

Grinberg Triangles

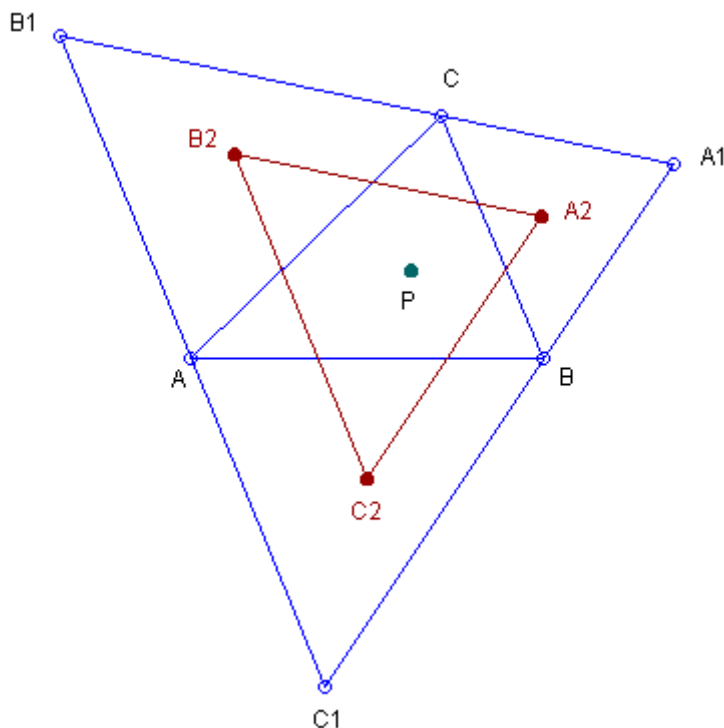
Deko Dekov

Abstract. We define Grinberg triangles and use the computer program "Machine for Questions and Answers" to study properties of Grinberg triangles.

The Grinberg triangles are studied by Darij Grinberg [3].

Given a triangle ABC and a Triangle Center, labeled by P . Let $A_1B_1C_1$ be the anticevian triangle of P . Construct the midpoints A_2, B_2, C_2 of segments PA_1, PB_1, PC_1 , respectively. We call triangle $A_2B_2C_2$ the *Grinberg Triangle of the Triangle Center*.

See the Figure:



P - Triangle Center;

$A_1B_1C_1$ - anticevian triangle of P ;

A_2, B_2, C_2 - midpoints of segments PA_1, PB_1, PC_1 , respectively;

$A_2B_2C_2$ - Grinberg Triangle of the Triangle Center.

In this Figure:

P - Incenter;
 $A_1B_1C_1$ - anticevian triangle of the Incenter = Excentral Triangle;
 A_2, B_2, C_2 - midpoints of segments PA_1, PB_1, PC_1 , respectively;
 $A_2B_2C_2$ - Grinberg Triangle of the Incenter.

Darij Grinberg [3] states the following results:

For any Triangle Center, the Grinberg Triangle of the Triangle Center is perspective with the Medial Triangle.

For any Triangle Center, the Grinberg Triangle of the Triangle Center is perspective with the Triangle of the Centroids of the Triangulation Triangles of the Triangle Center.

For any Triangle Center, the Grinberg Triangle of the Triangle Center is perspective with the Triangle of the Centroids of the Anticevian Corner Triangles of the Triangle Center.

Darij Grinberg [3] gives descriptions of the perspector in the above three theorems.

Examples

The Machine for Questions and Answers produces theorems related to properties of general and specific Grinberg triangles. A few examples of properties related to specific Grinberg triangles are given below.

Grinberg Triangle of the Incenter = Circum-Incentral Triangle.

Comment. The above theorem states that the Grinberg Triangle of the Incenter coincides with the Circum-Incentral Triangle. Hence, we have to consider properties of the Circum-Incentral Triangle.

The Grinberg Triangle of the Centroid is congruent to Triangle ABC.

The Grinberg Triangle of the Centroid is similar to the Medial Triangle.

The Grinberg Triangle of the Centroid is similar to the Anticomplementary Triangle.

The Grinberg Triangle of the Centroid is similar to the Pedal Triangle of the Circumcenter.

The Grinberg Triangle of the Centroid is similar to the Antipedal Triangle of the Orthocenter.

The Grinberg Triangle of the Centroid is similar to the Euler Triangle.

