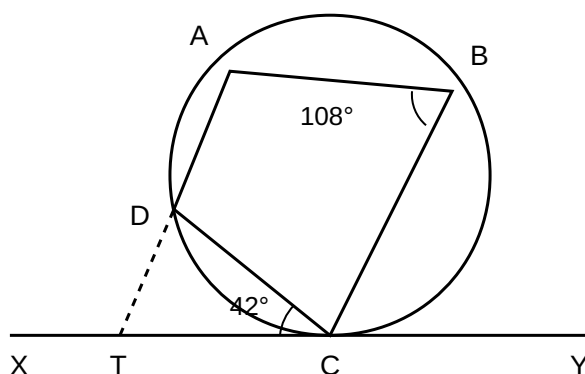


Circle Theorems Mastery

Practice Worksheet

I DO

Points A , B , C , and D lie on the circumference of a circle.



The straight line XY is a tangent to the circle at the point C .

The line AD is extended to meet the tangent at a point T .

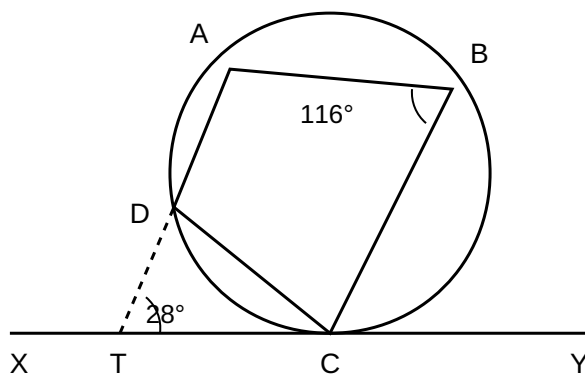
Angle $DCT = 42^\circ$ and Angle $ABC = 108^\circ$.

Calculate the size of Angle ATC .

You must give a formal geometrical reason for each stage of your working.

WE DO

Points A , B , C , and D lie on the circumference of a circle.



The straight line XY is a tangent to the circle at the point C .

The line AD is extended to meet the tangent at a point T .

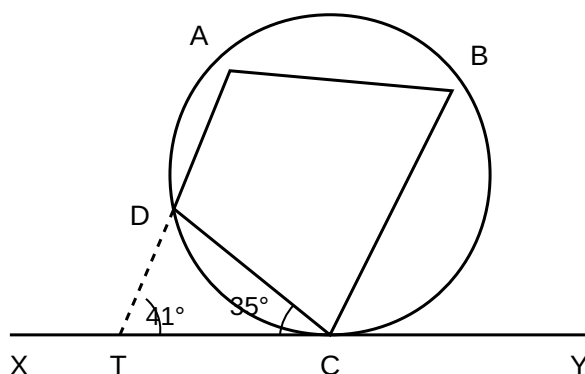
Angle $ATC = 28^\circ$ and Angle $ABC = 116^\circ$.

Calculate the size of Angle DCT .

You must give a formal geometrical reason for each stage of your working.

YOU DO 1

Points A , B , C , and D lie on the circumference of a circle.



The straight line XY is a tangent to the circle at the point C .

The line AD is extended to meet the tangent at a point T .

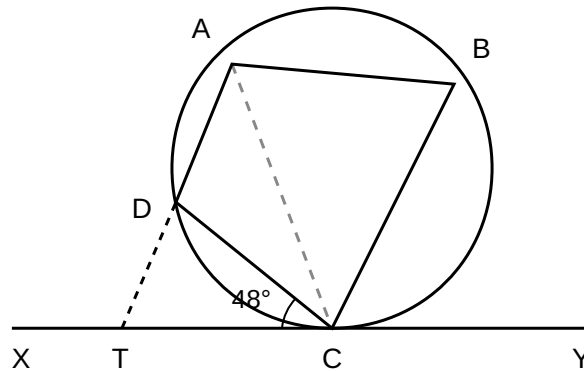
Angle $DCT = 35^\circ$ and Angle $ATC = 41^\circ$.

Calculate the size of Angle ABC .

You must give a formal geometrical reason for each stage of your working.

YOU DO 2

Points A , B , C , and D lie on the circumference of a circle.



The straight line XY is a tangent to the circle at the point C .

A dashed line is drawn connecting point A to point C .

