Daily Practice *25.8.2017*

Q1. Write each of the following as a decimal of hours

(a) 1 hour 30mins 1.5hrs (b) 20 minutes 0.3hrs (c) 3hours 45mins 3.75hrs

Q2. Write 1.529×10^{-3} in normal form

0.001529

Q3. Find 14% of 3200

10% of 3200 = 320

1% " " = 32

4% = 32 × 4 = 128

14% = 448

Q4. Write 780 000 in scientific notation

7.8×10^5

Q5. Calculate the length of x (calc.)

$x^2 = 15.5^2 - 13.2^2$

$x^2 = 66.01$

$x = \sqrt{66.01} = 8.1\text{cm}$ (1d.p.)

L.I: Today we will be learning about tangents to circles.

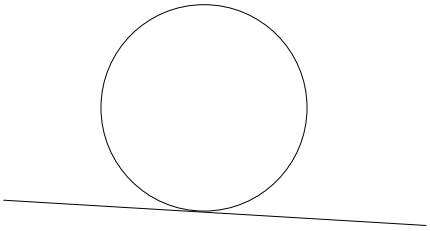
Angles in Triangles and Circles

Key things to remember:

- All the angles in a triangle add to get 180°
- Isosceles triangles have 2 equal sides + 2 equal angles
- Equilateral triangles have 3 equal sides and 3 equal angles (60° each)

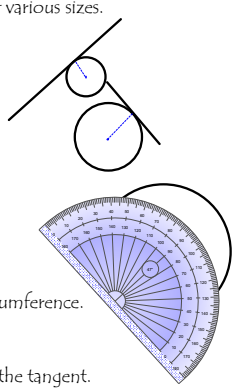
Tangents to Circles

A tangent to a circle is a straight line that touches the circle at only one point.



Tangents to Circles - Investigation

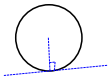
1. Use your pair of compasses to draw 3 circles of various sizes.
2. Mark in the centre (origin O) on your circle.
3. Plot a point on the circle.
4. Draw a tangent at that point.
5. Draw a radius that meets the point on the circumference.
6. Measure the angle that the radius makes with the tangent.



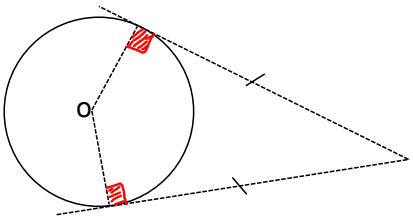
Tangents to Circles - Investigation

What do we notice?

** A radius drawn to a tangent is perpendicular to the tangent



Tangents to Circles



Tangents to Circles

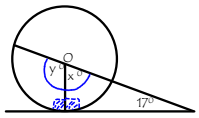
Examples:

1. Calculate the size of x

$x° = 180° - (90 + 17)°$

$= 73°$

$y = 180° - 73° = 107°$



2. What is the value of the angles

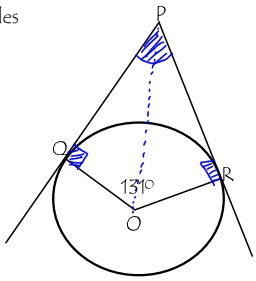
(i) $P\hat{Q}O = 90°$ (tangent)

(ii) $Q\hat{P}R$

$= 360° - (90° + 90° + 131°)$

$= 360° - 311°$

$= 49°$



Daily Practice **28.8.2017**

Q1. Solve $5(x - 1) = 3(x + 2)$

$5x - 5 = 3x + 6$

$2x - 5 = 6$

$2x = 11$

$x = 5.5$

Q2. Find 67% of 800

1% of 800 = 8

67% = 536

Q3. $2\frac{1}{3} - \frac{3}{4} = \frac{7}{3} - \frac{3}{4} = \frac{28}{12} - \frac{9}{12} = \frac{19}{12} = 1\frac{7}{12}$

