Diagonal Classification

by – Steve Phelps

Activity overview

This activity could be used as an assessment after a unit on special quadrilaterals. Students are given an unknown quadrilateral constructed with a given diagonal property. By dragging the vertices of the quadrilateral, students conjecture as to the names of the quadrilaterals that can be constructed with the given diagonal property. Students support their conjecture by taking appropriate measurements. As a result of this activity, students should have a classification of quadrilaterals based upon the diagonal properties.

Concepts

Special Quadrilaterals (Parallelograms, Rectangles, Rhombi, Squares, Kites, Trapezoids, Isosceles Trapezoids) and their properties.

Teacher preparation

The associated .tns file should be downloaded onto the student handhelds. If you choose to have students to type their conjectures into the document, you should be prepared to have students download their completed documents to your computer. You may also choose to have your students write their conjectures and support on paper; you should still check their documents for their support.

Classroom management tips

Roam about the room. Some students will need help with measuring angles and sides. Other students may need help "uncluttering" their screens. Not all the vertices are "draggable." This is just the nature of the construction.

TI-Nspire Applications

Graphs and Geometry.

Step-by-step directions

Students should work through the pages.

Assessment and evaluation

- *You must check the student's documents on their handhelds. If you are not downloading their work onto your computer and having students write their conjectures and support on paper, some students may not make any measurements or any drag tests.*
- *For some students at earlier Van Hiele levels with respect to quadrilaterals, it may be appropriate for them to base their support for their conjecture on how the quadrilateral looks.*
- *Many of the shapes can be dragged into different shapes. THIS IS THE IDEA BEHIND DIAGONAL CLASSIFICATION! The students should choose identify all the special quadrilateral for each page so they can make a complete classification!*
- *There is an associated .tns file with solutions.*
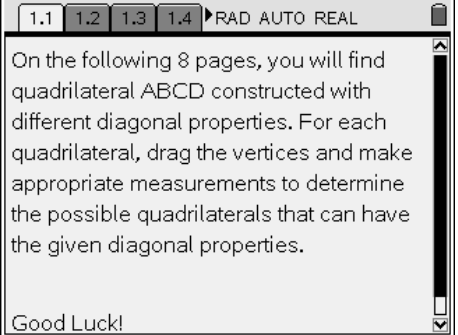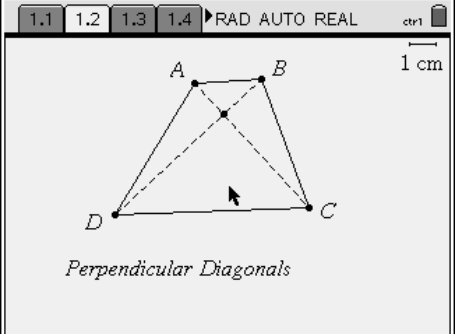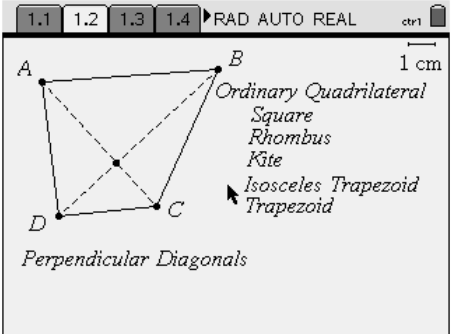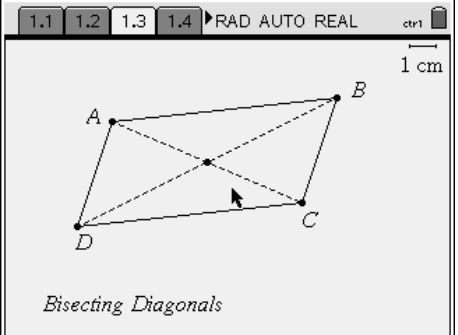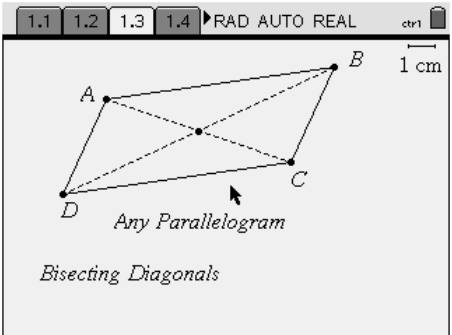
Activity extensions

- *This could be completed as a whole class activity. You could have your students work through each one, and then have some students present their "proofs" to the class.*

Mystery Quadrilateral!
by: Steve Phelps
Grade level: secondary
Subject: mathematics
Time required: 45 to 90 minutes

Materials: nSpire

- *Students could list all the possible shapes that appear in more than one classification..*
- *Students could "group" the pages of the documents according the shapes that can be made (Which pages have a quadrilateral that can be dragged into a trapezoid?)*

Student TI-Nspire Document

QuadrialteralDiagonals.tns.
SOLUTIONSQuadrilateralDiagonals.tns

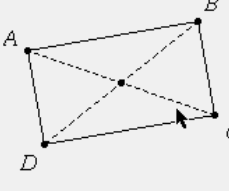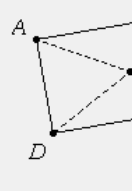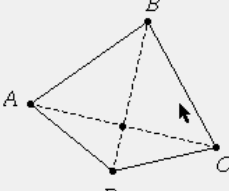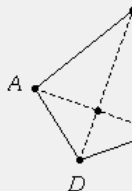| Diagonal Classification Screenshots	Solution Screenshots with Answer	Comments and Other Possible Shapes
On the following 8 pages, you will find quadrilateral ABCD constructed with different diagonal properties. For each quadrilateral, drag the vertices and make appropriate measurements to determine the possible quadrilaterals that can have the given diagonal properties. Good Luck!	You should try and unhide the constructions to see how they are made !	
Perpendicular Diagonals	Ordinary Quadrilateral Square Rhombus Kite Isosceles Trapezoid Trapezoid *Perpendicular Diagonals*	
Bisecting Diagonals	*Any Parallelogram* *Bisecting Diagonals*	

