

Questions

Q1.

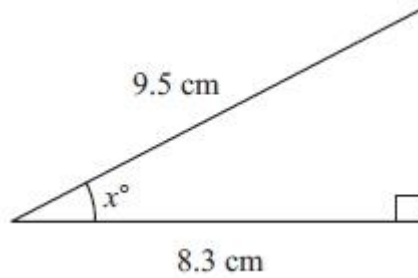


Diagram NOT
accurately drawn

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

$x = \dots\dots\dots$

(Total for question = 3 marks)

Q2.

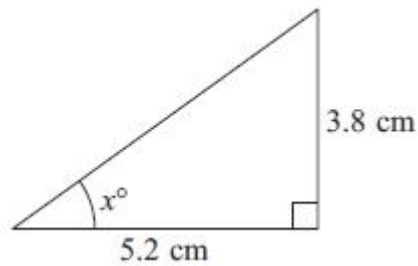


Diagram NOT
accurately drawn

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

$x = \dots\dots\dots$

(Total for question = 3 marks)

Q3.

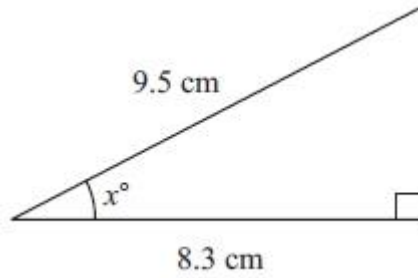


Diagram NOT accurately drawn

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

$x = \dots\dots\dots$

(Total for question = 3 marks)

Q4.

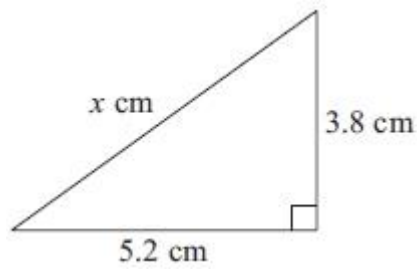


Diagram NOT accurately drawn

Calculate the value of x .
Give your answer correct to 3 significant figures.

$x = \dots\dots\dots$

(Total for question = 3 marks)

Q5.

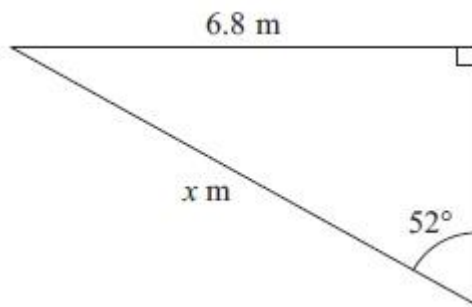


Diagram NOT accurately drawn

Calculate the value of x .
Give your answer correct to 3 significant figures.

$x = \dots\dots\dots$

(Total for question = 3 marks)

Q6.

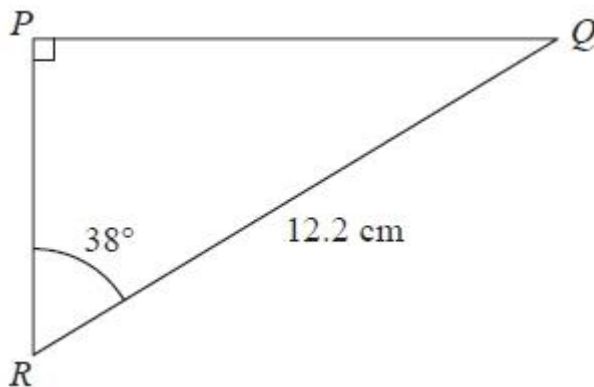


Diagram NOT accurately drawn

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

$\dots\dots\dots$ cm

(Total for Question is 3 marks)

Q7.

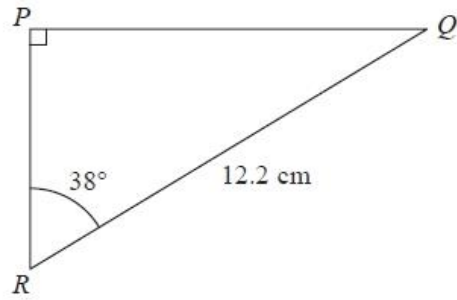


Diagram NOT accurately drawn

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

..... cm

(Total for Question is 3 marks)

Q8.