Q4. Rearrange the formula so t is the subject

$xt + 5 = b$

$xt = b - 5$

$t = \frac{b-5}{x}$ or $t = (b-5) \div x$

Q5. Round 6781000 to 1 significant figure

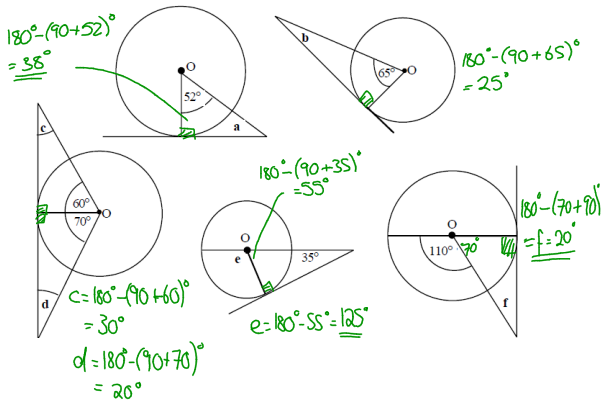
→ 7000 000

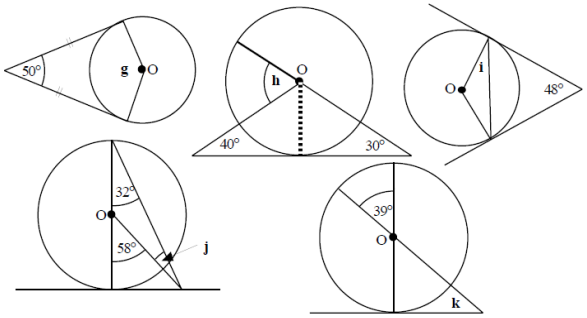
L.I: Today we will be continuing to learn about tangents to circles.

S.C: I will be able to use my knowledge of tangents to circles to find missing angles in the triangles created.

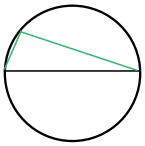
Tangents to Circles

1. Copy the diagrams below and fill in the sizes of the angles marked with a letter.





Triangles in semi- circles Investigation

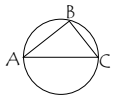


1. Draw some circles.
2. Draw a diameter on each.
3. Draw a triangle in each circle using the diameter as the base. The top of the triangle must touch the circumference.
4. Measure the angle at the top of the triangle.

Triangles in semi- circles Investigation

What do we notice?

- Given triangle ABC, where AC is the diameter and B is on the circumference. Angle $A\hat{B}C$ is right-angled.



http://www.mathopenref.com/semiinscribed.html

Daily Practice 30.8.2017

Q1. Factorise $6x^2 - 24x$

$6x(x-4)$

Q2. Multiply out and simplify 7(x - 1) + 2(x + 3)

$7x-7+2x+6$

$9x-1$

Q3. Calculate the distance John travels if he runs at 10mph for 45 minutes

$D = T \times S = 10 \times 0.75 = 7.5$ miles

Q4. Round 8716.5 to the nearest unit

$\rightarrow$ 8717

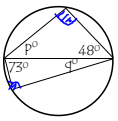
Q5. John earns £2200 per month, he gets a pay rise of 3.5%. How much is he now earning $2200 \times 1.035 = £2277$

Today we will be continuing to learn about angles in circles.

Triangles in semi- circles

Examples:

1. Calculate the size of angles p° and q°

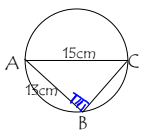


$p = 180° - (48 + 90)°$

$= 42°$

$q = 180° - (90 + 73)° = 17°$

2. Calculate the length of BC

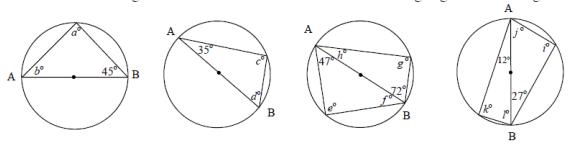


$BC^2 = 15^2 - 13^2$

$BC^2 = 56$

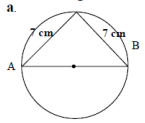
$BC = \sqrt{56} = 7.48$ cm (2d.p)

Q1. In each of the diagrams below AB is a diameter. Find the missing angles in each diagram.

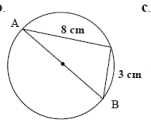


Q2. Find the length of the diameter AB in each of the circles below, given the other 2 sides of the triangle.

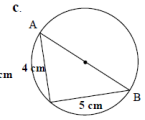
a.



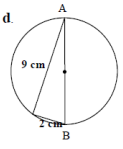
b.



c.



d.