The Grinberg Triangle of the Centroid is similar to the First Brocard Triangle.

The Grinberg Triangle of the Centroid is similar to the Inner Johnson-Yff Triangle.

The Grinberg Triangle of the Centroid is similar to the Outer Johnson-Yff Triangle.

The Grinberg Triangle of the Centroid is similar to the Inner Gallatly-Kiepert Triangle.

The Grinberg Triangle of the Centroid is similar to the Medial Triangle of the Medial Triangle.

The Grinberg Triangle of the Centroid is similar to the Orthic Triangle of the Intouch Triangle.

The Grinberg Triangle of the Centroid is similar to the Euler Triangle of the Medial Triangle.

The Grinberg Triangle of the Centroid is similar to the First Brocard Triangle of the Medial Triangle.

The Grinberg Triangle of the Centroid is similar to the Johnson Triangle of the Medial Triangle.

The Grinberg Triangle of the Centroid is similar to the Inner Johnson-Yff Triangle of the Medial Triangle.

The Grinberg Triangle of the Centroid is similar to the Outer Johnson-Yff Triangle of the Medial Triangle.

The Grinberg Triangle of the Centroid is similar to the Intangents Triangle of the Intouch Triangle.

The Grinberg Triangle of the Centroid is similar to the Extangents Triangle of the Intouch Triangle.

The Grinberg Triangle of the Centroid is similar to the Pedal Triangle of the Circumcenter of the Medial Triangle.

The Grinberg Triangle of the Centroid is similar to the Pedal Triangle of the Orthocenter of the Intouch Triangle.

The Grinberg Triangle of the Centroid is similar to the Circumcevian Triangle of the Circumcenter of the Medial Triangle.

The Grinberg Triangle of the Centroid is similar to the Circum-Orthic Triangle of the Intouch Triangle.

The Grinberg Triangle of the Centroid is similar to the Inner Brocard Triangle of the Medial Triangle.

The Grinberg Triangle of the Centroid is similar to the Tangential Triangle of the Excentral Triangle.

The Grinberg Triangle of the Centroid is similar to the Anticomplementary Triangle of the Anticomplementary Triangle.

The Grinberg Triangle of the Centroid is similar to the Antipedal Triangle of the Circumcenter of the Excentral Triangle.

The Grinberg Triangle of the Centroid is similar to the Antipedal Triangle of the Orthocenter of the Anticomplementary Triangle.

The Grinberg Triangle of the Centroid is similar to the Circum-Orthic Triangle of the Excentral

Triangle.

The Grinberg Triangle of the Centroid is similar to the Circumcevian Triangle of the Circumcenter of the Anticomplementary Triangle.

The Grinberg Triangle of the Centroid is similar to the Intangents Triangle of the Excentral Triangle.

The Grinberg Triangle of the Centroid is similar to the Extangents Triangle of the Excentral Triangle.

The Grinberg Triangle of the Centroid is similar to the First Brocard Triangle of the Anticomplementary Triangle.

The Grinberg Triangle of the Centroid is similar to the Johnson Triangle of the Anticomplementary Triangle.

The Grinberg Triangle of the Centroid is similar to the Inner Johnson-Yff Triangle of the Anticomplementary Triangle.

The Grinberg Triangle of the Centroid is similar to the Outer Johnson-Yff Triangle of the Anticomplementary Triangle.

The Grinberg Triangle of the Centroid is similar to the Inner Brocard Triangle of the Anticomplementary Triangle.

The Grinberg Triangle of the Centroid is similar to the Orthic Triangle of the Circum-Incentral Triangle.

The Grinberg Triangle of the Centroid is similar to the Tangential Triangle of the Circum-Incentral Triangle.

The Grinberg Triangle of the Centroid is similar to the Pedal Triangle of the Orthocenter of the Circum-Incentral Triangle.

The Grinberg Triangle of the Centroid is similar to the Antipedal Triangle of the Circumcenter of the Circum-Incentral Triangle.

The Grinberg Triangle of the Centroid is similar to the Intangents Triangle of the Circum-Incentral Triangle.

The Grinberg Triangle of the Centroid is similar to the Extangents Triangle of the Circum-Incentral Triangle.

The Grinberg Triangle of the Centroid is similar to the Medial Triangle of the Euler Triangle.

The Grinberg Triangle of the Centroid is similar to the Orthic Triangle of the Fuhrmann Triangle.

