Circle Theorems

Starter

1. **(Review of last lesson)**

(a) Find the equation of the tangent to the circle $x^2 + y^2 = 29$ at the point $P(5, 2)$.

(b) The tangent cuts the $x-$axis at the point Q. Find the coordinates at Q.

Working: (a) Gradient of radius $= \dfrac{2-0}{5-0} = \dfrac{2}{5}$

So gradient of tangent is $-\dfrac{5}{2}$ ***negative reciprocal***

Substitute into $y - y_1 = m(x - x_1)$: $y - 2 = -\dfrac{5}{2}(x - 5)$

Multiply by 2: $2y - 4 = -5x + 25$

Equation of tangent is $5x + 2y = 29$

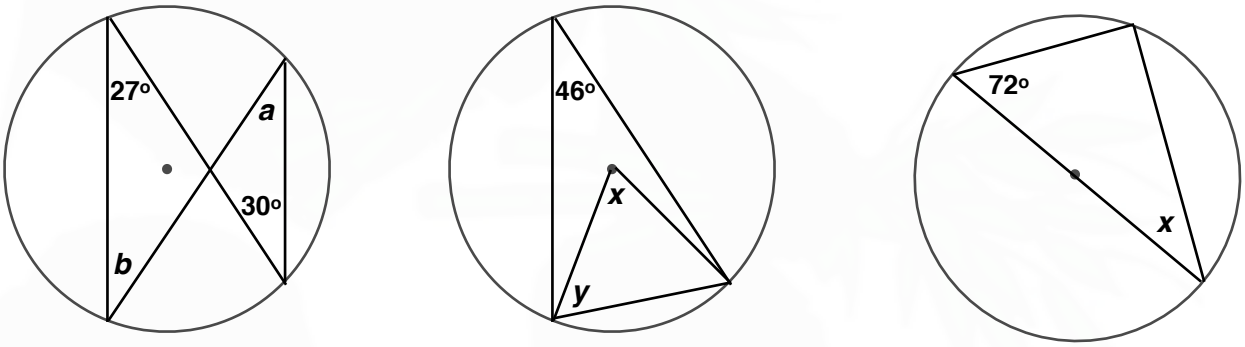
(b) At the $x-$axis $y = 0$

Substitute into $5x + 2y = 29$: $5x = 29$ $\therefore x = 5.8$

The coordinates of Q are $(5.8, 0)$

E.g. 1 Find the marked angle, giving a reason for your answer:

(a) (b) (c)



Working: (a) $a = 27^o$ because angles at the circumference from the same chord are equal.

$b = 30^o$ because angles at the circumference from the same chord are equal.

(b) $x = 92^o$ because the angle at the centre is twice the angle at the circumference from the same chord.

The triangle is isosceles so $x + 2y = 180 \Rightarrow 92 + 2y = 180$

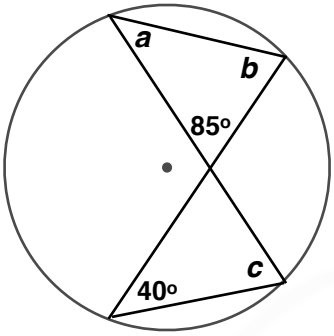
$2y = 88 \Rightarrow y = 44^o$

(c) The triangle is right-angled because the angle in semi-circle is 90^o.

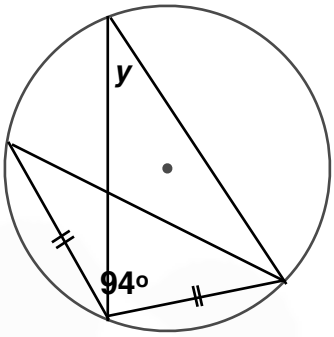
So $x = 180 - 90 - 72 = 18^o$

E.g. 2 Find the marked angle, giving a reason for your answer:

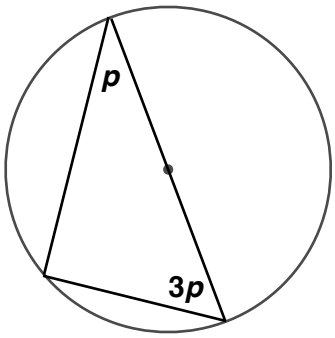
(a)



(b)



(c)



Working:

(a) $a = 40^o$ because angles at the circumference from the ***same chord*** are equal

$b = 180 - 85 - 40 = 55^o$ as angles in a triangle add up to 180^o

$c = b = 55^o$ because angles at the circumference from the ***same chord*** are equal

(b) $x = \dfrac{180 - 94}{2} = 43^o$ because it is a isosceles triangle

Since the triangle is isosceles, the other angle is also 43^o.

$y = 43^o$ because angles at the circumference from the ***same chord*** are equal

(c) The triangle is right-angled because the angle in semi-circle is 90^o.

So $p + 3p + 90 = 180 \Rightarrow 4p = 90 \Rightarrow p = 22.5^o$

$\therefore 3p = 67.5^o$

Video: Circle theorems

Solutions to Starter and E.g.s

Exercise

9-1 class textbook:	p74 E3.1 Qu 1-26 odd
A*-G class textbook:	p67 E3.1 Qu 1-26 odd
9-1 homework book:	p24 E3.1 Qu 1-14
A*-G homework book:	p18 E3.1 Qu 1-12

Homework book answers (only available during a lockdown)