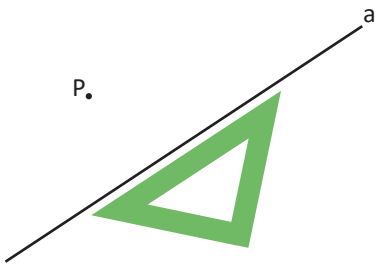


PERPENDICULAR LINE TO ANOTHER LINE THROUGH A GIVEN POINT WITH THE SET SQUARES.

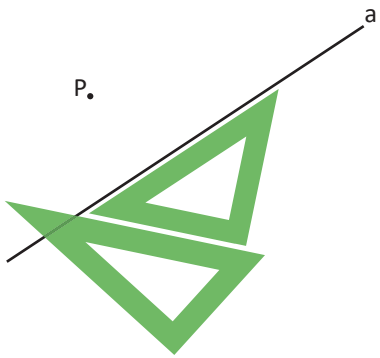
Draw a perpendicular line to the line a and passing through the point P.



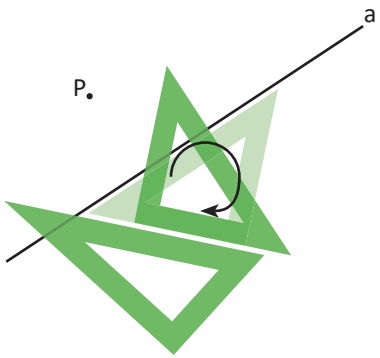
1 Align the hypotenuse of the 45º set square with the line a.



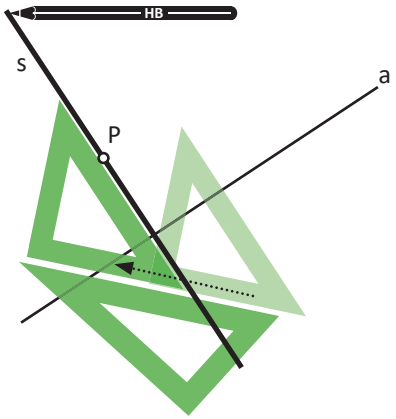
2 Put the hypotenuse of the 60º set square against the leg of the 45º set square.



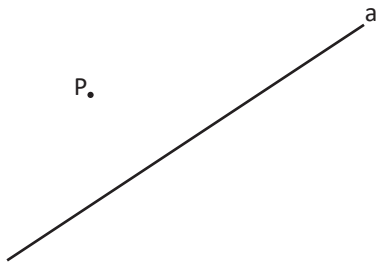
3 Turn the 45º set square, so its other leg is aligned with the hypotenuse of the 60º set square. The 60º set square must remain completely static.
Check that the hypotenuse of the 60º set square has now a perpendicular direction to the given line a.

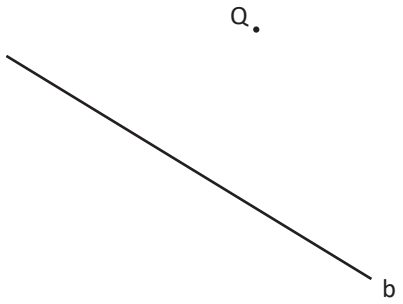


4 Move the 45º set square so its hypotenuse passes through the point P and trace the line s, which is the solution.



DO IT BY YOURSELF.
Trace a perpendicular line to given lines through the given points for each case.

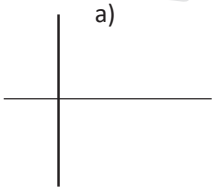




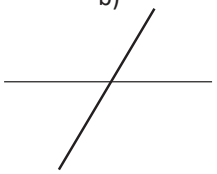
PERPENDICULAR LINE TO ANOTHER LINE THROUGH AN EXTERNAL POINT WITHOUT THE SET SQUARES.

1) One of the following pairs of lines are perpendicular. Choose the right option.

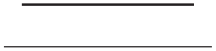
a)



b)

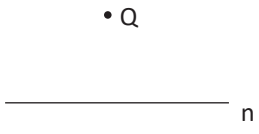


c)



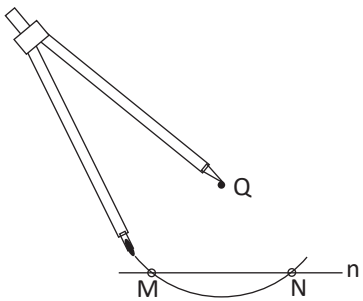
Vocabulary.
- **segment bisector**.
- **segment**.
- **drawing compass**.
- **to trace**.
- **radius**.
- **to join**.
- **external.**
- **arc.**

2) Watch the steps to draw a perpendicular line to another through an external point just with the compass.



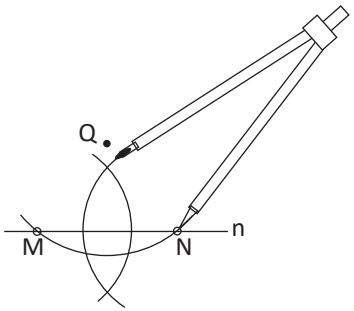
The initial situation is that you have the line n and the external point Q.

1



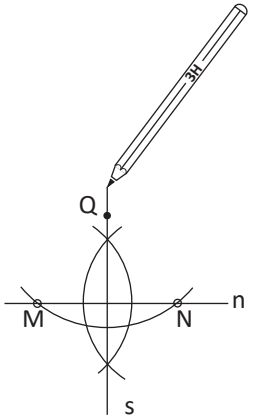
First af all you need to trace an arc with centre Q and with any radius, intersecting the line n at the points M and N.

2



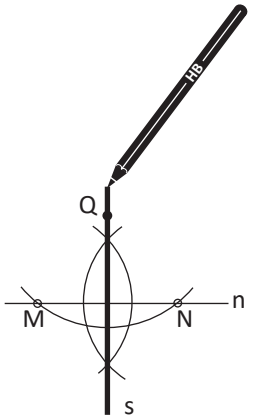
The next is tracing the segment bisector of the segment MN.

3



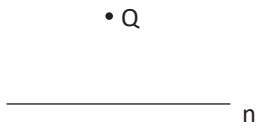
The segment bisector of MN is the line s and it must pass through the point Q.

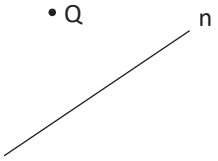
4

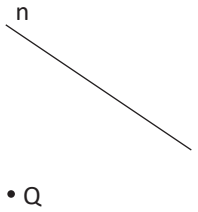


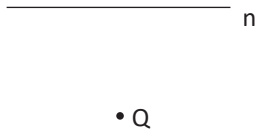
The line s is perpendicular to n and it passes through Q, so it is the solution of the problem.

3) Now do it by yourself. Trace the segment bisector of the next segments.





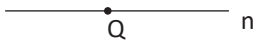




PERPENDICULAR LINE TO ANOTHER LINE THROUGH A *POINT ON THE LINE* WITHOUT THE SET SQUARES. FIRST METHOD.

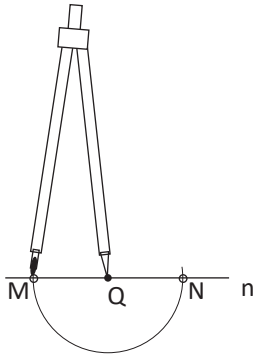
Watch the steps to draw a perpendicular line to another through point on the line, without using the set squares but just with the compass and ruler.

Vocabulary.
- **segment bisector** or **perpendicular bisector**.
- **segment**.
- **drawing compass**.
- **to trace**.
- **radius**.
- **to join**.
- **arc.**



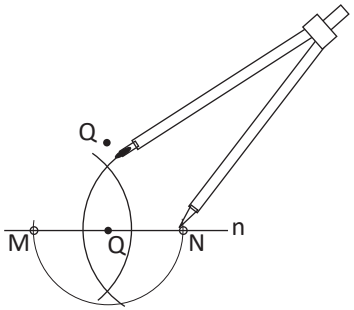
The initial situation is that you have the line n and its point Q.

1



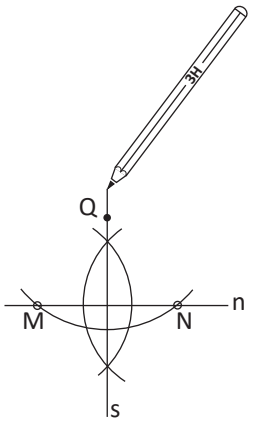
First af all you need to trace an arc with centre Q and any radius intersecting the line n at the points M and N.

2



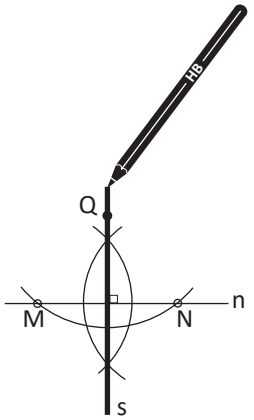
The next is to trace the **segment bisector** of the segment MN. That is the reason segment bisector is also called **perpendicular bisector**.

3



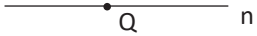
The segment bisector of MN is the line s and it must pass through the point Q.

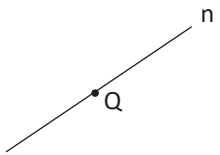
4

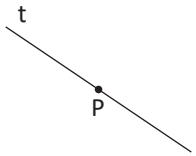


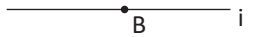
The line s is perpendicular to n and it passes through Q, so it is the solution of the problem.

3) Now do it by yourself. Trace the segment bisector of the next segments.









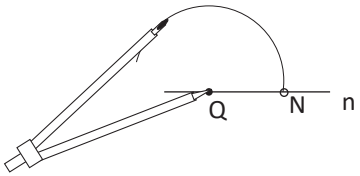
PERPENDICULAR LINE TO ANOTHER LINE THROUGH A *POINT ON THE LINE* USING ONLY THE COMPASS. SECOND METHOD.

Watch the steps to draw a perpendicular line to another through point on the line, without using the set squares but just with the compass and ruler.
On this occasion perpendicular bisector has not been used directly.

Vocabulary.
- **segment bisector** or **perpendicular bisector**.
- **segment**.
- **drawing compass**.
- **to trace**.
- **radius**.
- **to join**.
- **arc.**

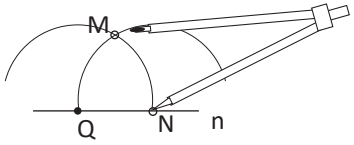
The initial situation is that you have the line n and its point Q.

1



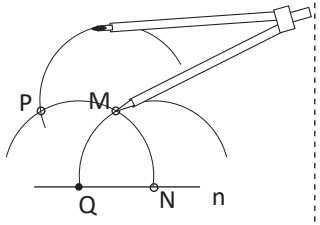
First af all you need to trace an arc with centre Q and any radius intersecting the line n at the point N.

2



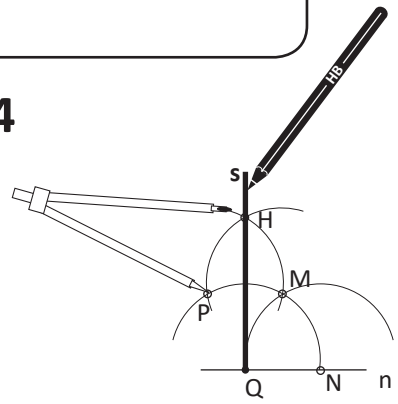
The next is to trace another arc with centre N and **same radius** intersecting the previous arc at the point M.

3



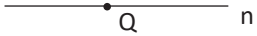
For the third step you need to trace another arc with centre M and **same radius** intersecting the second arc at the point P.

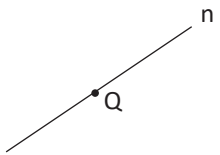
4

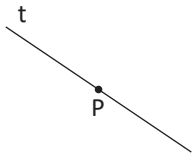


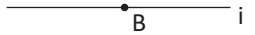
To finish the problem, trace another arc with centre Q and **same radius** so you get the point H. Joining Q to H you get the line **s**, which is the solution.