The Grinberg Triangle of the Centroid is similar to the Medial Triangle of the First Brocard

Triangle.

The Grinberg Triangle of the Centroid is similar to the Orthic Triangle of the Yff Central Triangle.

The Grinberg Triangle of the Centroid is similar to the Medial Triangle of the Johnson Triangle.

The Grinberg Triangle of the Centroid is similar to the Medial Triangle of the Inner Johnson-Yff Triangle.

The Grinberg Triangle of the Centroid is similar to the Medial Triangle of the Outer Johnson-Yff Triangle.

The Grinberg Triangle of the Centroid is similar to the Tangential Triangle of the Fuhrmann Triangle.

The Grinberg Triangle of the Centroid is similar to the Anticomplementary Triangle of the First Brocard Triangle.

The Grinberg Triangle of the Centroid is similar to the Tangential Triangle of the Yff Central Triangle.

The Grinberg Triangle of the Centroid is similar to the Tangential Triangle of the Hexyl Triangle.

The Grinberg Triangle of the Centroid is similar to the Anticomplementary Triangle of the Johnson Triangle.

The Grinberg Triangle of the Centroid is similar to the Anticomplementary Triangle of the Inner Johnson-Yff Triangle.

The Grinberg Triangle of the Centroid is similar to the Anticomplementary Triangle of the Outer Johnson-Yff Triangle.

The Grinberg Triangle of the Centroid is similar to the Euler Triangle of the Euler Triangle.

The Grinberg Triangle of the Centroid is similar to the First Brocard Triangle of the Euler Triangle.

The Grinberg Triangle of the Centroid is similar to the Johnson Triangle of the Euler Triangle.

The Grinberg Triangle of the Centroid is similar to the Inner Johnson-Yff Triangle of the Euler Triangle.

The Grinberg Triangle of the Centroid is similar to the Outer Johnson-Yff Triangle of the Euler Triangle.

The Grinberg Triangle of the Centroid is similar to the Intangents Triangle of the Fuhrmann Triangle.

The Grinberg Triangle of the Centroid is similar to the Extangents Triangle of the Fuhrmann Triangle.

The Grinberg Triangle of the Centroid is similar to the Euler Triangle of the First Brocard Triangle.

The Grinberg Triangle of the Centroid is similar to the First Brocard Triangle of the First Brocard Triangle.

The Grinberg Triangle of the Centroid is similar to the Johnson Triangle of the First Brocard Triangle.

The Grinberg Triangle of the Centroid is similar to the Inner Johnson-Yff Triangle of the First Brocard Triangle.

The Grinberg Triangle of the Centroid is similar to the Outer Johnson-Yff Triangle of the First Brocard Triangle.

The Grinberg Triangle of the Centroid is similar to the Fourth Brocard Triangle of the Fourth Brocard Triangle.

The Grinberg Triangle of the Centroid is similar to the Malfatti Squares Triangle of the Fourth Brocard Triangle.

The Grinberg Triangle of the Centroid is similar to the Intangents Triangle of the Yff Central Triangle.

The Grinberg Triangle of the Centroid is similar to the Fourth Brocard Triangle of the Malfatti Squares Triangle.

The Grinberg Triangle of the Centroid is similar to the Malfatti Squares Triangle of the Malfatti Squares Triangle.

The Grinberg Triangle of the Centroid is similar to the Intangents Triangle of the Hexyl Triangle.

The Grinberg Triangle of the Centroid is similar to the Extangents Triangle of the Hexyl Triangle.

The Grinberg Triangle of the Centroid is similar to the Euler Triangle of the Johnson Triangle.

The Grinberg Triangle of the Centroid is similar to the First Brocard Triangle of the Johnson Triangle.

The Grinberg Triangle of the Centroid is similar to the Inner Johnson-Yff Triangle of the Johnson Triangle.

The Grinberg Triangle of the Centroid is similar to the Outer Johnson-Yff Triangle of the Johnson Triangle.

The Grinberg Triangle of the Centroid is similar to the Euler Triangle of the Inner Johnson-Yff Triangle.

The Grinberg Triangle of the Centroid is similar to the First Brocard Triangle of the Inner Johnson-Yff Triangle.

The Grinberg Triangle of the Centroid is similar to the Johnson Triangle of the Inner Johnson-Yff Triangle.

