Name:

Level 2 Further Maths

Circle Theorems

Corbettmaths

Ensure you have: Pencil or pen

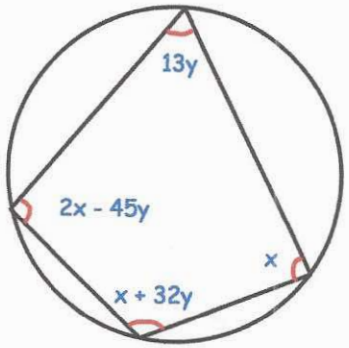
Guidance

1. Read each question carefully before you begin answering it.
2. Check your answers seem right.
3. Always show your workings

Revision for this topic

www.corbettmaths.com/more/further-maths/

1.



Find the values of x and y

$3x - 45y = 180$

$x + 45y = 180$

$4x = 360$

$x = 90°$

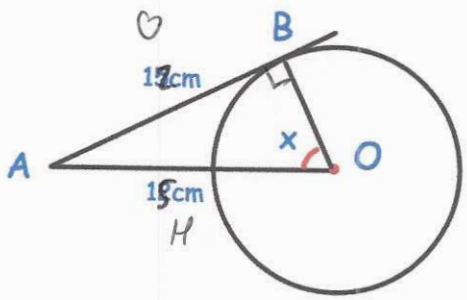
$90 + 45y = 180$

$y = 2$

$x = \ldots 90° \quad y = \ldots 2 \ldots\ldots°$

(3)

2.



AB is a tangent to the circle.

Calculate the size of angle x.

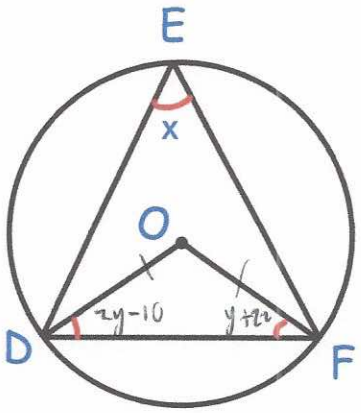
$\sin x = \frac{12}{15}$

$x = 53.13$

$x = \ldots 53.13 \ldots\ldots°$

(3)

3.



Given $\angle ODF = 2y - 10°$ and $\angle OFD = y + 22°$

Find $\angle DEF$

$2y - 10 = y + 22$

$y = 32°$

$\angle OFD = 54°$

$54 + 54 = 108$

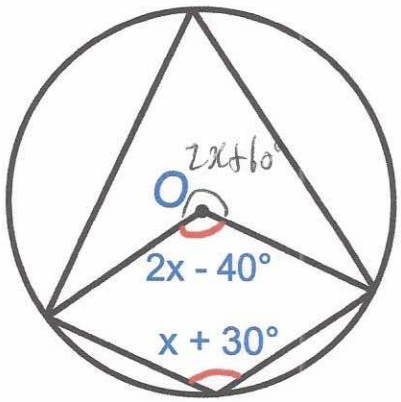
$\angle DOF = 72°$

$\angle DEF = 72 \div 2$

36 .....°

(3)

4.