3) Now do it by yourself. Trace the segment bisector of the next segments.









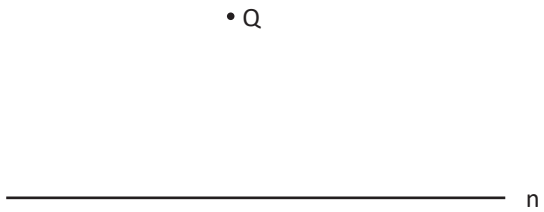
SCORING ACTIVITY

Draw a perpendicular line to the line m passing through the point P. Use only the compass (2 points).

Concept (0,12)	
Neatness (0,2)	
Precision (0,2)	
Labels (0,2)	
HB (0,2)	
TOTAL	

Draw a perpendicular line to the line n passing through the point Q. Use only the compass. (2 points).

Concept (0,12)	
Neatness (0,2)	
Precision (0,2)	
Labels (0,2)	
HB (0,2)	
TOTAL	



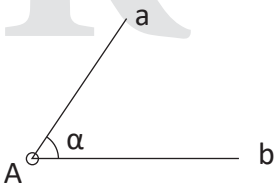
Exercise: draw an artistic composition made of parallel and perpendicular lines. Use the set squares, so you can draw faster (6 points).

Concept (0,6)		Neatness (0,2)		Precision (0,2)		**TOTAL**	

Group:		Due date:
Project:	Title: **PERPENDICULAR LINES WITH COMPASS**	**Mark:**

ANGLES.

An angle is the space between two intersecting lines.
The elements of the angles are the vertex ("vertices" in plural) and the sides (the intersecting lines).

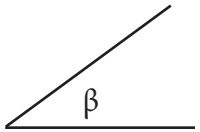


"a" and "b" are the sides.
A is the vertex.

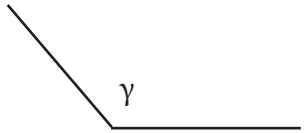
Angles can be labelled with Greek letters (α, β, γ, δ...) or with the symbol "^" on the vertex label: Â.

1. This is a **right** angle, which is ***equal** to 90˚*. You can represent it with the symbols ◺ or □
Draw two right angles on the right like in the examples. You should use your set squares.

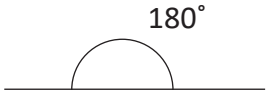
2. This is an **acute** angle, which is ***less** than 90˚*.
Draw an acute angle on the right.



3. This is an **obtuse** angle, which is ***greater** than 90˚*.
Draw an obtuse angle on the right.



4. This is an **straight** angle, which is ***equal to 180˚***.
Draw a **straight** angle on the right.

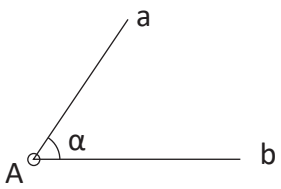


Draw an artistic composition made of many different kinds of angles. You can use colours and different thicknesses fro lines.

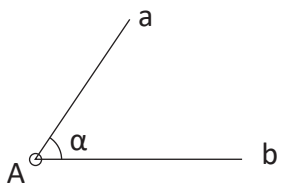
Group:		Due date:
Project:	Title: **ANGLES.**	**Mark:**

COPYING ANGLES.

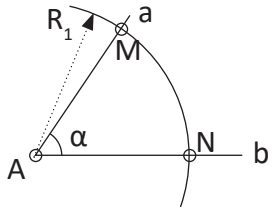
Copy the angle α
in the space below.

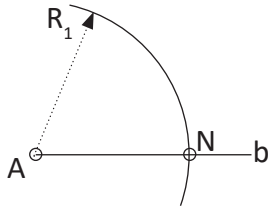


Step 1: Choose any point for vertex A and draw the side b.



Step 2: trace any arc in the original angle α with any radius you choose and draw it againg, with the same radius, in the copy below.

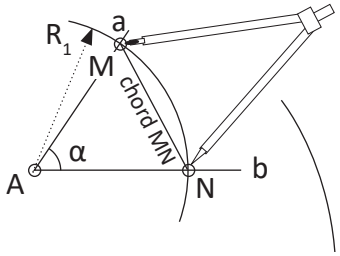




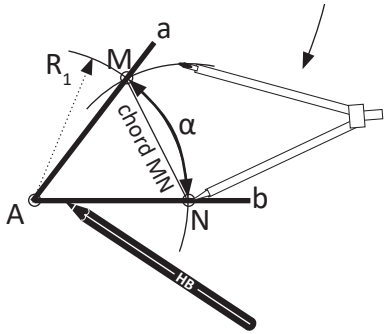
You get the points M and N in the original angle. However, you can only draw the point N in the copy. You can be sure that M is going to be on the arc, but where?

If you find out where the point M is, you will be able to draw the side a and you would have finished the problem.

Step 3: if you transfer the measurement of the chord MN to the copy, you get the point M on the arc.



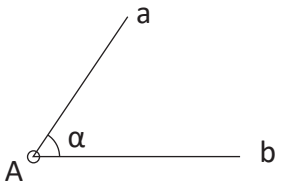
Tranfer the measurement of the chord MN



Once you get the point M on the arc, you can join the vertex A to the point M, so you get the side a.

Don´t forget to go over the sides a and b with and HB pencil (the rest of lines are traced with 3H pencil) and add the arrows to point out the angle α, which is the solution.

Do it by yourself.
Copy again the angle α.



IMPORTANT VOCABULARY FOR THIS EXERCISE

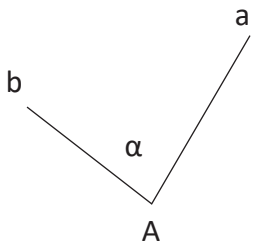
Read the instructions and underline these words. Try to find out their meaning without a dictionary.

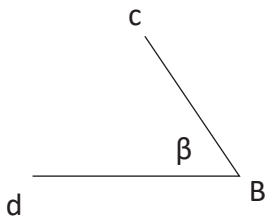
angle
arc
vertex
radius
measurement
point out
go over

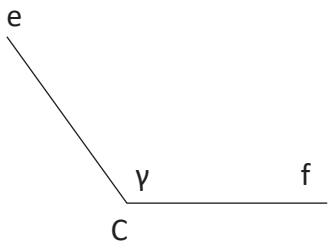
COPYING ANGLES - PRACTISE.

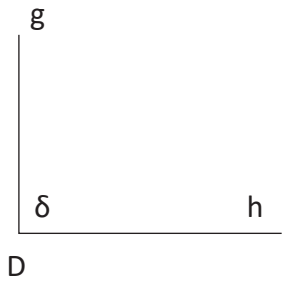
Do it by yourself (Practise)

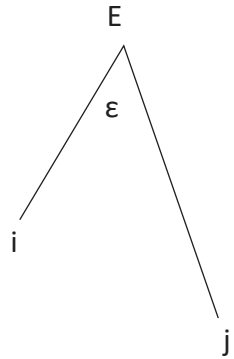
Copy the followign angles.





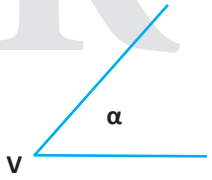


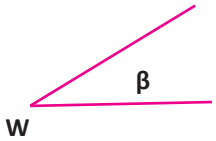




ADDING ANGLES

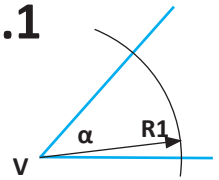
Add the angles **α** and **β**.





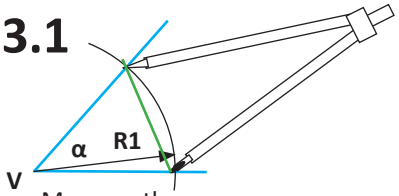
Copying α

2.1

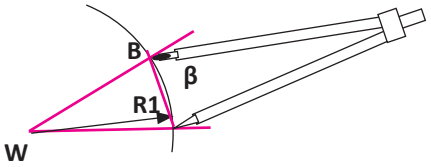


Trace an arc with any radius R1 and centre V in the original angle α.

3.1



Measure the chord of the arc.

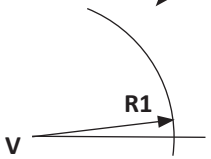


For **β** You need to trace the same arc with the **SAME RADIUS R1.**

1

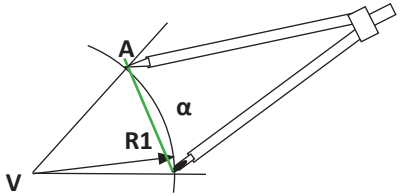
Copy **α**. Start tracing a line and a point for the vertice.

2.2.



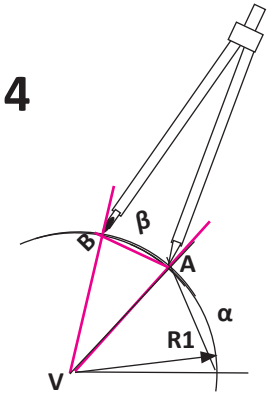
Trace an arc with the same radius R1.

3.2.



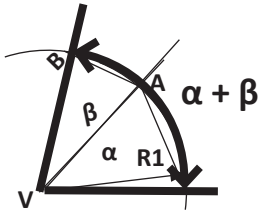
Transfer the measure of the chord to the arc of **α** so you get A.
Join A to V so you get the angle **α**.

4



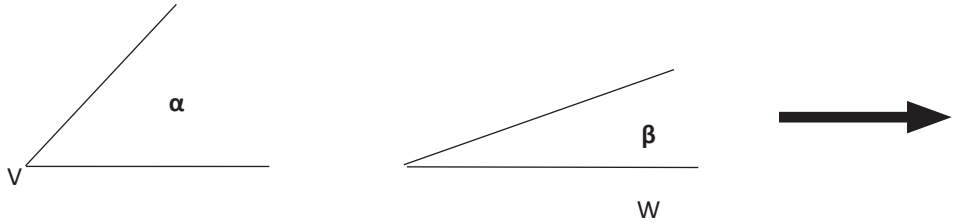
Transfer the measure of the chord for the arc of **β** so you get B.
Join A to V so you get the angle **α**.

5



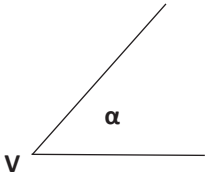
The solution is the angle marked with a very thick arc and the arrows.
Sides of the angle are thick too.

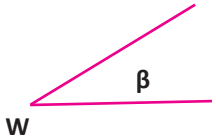
3) Now do it by yourself. Add the next angles.



SUBTRACTING ANGLES

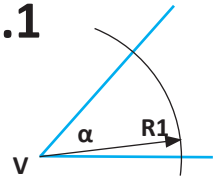
Subtracting the angles **α** and **β**: the method is similar to the addition but **β** must be copied ***inside* α**.





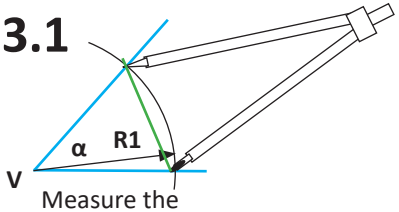
Copying α

2.1

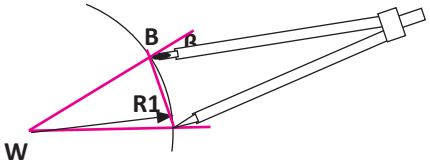


Trace an arc with any radius R1 and centre V in the original angle α.

3.1



Measure the chord of the arc.

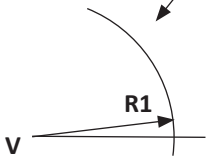


For **β** You need to trace the same arc with the **SAME RADIUS R1.**

1

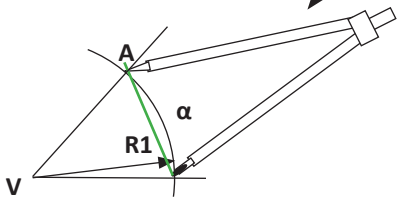
Copy **α**. Start tracing a line and a point for the vertice.

