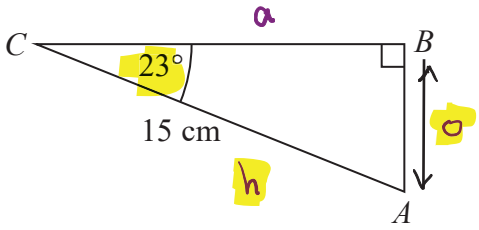
1. *ABC* is a right-angled triangle.



Calculate the length of *AB*.
Give your answer correct to 3 significant figures.

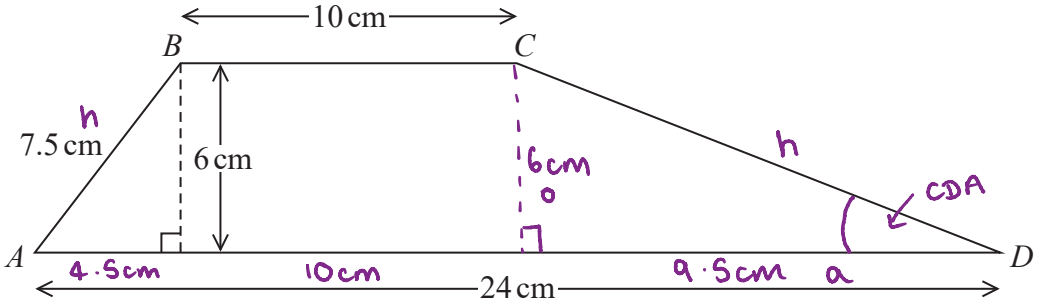
$\sin 23 = \frac{\text{opposite}}{\text{hypotenuse}} = \frac{AB}{15}$ (1)

$AB = 15 \times (\sin 23) = 5.860966\ldots$ (1)

5.86 cm

(Total for Question is 2 marks)

2. *ABCD* is a trapezium.



Work out the size of angle *CDA*.
Give your answer correct to 1 decimal place.

$a^2 + b^2 = c^2$

$a^2 = c^2 - b^2$

$a^2 = 7.5^2 - 6^2$ ✓

$a^2 = 20.25$

$a = 4.5$ ✓

$24 - 10 - 4.5 = 9.5\text{cm}$ ✓

$\tan x = \frac{o}{a}$

$\tan x = \frac{6}{9.5}$

$x = \tan^{-1}\left(\frac{6}{9.5}\right)$ ✓

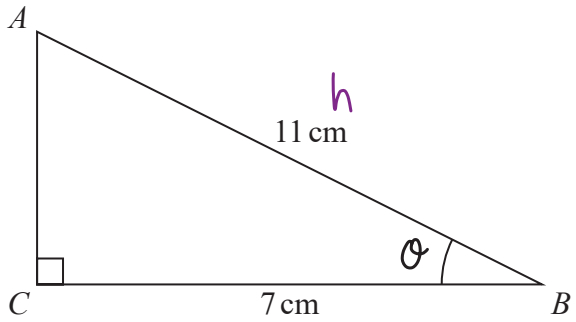
$x = 32.2756\ldots$

$x = 32.3°$

32.3 ✓ °

(Total for Question is 5 marks)

3. ABC is a right-angled triangle.



(a) Work out the size of angle ABC.
Give your answer correct to 1 decimal place.

SOH CAH TOA — We need to use cos as we has the length of the adjacent and hypotenuse

$\cos\theta = \frac{a}{h} = \frac{7}{11}$

$\theta = \cos^{-1}\left(\frac{7}{11}\right)$

$\theta = 50.4788°$

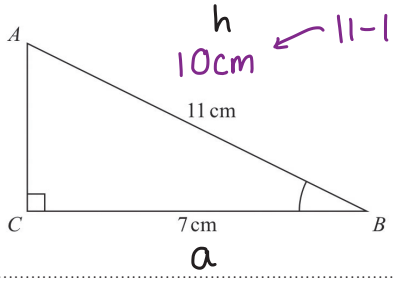
$\theta = 50.5°$ to 1dp

50.5 °

(2)

The length of the side AB is reduced by 1 cm.

The length of the side BC is still 7 cm.
Angle ACB is still 90°



(b) Will the value of cos ABC increase or decrease?
You must give a reason for your answer.