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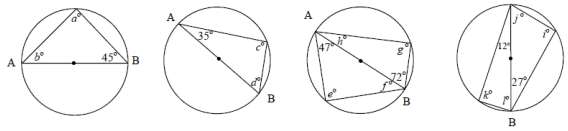
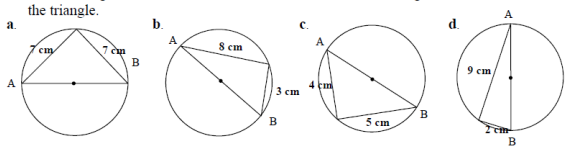


Q2. Find the length of the diameter AB in each of the circles below, given the other 2 sides of the triangle.



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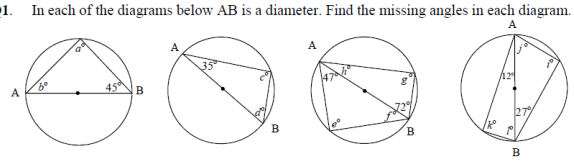

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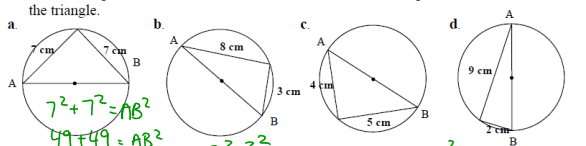


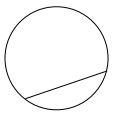
$7^2+7^2=AB^2$
$49+49=AB^2$
$\sqrt{98}=AB$
$AB=9.89$

8^2+3^2
$73=AB^2$
$\sqrt{73}=AB$
$AB=8.5cm$

$5^2+4^2=AB^2$
$41=AB^2$
$\sqrt{41}=AB$
$AB=6.4cm$

$9^2+2^2=AB^2$
$=85=AB^2$
$AB=\sqrt{85}$
$AB=9.2cm$

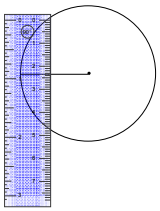
Chords in Circles



A chord is a line that joins two points on the circumference of a circle.

Chords in Circles - Investigation

1. Draw 3 circles of any size
2. Draw a chord on each circle that isn't a diameter.
3. Draw a line from the centre of the circle perpendicular to the chord.
4. Measure the distance from each end of the chord to the line you have drawn.

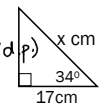


Daily Practice 31.8.2017

Q1. State the equation of the line that passes through (-1, 3) and (0, 2)

$m: \frac{2-3}{0-(-1)} = \frac{-1}{1} = -1$ $y=-1x+2$

Q2. Calculate the value of x in the triangle shown



$\cos 34° = \frac{17}{x}$ $x\cos 34° = 17$ $x = \frac{17}{\cos 34°} = 20.5cm$ (1d.p.)

Q3. Multiply out and simplify 4(x - 6) - 2(x + 1)

$4x-24-2x-2$

$2x-26$

Q4. $2\frac{2}{3} \div \frac{3}{5}$

$= \frac{8}{3} \times \frac{5}{3} = \frac{40}{9} = 4\frac{4}{9}$

Q5. Rearrange the formula $V = \pi r^2 h$ so that 'r' is the subject

$r^2 = \frac{V}{\pi h}$

$r = \sqrt{\frac{V}{\pi h}}$

L.I: Today we will be learning about chords in circles.

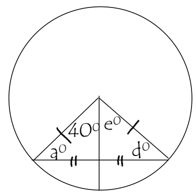
Chords in Circles – Investigation

What do we notice?

- A line drawn from the centre of a circle perpendicular to a chord bisects the chord.

Example:

Calculate the sizes of the missing angles



$a = 180° - (90° + 40°)$

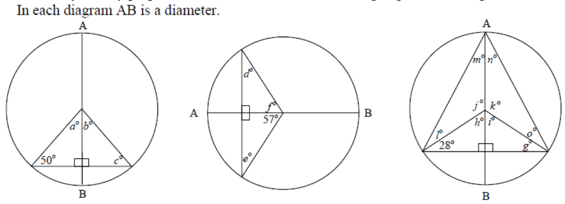
$= \underline{50°}$

$d = \underline{50°}$ $e = \underline{40°}$

Chords in Circles

Chords in Circles

Use the symmetry properties of the circle to find the missing angles in the diagrams below.
In each diagram AB is a diameter.