2.2.



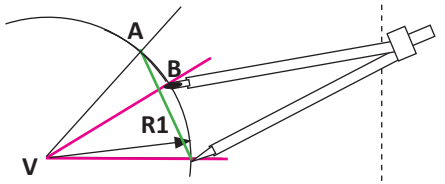
Trace the same arc with radius R1.

3.2.



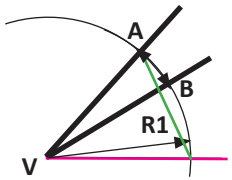
Transfer the measure of the chord to the arc of **α** so you get A.
Join A to V so you get the angle **α**.

4



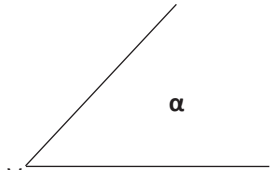
Transfer the measure of the chord for the arc of **β** so you get B.
You have to copy **β inside α**.

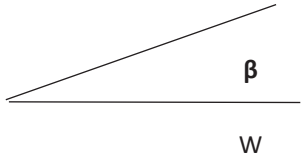
5



The solution is the angle marked with a very thick arc and the arrows.
Sides of the angle are thick too.

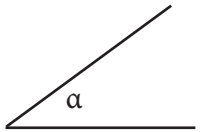
3) Now do it by yourself. Subrtact the next angles.

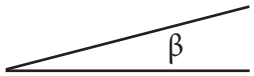


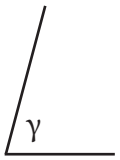


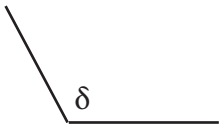
ANGLES. ADDITION AND SUBTRACTION - PRACTISE 1.

Given the angles below, do the next exercises.









1) Add the angles below.

α+β	β+γ	γ+δ	α+δ

2) Subtract the next angles:

α-β	δ-β

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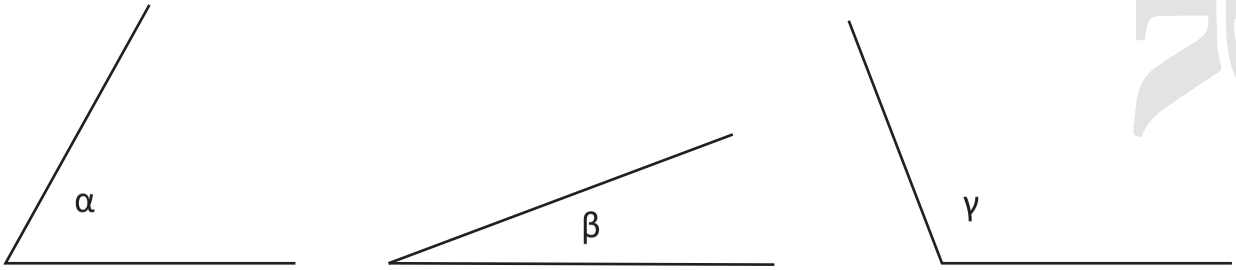
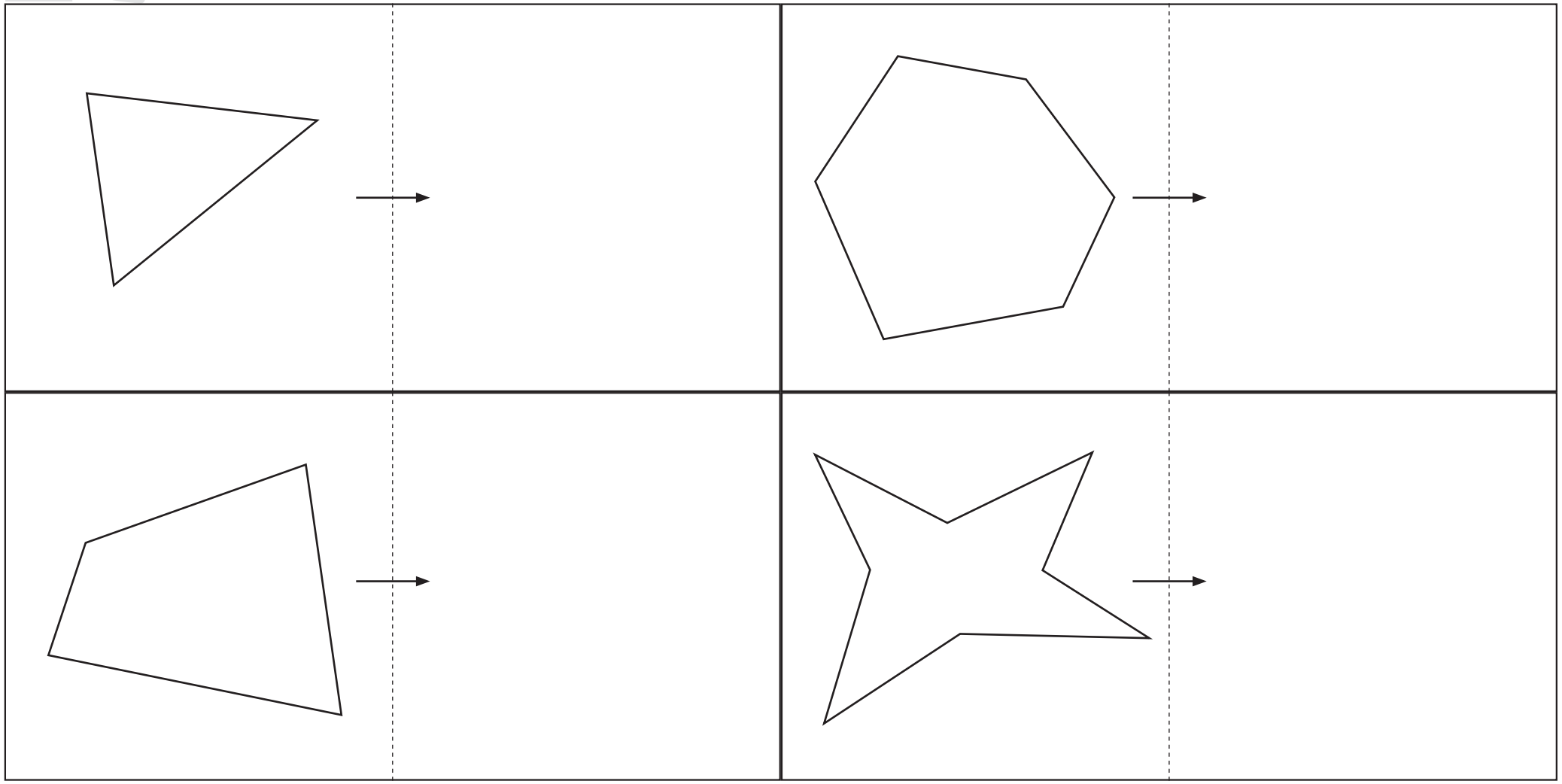
2. Do the next operations with the given angles below: (6 points):



α +β	**α - β**
α + β - γ/2	**3α/2**
(α -β) x 2	**(α +** γ**) / 2**

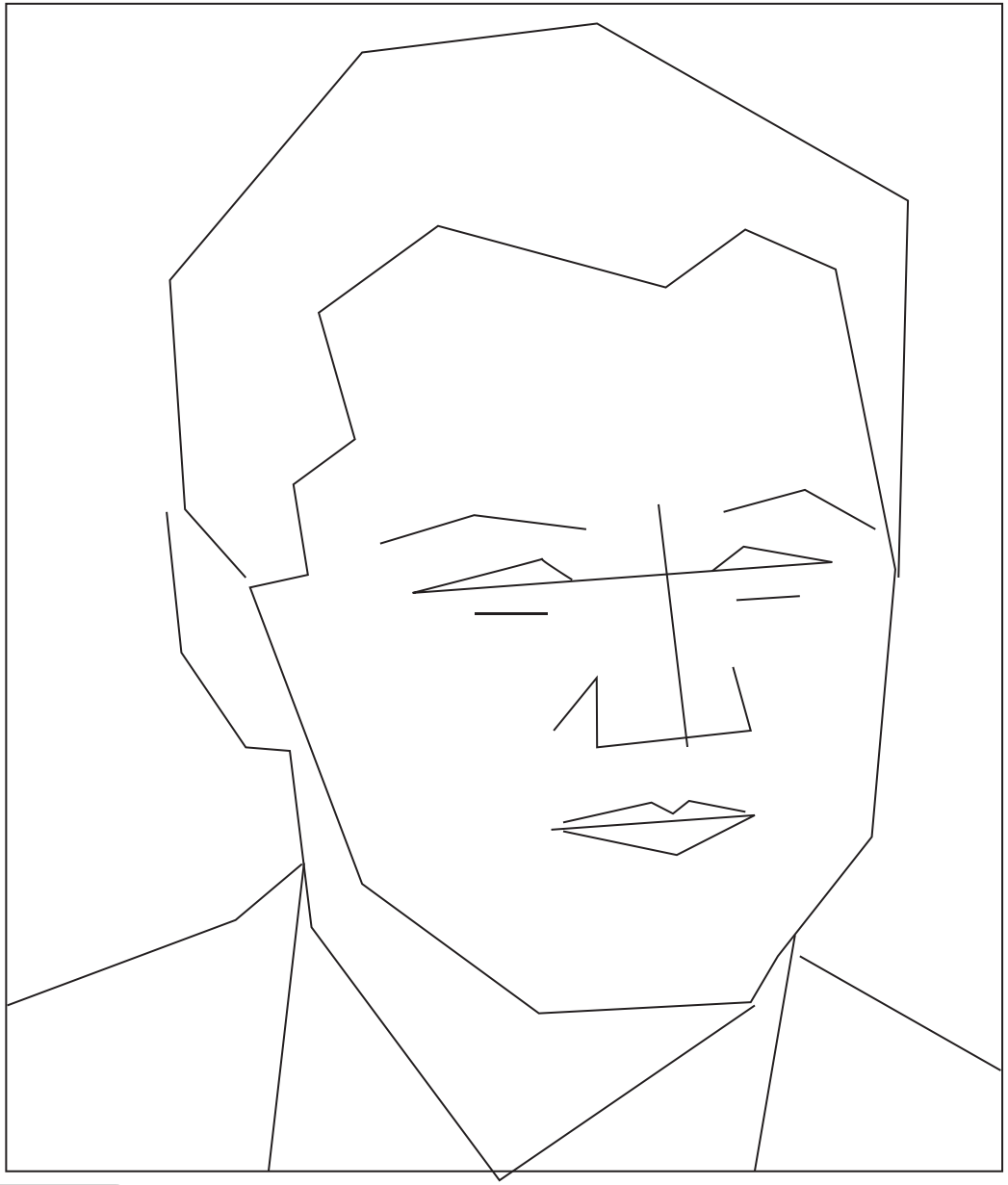
COPYING FIGURES - PRACTISE 3

Copy and label the next figures (Label vertices, sides and angles).
In order to copy these figures you need to apply what you know about copying segments and angles.



DRAWING PORTRAITS 1 (EXAMPLE)

When drawing a protrait *angles between key lines of the face* are very important for *likeness*.
Watch the next example and complete it with colours and details.



