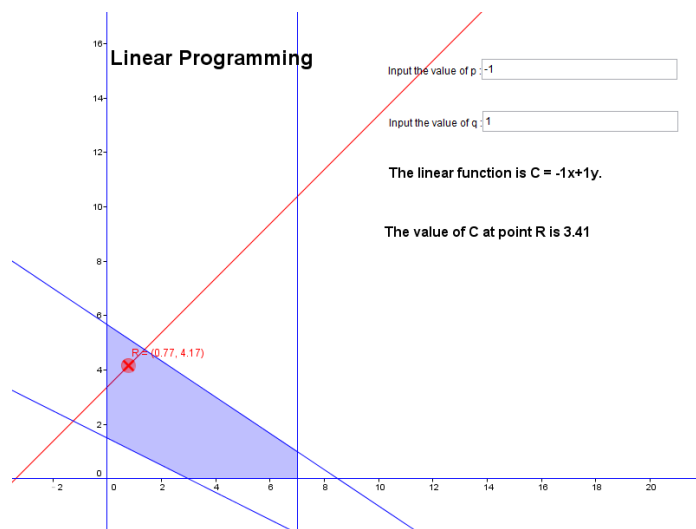










Task A: Linear programming

To create a dynamic worksheet that illustrates constructing the solution set of linear inequalities and the process of linear programming.



Create objects on the Graphics window as follows:

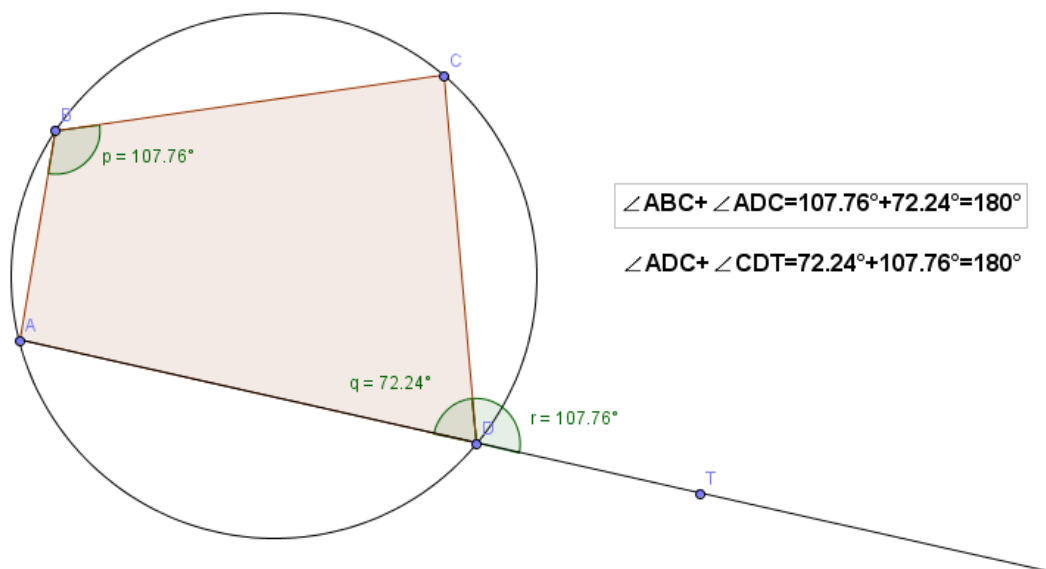
Steps	Objects to be created	Action
1.	The solution set of the linear inequality $x + 2y \geq 3$	<ul style="list-style-type: none"> ◆ Type “$x + 2y \geq 3$” in the input field ◆ Select  “Point on object”, add a point in the solution set of the inequality and rename the point as A ◆ Type “$k=x(A)+2*y(A)$” in the input field ◆ Select  “Text box” and type “Substituting A into the inequality, $x + 2y = k$” where k is selected from “Objects” ◆ Select  “New Point”, add a point outside the solution set of the inequality and rename the point as B ◆ Type “$k'=x(B)+2*y(B)$” in the input field ◆ Select  “Text box” and type “Substituting B into the inequality, $x + 2y = k'$” where k' is selected