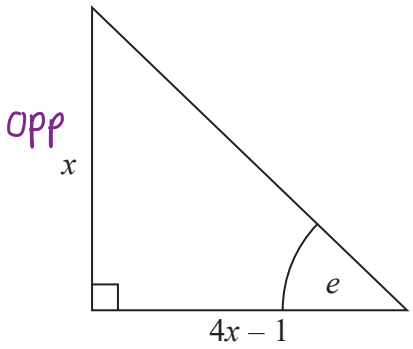
$\cos ABC = \frac{a}{h} = \frac{7}{10}$

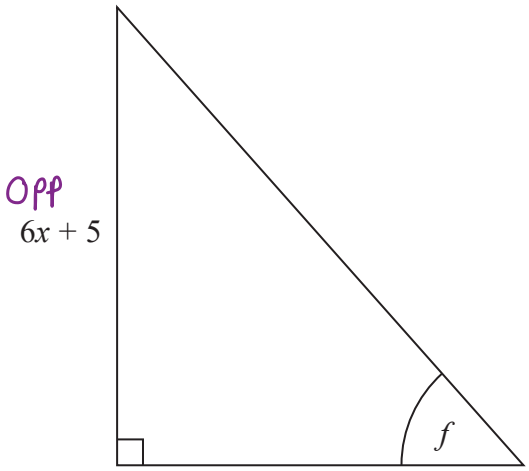
$\frac{7}{10}$ is greater than $\frac{7}{11}$, so cos ABC has increased

(1)

(Total for Question is 3 marks)

4. Here are two right-angled triangles.





Given that

$\tan e = \tan f$

SOH CAH TOA

$\tan\theta = \frac{\text{opposite}}{\text{adjacent}}$

find the value of x.

You must show all your working.

$\tan e = \frac{x}{4x-1}$ $\quad \tan f = \frac{6x+5}{12x+31}$

Cross multiply

$\frac{x}{4x-1} = \frac{6x+5}{12x+31}$ (1)

$x(12x+31) = (6x+5)(4x-1)$ Multiply out (1)

$12x^2 + 31x = 24x^2 - 6x + 20x - 5$

$12x^2 + 31x = 24x^2 + 14x - 5$

$0 = (24x^2 - 12x^2) + (14x - 31x) - 5$ $\quad -(12x^2 + 31x)$

$0 = 12x^2 - 17x - 5$ (1)

Solving for x :

(By factorisation or using the quadratic formula)

$(4x+1)(3x-5) = 0$ (1)

$\therefore$ either $4x+1=0$ or $3x-5=0$

$4x = -1$ $\quad 3x = 5$

$x = -\frac{1}{4}$ $\quad x = \frac{5}{3}$

$x > 0$ as it is a length so this solution is not valid

$\frac{5}{3}$ (1)

(Total for Question is 5 marks)

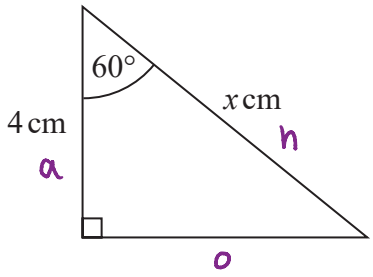
5. (a) Write down the exact value of tan 45°

tan 45 = 1

1 ✓

(1)

Here is a right-angled triangle.



cos 60° = 0.5

(b) Work out the value of x.

$\cos x = \frac{a}{h}$

$\cos 60 = \frac{4}{x}$ ✓

$\frac{4}{x} = 0.5$

$(\times x) \quad (\times x)$

$4 = 0.5x$

$(\div 0.5) \quad (\div 0.5)$

$8 = x$

8 ✓

(2)

(Total for Question is 3 marks)

6. Find the exact value of $\tan 30° \times \sin 60°$
Give your answer in its simplest form.

$\tan 30 = \frac{1}{\sqrt{3}}$. $\quad \sin 60 = \frac{\sqrt{3}}{2}$.

$\therefore \tan 30° \times \sin 60° = \frac{1}{\sqrt{3}} \times \frac{\sqrt{3}}{2}$ (1)

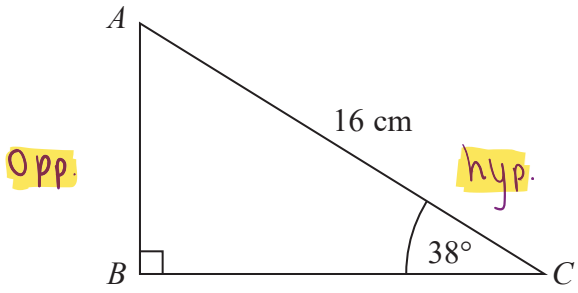
$= \frac{\sqrt{3}}{2\sqrt{3}}$

$= \boxed{\frac{1}{2}}$

(1) $\frac{1}{2}$.