Work out the size of angle $x°$

$2(x+30) = 2x+60$

$(2x+60)+(2x-40) = 360°$

$4x+20 = 360$

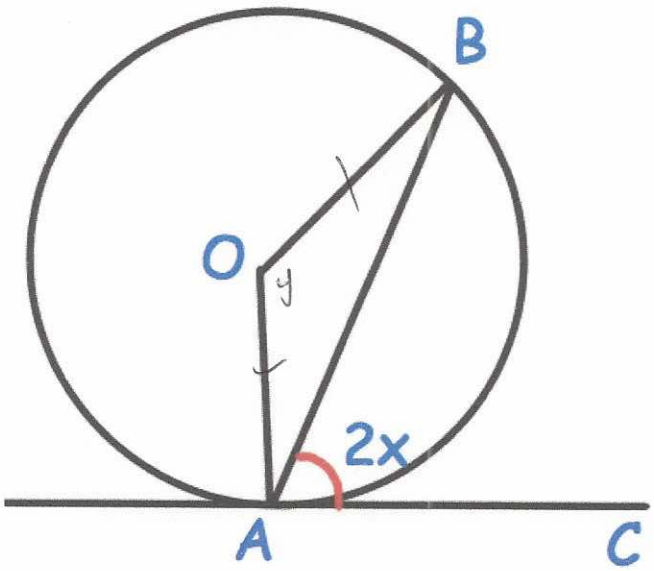
$4x = 340$

$x = 85°$

$x =$ 85 °

(4)

5.



A and B are points on the circumference of a circle, centre O.
CA is a tangent to the circle.
Angle CAB = 2x

Prove that angle AOB = 4x
Give reasons for each stage of your working.

$\angle OAB = 90 - 2x^\circ$ ($\angle OAC = 90^\circ$ as radius & tangent meet at 90°)

$\angle OBA = 90 - 2x^\circ$ ($\triangle OAB$ is isosceles as $OA = OB = r$)

As the angles in a triangle add to 180°

$y + (90 - 2x) + (90 - 2x) = 180^\circ$ **(4)**

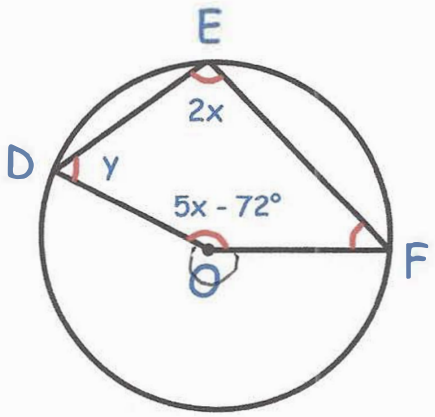
$y + 180 - 4x = 180$

$y - 4x = 0$

$y = 4x$

$\angle AOB = 4x$ QED

6.



The points D, E and F are points on a circle, centre O.

Angle DEF = $2x$ Angle DOF = $5x - 72°$ Angle EDO = y

Angle EFO is 14° smaller than angle EDO.

Work out the value of y

$(2x) \times 2 = 4x$

$4x + 5x - 72 = 360°$

$9x = 432°$

$x = 48°$

$\angle EFO = y - 14°$

$72 - 72 + y + y - 14 = 360$

$336 - 72 + 2y - 14 = 360$

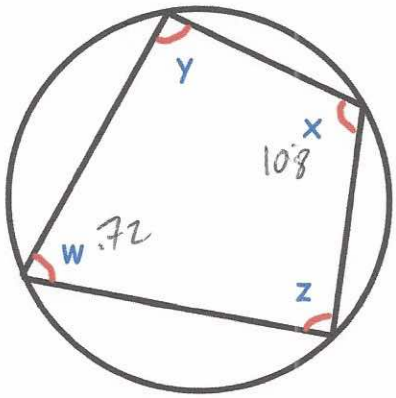
$250 + 2y = 360$

$y = 55°$

$y =$ 55 °

(5)

7.



$w : x = 2 : 3$

$x : y = 6 : 5$ 9 : 8

Work out the size of angle z.

w + x = 180 (opposite angles in a cyclic quadrilateral)