The Grinberg Triangle of the Centroid is similar to the Inner Johnson-Yff Triangle of the Inner Johnson-Yff Triangle.

The Grinberg Triangle of the Centroid is similar to the Outer Johnson-Yff Triangle of the Inner Johnson-Yff Triangle.

The Grinberg Triangle of the Centroid is similar to the Euler Triangle of the Outer Johnson-Yff Triangle.

The Grinberg Triangle of the Centroid is similar to the First Brocard Triangle of the Outer Johnson-Yff Triangle.

The Grinberg Triangle of the Centroid is similar to the Johnson Triangle of the Outer Johnson-Yff Triangle.

The Grinberg Triangle of the Centroid is similar to the Inner Johnson-Yff Triangle of the Outer Johnson-Yff Triangle.

The Grinberg Triangle of the Centroid is similar to the Outer Johnson-Yff Triangle of the Outer Johnson-Yff Triangle.

The Grinberg Triangle of the Centroid is similar to the Pedal Triangle of the Circumcenter of the Euler Triangle.

The Grinberg Triangle of the Centroid is similar to the Pedal Triangle of the Orthocenter of the Fuhrmann Triangle.

The Grinberg Triangle of the Centroid is similar to the Pedal Triangle of the Circumcenter of the First Brocard Triangle.

The Grinberg Triangle of the Centroid is similar to the Pedal Triangle of the Symmedian Point of the Fourth Brocard Triangle.

The Grinberg Triangle of the Centroid is similar to the Pedal Triangle of the Schoute Center of the Fourth Brocard Triangle.

The Grinberg Triangle of the Centroid is similar to the Pedal Triangle of the Orthocenter of the Yff Central Triangle.

The Grinberg Triangle of the Centroid is similar to the Pedal Triangle of the Symmedian Point of the Malfatti Squares Triangle.

The Grinberg Triangle of the Centroid is similar to the Pedal Triangle of the Schoute Center of the Malfatti Squares Triangle.

The Grinberg Triangle of the Centroid is similar to the Pedal Triangle of the Circumcenter of the

Johnson Triangle.

The Grinberg Triangle of the Centroid is similar to the Pedal Triangle of the Circumcenter of the Inner Johnson-Yff Triangle.

The Grinberg Triangle of the Centroid is similar to the Pedal Triangle of the Circumcenter of the Outer Johnson-Yff Triangle.

The Grinberg Triangle of the Centroid is similar to the Antipedal Triangle of the Circumcenter of the Fuhrmann Triangle.

The Grinberg Triangle of the Centroid is similar to the Antipedal Triangle of the Orthocenter of the First Brocard Triangle.

The Grinberg Triangle of the Centroid is similar to the Antipedal Triangle of the Centroid of the Fourth Brocard Triangle.

The Grinberg Triangle of the Centroid is similar to the Antipedal Triangle of the Circumcenter of the Yff Central Triangle.

The Grinberg Triangle of the Centroid is similar to the Antipedal Triangle of the Centroid of the Malfatti Squares Triangle.

The Grinberg Triangle of the Centroid is similar to the Antipedal Triangle of the Circumcenter of the Hexyl Triangle.

The Grinberg Triangle of the Centroid is similar to the Antipedal Triangle of the Orthocenter of the Johnson Triangle.

The Grinberg Triangle of the Centroid is similar to the Antipedal Triangle of the Orthocenter of the Inner Johnson-Yff Triangle.

The Grinberg Triangle of the Centroid is similar to the Antipedal Triangle of the Orthocenter of the Outer Johnson-Yff Triangle.

The Grinberg Triangle of the Centroid is similar to the Circumcevian Triangle of the Circumcenter of the Euler Triangle.

The Grinberg Triangle of the Centroid is similar to the Circum-Orthic Triangle of the Fuhrmann Triangle.

The Grinberg Triangle of the Centroid is similar to the Circumcevian Triangle of the Circumcenter of the First Brocard Triangle.

The Grinberg Triangle of the Centroid is similar to the Circumcevian Triangle of the Symmedian Point of the Fourth Brocard Triangle.

The Grinberg Triangle of the Centroid is similar to the Circumcevian Triangle of the Schoute Center of the Fourth Brocard Triangle.

The Grinberg Triangle of the Centroid is similar to the Circum-Orthic Triangle of the Yff Central Triangle.