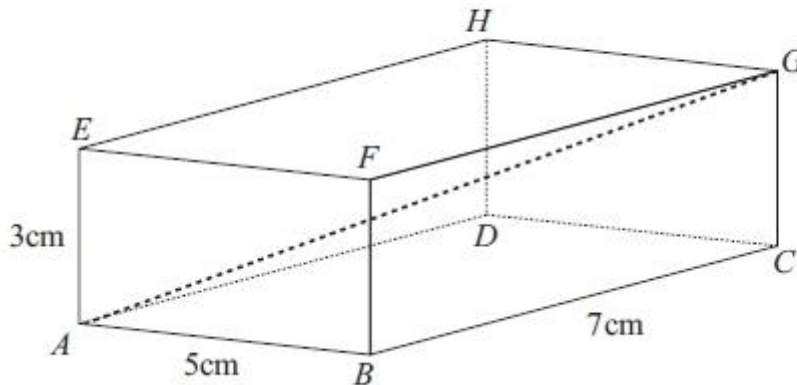


Diagram NOT accurately drawn

The diagram shows a cuboid $ABCDEFGH$.
 $AB = 5\text{cm}$
 $BC = 7\text{cm}$
 $AE = 3\text{cm}$

(a) Calculate the length of AG .
Give your answer correct to 3 significant figures.

..... cm

(3)

Calculate the size of the angle between AG and the plane $ABCD$.
Give your answer correct to 3 significant figures.

.....°
(2)

(Total for question = 5 marks)

Q9.

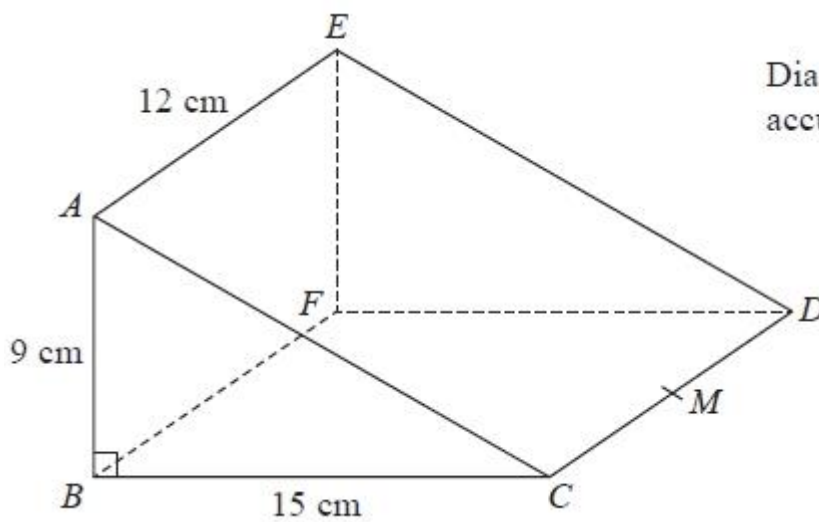


Diagram NOT
accurately drawn

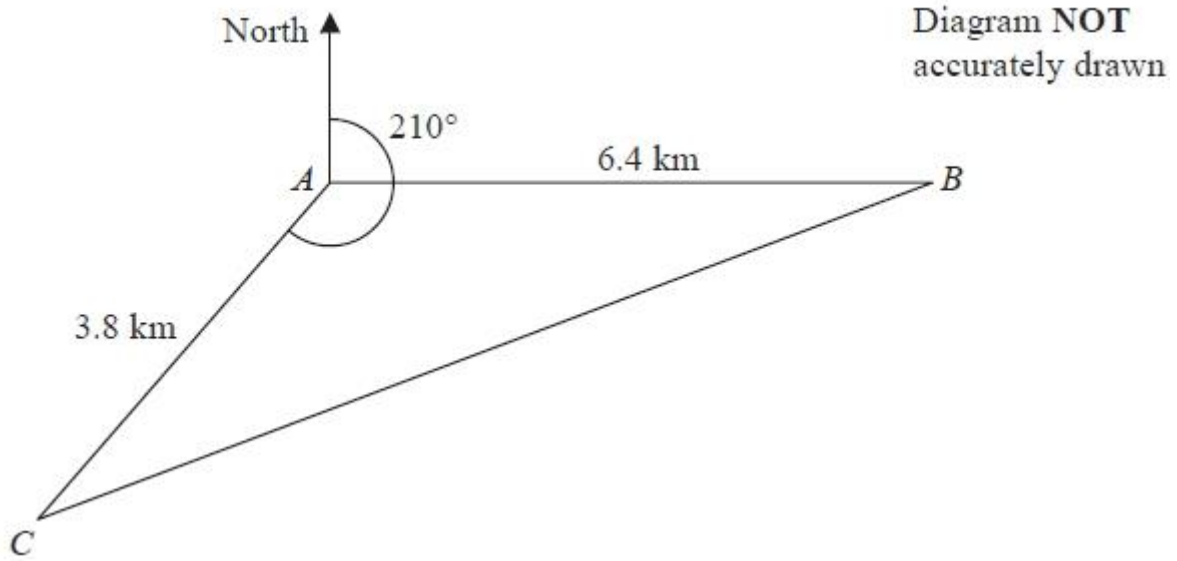
$ABCDEF$ is a triangular prism.
 $AB = 9$ cm, $BC = 15$ cm and $AE = 12$ cm.
Angle $ABC = 90^\circ$
 M is the midpoint of CD .