DRAWING PORTRAITS 2 (PRACTISE 4)

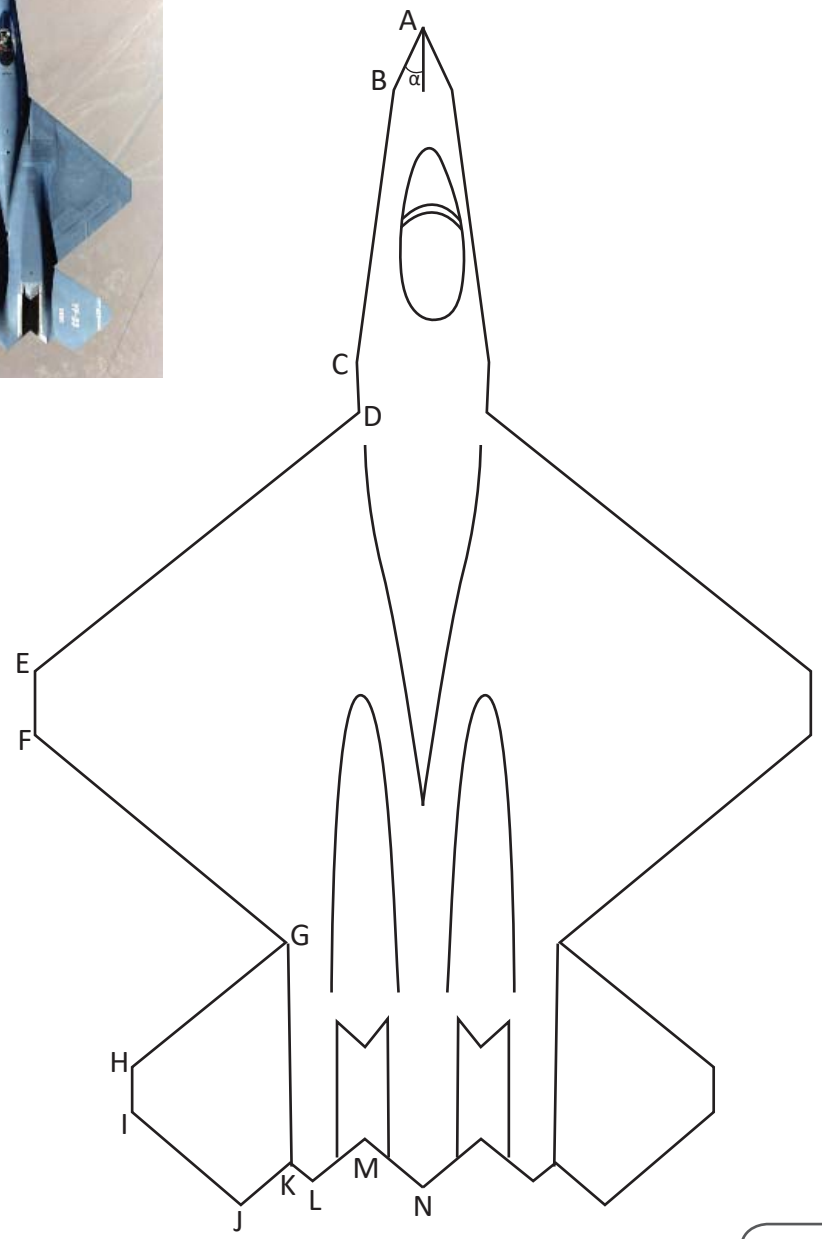
Draw the key lines on the face below, Robert Mitchum´s face. After drawing these key lines copy them in the box on the right and complete the portrait with details and colours.
In order to copy these key lines you need to know how to copy segments and angles.

DRAWING PORTRAITS 3 (PRACTISE 5)

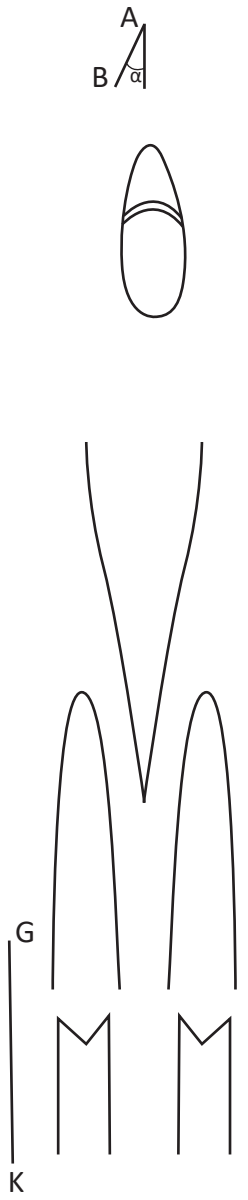
Draw the key lines of on the face below, Grace Kelly´s face. After drawing these key lines copy them in the box on the right and complete the portrait with details and colours.
In order to copy these key lines you need to know how to copy segments and angles.

COPYING ANGLES AND SEGMENTS (PRACTISE 6)

Copy the top view of this strange jet fighter, the YF-23. You will have to measure the angles and the segments with your compass and transfer them to the right figure. You can start with the initial angle α and the points A and B.

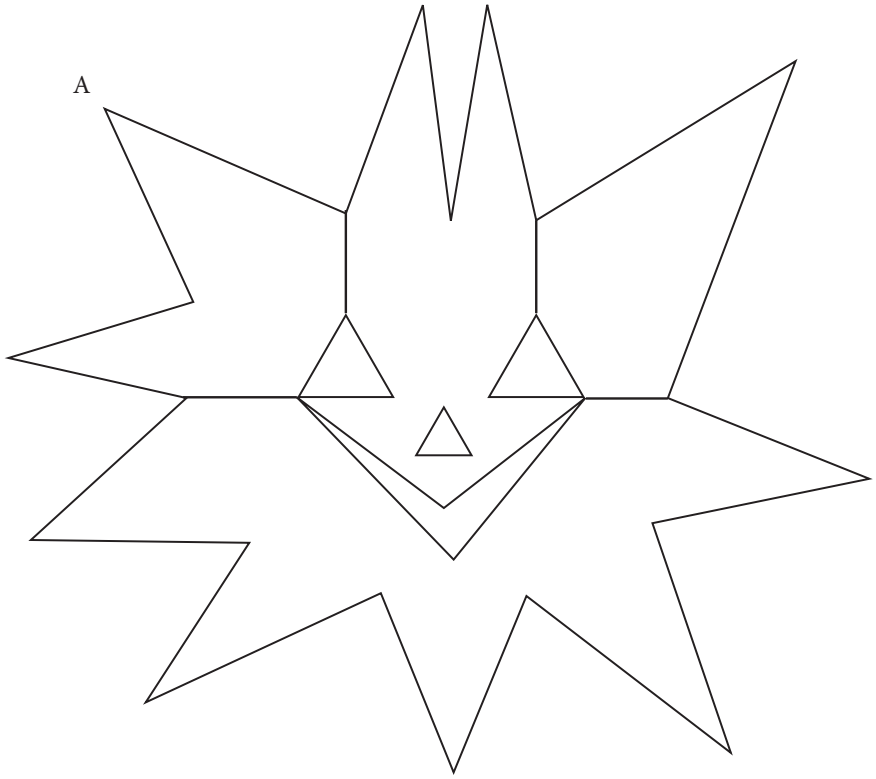


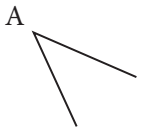
Once you have completed the left side you will have to apply symmetry to get the right side of the jet. Colour it as you prefer when you have finished copying the lines.



(PRACTISE 7)

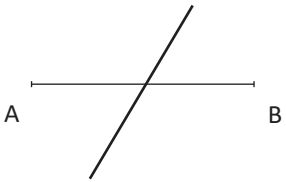
Copy this figure in the space given on the right. You need to know how to copy angles, how to draw equilateral triangles and how to transfer measures. The tools you need are only a compass and the set squares. Use the compass to transfer measures. You can colour it when you have finished.
Start with the angle Â.

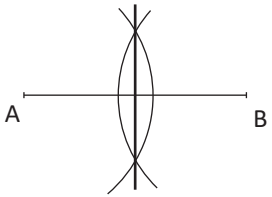




LINE SEGMENT BISECTOR OR PERPENDICULAR BISECTOR

1) One of the following figures is a segment bisector. Choose the right option.





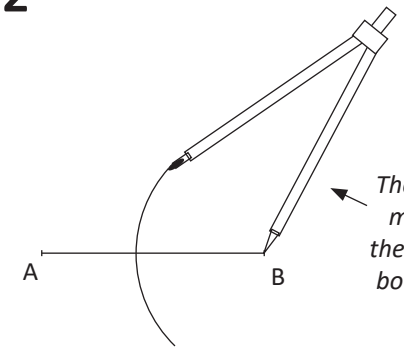
Vocabulary.
- **angle bisector**.
- **segment**.
- **drawing compass**.
- **to trace**.
- **radius**.
- **to join**.

2) Watch the steps to draw a segment bisector.

1

You have to trace the segment bisector of the segment AB

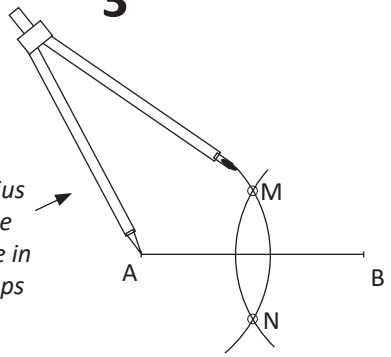
2



Trace an arc with centre B and radius more than the half of AB. This radius is approximate so you choose it.

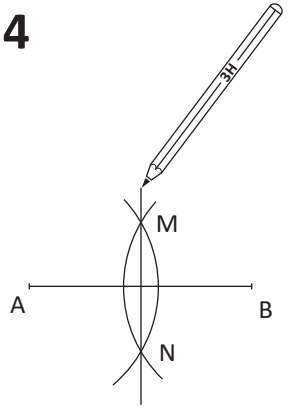
The radius must be the same in both steps

3



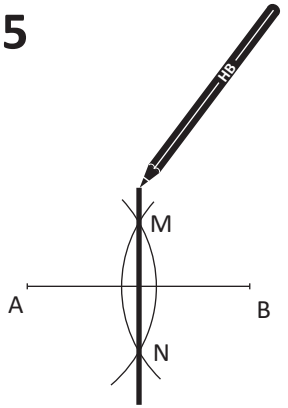
Trace another arc with centre A and ***the same radius*** you used before. You get the points M and N.

4



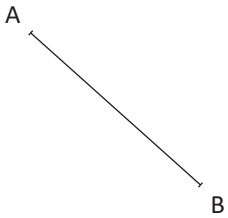
Draw a line with a 3H pencil joining M to N.