The Grinberg Triangle of the Centroid is similar to the Circumcevian Triangle of the Symmedian Point of the Malfatti Squares Triangle.

The Grinberg Triangle of the Centroid is similar to the Circumcevian Triangle of the Schoute Center of the Malfatti Squares Triangle.

The Grinberg Triangle of the Centroid is similar to the Circum-Orthic Triangle of the Hexyl Triangle.

The Grinberg Triangle of the Centroid is similar to the Circumcevian Triangle of the Circumcenter of the Inner Johnson-Yff Triangle.

The Grinberg Triangle of the Centroid is similar to the Circumcevian Triangle of the Circumcenter of the Outer Johnson-Yff Triangle.

The Grinberg Triangle of the Centroid is similar to the Inner Brocard Triangle of the Euler Triangle.

The Grinberg Triangle of the Centroid is similar to the Inner Brocard Triangle of the First Brocard Triangle.

The Grinberg Triangle of the Centroid is similar to the Inner Brocard Triangle of the Johnson Triangle.

The Grinberg Triangle of the Centroid is similar to the Inner Brocard Triangle of the Inner Johnson-Yff Triangle.

The Grinberg Triangle of the Centroid is similar to the Inner Brocard Triangle of the Outer Johnson-Yff Triangle.

For any Triangle Center, the Medial Triangle is perspective with the Grinberg Triangle of the Triangle Center.

The Grinberg Triangle of the Centroid and the Pedal Triangle of the Centroid of the Intouch Triangle are perspective with perspector the Midpoint of the Centroid and the Gergonne Point.

The Grinberg Triangle of the Centroid and the Triangle of the Centroids of the Triangulation Triangles of the Incenter are homothetic with homothetic center the Midpoint of the Centroid and the Incenter.

The Grinberg Triangle of the Centroid and the Triangle of the Centers of the Orthocentroidal Circles of the Triangulation Triangles of the Incenter are perspective with perspector the Midpoint of the Centroid and the Nagel Point.

The Grinberg Triangle of the Centroid and the Triangle of the Centroids of the Triangulation Triangles of the Circumcenter are homothetic with homothetic center the Midpoint of the Centroid

and the Circumcenter.

The Grinberg Triangle of the Centroid and the Triangle of the First Feuerbach Points of the Triangulation Triangles of the Circumcenter are homothetic with homothetic center the Centroid.

The Grinberg Triangle of the Centroid and the Triangle of the Kiepert Centers of the Triangulation Triangles of the Circumcenter are homothetic with homothetic center the Centroid.

The Grinberg Triangle of the Centroid and the Triangle of the Centroids of the Triangulation Triangles of the Orthocenter are homothetic with homothetic center the Center of the Orthocentroidal Circle.

The Grinberg Triangle of the Centroid and the Triangle of the de Longchamps Points of the Triangulation Triangles of the Orthocenter are homothetic with homothetic center the Circumcenter.

The Grinberg Triangle of the Centroid and the Triangle of the Centers of the Orthocentroidal Circles of the Triangulation Triangles of the Orthocenter are homothetic with homothetic center the Midpoint of the Centroid and the Nine-Point Center.

The Grinberg Triangle of the Centroid and the Triangle of the Centroids of the Triangulation Triangles of the Nine-Point Center are homothetic with homothetic center the Midpoint of the Centroid and the Nine-Point Center.

The Grinberg Triangle of the Centroid and the Triangle of the Centroids of the Triangulation Triangles of the Symmedian Point are homothetic with homothetic center the Midpoint of the Centroid and the Symmedian Point.

The Grinberg Triangle of the Centroid and the Triangle of the Centroids of the Triangulation Triangles of the Gergonne Point are homothetic with homothetic center the Midpoint of the Centroid and the Gergonne Point.

The Grinberg Triangle of the Centroid and the Triangle of the Centroids of the Triangulation Triangles of the Nagel Point are homothetic with homothetic center the Midpoint of the Centroid and the Nagel Point.

The Grinberg Triangle of the Centroid and the Triangle of the Centroids of the Triangulation Triangles of the Mittenpunkt are homothetic with homothetic center the Midpoint of the Centroid and the Mittenpunkt.

The Grinberg Triangle of the Centroid and the Triangle of the Centroids of the Triangulation Triangles of the Spieker Center are homothetic with homothetic center the Midpoint of the Centroid and the Spieker Center.