(Total for Question is 2 marks)

7. *ABC* is a right-angled triangle.



Calculate the length of *AB*.
Give your answer correct to 2 decimal places.

$\sin x = \frac{\text{opp.}}{\text{hyp.}}$

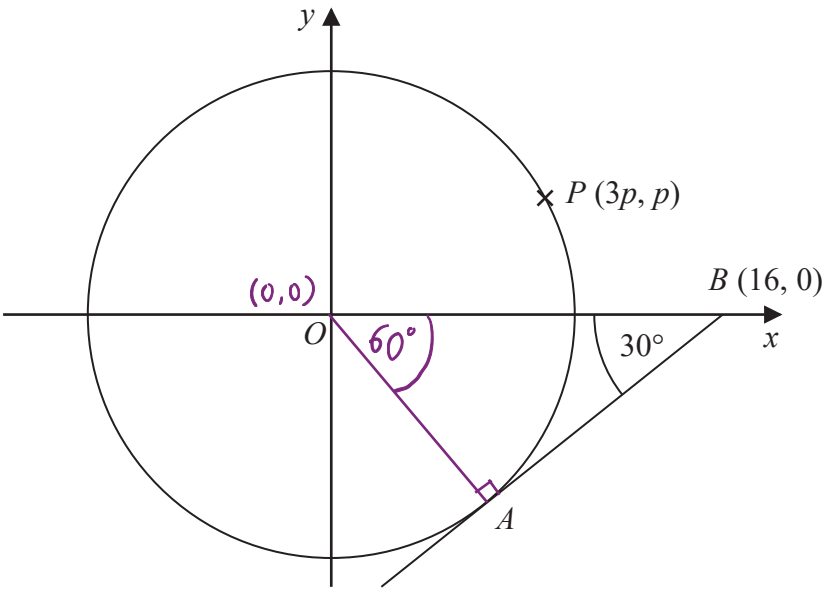
$\sin 38 = \frac{AB}{16}$ (1)

$AB = 16 \times \sin(38) = 9.85 \text{ cm (2d.p.)}$ (1)

9.85 ..... cm

(Total for Question is 2 marks)

8. The diagram shows a circle, centre O.

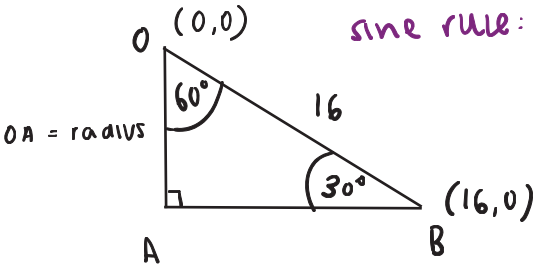


AB is the tangent to the circle at the point A.
Angle $OBA = 30°$

Point B has coordinates (16, 0)
Point P has coordinates $(3p, p)$

Angle between tangent and radius = 90°

Find the value of p.
Give your answer correct to 1 decimal place.
You must show all your working.



sine rule: $\frac{\sin 90}{16} = \frac{\sin 30}{OA}$ (1)

$\frac{1}{16} = \frac{1/2}{OA}$ $\quad OA = 16 \times \frac{1}{2} = 8.$

(1) $x^2 + y^2 = r^2 \longrightarrow r = 8 \therefore x^2 + y^2 = 8^2$

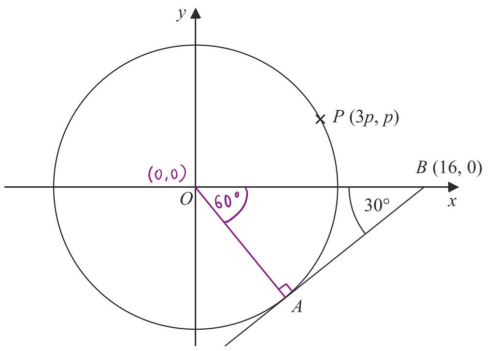
Point $P(3p, p) \longrightarrow x = 3p,\ y = p.$

$\therefore (3p)^2 + p^2 = 8^2$ (1)

$9p^2 + p^2 = 8^2$

$10p^2 = 64$

$p^2 = \frac{64}{10} \quad \therefore p = \sqrt{\frac{64}{10}} = 2.5$ (1 d.p.)