5



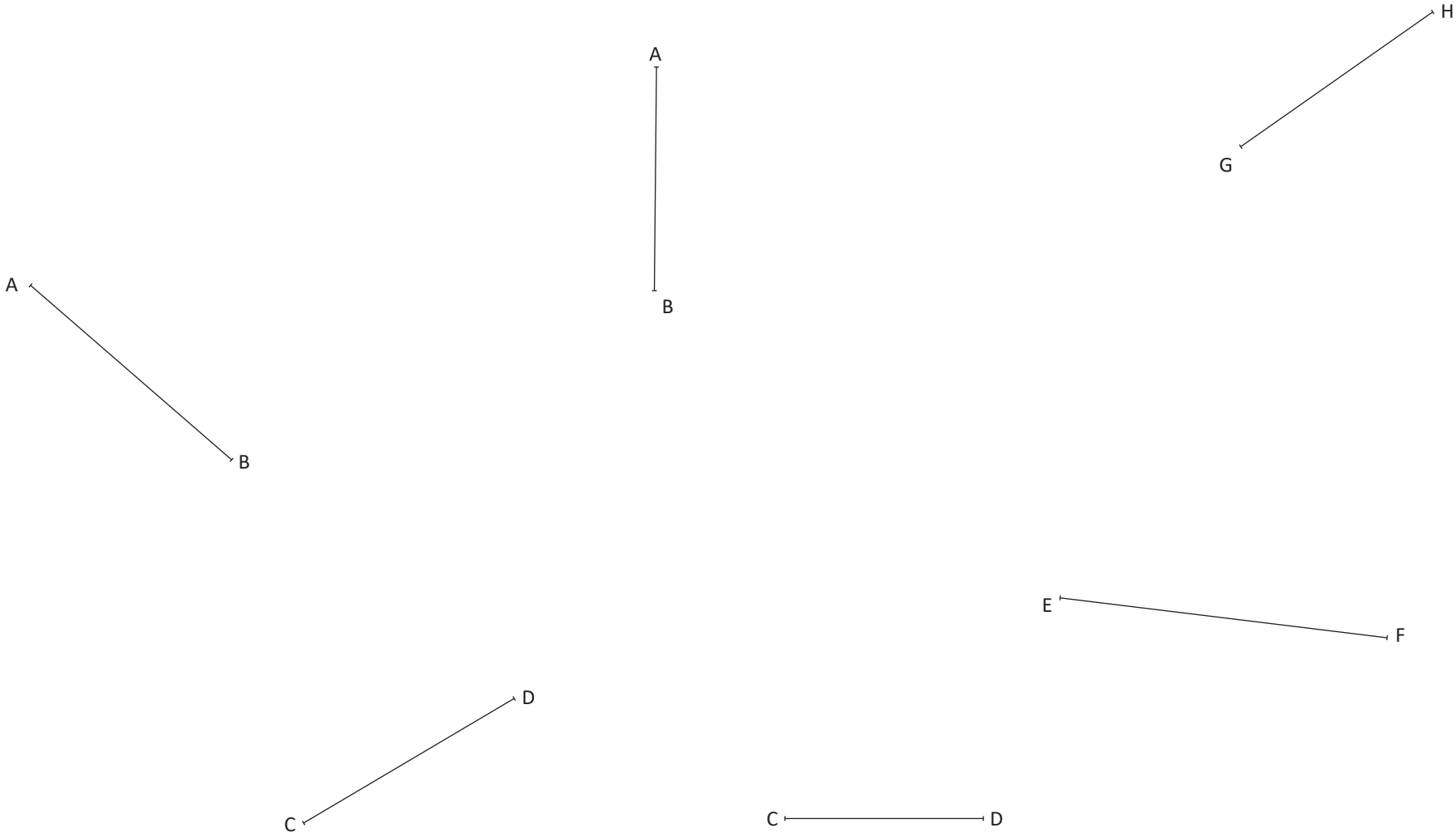
The **line of MN is the solution** of the problem, so you must go over it with an HB pencil.

3) Now do it by yourself. Trace the segment bisector of the next segments.



DO IT BY YOURSELF - PRACTISE

Trace the segment bisectors of the next segments.

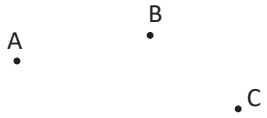


CIRCUMFERENCE PASSING THROUGH THREE POINTS

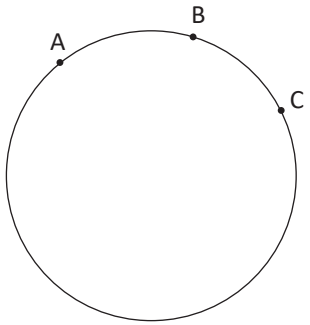
To draw a circumference passing through three points you need to trace two segment bisectors, like in the following method:

Vocabulary.
- **circumference**
- **through**.
- **segment bisector**.
- **method**.
- **to trace**.
- **to meet**.

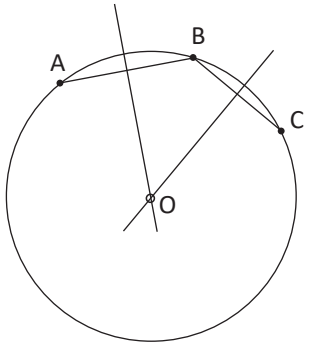
You are given three points:



You have to draw the circumference which passes through them all.

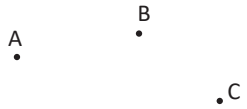


Realize that you need two segment bisectors. Both segment bisectors meet at O, the centre of the circumference we want to draw.

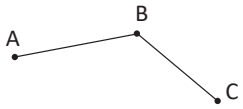


HOW TO DRAW A CIRCUMFERENCE PASSING THROUGH THREE POINTS. METHOD STEP BY STEP.

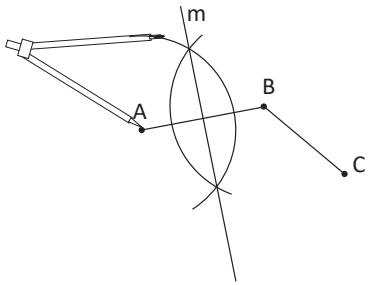
1 This is the information you have initially: just three points.



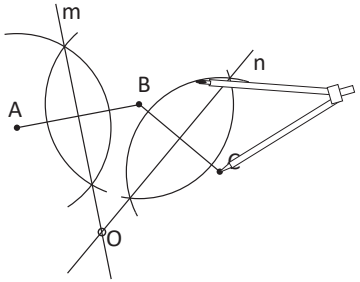
2 Draw the segments AB and BC.



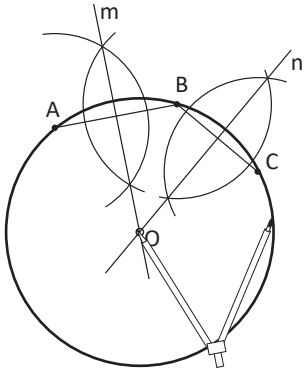
3 Trace the segment bisector of AB, which is the line m.



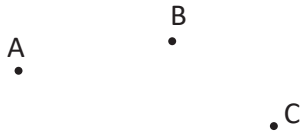
4 Trace the segment bisector of BC, which is the line n.



5 The segment bisectors m and n meet at O, which is the centre of the circumference you have to draw.



Do it by yourself.
Circumference passing through A, B and C.

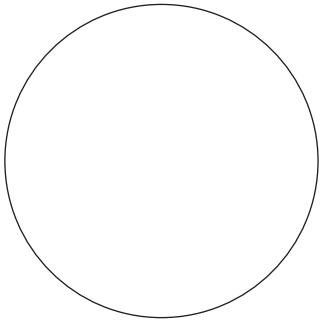


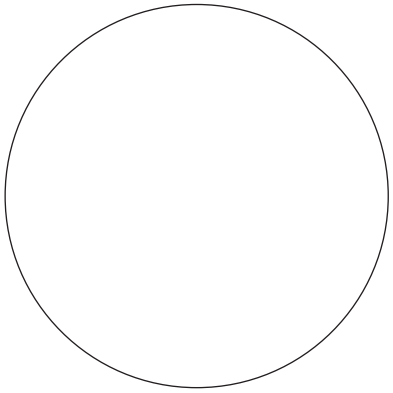
https://dibujoramon.wordpress.com/2015/10/13/circumference-passing-through-three-points/

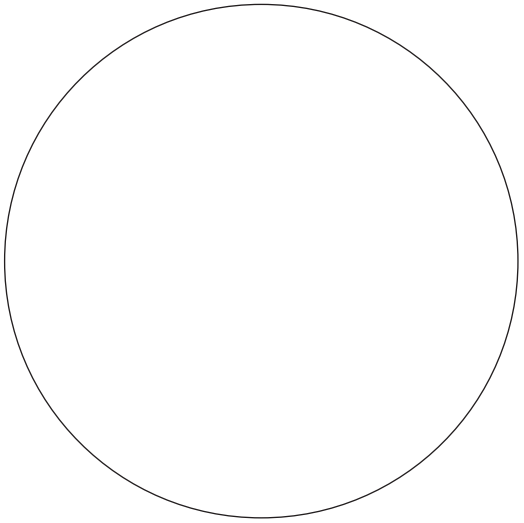
CIRCUMFERENCE PASSING THROUGH THREE POINTS: FINDING THE CENTRE OF A CIRCUMFERENCE WHEN ITS POSITION IS NOT GIVEN.

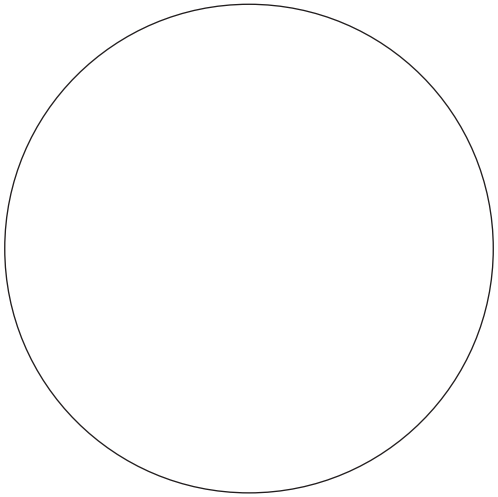
If you want to know where the centre of a circumference is when this is not given, you can use the method of the three points: just choose three points of the circumference and trace the corresponding segment bisectors.

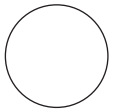
Find the centre of the following circumferences:





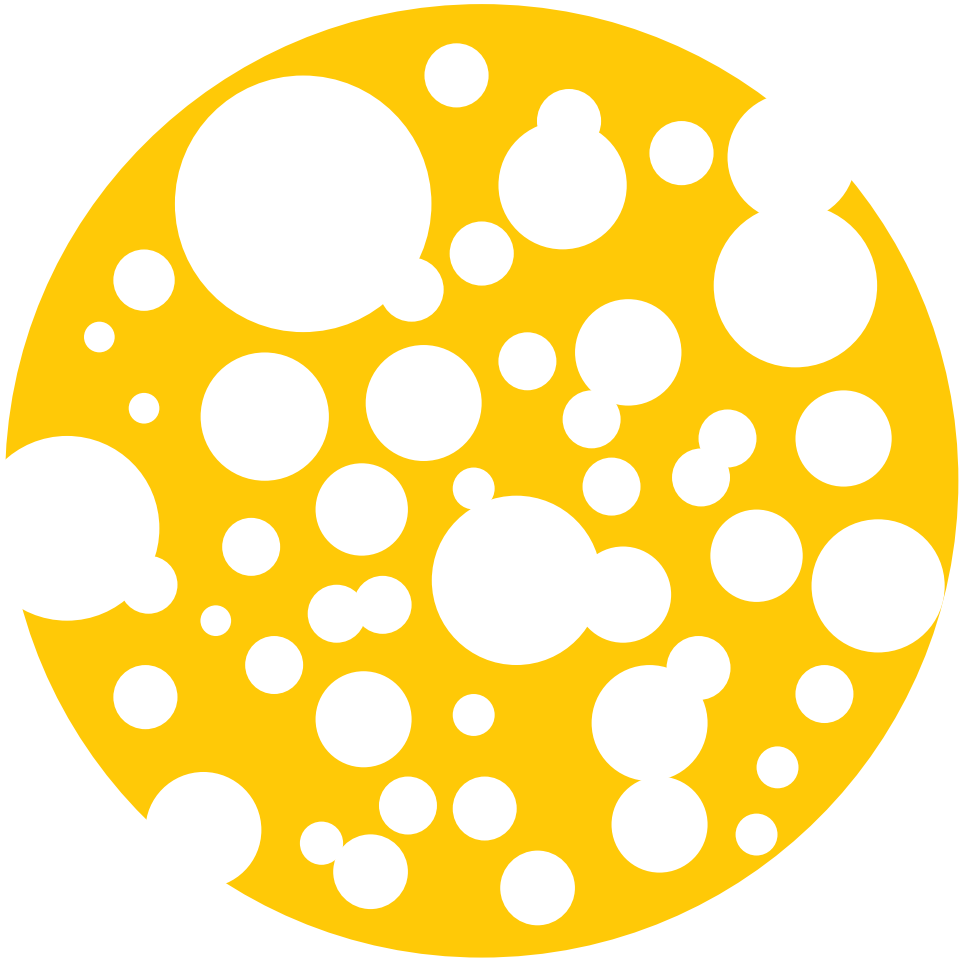






DESIGN WITH CIRCUMFERENCES.

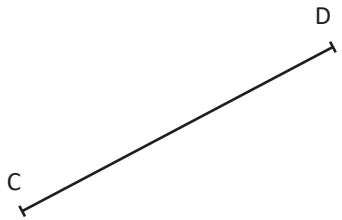
Watch the following example and draw your own design in the gap on the right.



