

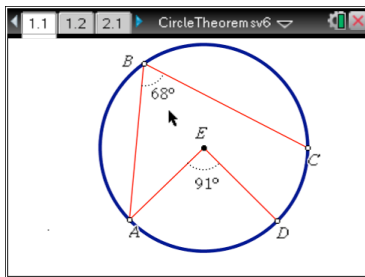
CIRCLE THEOREMS

Student Notes

1. Double it

Transfer the document, **CirclesTheorems.tns** to your handheld and open it.

You will see an image like this with two angles marked.



Move the cursor to point A until you can see an open hand and the words 'point A'. Press **ctrl** **↵** to close the hand and use the Touchpad to move the point around. You will see that both angles change. Press **↵** again to stop moving point A.

Now choose a point to move and try to make the angle at the centre twice the angle at the circumference. What sort of shape do you see? What happens to points C and D when the words "You did it!" appear on the screen?

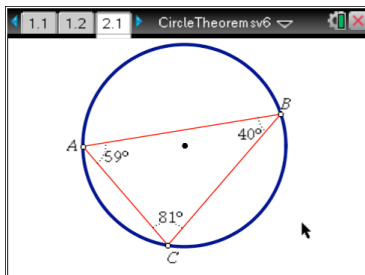
Press **ctrl** **→** to move to page 1.2 and see a summary of the circle theorem you have been exploring.

You can move any points around to help you understand how the theorem works.

2(a). A triangle in a circle

Press **ctrl** **→** to move to page 2.1

You will see a triangle with vertices labeled A, B and C, and all three angles measured.



Look at the sizes of the three angles. Imagine moving point B clockwise. Write down what you think will happen to the three angles: will they get larger, smaller or stay the same?

Move point B around the circle but do not drag it past either of the other two points.

When you move point A, what happens to each of the three angles?

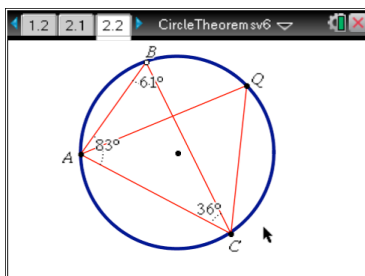
What happens to the three angles? Which change and which stay the same?

Predict what will happen when you move point C.

2(b). Adding an angle

Move to page 2.2 of the document.

You will see this diagram:



What is the value of the angle at Q? Write down what you think it is.

If you need to, check the angle at Q by measuring it.

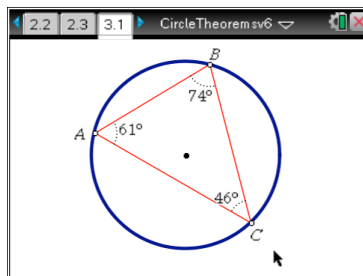
Move to page 2.3 where you will see a summary of the circle theorem you have been exploring.

You may find it helpful to drag point B until it is over point Q.

Press **menu** **8** **4**, then click on points A, then Q, then C.

3. Is your angle right?

Press **ctrl** **▶** to move to page 3.1.
You will see a triangle whose corners lie on a circle.



By moving one of the points, try to make the angle at A exactly 90° .

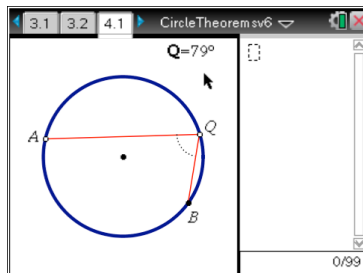
Now move a different point. This time, try to make the angle at B 90° .

Is it possible to make any of the three angles equal to 90° without one of the sides of the triangle going through the centre of the circle?

Move to page 3.2 to see a summary of the circle theorem you have been exploring.

4(a) Switching segments

Move to page 4.1.
On the left of the screen there is a diagram to explore. On the right is a calculator page.
You can switch between them by pressing **ctrl** **tab**.



Drag point Q all the way round the circle. When does the value of Q change?

Add together the two different values for Q.

Move point A or B to change the angle at Q. Now drag Q round the circle again.

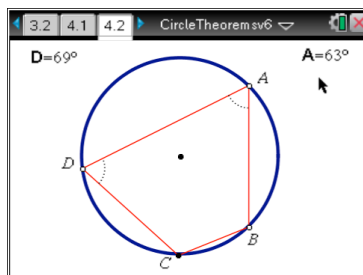
What are the two angles this time? Add them together. What do you notice?

Where do you need to place A or B so that the two values for Q are equal to each other?

4(b) A cyclic quadrilateral

Move to page 4.2.
You will see a quadrilateral. All 4 points are on the circle so this is called a *cyclic quadrilateral*.

Using your results from part 4(a), try to predict the value of A when you rotate point A past point B or point D.



Now rotate A around the circle. Did you correctly predict the new value for A?

Move A so that it is directly over point C. What is the size of angle C?

Now rotate angle D around the circle.

Try to predict the new value for the angle at D after the point D passes A or C.

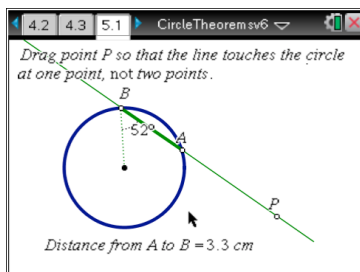
Page 4.3 has a summary of the circle theorem you have been learning about.

5. Make two points one

Move to page 5.1.

You will see a circle with a line cutting it at two points, A and B.

By moving point P you can change the steepness of the line.



Try to move point P so that the line touches the circle at one point, not two points.

Hint: What does the distance from A to B need to be?

When A and B come together, a message appears asking you to notice the angle between the line and the radius.

A line that touches a circle at only one point is called a **tangent**.

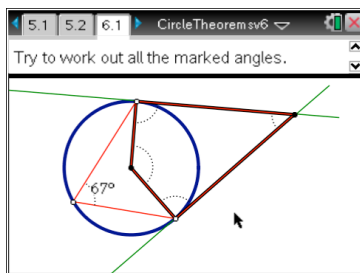
Page 5.2 has a summary of this theorem. You can move the point around the circle.

6. An angle puzzle

Move to page 6.1. You will see a blue quadrilateral with its angles marked.

Press **ctrl** **tab** to move to the lower part of the screen.

Move the points around and change the size of the angles.



The two tangents meet at a point and with two radii they form the blue quadrilateral.

What type of quadrilateral is this?

Try to work out the sizes of all the marked angles.

You can check your answers, by pressing **menu** **1** **3** to reveal the hidden angles.