Calculate the size of the angle between AM and the plane $BCDF$.
Give your answer correct to 1 decimal place.

.....°

(Total for Question is 5 marks)

Q10.



A , B and C are 3 villages.
 B is 6.4 km due east of A .
 C is 3.8 km from A on a bearing of 210°

Calculate the bearing of B from C .
Give your answer correct to the nearest degree.
Show your working clearly.

.....^o

(Total for Question is 6 marks)

Q11.

Here is a triangle QRS .

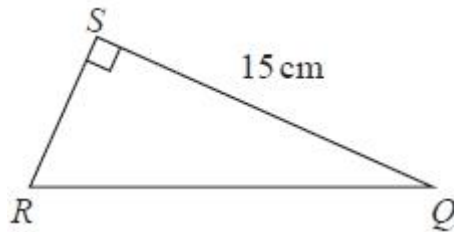


Diagram **NOT**
accurately drawn

$SQ = 15 \text{ cm}$

Angle $RSQ = 90^\circ$

Area of triangle $QRS = 60 \text{ cm}^2$

Work out the size of angle SQR .

Give your answer correct to 1 decimal place.

.....^o

(Total for question = 4 marks)

Q12.

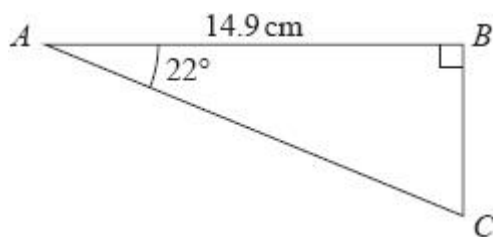


Diagram **NOT**
accurately drawn

Calculate the length of AC .

Give your answer correct to 3 significant figures.

..... cm

(Total for question = 3 marks)

Q13.

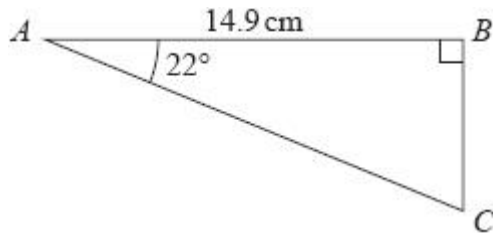


Diagram NOT accurately drawn

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

..... cm

(Total for question = 3 marks)

Q14.

The diagram shows triangle ABC.