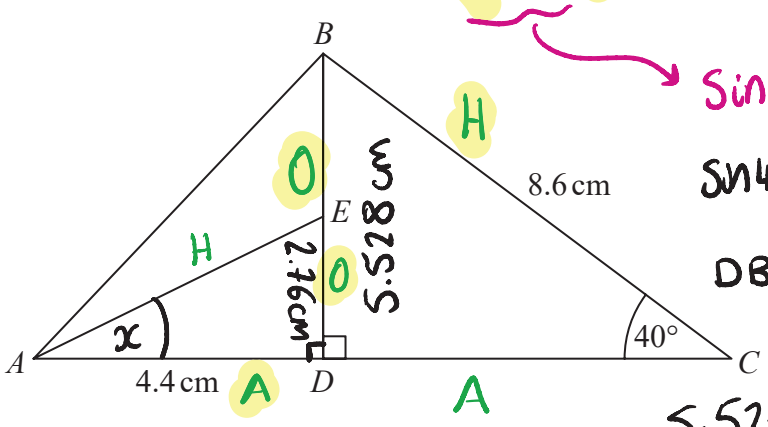


(1)

$p =$ 2.5

(Total for Question is 4 marks)

9. The diagram shows triangle *ABC*.



ADC and *DEB* are straight lines.

AD = 4.4 cm
BC = 8.6 cm
E is the midpoint of *DB*.

Angle *CDB* = 90°
Angle *DCB* = 40°

Work out the size of angle *EAD*.
Give your answer correct to 1 decimal place.
You must show all your working.

SOHCAHTOA

$\sin\theta = \frac{O}{H}$

$\sin 40 = \frac{DB}{8.6}$ (1)

$DB = \sin 40 \times 8.6$
$= 5.52797\ldots$

$ED = \frac{5.52797\ldots}{2} = 2.76\ldots$ (1)

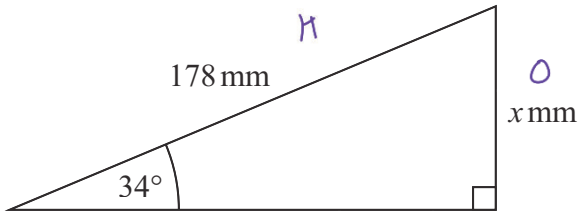
$\tan\theta = \frac{O}{A}$

$\tan x = \frac{2.76\ldots}{4.4}$ (1)

$x = \tan^{-1}\left(\frac{2.76\ldots}{4.4}\right)$

$x = 32.1$ (1dp) (1)

10.



SOH
CAH
TOA

Work out the value of x.
Give your answer correct to 1 decimal place.

$\sin\theta = \frac{O}{H} \rightarrow O = H\sin\theta$

$= 178\text{mm} \times \sin 34°$

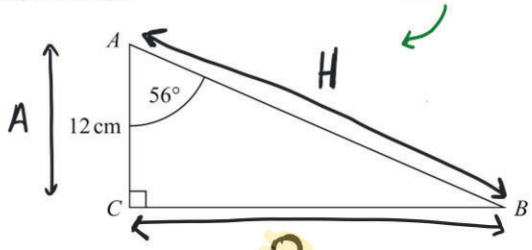
$= 99.5\text{mm}$

99.5 mm

(Total for Question is 2 marks)

11. *ABC* is a right-angled triangle.

STEP 1: Label A, O, H



(a) Work out the length of *BC*.
Give your answer correct to 1 decimal place.

SOHCAHTOA

STEP 2

$\tan\theta = \frac{O}{A}$ so $\tan(56°) = \frac{BC}{12}$ (1)

$12\tan(56°) = BC$ (1)

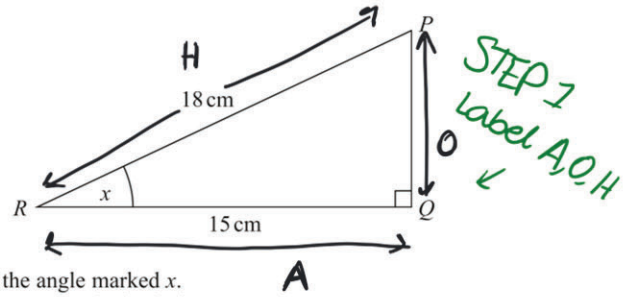
$BC = 17.79073...$

$= 17.8$ (1dp) cm

(1) 17.8 cm

(2)

PQR is a right-angled triangle.



STEP 1 Label A, O, H

(b) Work out the size of the angle marked *x*.
Give your answer correct to 1 decimal place.

SOHCAHTOA

$\cos\theta = \frac{A}{H}$ so $\cos(x) = \frac{15}{18}$

STEP 2

$x = \cos^{-1}\left(\frac{15}{18}\right)$ (1)

$= 33.5573...$

$= 33.6°$ (1dp)

(1) 33.6 °

(2)