

Edexcel GCSE

Mathematics (Linear) – 1MA0

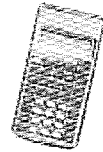
TRIGONOMETRY

Materials required for examination

Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser.
Tracing paper may be used.

Items included with question papers

Nil



Instructions

Use black ink or ball-point pen.

Fill in the boxes at the top of this page with your name, centre number and candidate number.

Answer all questions.

Answer the questions in the spaces provided – there may be more space than you need.

Calculators may be used.

Information

The marks for each question are shown in brackets – use this as a guide as to how much time to spend on **each** question.

Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed – you should take particular care on these questions with your spelling, punctuation and grammar, as well as the clarity of expression.

Advice

Read each question carefully before you start to answer it.

Keep an eye on the time.

Try to answer every question.

Check your answers if you have time at the end.

1.

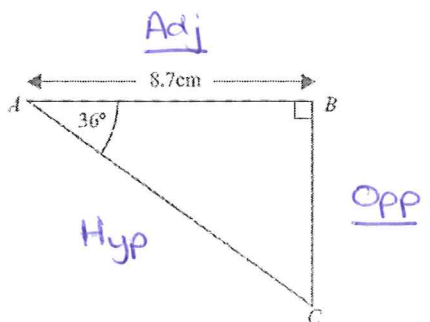


Diagram NOT accurately drawn

ABC is a right-angled triangle.

Angle $B = 90^\circ$.

Angle $A = 36^\circ$.

$AB = 8.7$ cm.

Work out the length of BC .

Give your answer correct to 3 significant figures.

SOH CAH TOA

$$\tan \theta = \frac{\text{Opp}}{\text{Adj}}$$

$$\tan 36 = \frac{BC}{8.7}$$

$$\begin{aligned} BC &= 8.7 \times \tan 36 \\ &= 6.32091\dots \\ &= 6.32 \text{ cm (3sf)} \end{aligned}$$

..... 6.32 cm
(3 marks)

2.

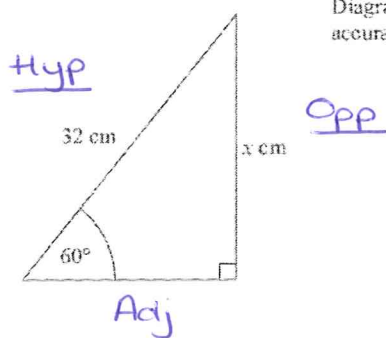


Diagram NOT accurately drawn

Calculate the value of x .

Give your answer correct to 3 significant figures.

SOH CAH TOA

$$\sin \theta = \frac{\text{Opp}}{\text{Hyp}}$$

$$\sin 60 = \frac{x}{32}$$

$$\begin{aligned} x &= 32 \sin 60 \\ &= 27.7128\dots \\ &= 27.7 \text{ cm (3sf)} \end{aligned}$$

..... 27.7 cm (3sf)
(3 marks)

3.

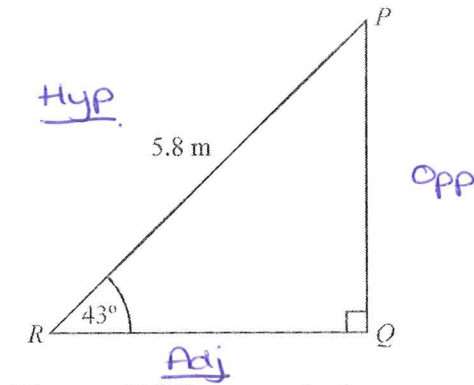


Diagram NOT accurately drawn

PQR is a triangle.

Angle $Q = 90^\circ$.

Angle $R = 43^\circ$.

$PR = 5.8$ m.

Calculate the length of QR .

Give your answer correct to 3 significant figures.

SOH (CAH) TOA

$$\cos \theta = \frac{\text{Adj}}{\text{Hyp}}$$

$$\cos 43 = \frac{QR}{5.8}$$

$$QR = 5.8 \times \cos 43 = 4.24185... = 4.24 \text{ m (3sf)}$$

..... 4.24 m

(3 marks)

4.