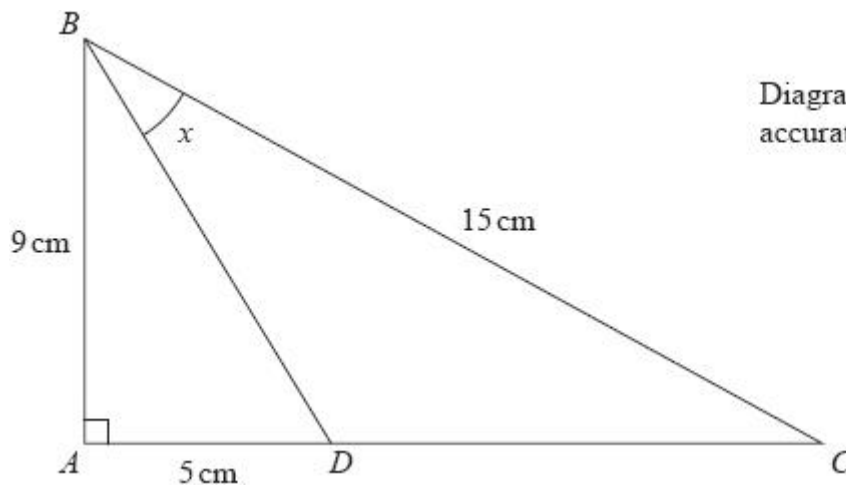


Diagram NOT accurately drawn

$AB = 9 \text{ cm}$ $BC = 15 \text{ cm}$
 D is the point on AC such that $AD = 5 \text{ cm}$.
Angle $BAC = 90^\circ$

Calculate the size of angle x .
Give your answer to the nearest degree.

.....°

(Total for question = 4 marks)

Mark Scheme

Q1.

	use of cos		3	M1	cos must be selected for use in trig ratio NOT Cosine Rule	or M2 for sin and $\frac{\sqrt{21.36}}{9.5}$ following correct Pythagoras or M2 for tan and $\frac{\sqrt{21.36}}{8.3}$ following correct Pythagoras
	$\cos("x") = \frac{8.3}{9.5} (=0.87\dots)$ or $("x" =) \cos^{-1}\left(\frac{8.3}{9.5}\right)$			M1		or correct Pythag and then correct use of sine or cosine rule with "21.36"
		29.1		A1	for ans rounding to 29.1 (29.1103...)	
Total 3 marks						

Q2.

Question Number	Working	Answer	Mark	Notes		
	tan chosen		3	M1	for tan chosen	M1 for sin and $\frac{3.8}{\sqrt{41.48}}$
	$\frac{3.8}{5.2}$ or 0.7307...			A1	for $\frac{3.8}{5.2}$ or 0.7307... oe	following correct Pythagoras and A1 for 0.5900...
		36.2		A1	for answer rounding to 36.2	
Total 3 marks						

Q3.

Question Number	Working	Answer	Mark	Notes
	use of cos		3	M1 cos must be selected for use in trig ratio NOT Cosine Rule
	$\cos ("x") = \frac{8.3}{9.5} (=0.87\dots)$ or $("x" =) \cos^{-1} \left(\frac{8.3}{9.5} \right)$			M1
		29.1		A1 for awrt 29.1 e.g. (29.1103...)
Total 3 marks				

Q4.

Question Number	Working	Answer	Mark	Notes
	$5.2^2 + 3.8^2$ or $27.04 + 14.44$ or 41.48		3	M1 for squaring and adding
	$\sqrt{5.2^2 + 3.8^2}$			M1 (dep) for square root
		6.44		A1 for answer rounding to 6.44
Total 3 marks				

Q5.

Question	Working	Answer	Mark	Notes
	identify sin 52 or cos 38			M1 for use of sin 52 or use of cos 38
	$\frac{6.8}{\sin 52} = x$ or $(x =) \frac{6.8}{\sin 52}$ or $\frac{x}{\sin 90} = \frac{6.8}{\sin 52}$	8.63	3	M1 or $\cos 38 = \frac{6.8}{x}$ or $(x =) \frac{6.8}{\cos 38}$
				A1 (8.62932..) awrt 8.63
Total 3 marks				

Q6.

Question	Working	Answer	Mark	Notes		
	$\sin 38 = \frac{PQ}{12.2}$ or $\cos(90 - 38) = \frac{PQ}{12.2}$ oe			M1	12.2cos38 (9.61...) and 12.2 ² - "9.61" ² (= 56.4.)	correct statement of sine rule eg $\frac{PQ}{\sin 38} = \frac{12.2}{\sin 90}$
	("PQ" =) 12.2 x sin 38 or 12.2cos(90 - 38) oe			M1	$\sqrt{56.4}$	correct expression for x eg (PQ) = $\frac{12.2 \sin 38}{\sin 90}$
		7.51	3	A1	awrt 7.51	
						Total 3 marks

Q7.

