Circle Product Theorems

ID: 12513

Time Required
20 minutes

Activity Overview

Students will use dynamic models to find patterns. These patterns are the Chord-Chord, Secant-Secant, and Secant-Tangent Theorems.

Topic: Circles

- *Chord-Chord, Secant-Secant, and the Secant-Tangent Product Theorems*

Teacher Preparation and Notes

- *To complete this activity, students will need to know how to change between pages, and how to grab and move points.*
- *The multiple-choice items are self-check. Students can check their answers by pressing (menu) and selecting **Check Answer** (or (ctrl) + ▲). If desired, by using the TI-Nspire Teacher Edition software, teachers can change the self-check questions to exam mode so students cannot check their answer. On any question click the Teacher Tool Palette and select Question Properties. Change the Document Type from Self-Check to Exam.*
- ***To download the student TI-Nspire document (.tns file) and student worksheet, go to education.ti.com/exchange and enter "12513" in the quick search box.***

Associated Materials

- *GeoWeek22_Products_worksheet_TINspire.doc*
- *GeoWeek22_Products.tns*

Suggested Related Activities

To download any activity listed, go to education.ti.com/exchange and enter the number in the quick search box.

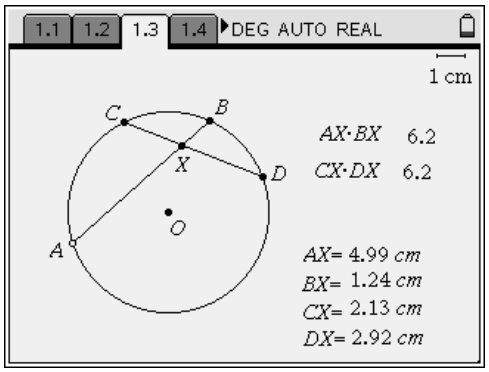
- *Chords and Circles (TI-Nspire technology) — 9423*
- *Angles formed by Intersecting Chords, Secants and Tangents (TI-84 Plus Family) — 4065*
- *Evaluating the Products of Chords of a Circle (TI-84 Plus Family) — 7377*

Problem 1 – Chord-Chord Product Theorem

Students will begin this activity by investigating the intersection of two chords and the product of the length of the segments of one chord and the product of the length of the segments of the other chord.

Students will be asked to collect data by moving point *A*. Students are asked to calculate the products by hand on their accompanying worksheet. Students are asked several questions about the relationship among the products.

As an extension, prove the *chord-chord* product theorem using similar triangles.

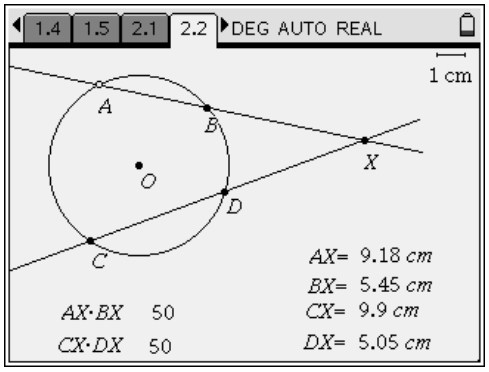


Problem 2 – Secant-Secant Product Theorem

Students will investigate the intersection of two secants and the product of the lengths of one secant segment and its external segment and the product of the lengths of the other secant segment and its external segment.

Students will be asked to collect data by moving point *A*. They are to calculate the products by hand on their accompanying worksheet. Students are asked several questions about the relationship among the products.

As an extension, prove the *secant-secant* product theorem using similar triangles.

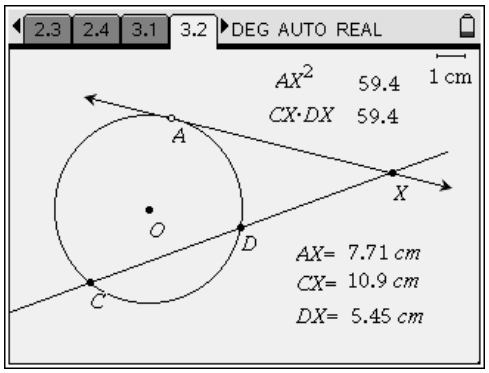


Problem 3 – Secant-Tangent Product Theorem

Students will investigate the intersection of the product of the lengths of one secant segment and its external segment and the square of the tangent segment.

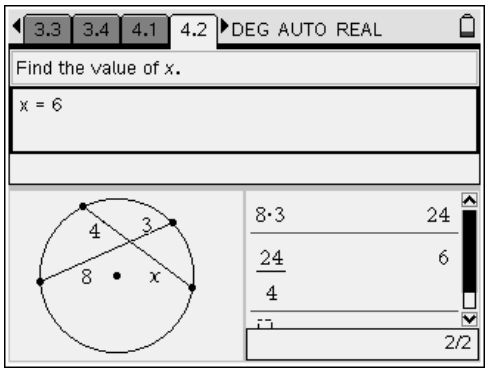
Students will be asked to collect data by moving point *A*. Students are asked to calculate the products by hand on their accompanying worksheet. Students are asked several questions about the relationship among the products.

As an extension, prove the *secant-tangent* product theorem using similar triangles.



Problem 4 – Application of the Product Theorems

Students will be asked to apply what they learned in Problems 1–3 to solve a few problems.



Student Solutions

1. Sample answers:

Position	*AX*	*BX*	*CX*	*DX*	*AX · BX*	*CX · DX*
1	4.99	1.24	2.13	2.92	6.2	6.2
2	4.38	1.36	1.9	3.15	5.97	5.97
3	5.69	1.12	2.61	2.44	6.35	6.35
4	5.02	1.24	2.14	2.9	6.22	6.22

2. They are equal.

3. equal

4. Sample answers:

Position	*AX*	*BX*	*CX*	*DX*	*AX · BX*	*CX · DX*
1	9.18	5.45	9.9	5.05	50	50
2	13.9	9.15	14	9.12	127	127
3	9.49	5.65	10.1	5.29	53.6	53.6
4	4.6	3.39	7.06	2.21	15.6	15.6

5. They are equal.

6. equals

7. Sample answers:

Position	*AX*	*CX*	*DX*	AX^2	*CX* · *DX*
1	7.71	10.9	5.45	59.4	59.4
2	4.02	7.58	2.13	16.2	16.2
3	2.8	6.63	1.18	7.84	7.84
4	19.5	17	22.4	382	382

8. They are equal.

9. equals

10. 6

11. $\frac{3}{4}$

12. $3\sqrt{13}$ or 10.817