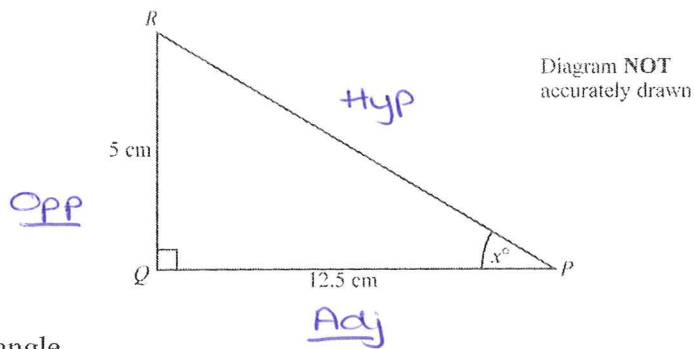


Diagram NOT accurately drawn

PQR is a triangle.

Angle $PQR = 90^\circ$.

$PQ = 12.5$ cm.

$QR = 5$ cm.

Calculate the value of x .

Give your answer correct to 1 decimal place.

SOH CAH (TOA)

$$\tan \theta = \frac{\text{Opp}}{\text{Adj}}$$

$$\tan x = \frac{5}{12.5}$$

..... 21.8° (1dp)

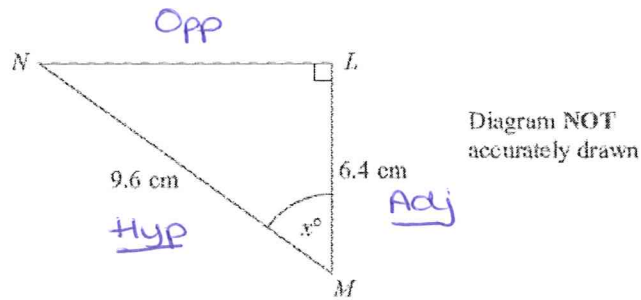
(3 marks)

$$x = \tan^{-1} \left(\frac{5}{12.5} \right)$$

$$= 21.8014...$$

$$= 21.8^\circ \text{ (1dp)}$$

5.



LMN is a right-angled triangle.

$MN = 9.6$ cm.

$LM = 6.4$ cm.

Calculate the size of the angle marked x° .
Give your answer correct to 1 decimal place.

SCH (CAH) TOA

$$\cos \theta = \frac{\text{Adj}}{\text{Hyp}}$$

$$\cos x = \frac{6.4}{9.6}$$

$$x = \cos^{-1}\left(\frac{6.4}{9.6}\right)$$

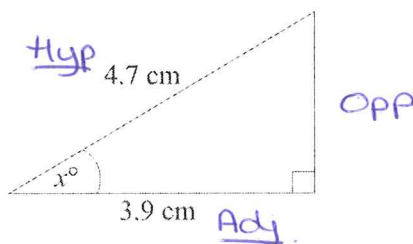
$$= 48.1896 \dots$$

$$= 48.2^\circ \text{ (1dp)}$$

48.2

(3 marks)

6.



Work out the value of x .

Give your answer correct to 1 decimal place.

SCH (CAH) TOA

$$\cos \theta = \frac{\text{Adj}}{\text{Hyp}}$$

$$\cos x = \frac{3.9}{4.7}$$

$$x = \cos^{-1}\left(\frac{3.9}{4.7}\right)$$

$$= 33.9231 \dots$$

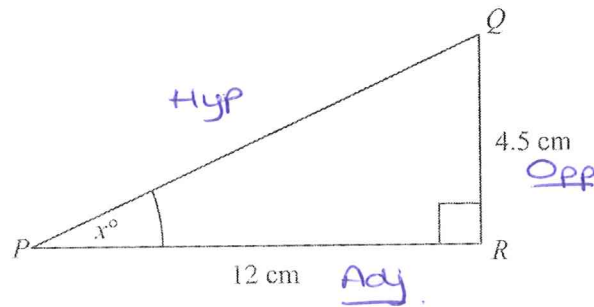
$$= 33.9^\circ \text{ (1dp)}$$

$x = 33.9^\circ \text{ (1dp)}$

(3 marks)

7.

Diagram NOT accurately drawn



PQR is a right-angled triangle.

$PR = 12$ cm.

$QR = 4.5$ cm.

Angle $PRQ = 90^\circ$.

Work out the value of x .

Give your answer correct to one decimal place.