Question	Working	Answer	Mark	Notes		
	$\sin 38 = \frac{PQ}{12.2}$ or $\cos(90 - 38) = \frac{PQ}{12.2}$ oe			M1	12.2cos38 (9.61...) and 12.2 ² - "9.61" ² (= 56.4.)	correct statement of sine rule eg $\frac{PQ}{\sin 38} = \frac{12.2}{\sin 90}$
	("PQ" =) 12.2 x sin 38 or 12.2cos(90 - 38) oe			M1	$\sqrt{56.4}$	correct expression for PQ eg (PQ) = $\frac{12.2 \sin 38}{\sin 90}$
		7.51	3	A1	awrt 7.51	
						Total 3 marks

Q8.

Q	Working	Answer	Mark	Notes
(a)	$(AC^2 =) 5^2 + 7^2 (=74)$ $(AG^2 =) "74" + 3^2 (=83)$ $(AG =) \sqrt{"83"}$	9.11	3	M1 or $AC = 8.6..$ or $(BG^2) = 3^2 + 7^2 (=58)$ or $(AF^2) = 3^2 + 5^2$ $(AG^2 =)$ $"58" + 5^2 (=83)$ M1 ft (dep on M1) M1M1 for $\sqrt{(5^2 + 7^2 + 3^2)}$ A1 awrt 9.11
(b)	$\sin \theta = 3 / \sqrt{"83"}$			M1 or $\cos \theta = \sqrt{"74"} / \sqrt{"83"}$ or $\tan \theta = 3 / \sqrt{"74"}$
		19.2	2	or $\cos \theta = \frac{"74" + "83" - 9}{2 \times \sqrt{"74"} \times \sqrt{"83"}}$ A1 awrt 19.2 or 160.8
				Total 5 marks

Q9.

Question	Working	Answer	Mark	Notes
	Angle AMB identified			M1 Angle AMB identified
	$(BM^2) = 15^2 + 6^2$			M1 $(AM^2 =) 9^2 + 15^2 + 6^2$
	$(BM =) \sqrt{15^2 + 6^2}$ or $\sqrt{261}$ or $3\sqrt{29}$ (=16.1...)			M1 (dep on previous M1) $(AM =) \sqrt{9^2 + 15^2 + 6^2}$ or $\sqrt{342}$ or $3\sqrt{38}$ (=18.49...)
	$\tan AMB = \frac{9}{\sqrt{261}}$			M1 $\sin AMB = \frac{9}{"18.49"} (\times \sin 90) (= 0.4867)$ etc or $\cos AMB = \frac{"16.16"}{"18.49"} (= 0.8735)$ etc or correct method to find AM and BM with correct substitution into Cosine rule and correct rearrangement to make $\cos AMB$ the subject
		29.1	5	A1 for 29.1 – 29.25 NB. If angle BAM (60.9) found then maximum of M0M1M1M0A0 unless this is used to go onto find angle AMB
				Total 5 marks

Q10.

Question	Working	Answer	Mark	Notes
	$(BC^2 =)3.8^2 + 6.4^2 - 2 \times 3.8 \times 6.4 \cos 120^\circ$ $(= 79.72)$ $(BC^2 =) 14.44 + 40.96 + 24.32 (=79.72)$			M1 correct use of Cosine rule to find BC M1 correct order of operations A1 for $BC = 8.9 - 8.93$ or $\sqrt{79.72}$ or $\sqrt{\frac{1993}{25}}$ oe Award M2 A1 for $BC = 8.9 - 8.93$ or $\sqrt{79.72}$ or $\sqrt{\frac{1993}{25}}$ oe
	$\frac{\sin C}{6.4} = \frac{\sin 120}{8.92}$ or $6.4^2 = 3.8^2 + 8.92^2 - 2 \times 3.8 \times 8.92 \times \cos C$ $\sin C = \frac{6.4 \times 0.866}{8.92} (= 0.62...)$ or $\cos C = \frac{3.8^2 + 8.92^2 - 6.4^2}{2 \times 3.8 \times 8.92} (=0.78...)$ $C = 38 - 38.5$			M1 correct use of Sine rule or Cosine rule to find angle C M1 correct rearrangement Award M2 for $C = 38 - 38.5$ Award M2 for $B = 21.5 - 22$ and $C = 180 - 120 - B$
		068	6	A1 (0)68 – (0)68.4
	Alternative CD is the perpendicular from C to BA produced. $\angle CAD = 60^\circ$ or $ACD = 30^\circ$ $AD = 3.8 \cos 60^\circ$ or $3.8 \sin 30^\circ (= 1.9)$ $BD = 6.4 + 1.9 (= 8.3)$ $CD = 3.8 \sin 60^\circ$ or $3.8 \cos 30^\circ (= 3.29)$ $\tan BCD = \frac{8.3}{3.8 \sin 60}$ oe			M1 uses triangle CAD and $\angle CAD = 60^\circ$ or $ACD = 30^\circ$ CD may not be drawn in but can be implied M1 for correct method to find horizontal length A1 for $BD = 8.3$ M1 M1
		068		A1 (0)68 – (0)68.4
				Total 6 marks