Chords in Circles

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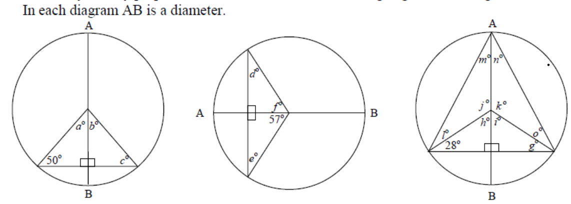
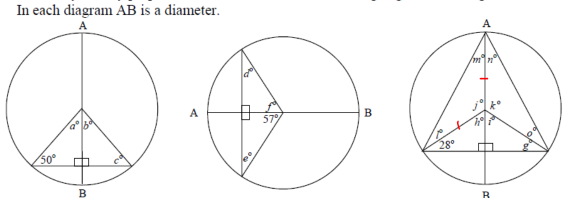


Chords in Circles

Use the symmetry properties of the circle to find the missing angles in the diagrams below.
In each diagram AB is a diameter.



$180° - (90° + 50°)$

$a° = \underline{40°}$ $b = \underline{40°}$

$c = \underline{50°}$

$e° = 180° - (90° + 57°)$

$e° = \underline{33°}$ $d = \underline{33°}$

$f° = \underline{57°}$

$g° = 28°$

$h = 180° - (90° + 28°)$

$h = \underline{62°}$ $i = \underline{62°}$

$n = \underline{31°}$

$o = \underline{31°}$

$j = \underline{118°}$

$k = 180° - 62° = \underline{118°}$

$l \Rightarrow 180° - 118° = 62°$

$62° \div 2 = \underline{31°}$

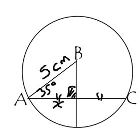
$m = \underline{31°}$

Chords in Circles

2. Calculate the length of AC

when the radius is 5cm

and angle BAC = 35°



$\cos 35° = \frac{x}{5}$

$x = 5\cos 35°$

$x = 4.1cm$ (1d.p.)

$AC = 4.1 \times 2 = \underline{8.2cm}$

Daily Practice 1.9.2017

Q1. Calculate the volume of a cuboid with length 5cm, breadth 4.5cm and height 10cm

$V = 5 \times 4.5 \times 10$

$V = 225cm^3$

Q2. Given a bag of 3 yellow, 4 red and 3 green sweets. What is the probability of picking a red sweet? $\frac{4}{10} = \frac{2}{5}$

Q3. $5\frac{1}{3} - 3\frac{2}{5} = \frac{16}{3} - \frac{17}{5} = \frac{80}{15} - \frac{51}{15} = \frac{29}{15} = 1\frac{14}{15}$

Q4. State the equation of the line joining (-4, 5) and (0, -3)

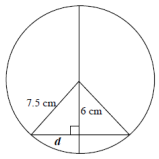
$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-3-5}{0-(-4)} = \frac{-8}{4} = -2$

$y = -2x - 3$

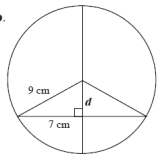
Today we will be practising mixed circle questions.

Questions: Calculate d for each

a.

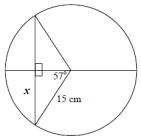


b.

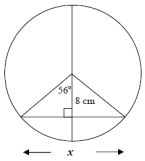


Calculate x for each

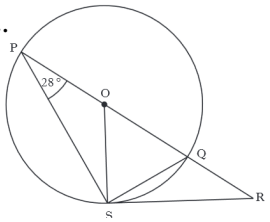
d.



e.



1.

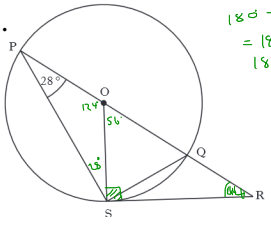


In the above diagram,

- O is the centre of the circle
- PQ is a diameter of the circle
- PQR is a straight line
- RS is a tangent to the circle at S
- angle OPS is 28°.

Calculate the size of angle QRS.

1.