Steps	Objects to be created	Action
		from “Objects”
2.	<p>The constrained solution set of the system of linear inequalities:</p> $\begin{cases} x + 2y \geq 3 \\ 2x + 3y \leq 17 \\ 0 \leq x \leq 7 \\ 0 \leq y \end{cases}$	<ul style="list-style-type: none"> ◆ Hide points A and B, and the text boxes ◆ Key in the inequalities one by one in the input field ◆ Type “a&&b&&c&&d” in the input field (by default, a, b, c and d are the assigned names of the inequalities) ◆ Hide the solution sets of each of the individual inequalities
3.	<p>The optimal solution C of a linear function $C = px + qy$ within the constrained solution set</p>	<ul style="list-style-type: none"> ◆ Type “p=0” and “q=0” in the input field ◆ Select  “Input box”, select “p = 0” in “linked object” and type “Input the value of p” in the caption field ◆ Select  “Input box”, select “q = 0” in “linked object” and type “Input the value of q” in the caption field ◆ Select  “Point on object”, add a point in the constrained solution set and rename the point as R ◆ Type “C=p*x(R)+q*y(R)” in the input field ◆ Type “p*x+q*y=C” in the input field ◆ Select  “Text box” and type “The value of C at point R is <input type="text"/>.” where <input type="text"/> is selected from “Objects”





Task B: Exterior Angle of Quadrilateral






To create a dynamic worksheet that illustrates an exterior angle of cyclic quadrilateral equals the interior opposite angle.

Exterior angle equals interior opposite angle of a cyclic quadrilateral.



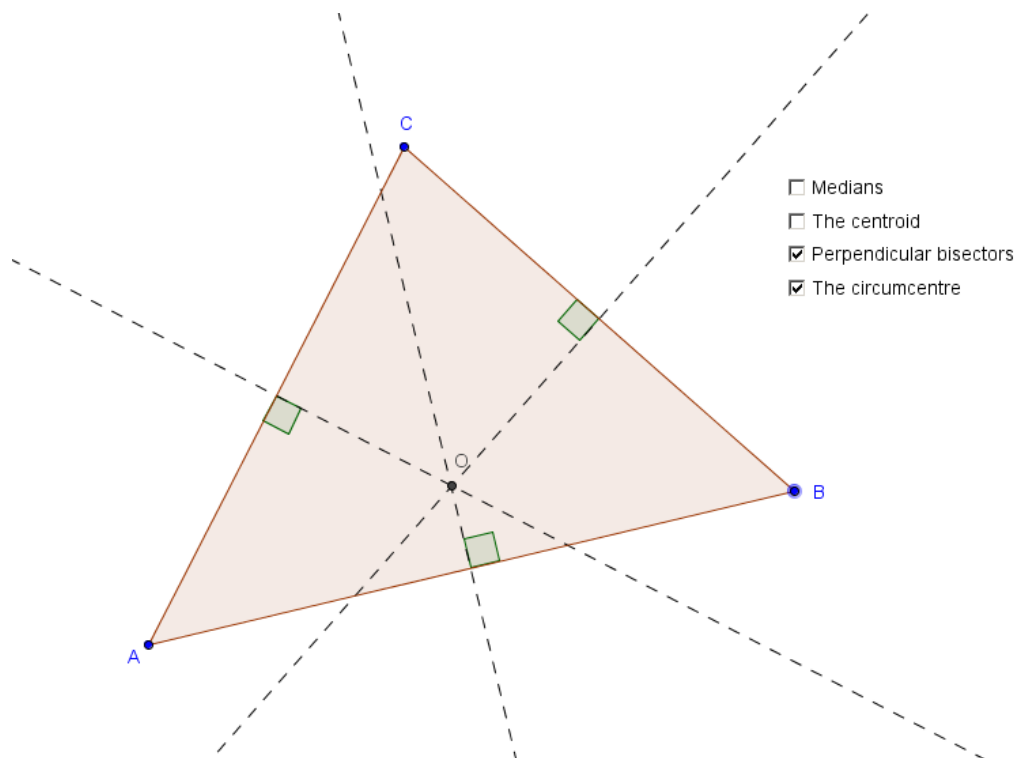
Create objects on the Graphics window as follows:

Steps	Objects to be created	Action
1.	A circle	<ul style="list-style-type: none"> Select  “Circle with center through point” and click on the Graphics window for two times to create a circle Rename A and B as O and M respectively Right click on points O and M and deselect “Show Object” to hide the points
2.	Four points A,B,C and D on the circle	<ul style="list-style-type: none"> Select  “New Point” Click on the circle for four times in a clockwise direction to create the points
3.	Polygon ABCD	<ul style="list-style-type: none"> Select  “Polygon” Click on points A, B, C, D and then A again Right click on the polygon and deselect “Show label” if you see the label of the polygon
4.	Ray from A through D	<ul style="list-style-type: none"> Select  “Ray through Two Points”




Steps	Objects to be created	Action
		<ul style="list-style-type: none"> Click on points A and D
5.	Point T	<ul style="list-style-type: none"> Select  “New Point” Click on the part of the ray outside the circle and rename the point as T
6.	Angles p, q and r	<ul style="list-style-type: none"> Select  “Angle” Click on points A, B, C, then C, D, A, and then T, D, C (all in clockwise direction) Rename the angles as p, q and r respectively Right click on the angles and choose “Object Properties”, then check the option “Show Label” and select “Name and Value”
7.	Text T1	<ul style="list-style-type: none"> Select  “Insert text:” Click on the Graphics window Type $\angle ABC + \angle ADC = p + q = \boxed{p} + \boxed{q} = \boxed{p+q}$ <p>Remarks:</p> <ul style="list-style-type: none"> Select “\angle” from “Symbols” Select \boxed{p} and \boxed{q} from “Objects” To type $\boxed{p+q}$, start from \boxed{p} and click beside p to bring the cursor into the box, then type “+q”
8.	Text T2	<ul style="list-style-type: none"> Select  “Insert text:” Click on the Graphics window Type $\angle ADC + \angle CDT = q + r = \boxed{q} + \boxed{r} = \boxed{q+r}$
9.	Text T3	<ul style="list-style-type: none"> Select  “Insert text:” Click on the Graphics window and type “Exterior angle equals interior opposite angle of a cyclic quadrilateral” Right click on the text, click “Object Properties” and click on “Position” and check the box “Absolute Position on Screen”



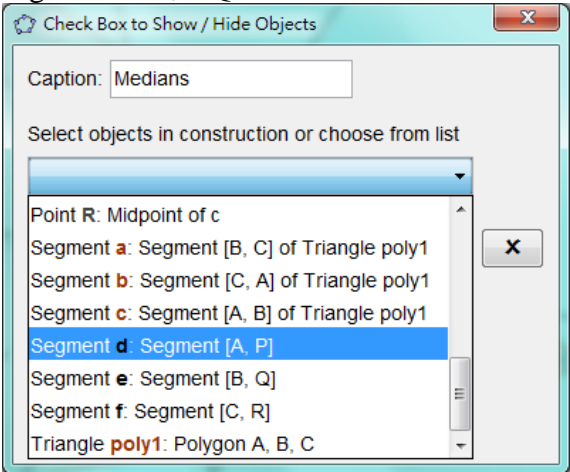
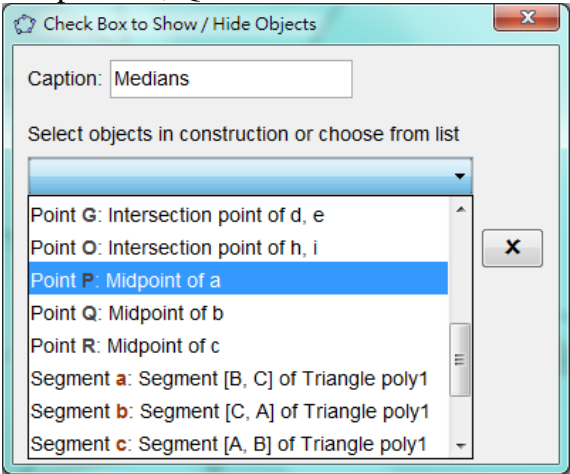
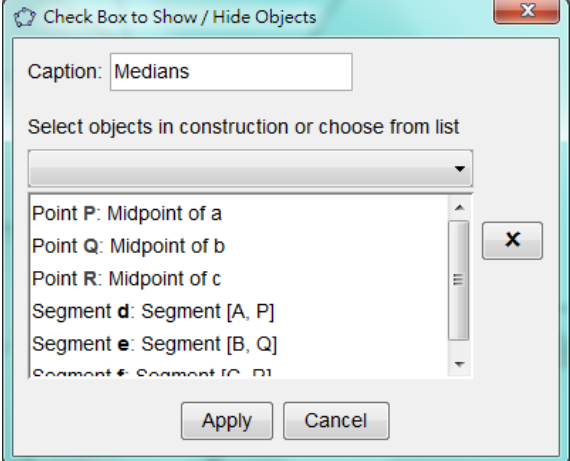
Task C: Centers of Triangle