The Grinberg Triangle of the Centroid and the Triangle of the Centroids of the Triangulation Triangles of the Center of the Orthocentroidal Circle are homothetic with homothetic center the Nine-Point Center.

The Grinberg Triangle of the Circumcenter is congruent to the Anticevian Triangle of the

Circumcenter of the Medial Triangle.

The Grinberg Triangle of the Circumcenter is congruent to the Anticevian Triangle of the Circumcenter of the Euler Triangle.

The Grinberg Triangle of the Circumcenter is similar to the Anticevian Triangle of the Circumcenter.

The Grinberg Triangle of the Circumcenter is similar to the Pedal Triangle of the de Longchamps Point.

The Grinberg Triangle of the Circumcenter is similar to the Circumcevian Triangle of the de Longchamps Point.

The Grinberg Triangle of the Circumcenter is similar to the Pedal Triangle of the de Longchamps Point of the Medial Triangle.

The Grinberg Triangle of the Circumcenter is similar to the Circumcevian Triangle of the de Longchamps Point of the Medial Triangle.

The Grinberg Triangle of the Circumcenter is similar to the Anticevian Triangle of the Circumcenter of the Anticomplementary Triangle.

The Grinberg Triangle of the Circumcenter is similar to the Anticomplementary Triangle of the Anticevian Triangle of the Circumcenter.

The Grinberg Triangle of the Circumcenter is similar to the Pedal Triangle of the de Longchamps Point of the Anticomplementary Triangle.

The Grinberg Triangle of the Circumcenter is similar to the Circumcevian Triangle of the de Longchamps Point of the Anticomplementary Triangle.

The Grinberg Triangle of the Circumcenter is similar to the Anticevian Triangle of the Circumcenter of the First Brocard Triangle.

The Grinberg Triangle of the Circumcenter is similar to the Anticevian Triangle of the Circumcenter of the Johnson Triangle.

The Grinberg Triangle of the Circumcenter is similar to the Anticevian Triangle of the Circumcenter of the Inner Johnson-Yff Triangle.

The Grinberg Triangle of the Circumcenter is similar to the Anticevian Triangle of the Circumcenter of the Outer Johnson-Yff Triangle.

The Grinberg Triangle of the Circumcenter is similar to the Pedal Triangle of the de Longchamps Point of the Euler Triangle.

The Grinberg Triangle of the Circumcenter is similar to the Pedal Triangle of the de Longchamps Point of the First Brocard Triangle.

The Grinberg Triangle of the Circumcenter is similar to the Pedal Triangle of the de Longchamps Point of the Johnson Triangle.

The Grinberg Triangle of the Circumcenter is similar to the Pedal Triangle of the de Longchamps Point of the Inner Johnson-Yff Triangle.

The Grinberg Triangle of the Circumcenter is similar to the Pedal Triangle of the de Longchamps Point of the Outer Johnson-Yff Triangle.

The Grinberg Triangle of the Circumcenter is similar to the Circumcevian Triangle of the de Longchamps Point of the Euler Triangle.

The Grinberg Triangle of the Circumcenter is similar to the Circumcevian Triangle of the de Longchamps Point of the First Brocard Triangle.

The Grinberg Triangle of the Circumcenter is similar to the Circumcevian Triangle of the de Longchamps Point of the Johnson Triangle.

The Grinberg Triangle of the Circumcenter is similar to the Circumcevian Triangle of the de Longchamps Point of the Inner Johnson-Yff Triangle.

The Grinberg Triangle of the Circumcenter is similar to the Circumcevian Triangle of the de Longchamps Point of the Outer Johnson-Yff Triangle.

The Grinberg Triangle of the Circumcenter and the Circum-Orthic Triangle are perspective with perspector the Kiepert-Parry Point.

The Grinberg Triangle of the Circumcenter and the Johnson Triangle are perspective with perspector the Kiepert-Parry Point.

The Grinberg Triangle of the Circumcenter and the First Taylor-Kiepert Triangle are perspective with perspector the Nine-Point Center.

The Grinberg Triangle of the Circumcenter and the Euler Triangle of the Medial Triangle are perspective with perspector the Center of the Brocard Circle.

The Grinberg Triangle of the Circumcenter and the Johnson Triangle of the Medial Triangle are perspective with perspector the Circumcenter.