2+3=5

180 ÷ 5 = 36

36 x 2 = 72 w

36 x 3 = 108 x

108 ÷ 9 = 12

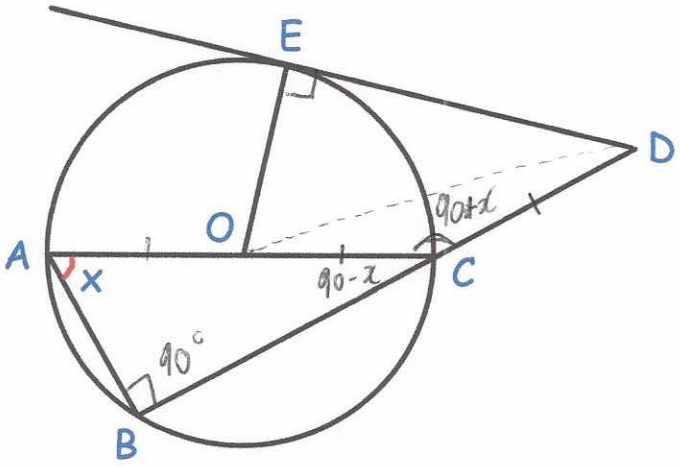
12 x 8 = 96

180 - 96 = 84

$z =$ 84 °

(5)

8.



AC is the diameter of a circle, centre O.
DE is the tangent to the circle.
BCD is a straight line.

Angle BAC = x

Express angle COD in terms of x.

$\angle ABC = 90°$ (angle in semi-circle)

$\angle ACB = 90° - x$ (angles in $\triangle ABC$ add to 180°)

$\angle OCD = 90° + x$ (BCD is a straight line)

$\angle OED = 90°$ (radius / tangent meet at 90°

$180 - (90 + x) = 90 - x$

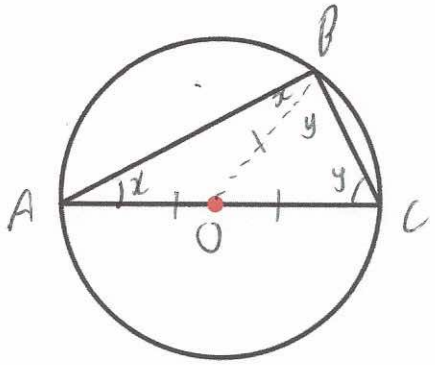
$\frac{90 - x}{2}$

$= 45 - \frac{1}{2}x$

$45 - \frac{1}{2}x$

(5)

9.



Prove that the angle in a semi-circle is always 90°

$OA = OB = OC =$ radius

$\angle OAB = \angle ABO = x°$ } Two Angles in an isosceles triangle are equal.

$\angle OCB = \angle OBC = y°$ }

Angles in a triangle add to 180°

$\therefore x + (x+y) + y = 180$

$2x + 2y = 180$

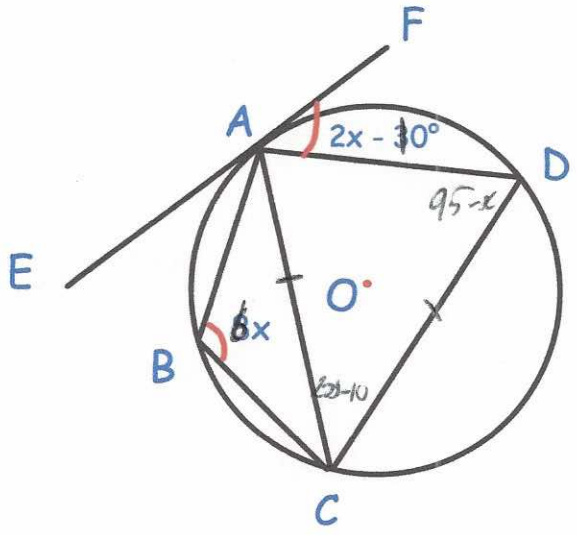
$x + y = 90°$

As $\angle ABC = x + y$

it equals 90°

(3)

10.



EF is a tangent to a circle, centre O.

$\angle DAF = 2x - 30°$

$\angle ABC = 8x$

Find the size of angle $\angle DAF$

$\angle ACD = 2x - 10$ (alternate segment theorem)

$\angle ADC = \frac{180 - (2x-10)}{2} = \frac{190 - 2x}{2} = 95 - x$

$6x + (95 - x) = 180$

$5x + 95 = 180$

$5x = 85$

$x = 17$

$2 \times 17 - 10 = 24°$

24°

(3)