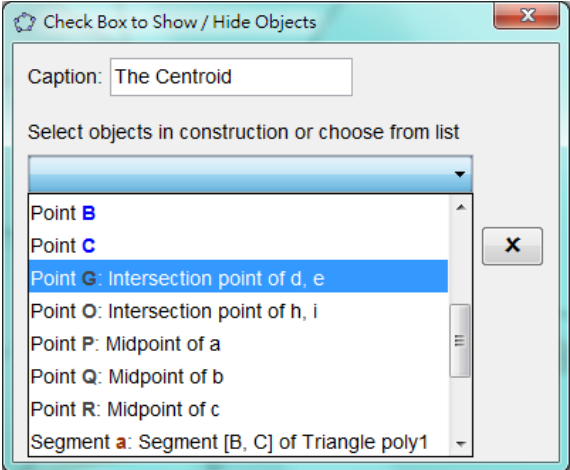
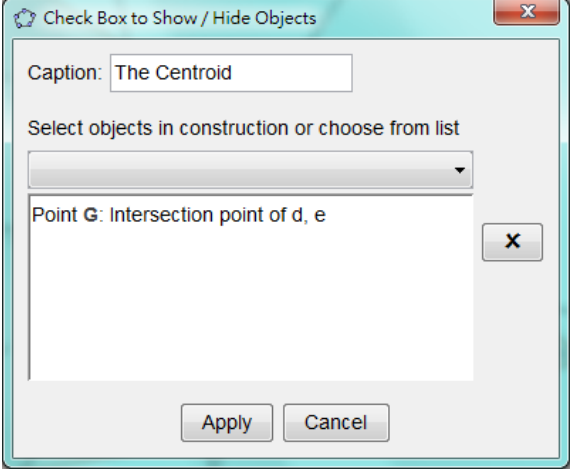

To create a dynamic worksheet that shows the collinearity of the centroid and circumcenter of an arbitrary triangle.







Create objects on the Graphics window as follows:


Steps	Objects to be created	Action
1.	Triangle ABC	<ul style="list-style-type: none"> Select  "Polygon"
2.	Medians AP, BQ and CR and the centroid G	<p>Medians:</p> <ul style="list-style-type: none"> Select <input type="checkbox"/> "Midpoint or Center" Click on segments AB, BC and CA to create the mid-points of the three sides Right click on the mid-points of BC, CA, and AB and rename the points as P, Q and R Select  "Segment between Two Points" Click on points A and P, B and Q, C and R to create the medians Select  "Move" While holding the <input type="checkbox"/> Ctrl key, click on AP, BQ and CR Right click on any one of the lines and click "Object properties" Click on "Style" and change the line type to dashed line, then click the cross button to close the dialog box