The Grinberg Triangle of the Circumcenter and the Anticevian Triangle of the Circumcenter of the Medial Triangle are homothetic with homothetic center the Complement of the Nine-Point Center.

The Grinberg Triangle of the Circumcenter and the Euler Triangle of the Anticomplementary Triangle are perspective with perspector the Circumcenter.

The Grinberg Triangle of the Circumcenter and the Euler Triangle of the Tangential Triangle are perspective with perspector the Kiepert-Parry Point.

The Grinberg Triangle of the Circumcenter and the Anticomplementary Triangle of the Euler

Triangle are perspective with perspector the Kiepert-Parry Point.

The Grinberg Triangle of the Circumcenter and the Anticevian Triangle of the Circumcenter of the Johnson Triangle are homothetic with homothetic center the Centroid.

The Grinberg Triangle of the Circumcenter and the Anticevian Triangle of the Circumcenter of the Inner Johnson-Yff Triangle are homothetic with homothetic center the External Center of Similitude of the Incircle and the Circumcircle.

The Grinberg Triangle of the Circumcenter and the Anticevian Triangle of the Circumcenter of the Outer Johnson-Yff Triangle are homothetic with homothetic center the Internal Center of Similitude of the Incircle and the Circumcircle.

The Grinberg Triangle of the Circumcenter and the Pedal Triangle of the Orthocenter of the Hexyl Triangle are perspective with perspector the Circumcenter.

The Grinberg Triangle of the Circumcenter and the Antipedal Triangle of the Orthocenter of the Euler Triangle are perspective with perspector the Kiepert-Parry Point.

The Grinberg Triangle of the Circumcenter and the Triangle of the Centroids of the Triangulation Triangles of the Circumcenter are perspective with perspector the Kosnita Point.

The Grinberg Triangle of the Circumcenter and the Triangle of the Circumcenters of the Triangulation Triangles of the Orthocenter are perspective with perspector the Kiepert-Parry Point.

The Grinberg Triangle of the Circumcenter and the Triangle of the Centroids of the Triangulation Triangles of the de Longchamps Point are perspective with perspector the Circumcenter.

The Orthic Triangle is perspective with the Grinberg Triangle of the Orthocenter.

The Orthic Triangle is homothetic to the Grinberg Triangle of the Symmedian Point.

The Symmedial Triangle is perspective with the Grinberg Triangle of the Symmedian Point.

The Symmedial Triangle is homothetic to the Grinberg Triangle of the Brocard Midpoint.

The Intouch Triangle is perspective with the Grinberg Triangle of the Gergonne Point.

The Extouch Triangle is perspective with the Grinberg Triangle of the Nagel Point.

The Extouch Triangle is homothetic to the Grinberg Triangle of the Mittenpunkt.

The Extouch Triangle is perspective with the Grinberg Triangle of the Bevan Point.

The Anticomplementary Triangle is homothetic to the Grinberg Triangle of the Centroid.

The Tangential Triangle is homothetic to the Grinberg Triangle of the Symmedian Point.

The Circum-Medial Triangle is perspective with the Grinberg Triangle of the Centroid.

The Circum-Medial Triangle is perspective with the Grinberg Triangle of the Symmedian Point.

The Circum-Orthic Triangle is perspective with the Grinberg Triangle of the Circumcenter.

The Circum-Orthic Triangle is perspective with the Grinberg Triangle of the Orthocenter.

The Circum-Orthic Triangle is homothetic to the Grinberg Triangle of the Symmedian Point.

The Half-Altitude Triangle is homothetic to the Grinberg Triangle of the Circumcenter.

The Half-Altitude Triangle is perspective with the Grinberg Triangle of the Orthocenter.

The Euler Triangle is homothetic to the Grinberg Triangle of the Centroid.

The Euler Triangle is perspective with the Grinberg Triangle of the Orthocenter.

The Euler Triangle is perspective with the Grinberg Triangle of the Nine-Point Center.

The Feuerbach Triangle is perspective with the Grinberg Triangle of the Second Feuerbach Point.

The Intangents Triangle is homothetic to the Grinberg Triangle of the Symmedian Point.

The Extangents Triangle is homothetic to the Grinberg Triangle of the Symmedian Point.

The Reflection Triangle is perspective with the Grinberg Triangle of the Orthocenter.

The First Brocard Triangle is perspective with the Grinberg Triangle of the Centroid.