SOH CAH (TOA)

$$\tan \theta = \frac{\text{Opp}}{\text{Adj}}$$

$$\tan x = \frac{4.5}{12}$$

$$x = \tan^{-1}\left(\frac{4.5}{12}\right)$$

$$x = 20.55604\dots$$

$$= 20.6^\circ \text{ (1dp)}$$

$$x = \dots 20.6^\circ \text{ (1dp)}$$

(3 marks)

8. Calculate the size of angle a in this right-angled triangle.
Give your answer correct to 3 significant figures.

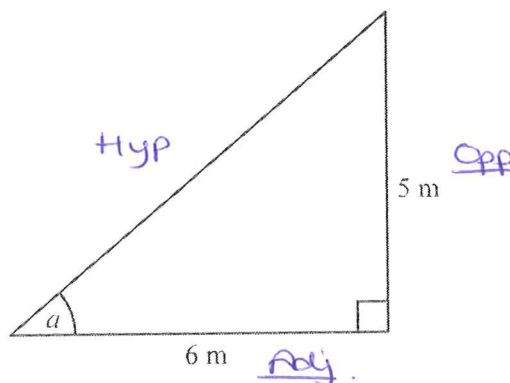


Diagram NOT accurately drawn

SOH CAH (TOA)

$$\tan \theta = \frac{\text{Opp}}{\text{Adj}}$$

$$\tan a = \frac{5}{6}$$

$$a = \tan^{-1}\left(\frac{5}{6}\right)$$

$$= 39.80557\dots$$

$$= 39.8^\circ \text{ (3sf)}$$

$$\dots 39.8^\circ \text{ (3sf)}$$

(3 marks)

9. PQR is a right-angled triangle.

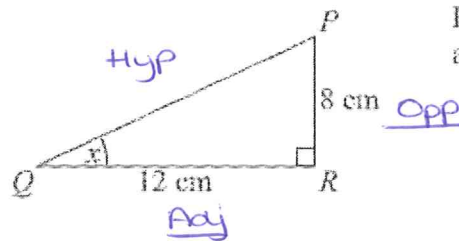


Diagram NOT accurately drawn

$PR = 8 \text{ cm.}$
 $QR = 12 \text{ cm.}$

- (a) Find the size of the angle marked x .
 Give your answer correct to 1 decimal place.

SOH CAH TOA

$$\begin{aligned} \tan \theta &= \frac{\text{Opp}}{\text{Adj}} \\ \tan x &= \frac{8}{12} \\ x &= \tan^{-1}\left(\frac{8}{12}\right) \\ &= 33.69006\dots \\ &= 33.7^\circ \text{ (1dp)} \end{aligned}$$

..... 33.7 °
 (3)

XYZ is a different right-angled triangle.

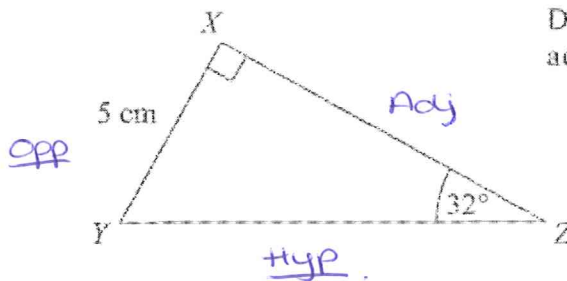


Diagram NOT accurately drawn

$XY = 5 \text{ cm.}$
 Angle $Z = 32^\circ$.

- (b) Calculate the length YZ .
 Give your answer correct to 3 significant figures.

SOH CAH TOA

$$\begin{aligned} \sin \theta &= \frac{\text{Opp}}{\text{Hyp}} \\ \sin 32 &= \frac{5}{YZ} \\ YZ \sin 32 &= 5 \\ YZ &= \frac{5}{\sin 32} \\ &= 9.43539\dots \\ &= 9.44 \text{ cm (3sf)} \end{aligned}$$

..... 9.44 cm
 (3)
 (6 marks)

10. The diagram shows a quadrilateral $ABCD$.

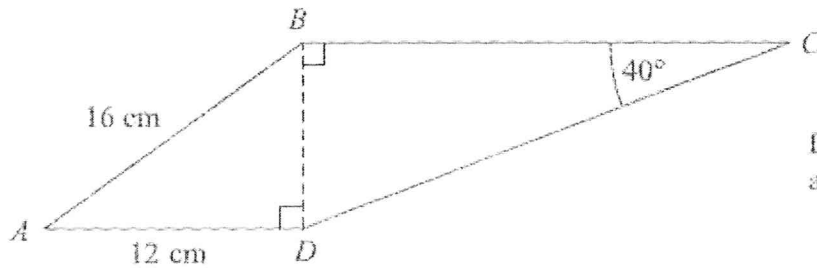


Diagram NOT accurately drawn

$AB = 16 \text{ cm.}$

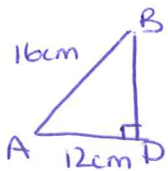
$AD = 12 \text{ cm.}$

Angle $BCD = 40^\circ.$

Angle $ADB = \text{angle } CBD = 90^\circ.$

Calculate the length of CD .