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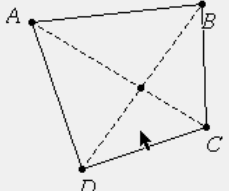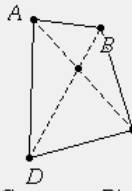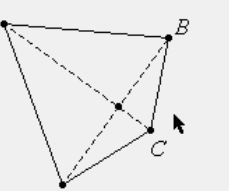
Materials: nSpire

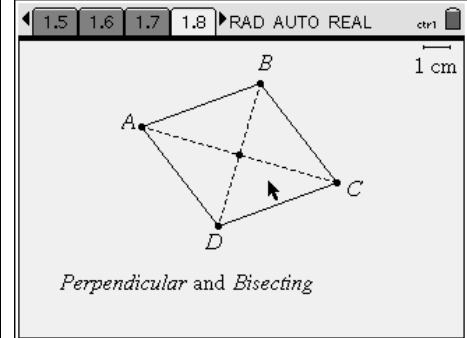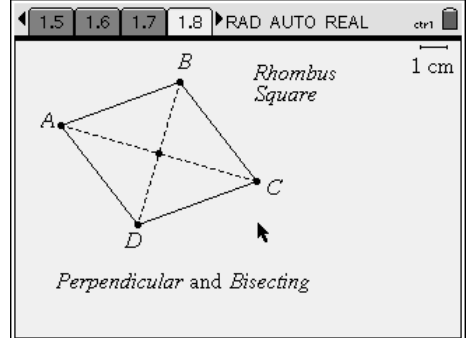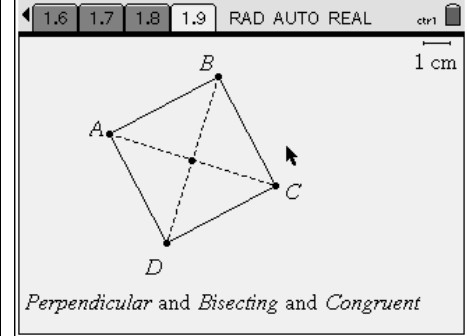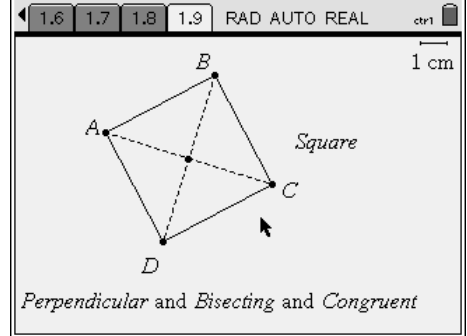|		
1.1 1.2 1.3 1.4 ▶ RAD AUTO REAL ctrl 🔋 — 1 cm — A, B, C, D quadrilateral with congruent diagonals. *Congruent Diagonals*	◀ 1.2 1.3 1.4 1.5 ▶ RAD AUTO REAL ctrl 🔋 — 1 cm — *Ordinary Quadrilateral / Kite / Rectangle / Square / Isosceles Trapezoid* *Congruent Diagonals*	
◀ 1.2 1.3 1.4 1.5 ▶ RAD AUTO REAL ctrl 🔋 — 1 cm — *Perpendicular* and *Congruent*	◀ 1.2 1.3 1.4 1.5 ▶ RAD AUTO REAL ctrl 🔋 — 1 cm — *Ordinary Quadrilateral / Isosceles Trapezoid / Square / Kite* *Perpendicular* and *Congruent*	
◀ 1.3 1.4 1.5 1.6 ▶ RAD AUTO REAL ctrl 🔋 — 1 cm — *Congruent* and *Bisecting*	◀ 1.3 1.4 1.5 1.6 ▶ RAD AUTO REAL ctrl 🔋 — 1 cm — *Rectangle / Square* *Congruent* and *Bisecting*	
◀ 1.4 1.5 1.6 1.7 ▶ RAD AUTO REAL ctrl 🔋 — 1 cm — *Perpendicular, only one Bisected*	◀ 1.4 1.5 1.6 1.7 ▶ RAD AUTO REAL ctrl 🔋 — 1 cm — *Kite / Can be "dragged" into a rhombus or square* *Perpendicular, only one Bisected*	

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1.5 1.6 1.7 1.8 ▶RAD AUTO REAL ctrl 🔋 1 cm *B* *A* *C* ▲ *D* *Perpendicular* and *Bisecting*	1.5 1.6 1.7 1.8 ▶RAD AUTO REAL ctrl 🔋 1 cm *B* *Rhombus* *Square* *A* *C* *D* ▲ *Perpendicular* and *Bisecting*	
1.6 1.7 1.8 1.9 RAD AUTO REAL ctrl 🔋 1 cm *B* *A* ▲ *C* *D* *Perpendicular* and *Bisecting* and *Congruent*	1.6 1.7 1.8 1.9 RAD AUTO REAL ctrl 🔋 1 cm *B* *A* *Square* *C* *D* ▲ *Perpendicular* and *Bisecting* and *Congruent*	