The First Brocard Triangle is perspective with the Grinberg Triangle of the Symmedian Point.

The Second Brocard Triangle is perspective with the Grinberg Triangle of the Symmedian Point.

The Third Brocard Triangle is perspective with the Grinberg Triangle of the Third Power Point.

The Fourth Brocard Triangle is perspective with the Grinberg Triangle of the Centroid.

The de Villiers Triangle is perspective with the Grinberg Triangle of the First de Villiers Point.

The Lucas Central Triangle is perspective with the Grinberg Triangle of the Circumcenter.

The Inner Lucas Triangle is perspective with the Grinberg Triangle of the Radical Center of the Lucas Circles.

The Neuberg Triangle is perspective with the Grinberg Triangle of the Centroid.

The Reflected Neuberg Triangle is perspective with the Grinberg Triangle of the Centroid.

The Johnson Triangle is perspective with the Grinberg Triangle of the Circumcenter.

The Johnson Triangle is perspective with the Grinberg Triangle of the Nine-Point Center.

The Inner Johnson-Yff Triangle is homothetic to the Grinberg Triangle of the Centroid.

The Outer Johnson-Yff Triangle is homothetic to the Grinberg Triangle of the Centroid.

The Apollonius Triangle is perspective with the Grinberg Triangle of the Apollonius Point.

The Outer Fermat Triangle is perspective with the Grinberg Triangle of the Centroid.

The Outer Fermat Triangle is perspective with the Grinberg Triangle of the Outer Fermat Point.

The Inner Fermat Triangle is perspective with the Grinberg Triangle of the Centroid.

The Inner Fermat Triangle is perspective with the Grinberg Triangle of the Inner Fermat Point.

The Outer Napoleon Triangle is perspective with the Grinberg Triangle of the Centroid.

The Outer Napoleon Triangle is perspective with the Grinberg Triangle of the Outer Napoleon Point.

The Inner Napoleon Triangle is perspective with the Grinberg Triangle of the Centroid.

The Inner Napoleon Triangle is perspective with the Grinberg Triangle of the Inner Napoleon Point.

The Outer Vecten Triangle is perspective with the Grinberg Triangle of the Centroid.

The Outer Vecten Triangle is perspective with the Grinberg Triangle of the Outer Vecten Point.

The Inner Vecten Triangle is perspective with the Grinberg Triangle of the Centroid.

The Inner Vecten Triangle is perspective with the Grinberg Triangle of the Inner Vecten Point.

Invitation

The reader is invited to submit a note/paper containing

- synthetic proofs of theorems from this paper,
- or, applications of theorems from this paper,
- or, additional references related to this paper.

Definitions

We use the definitions in accordance with [1 - 6] and papers published in this journal.

The Level

The Machine for Questions and Answers is used to produce results in this paper. Currently the Machine has 6 levels of depths - 0,1,2,3,4,5. We use for this paper the level 0, that is, the Machine

produces only elementary results. If we need deeper investigation, we have to use a level bigger than 0. Since the Machine for Questions and Answers produces too many results, it is suitable we to use bigger levels upon request, that is, for specific questions.

Thanks

The figure in this note is produced by using the program C.a.R. (Compass and Ruler), an amazing program created by Rene Grothmann. The Grothmann's program is available for download in the Web: [Rene Grothmann's C.a.R.](#). It is free and open source. The reader may verify easily the statements of this paper by using C.a.R. Many thanks to Rene Grothmann for his wonderful program.

References

1. Quim Castellsaguer, The Triangles Web,
<http://www.xtec.es/~qcastell/ttw/ttweng/portada.html>
2. D. Dekov, Computer-Generated Encyclopedia of Euclidean Geometry, First Edition, 2006,
<http://www.dekovsoft.com/>
3. Darij Grinberg, Affine stuff,
http://www.paideiaschool.org/Teacherpages/Steve_Sigur/resources/VoodooPad%20web/affine.html
4. C. Kimberling, Encyclopedia of Triangle Centers,
<http://faculty.evansville.edu/ck6/encyclopedia/>
5. Eric W. Weisstein, MathWorld - A Wolfram Web Resource.
<http://mathworld.wolfram.com/>
6. Paul Yiu, Introduction to the Geometry of the Triangle, 2001,
<http://www.math.fau.edu/yiu/geometry.html>

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Dr.Deko Dekov, ddekov@dekovsoft.com.