Give your answer correct to 3 significant figures.



Using Pythagoras

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

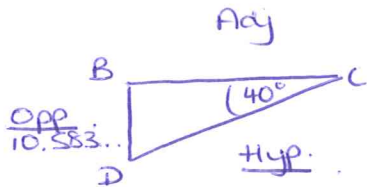
$$12^2 + BD^2 = 16^2$$

$$BD^2 = 16^2 - 12^2$$

$$= 112$$

$$BD = \sqrt{112}$$

$$= 10.5830\dots$$



Using Trigonometry

SOH CAH TOA

$$\sin \theta = \frac{\text{Opp}}{\text{Hyp}}$$

$$\sin 40^\circ = \frac{10.5830\dots}{CD}$$

$$CD \sin 40^\circ = 10.5830\dots$$

$$CD = \frac{10.5830\dots}{\sin 40}$$

$$CD = 16.46423\dots$$

$$= 16.5 \text{ cm (3sf)}$$

..... 16.5 cm

(5 marks)

11.

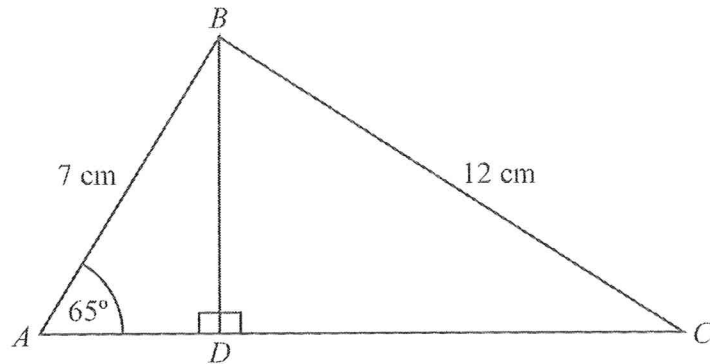
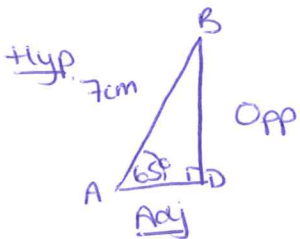


Diagram NOT accurately drawn

ABC is a triangle.
 ADC is a straight line with BD perpendicular to AC .
 $AB = 7$ cm.
 $BC = 12$ cm.
 Angle $BAD = 65^\circ$.

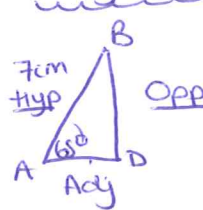
Calculate the length of AC .
 Give your answer correct to 3 significant figures.

Length of AD



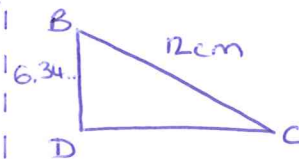
Using trigonometry
 Soh (CAH) TOA
 $\cos \theta = \frac{\text{Adj}}{\text{Hyp}}$
 $\cos 65^\circ = \frac{AD}{7}$
 $AD = 7 \times \cos 65^\circ$
 $= 2.958327\dots$

Length of DC



Using trigonometry
 Soh (CAH) TOA
 $\sin \theta = \frac{\text{Opp}}{\text{Hyp}}$
 $\sin 65^\circ = \frac{BD}{7}$

$$BD = 7 \sin 65^\circ = 6.34415\dots$$



Using Pythagoras
 $a^2 + b^2 = c^2$
 $6.34415\dots^2 + DC^2 = 12^2$
 $DC^2 = 12^2 - 6.34415\dots^2$
 $= 103.7517\dots$
 $DC = \sqrt{103.7517\dots}$
 $= 10.1858\dots$

Length of $AC = \text{length of } AD + \text{length of } DC$
 $= 2.958327\dots + 10.1858\dots$
 $= 13.144185\dots$
 $= 13.1 \text{ cm (3sf)}$

..... 13.1 cm
 (6 marks)