Group:		Due date:
Project:	Title: **SEGMENT BISECTOR AND CIRCUMFERENCE**	**Mark:**

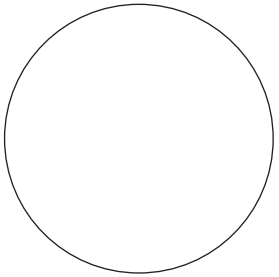
SCORING ACTIVITY

Draw the perpendicular bisector of the next segment. (2 points).



Concept (0,12)	
Neatness (0,2)	
Precision (0,2)	
Labels (0,2)	
HB (0,2)	
TOTAL	

Find the centre of the following circumference (2 points):



Concept (0,12)	
Neatness (0,2)	
Precision (0,2)	
Labels (0,2)	
HB (0,2)	
TOTAL	

Draw an original composition with circumferences and segment bisectors, colouring the shapes they produce (6 points).

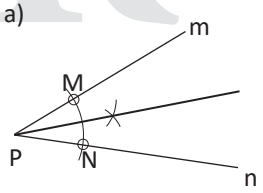
Composition mark	

Group:		Due date:
Project:	Title: **SEGMENT BISECTOR AND CIRCUMFERENCE**	**Mark:**

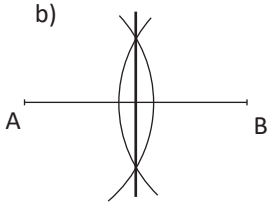
ANGLE BISECTOR

1) One of the following figures is a *angle bisector*. Choose the right option.

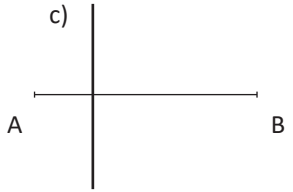
a)



b)

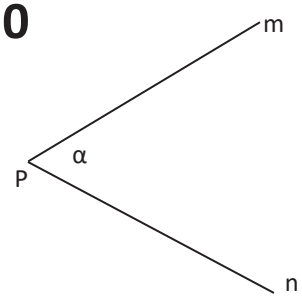


c)



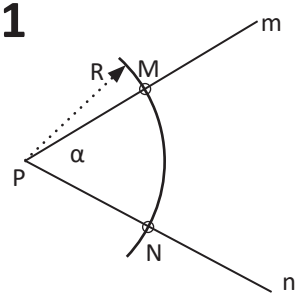
2) Watch the steps to draw an angle bisector.

0



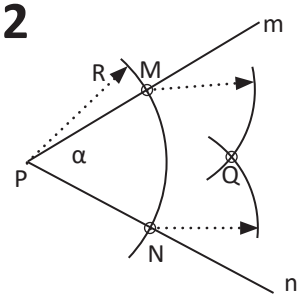
This is the angle β. The angle bisector will divide it into two equal angles.

1



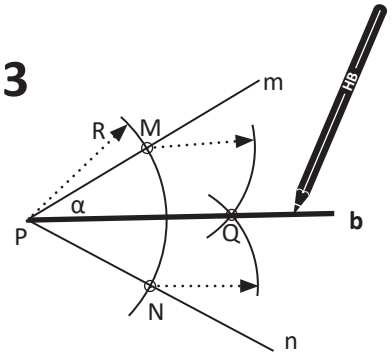
The first step consists of tracing an arc with any radius R, so it intersects the sides of the angle at the points M and N.

2

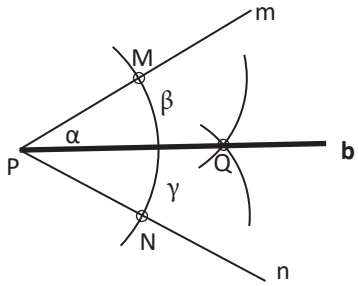


For the second step, trace two arcs with centres at M and N, and same radius, so you get the point Q.

3

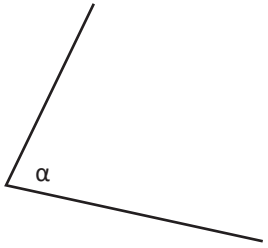


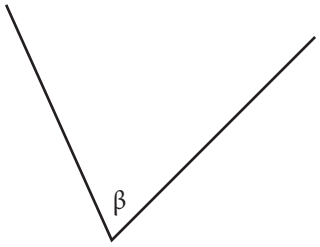
Finally, if you join the point P to the point Q, you get the line b, which is the angle bisector. As b is the solution, you have to draw it with HB pencil.

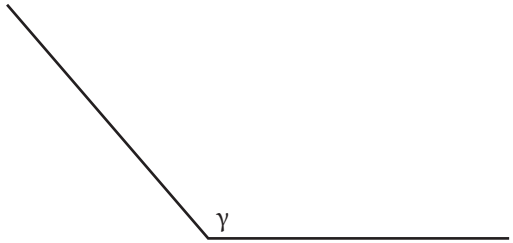


Check that the angle bisector **b** divides the angle α into two equal angles β=γ.

3) Now do it by yourself. Trace the angle bisector of the next angles and label all the points and lines.

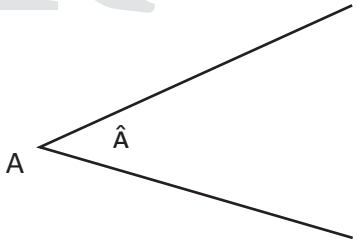




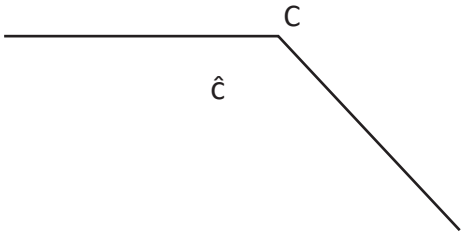


DO IT BY YOURSELF - PRACTISE

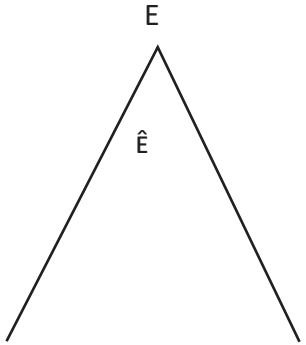
Trace the angle bisectors of the next angles and choose the right sentence.



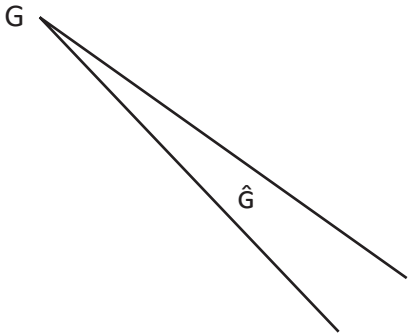
Â is ***less than 90º,*** so it is:
a) an acute angle.
b) an obtuse angle.
c) a right angle.



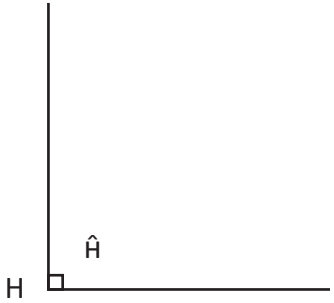
Ĉ is ***more than 90º,*** *so* it is:
a) an acute angle.
b) an obtuse angle.
c) a right angle.



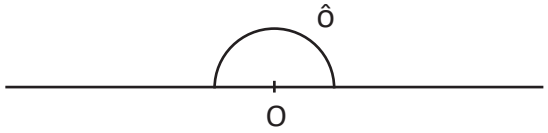
Ê is ***less than 90º,*** *so* it is:
a) an acute angle.
b) an obtuse angle.
c) a right angle.



Ĝ is ***less than 90º,*** so it is:
a) an acute angle.
b) an obtuse angle.
c) a right angle.



Ĥ is ***equal to 90º,*** so it is:
a) an acute angle.
b) an obtuse angle.
c) a right angle.



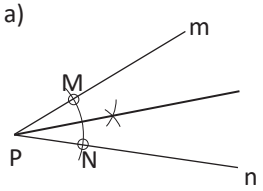
Ô is ***equal to 180***º, so it is:
a) a straight angle.
b) an obtuse angle.
c) a right angle.

Question: how is the angle bisector of a straight angle?

PERPENDICULAR BISECTOR AND ANGLE BISECTOR. EXERCISES.

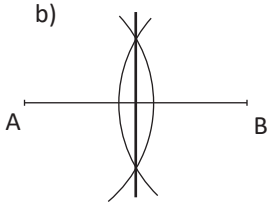
Recognise the following drawings and choose the right option in each case.

a)



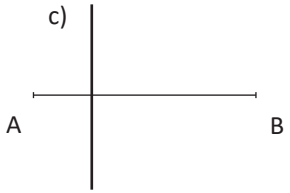
a) Angle bisector.
b) Perpendicular lines.
c) Segment bisector.

b)



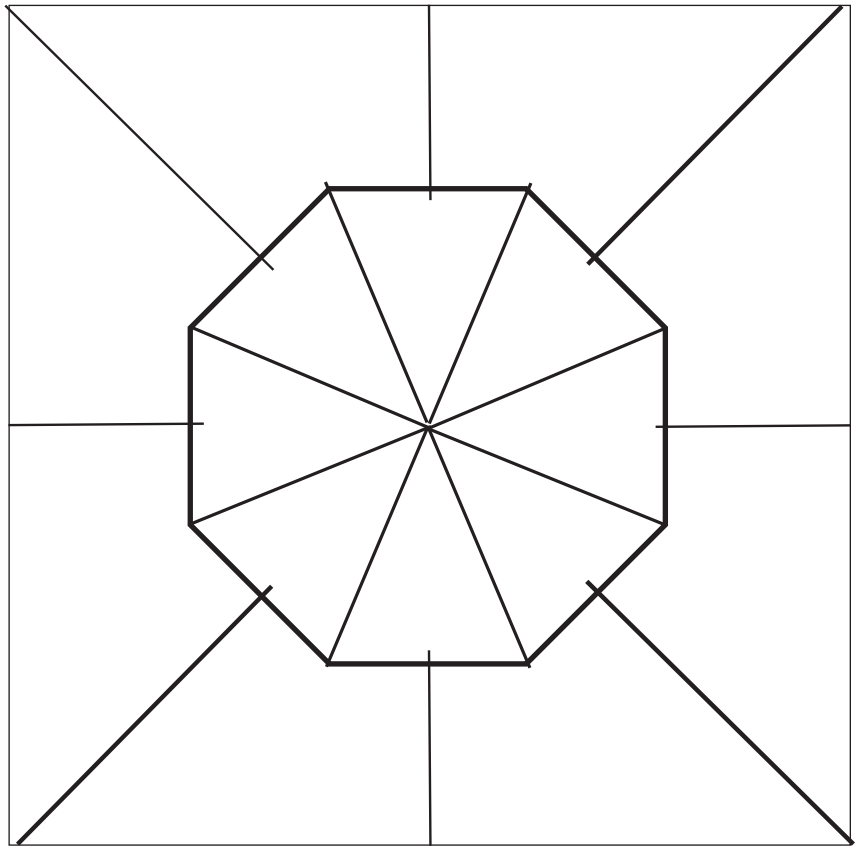
a) Angle bisector.
b) Perpendicular lines.
c) Segment bisector.

c)



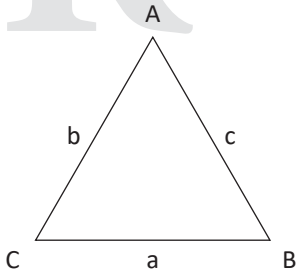
a) Angle bisector.
b) Perpendicular lines.
c) Segment bisector.

Go over the segment bisectors with a green colour pencil or felt-tip pen.
Go over the angle bisectors with a red colour pencil or felt-tip pen.
Colour the shapes produced by the segment bisectors and angle bisector.