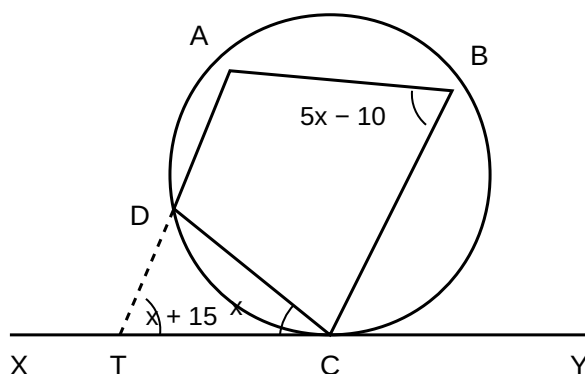
Angle $DCT = 48^\circ$.

Write down the exact size of Angle DAC .

Give a formal geometrical reason for your answer.

CHALLENGE

Points A , B , C , and D lie on the circumference of a circle.



The straight line XY is a tangent to the circle at the point C .

The line AD is extended to meet the tangent at a point T .

Angle $ABC = 5x - 10$.

Angle $DCT = x$.

Angle $ATC = x + 15$.

Calculate the exact size of Angle ADC .

Show clear algebraic working.

ANSWERS & WORKED SOLUTIONS

I Do

Step 1: Angle $ADC = 180^\circ - 108^\circ = 72^\circ$.

Reason: Opposite angles of a cyclic quadrilateral sum to 180° .

Step 2: Angle $TDC = 180^\circ - 72^\circ = 108^\circ$.

Reason: Angles on a straight line sum to 180° .

(Alternatively, note that the exterior angle of a cyclic quad equals the interior opposite angle, so Angle $TDC = \text{Angle } ABC = 108^\circ$).

Step 3: Look at triangle TDC . Angle $ATC = 180^\circ - (108^\circ + 42^\circ) = 180^\circ - 150^\circ = 30^\circ$.

Reason: Angles in a triangle sum to 180° .

Answer: 30°

We Do

Step 1: Angle $ADC = 180^\circ - 116^\circ = 64^\circ$.

Reason: Opposite angles of a cyclic quadrilateral sum to 180° .

Step 2: Angle $TDC = 180^\circ - 64^\circ = 116^\circ$.

Reason: Angles on a straight line sum to 180° .

Step 3: Look at triangle TDC . Angle $DC T = 180^\circ - (116^\circ + 28^\circ) = 180^\circ - 144^\circ = 36^\circ$.

Reason: Angles in a triangle sum to 180° .

Answer: 36°

ANSWERS & WORKED SOLUTIONS (CONTINUED)

You Do 1

Step 1: Look at triangle TDC . Angle $TDC = 180^\circ - (35^\circ + 41^\circ) = 180^\circ - 76^\circ = 104^\circ$.

Reason: Angles in a triangle sum to 180° .

Step 2: Angle $ADC = 180^\circ - 104^\circ = 76^\circ$.

Reason: Angles on a straight line sum to 180° .

Step 3: Angle $ABC = 180^\circ - 76^\circ = 104^\circ$.

Reason: Opposite angles of a cyclic quadrilateral sum to 180° .

(Alternatively, the exterior angle of a cyclic quad equals the interior opposite angle, so Angle $ABC =$ Angle $TDC = 104^\circ$).

Answer: 104°

You Do 2

Step 1: Identify the tangent XY and the chord CD .

Step 2: The angle between the tangent and the chord is given as 48° .

Step 3: By the Alternate Segment Theorem, the angle between the tangent and chord is equal to the angle subtended by the chord in the alternate segment (Angle DAC).

Answer: 48°

Reason: Alternate Segment Theorem.

ANSWERS & WORKED SOLUTIONS (CONTINUED)

Challenge

Step 1: The exterior angle of a cyclic quadrilateral is equal to the interior opposite angle. Therefore, Angle $TDC = \text{Angle } ABC = 5x - 10$.

Step 2: In triangle TDC , the angles must sum to 180° .

Form an equation: $(5x - 10) + x + (x + 15) = 180$.

Step 3: Collect like terms: $7x + 5 = 180$.

Step 4: Solve for x :

$$7x = 175$$

$$x = 25.$$

Step 5: We need to find Angle ADC . First, find Angle ABC .

$$\text{Angle } ABC = 5(25) - 10 = 125 - 10 = 115^\circ.$$

Step 6: Opposite angles in a cyclic quadrilateral sum to 180° .

$$\text{Angle } ADC = 180^\circ - 115^\circ = 65^\circ.$$

Answer: 65°