$180 - (28 + 28) = 180 - 56 = 124 = P\hat{O}S$

$180 - 124 = 56 = S\hat{O}Q$

$180 - (56 + 90)$

$= 180 - 146$

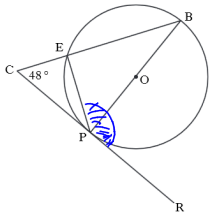
$= 34 = O\hat{R}S$

In the above diagram,

- O is the centre of the circle
- PQ is a diameter of the circle
- PQR is a straight line
- RS is a tangent to the circle at S
- angle OPS is 28°.

Calculate the size of angle QRS.

2. A circle, centre O, is shown below.

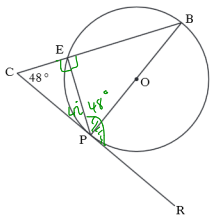


In the circle

- PB is a diameter
- CR is a tangent to the circle at point P
- Angle BCP is 48°.

Calculate the size of angle EPR.

2. A circle, centre O, is shown below.



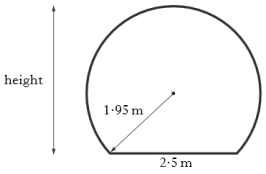
$C\hat{B}E = 180° - (48° + 90°)$
$= 180° - 138°$
$= 42°$
$E\hat{P}B = 90° - 42° = 48°$
$E\hat{P}R = 48° + 90° = 138°$

In the circle

- PB is a diameter
- CR is a tangent to the circle at point P
- Angle BCP is 48°.

Calculate the size of angle EPR.

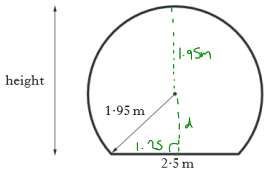
3. The diagram below shows the cross-section of the tunnel. It consists of part of a circle with a horizontal base.



The radius of the circle is 1·95 metres and the width of the base is 2·5 metres.

Calculate the height of the tunnel.

3. The diagram below shows the cross-section of the tunnel. It consists of part of a circle with a horizontal base.



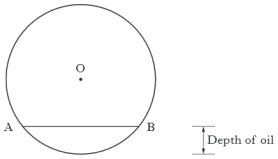
$1.95^2 - 1.25^2 = d^2$
$d^2 = 2.24$
$d = 1.5m$ (to 1dp)
height $= 1.5 + 1.95$
$= 3.45m$

The radius of the circle is 1·95 metres and the width of the base is 2·5 metres.

Calculate the height of the tunnel.

4. A tanker delivers oil to garages.

The tank has a circular cross-section as shown in the diagram below.



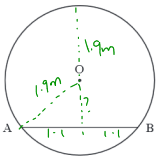
The radius of the circle, centre O, is 1·9 metres.

The width of the surface of the oil, represented by AB in the diagram, is 2·2 metres.

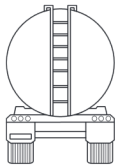
Calculate the depth of the oil in the tanker.

4. A tanker delivers oil to garages.

The tank has a circular cross-section as shown in the diagram below.



$1.9^2 - 1.1^2 = ?^2$
$2.4 = ?^2$
$? = 1.55m$
(to 2d.p.)



Depth of oil $= 1.9 - 1.55 = 0.35m$

The radius of the circle, centre O, is 1·9 metres.

The width of the surface of the oil, represented by AB in the diagram, is 2·2 metres.

Calculate the depth of the oil in the tanker.

Daily Practice 4.9.2017

Q1. Write 185 000 in scientific notation

1.85×10^5

Q2. Calculate the radius of a circle that has an area of 26.8cm

$A = \pi r^2$
$26.8 = \pi r^2$
$r^2 = \frac{26.8}{\pi}$
$r = \sqrt{\frac{26.8}{\pi}} = 2.92cm$ (2dp)

Q3. $1\frac{3}{4} \times \frac{4}{5} = \frac{7}{4} \times \frac{4}{5} = \frac{7}{5} = 1\frac{2}{5}$

Q4. Calculate the height of a cuboid that has volume 1500cm³ length 30cm and breadth 2.5cm

$V = lbh$
$1500 = 30 \times 2.5 \times h$
$h = \frac{1500}{75} = 20cm$

Q5. State the equation of the line joining (-2, 5) and (-1, 7)

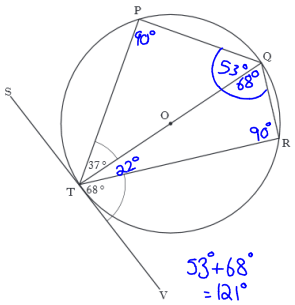
$m = \frac{7-5}{-1-(-2)} = \frac{2}{1} = 2$

$y = mx + c$
$y = 2x + c$
$7 = 2(-1) + c$
$9 = c$

$y = 2x + 9$

Today we will be continuing to practise mixed questions on angles in circles.