THE EQUILATERAL TRIANGLE

An equilateral triangle is a triangle with all sides equal.

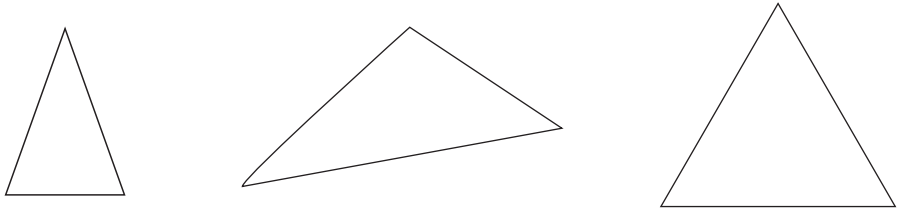


Labelling triangles

Capital letters for vertices: A, B, C.
Low case letters for sides: a, b, c.
Same letter for a vertice and its opposite sides: A→a.

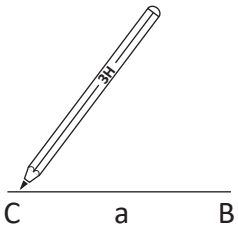
Vocabulary.
- **Equilateral**.
- **to label**.
- **Capital letters**.
- **Low case letters**.
- **Vertice**.
- **Opposite**.
- **Length**.
- **vertex**.
- **vertices**.

Exercise: label the next triangles and mark which one is equilateral.

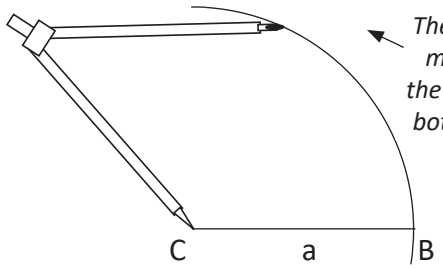


How to draw an equilateral triangle when given the side.

side

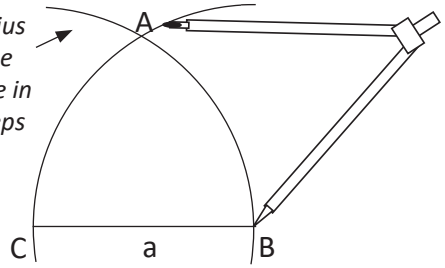


1 Copy the segment of the side and label it.

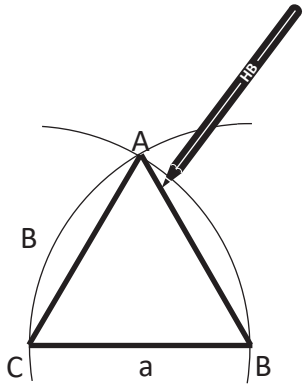


2 Draw an arc with centre C and radius the same length of the given side.

The radius must be the same in both steps



3 Draw another arc with centre B and the same radius: lenght of a.
Both arcs meet at the vertex A.



4 Join A to C.
Join A to B.
ABC is the equilateral triangle and you can trace it with an HB pencil.

Do it by yourself.

Draw an equilateral triangle using the folloging segment as side.

side

https://dibujoramon.wordpress.com/2015/11/08/equilateral-triangle-given-the-side/

DO IT BY YOURSELF - PRACTISE

Trace the equilateral triangles given the following sides.

side _____

side _____

side _____

THE SCALENE TRIANGLE
(EL TRIÁNGULO ESCALENO)

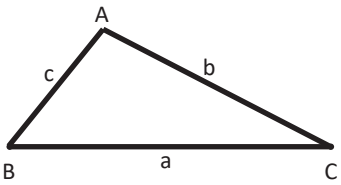
A scalene triangle is a triangle which has the sides all different.

Vocabulary.
- **circumference**: circunferencia.
- **method**: método.
- **to trace**: trazar, dibujar.
- **to meet**: encontrarse.
- **radius**: radio.

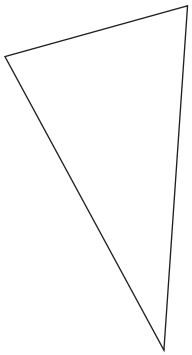
You are given three segments for the sides of he triangle:

a
b
c

You have to draw the scalene triangle which has those segments as sides:



Remembering how to label triangles.
Label the triangle bellow:



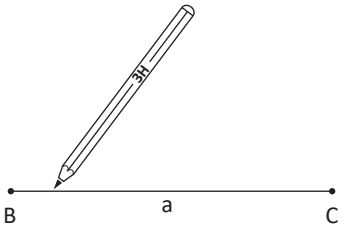
HOW TO DRAW A SCALENE TRIANGLE WHEN GIVEN THE SIDES. METHOD STEP BY STEP.

1 This is the information you have initially: just three segments.

a
b
c

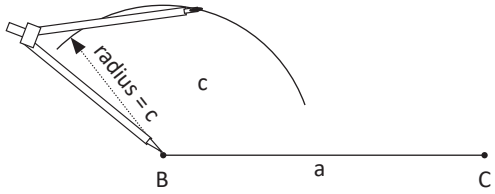
2 Draw one of the segments, for example the segment a. Label it keeping in mind the way we label triangles.

a
b
c



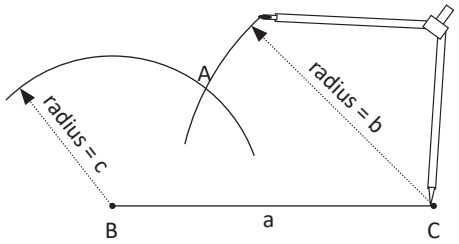
3 Trace an arc with centre B and radius c.

a
b
c



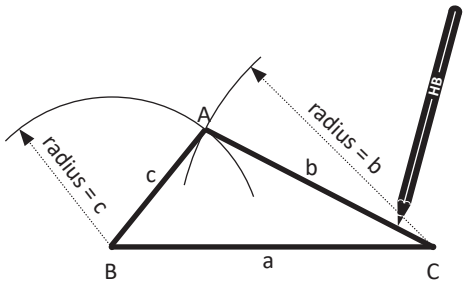
4 Trace an arc with centre C and radius b.

a
b
c



5 Both arcs meet at A. Therefore you can draw the sides AB and AC.

a
b
c



Do it by yourself.
Draw the scalene triangle with sides a, b and c.

a
b
c

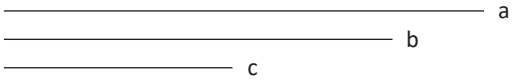
DO IT BY YOURSELF - PRACTISE

Trace the scalene triangles given the following sides.

a

b

c

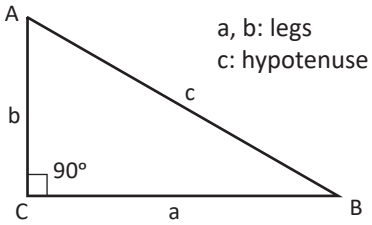


THE RIGHT TRIANGLE WHEN GIVEN BOTH LEGS

A right triangle is a triangle which has an angle of 90º.

Vocabulary.
- **right triangle**.
- **right angle**.
- **leg**.
- **hypotenuse**..
- **measure**.
- **to measure**.
- **to transfer**.

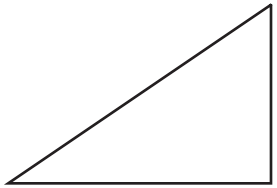
This a right triangle:



The sides which are perpendicular are the legs: a and b.
The other side, the longest, is the hypotenuse (c).

For this problem you know only the legs, but not the hypotnuse. So you will have to fing out how to draw the triangle starting just with the legs.

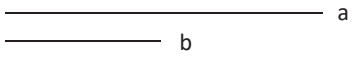
Remembering how to label triangles.
Label the triangle bellow:



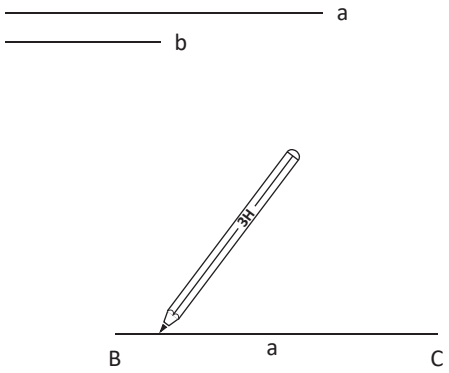
Is this a right triangle?

HOW TO DRAW A RIGHT TRIANGLE WHEN GIVEN THE LEGS. METHOD STEP BY STEP.

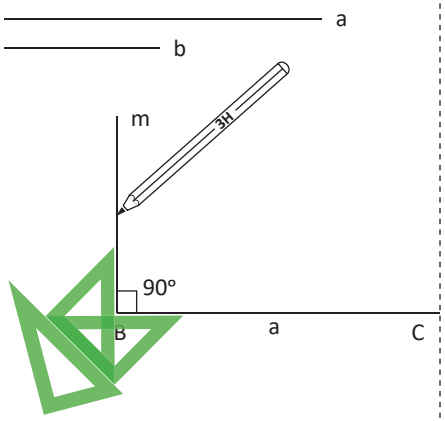
1 This is the information you have initially: just the legs.



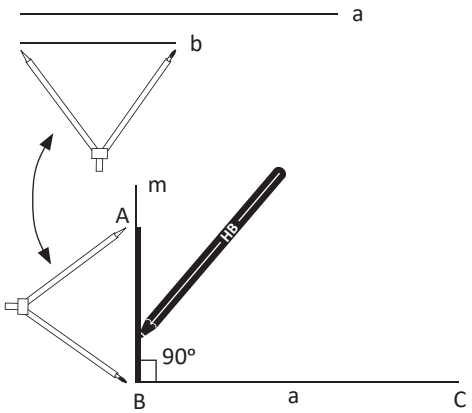
2 Draw one of the legs, for example the leg a. Label it keeping in mind the way we label triangles.



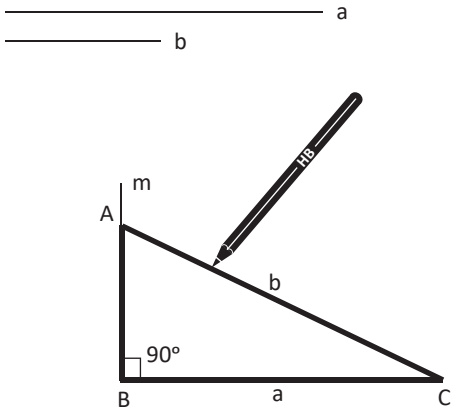
3 Draw a perpendicular line (m) to a passing through B.



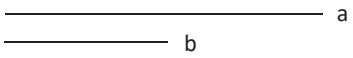
4 Measure the length of b and transfer it to the line m, so you get the vertex A.



5 Join A to C so you get the hypotenuse and the right triangle.



Do it by yourself.
Draw the right triangle with legs a and b.



DO IT BY YOURSELF - PRACTISE

Trace the right triangles given the following legs.

a

b

a

b

SCORING ACTIVITY

Classify the next angles choosing the right option. (1 point).

1

a) acute angle.
b) obtuse angle.
c) right angle.

2

a) acute angle.
b) straight angle.
c) obtuse angle.

3

a) straight angle.
b) obtuse angle.
c) right angle.

4

a) acute angle.
b) straight angle.
c) right angle.