Steps	Objects to be created	Action
		<p>Centroid:</p> <ul style="list-style-type: none"> ◆ Select  “Intersect Two Objects” ◆ Click on the intersection point of the lines AP, BQ and CR ◆ Right click on the new point and rename it as G
3.	Check boxes to show/hide the medians and centroid	<p>Show/hide Medians</p> <ul style="list-style-type: none"> ◆ Select  “Check Box to Show/Hide Objects” ◆ In the “Caption” field, enter “Medians” ◆ Click on the small black triangle and select segments AP, BQ and CR  <p>and points P, Q and R</p>  

Steps	Objects to be created	Action
		<ul style="list-style-type: none"> ◆ Click “Apply” ◆ Right click on the text of the check box and click “Object Properties” ◆ Check the box “Fix Checkbox” <p>Show/hide the Centroid</p> <ul style="list-style-type: none"> ◆ Select  “Check Box to Show/Hide Objects” ◆ Click on the Graphics window ◆ In the “Caption” field, enter “The centroid” ◆ Click on the small black triangle and select Point G <div style="display: flex; flex-direction: column; align-items: center;">   </div> <ul style="list-style-type: none"> ◆ Click “Apply” ◆ Right click on the text of the check box and click “Object Properties” ◆ Check the box “Fix Checkbox”
4.	Perpendicular bisectors and the circumcentre O	<p>Perpendicular Bisectors:</p> <ul style="list-style-type: none"> ◆ Select  “Perpendicular Bisector” ◆ Click on the segments AB, BC and CA to create the perpendicular bisectors

Steps	Objects to be created	Action
		<ul style="list-style-type: none"> ◆ Select  “Move” ◆ While holding <input type="checkbox"/> Ctrl key, click on the three perpendicular bisectors ◆ Right click on any one of the lines and click “Object properties” ◆ Click on “Style” and change the line type to dashed line, then click the cross button to close the window <p>Circumcentre:</p> <ul style="list-style-type: none"> ◆ Select  “Intersect Two Objects” ◆ Click on the intersection point of the perpendicular bisectors ◆ Right click on the new point and rename it as O <p>Mark the right angles:</p> <ul style="list-style-type: none"> ◆ Select  “Angle” ◆ Click on segment AB and then its perpendicular bisector ◆ Click on segment BC and then its perpendicular bisector ◆ Click on segment CA and then its perpendicular bisector ◆ Right click on the right angles and deselect “Show Label”
5.	Check box to show/hide the perpendicular bisectors and the circumcentre	<p>Show/hide Perpendicular Bisectors</p> <ul style="list-style-type: none"> ◆ Select  “Check Box to Show/Hide Objects” ◆ Click on the Graphics window ◆ In the “Caption” field, enter “Perpendicular bisectors”

Steps	Objects to be created	Action
		<div data-bbox="769 203 1342 674" style="border: 1px solid gray; padding: 5px; margin-bottom: 10px;"> </div> <p data-bbox="708 689 1326 768">◆ Click on the small black triangle and select Bisector a, b and c</p> <div data-bbox="769 779 1342 1249" style="border: 1px solid gray; padding: 5px; margin-bottom: 10px;"> </div> <p data-bbox="769 1265 1046 1299">and angles α, β and γ</p> <div data-bbox="769 1310 1342 1778" style="border: 1px solid gray; padding: 5px;"> </div>

Steps	Objects to be created	Action
		<div data-bbox="767 203 1342 674" style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> </div> <ul style="list-style-type: none"> ◆ Click “Apply” ◆ Right click on the text of the check box and click “Object Properties” ◆ Check the box “Fix Checkbox” <p>Show/hide the Circumcentre</p> <ul style="list-style-type: none"> ◆ Select  “Check Box to Show/Hide Objects” ◆ Click on the Graphics window ◆ In the “Caption” field, enter “The circumcentre” ◆ Click on the small black triangle and select Point O ◆ Click “Apply” ◆ Right click on the text of the check box and click “Object Properties” ◆ Check the box “Fix Checkbox”