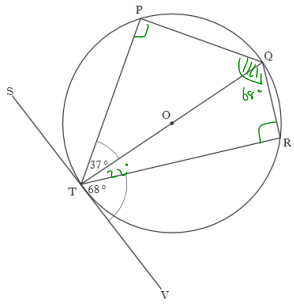
5.



The tangent SV touches the circle, centre O, at T.
Angle PTQ is 37° and angle VTR is 68°.
Calculate the size of angle PQR.

$53° + 68° = 121°$

5.



The tangent SV touches the circle, centre O, at T.
Angle PTQ is 37° and angle VTR is 68°.
Calculate the size of angle PQR.

$\hat{QTR} = 90° - 68° = 22°$

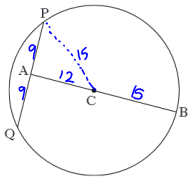
$\hat{RQT} = 180° - (90° + 22°) = 180° - 112° = 68°$

$\hat{PQT} = 180° - (90° + 37°) = 180° - 127° = 53°$

$\hat{PQR} = 53° + 68° = 121°$

6.

The diagram below shows a circle, centre C.



The radius of the circle is 15 centimetres.
A is the mid-point of chord PQ.
The length of AB is 27 centimetres.
Calculate the length of PQ.

$15^2 - 12^2 = 81$

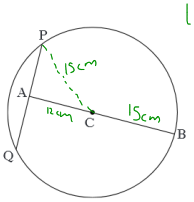
$\sqrt{81} = 9$

$PQ = 9 \times 2 = 18cm$

6.

The diagram below shows a circle, centre C.

$AC = 27 - 15 = 12cm$



$|PA|^2 = 15^2 - 12^2 = 225 - 144 = 81$

$|PA| = 9$

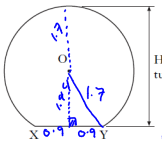
$PQ = 9 \times 2 = 18cm$

The radius of the circle is 15 centimetres.
A is the mid-point of chord PQ.
The length of AB is 27 centimetres.
Calculate the length of PQ.

7.

A railway goes through an underground tunnel.

The diagram below shows the cross-section of the tunnel. It consists of part of a circle with a horizontal base.



- The centre of the circle is O.
- XY is a chord of the circle.
- XY is 1·8 metres.
- The radius of the circle is 1·7 metres.

Find the height of the tunnel.

$1.7^2 - 0.9^2 = 2.08$

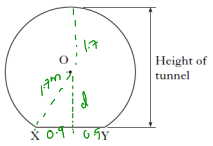
$\sqrt{2.08} = 1.44m$

Height $= 1.44 + 1.7 = 3.14m$

7.

A railway goes through an underground tunnel.

The diagram below shows the cross-section of the tunnel. It consists of part of a circle with a horizontal base.



- The centre of the circle is O.
- XY is a chord of the circle.
- XY is 1·8 metres.
- The radius of the circle is 1·7 metres.

Find the height of the tunnel.

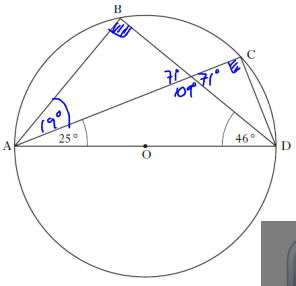
$d^2 = 1.7^2 - 0.9^2$

$d^2 = 2.08$

$d = 1.44m$ (to 2dl.p.)

Height $= 1.44 + 1.7 = 3.14m$

8.



$25° + 46° = 71°$

$180° - 71° = 109°$

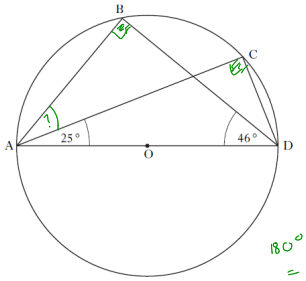
$180° - 109° = 71°$

$90° + 71° = 161°$

$180° - 161° = 19°$

AD is a diameter of a circle, centre O.
B and C are points on the circumference of the circle.
Angle CAD = 25°.
Angle BDA = 46°.
Calculate the size of angle BAC.