SCORE (1 POINT)	
1 (0,25)	
2 (0,25)	
3 (0,25)	
4 (0,25)	
TOTAL	

Draw an scalene triangle given its sides a, b and c.
Label it properly. (3 points):

a

b

c

Concept (0,12)	
Neatness (0,2)	
Precision (0,2)	
Labels (0,2)	
HB (0,2)	
TOTAL	

Draw an equilateral triangle given the side a. Label it properly.
(3 points).t

a

Concept (2)	
Neatness (0,25)	
Precision (0,25)	
Labels (0,25)	
HB (0,25)	
TOTAL	

Draw a right triangle given its legs. Label it properly.
(3 points).

b

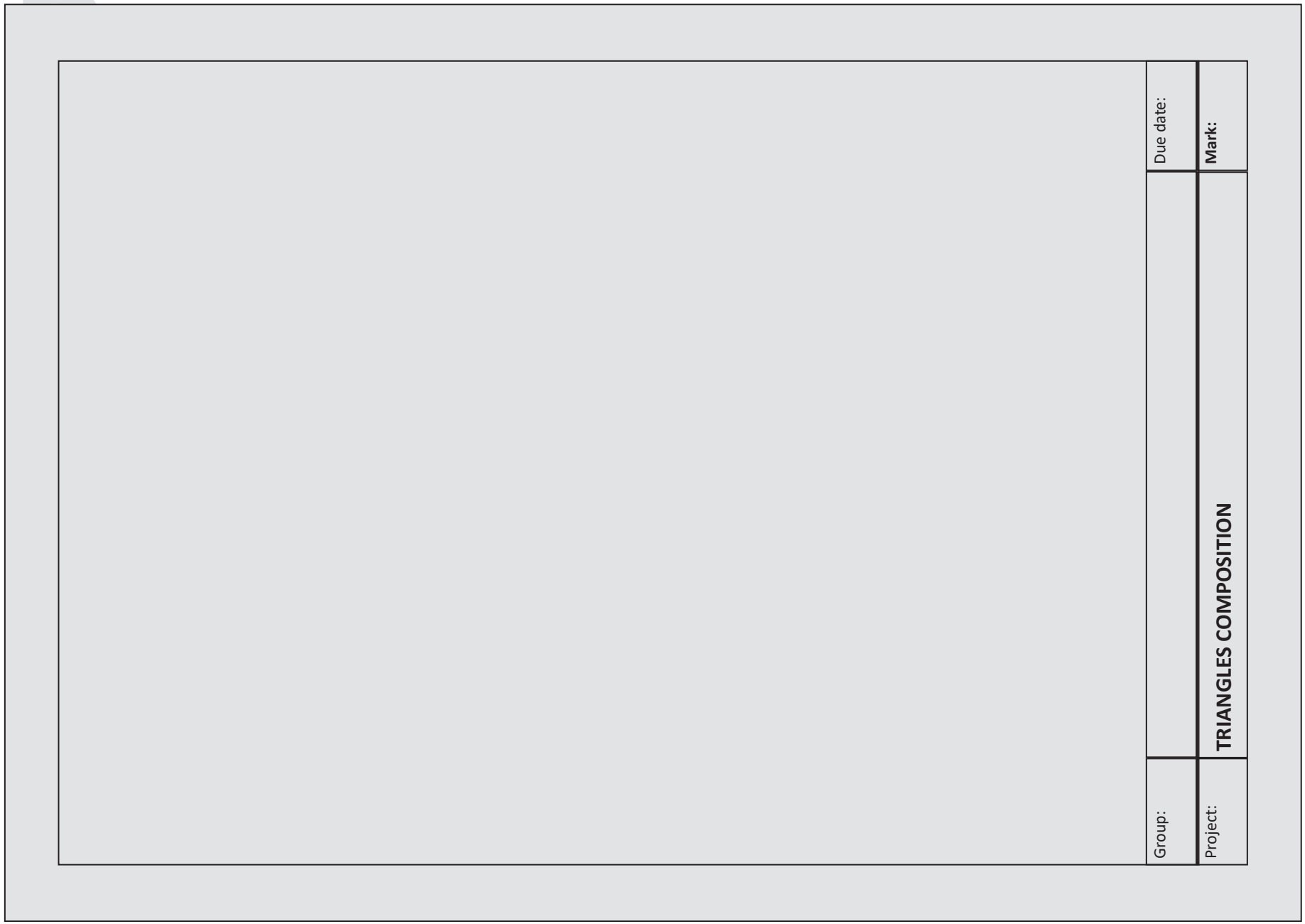
c

Concept (0,12)	
Neatness (0,2)	
Precision (0,2)	
Labels (0,2)	
HB (0,2)	
TOTAL	

Group:		Due date:
Project:	Title: **TRIANGLES**	**Mark:**

TRIANGLES COMPOSITION.

Draw a composition made of triangles.
Use an A4 Guarro paper with a box similar to the one you can see here.

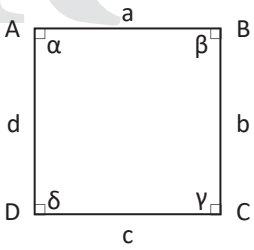


A4 Gvarro paper.
130 g/m²
Margins of 1 cm

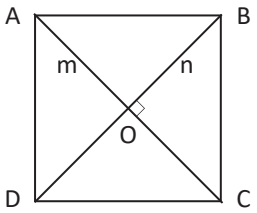
THE SQUARE

A square is a polygon with four straight equal sides and four angles of 90º.

The lines which link its opposite vertices (corners) are the diagonals. They intersect at the centre of the square.



a = b = c = d
α = β = γ = δ = 90º



m, n = diagonals.
m and n are also perpendicular lines.
O = centre of the square.

EXERCISE
Draw a square given the following side.

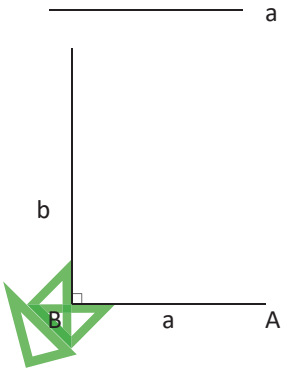
a

0

a

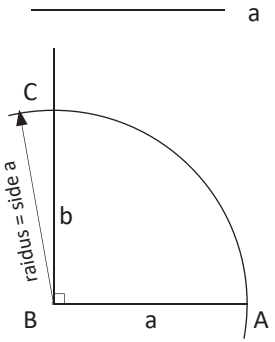
The initial information you have is just the length of the side

1



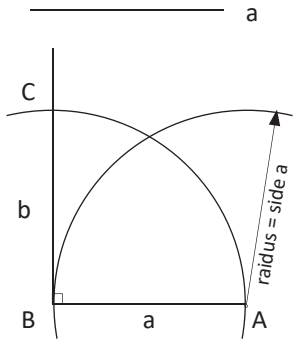
To start, copy the side a and trace a perpendicular line through one of its endpoints.
That is the line for side b.

2



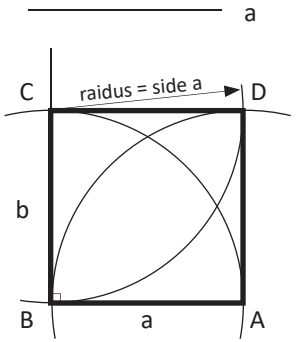
The next is to trace an arc with radius equal to the side, so you get the point C
on the side b.

3



You need the fourth vertice, the point D. You know that the distance from A to D must be the side. So you trace and arc with centre A
and radius the side.
The vertice D must be on a point of this arc.

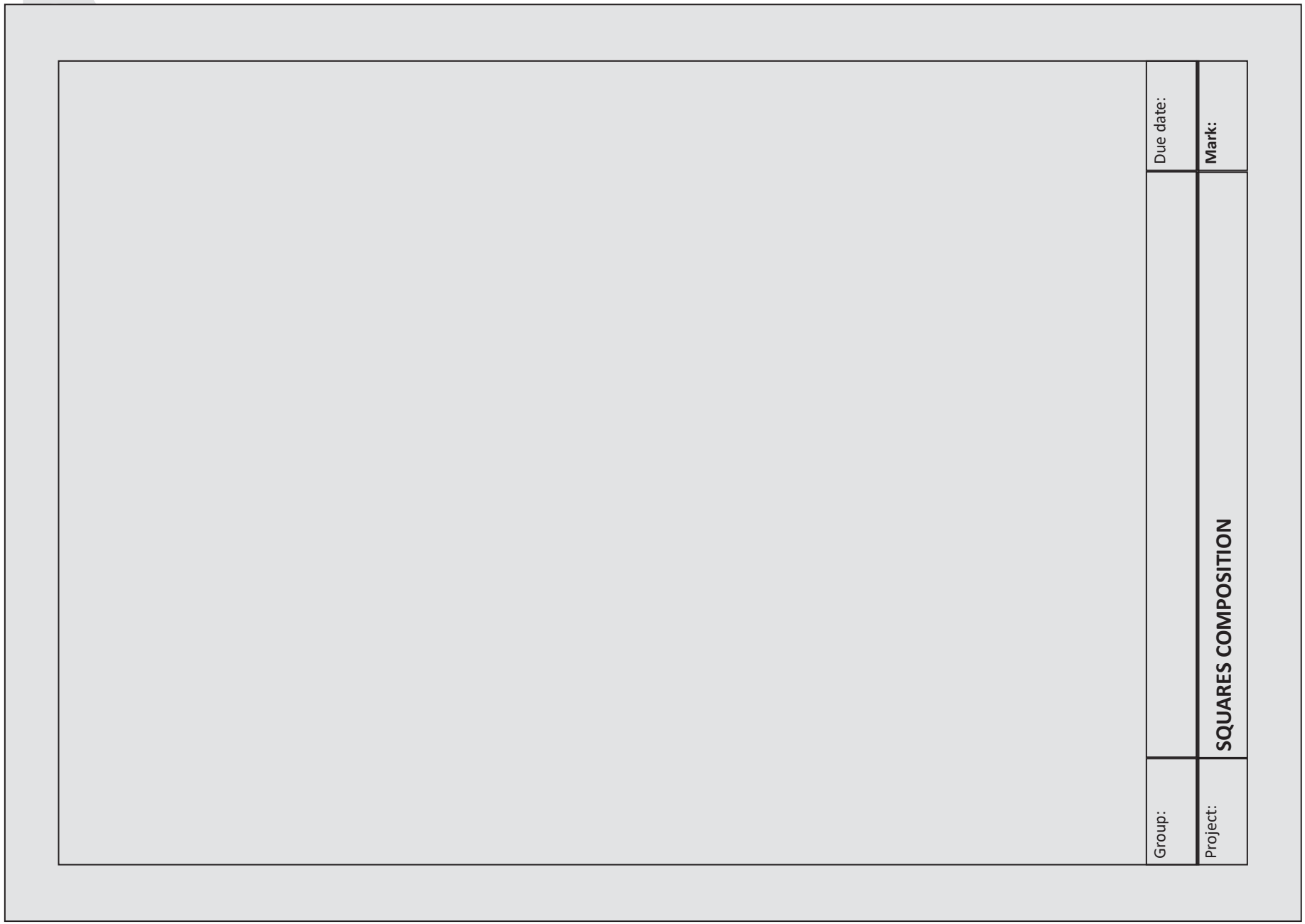
4



You also know that the distance from C to D must be the side, so you trace an arc with centre C
and radius the side.
This arc intersects the other arc at the vertice D.
Joining the vertices you get the square ABCD.

SQUARE COMPOSITION.

Draw a composition made of squares.
Use an A4 Guarro paper with a box similar to the one you can see here.



A4 Gvarro paper.
130 g/m²
Margins of 1 cm

GETTING COLOURS THROUGH POINTILLISM 1

Instead of mixing two primary colours, use directly the colour itself, if you have the proper felt tip.

Compare it with the colour produced by mixing primary colours

Primary colours	Primary colours	Secondary colours		Gradients	
Magenta (1) +	Yellow (1) =	Red	Red	Black	Red White
Magenta(1) +	Yellow (2) =	Orange	Orange	Black	Orange White
Cyan (1) +	Yellow (2) =	Yellow - Green	Yellow - Green	Black	Yellow-green White
Cyan (1) +	Yellow (1) =	Green	Green	Black	Green White
Cyan (2) +	Magenta (1) =	Violet	Violet	Black	Violet White
Cyan (1) +	Magenta (2) =	Purple	Purple	Black	Purple White

Mixing complementary colours.

Cyan (1) + Orange (2) =

Magenta (1) + Green (1) =

Purple (1) + Yellow (1) =