8.



AD is a diameter of a circle, centre O.
B and C are points on the circumference of the circle.
Angle CAD = 25°.
Angle BDA = 46°.
Calculate the size of angle BAC.

$180° - (90° + 46°)$

$= 180° - 136°$

$= 44° = B\hat{A}D$

$44° - 25° = 19° = B\hat{A}C$

Daily Practice 6.9.2017

20 Questions Mental Maths

Daily Practice 7.9.2017

Q1. Multiply out and simplify $7(3k - 3) + 2(k + 4)$

$21k - 21 + 2k + 8$

$23k - 13$

Q2. Rearrange the formula $3g + 2h^2 = p$ such that 'h' is the subject

$2h^2 = p - 3g$

$h^2 = \frac{p-3g}{2}$ $h = \sqrt{\frac{p-3g}{2}}$

Q3. State the equation of the line joining (-1, 3) and (0, 8)

$m = \frac{8-3}{0-(-1)} = \frac{5}{1} = 5$ $y = 5x + 8$

Q4. Calculate the length of x

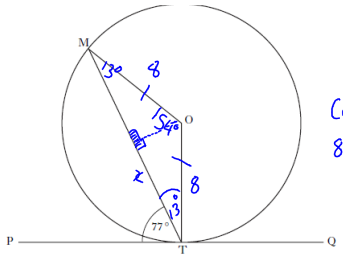
$\cos 43° = \frac{9}{x}$

$x \cos 43° = 9$

$x = \frac{9}{\cos 43°} = 12.3cm$ (1dl.p.)

L.I: Today we will be completing a check-up on angles in circles.

9.



$\cos 13^\circ = \frac{x}{8}$

$8\cos 13^\circ = x$

$x = 7.8$ (1d.p)

$MT = 7.8 \times 2$

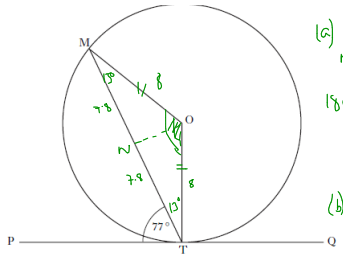
$= 15.6\text{cm}$

The tangent PQ touches the circle, centre O, at T.
Angle MTP is 77°.

(a) Calculate the size of angle MOT.

(b) The radius of the circle is 8 centimetres.
Calculate the length of chord MT.

9.



(a) $M\hat{T}O = 90^\circ - 77^\circ = 13^\circ$

$180^\circ - (2 \times 13^\circ)$

$= 180^\circ - 26^\circ = 154^\circ$

$= M\hat{O}T$

(b) $\cos 13^\circ = \frac{NT}{8}$ $\times 8$ $\times 8$

$8\cos 13^\circ = NT$

$NT = 7.8\text{cm}$

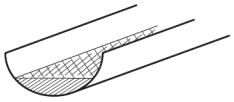
$MT = 7.8 \times 2 = 15.6\text{cm}$

The tangent PQ touches the circle, centre O, at T.
Angle MTP is 77°.

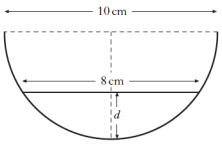
(a) Calculate the size of angle MOT.

(b) The radius of the circle is 8 centimetres.
Calculate the length of chord MT.

10. The diagram shows water lying in a length of roof guttering.

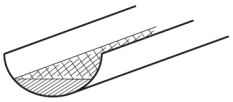


The cross-section of the guttering is a semi-circle with diameter 10 centimetres.
The water surface is 8 centimetres wide.



Calculate the depth, d, of water in the guttering.

10. The diagram shows water lying in a length of roof guttering.



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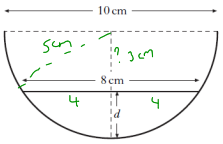

$?^2 = 5^2 - 4^2$

$?^2 = 9$

$? = 3\text{cm}$

$d = 5 - 3 = 2\text{cm}$

Calculate the depth, d, of water in the guttering.