Q11.

Ques	Working	Answer	Mark	Notes
	$SR = (60 \div 15) \times 2$ $(=8)$ $\tan SQR = \frac{8}{15}$ $SQR = \tan^{-1}\left(\frac{8}{15}\right)$		4	M1 M1ft (or M1 for $\sin SQR = \frac{8}{17}$ or $\cos SQR = \frac{15}{17}$ where '17' comes from a fully correct method) M1ft (or $\sin^{-1}\left(\frac{8}{17}\right)$ or $\cos^{-1}\left(\frac{15}{17}\right)$) A1 28.07 – 28.1
		28.1		
				Total 4 marks

Q12.

Q	Working	Answer	Mark	Notes
	$\cos 22 = \frac{14.9}{AC}$ or $\sin(90 - 22) = \frac{14.9}{AC}$ or $\frac{AC}{\sin 90} = \frac{14.9}{\sin(90 - 22)}$ oe			M1 M1 for $BC = 14.9 \times \tan 22$ oe (= 6.019 – 6.02) AND $(AC^2 =) 14.9^2 + 6.019...^2$
	$(AC =) \frac{14.9}{\cos 22}$ or $(AC =) \frac{14.9}{\sin 68}$ (× sin 90)			M1 M1 for $(AC) = \sqrt{14.9^2 + 6.019...^2}$
		16.1	3	A1 Accept 16.07 – 16.1
				Total 3 marks

Q13.

Q	Working	Answer	Mark	Notes
	$\cos 22 = \frac{14.9}{AC}$ or $\sin(90 - 22) = \frac{14.9}{AC}$ or $\frac{AC}{\sin 90} = \frac{14.9}{\sin(90 - 22)}$ oe or			M1 M1 for $BC = 14.9 \times \tan 22$ oe (= 6.019 – 6.02) AND $(AC^2 =) 14.9^2 + 6.019...^2$
	$(AC =) \frac{14.9}{\cos 22}$ or $(AC =) \frac{14.9}{\sin 68}$ (× sin 90)			M1 M1 for $(AC) = \sqrt{14.9^2 + 6.019...^2}$
		16.1	3	A1 Accept 16.07 – 16.1
				Total 3 marks

Q14.

Q	Working	Answer	Mark	Notes	
	(Angle $ABD = \tan^{-1}(\frac{5}{9})$) or (Angle $ADB = \tan^{-1}(\frac{9}{5})$) or (Angle $ABC = \cos^{-1}(\frac{9}{15})$) or (Angle $ACB = \sin^{-1}(\frac{9}{15})$) $(BD = \sqrt{9^2 + 5^2})$ or $(AC = \sqrt{15^2 - 9^2})$ $(DC = \sqrt{15^2 - 9^2} - 5)$		4	M1	For correct method to find angle ABD or ADB or ABC or ACB or for correct method to find side BD, AC or DC .
				A1	For angle $ABD = 29.(0546...)$ or for angle $ADB = 60.(9453...)$ or for angle $ABC = 53.(1301...)$ or for angle $ACB = 36.(8698...)$ or For $BD = \sqrt{106}$ or $10.(2956...)$ or for $AC = 12$ or for $DC = 7$ Accept rounded or truncated to at least 2SF
	E.g. $(x = \cos^{-1}(\frac{9}{15}) - \tan^{-1}(\frac{5}{9}))$ or $(x = 180 - 90 - "29.(0546...)" - "36.(8698...)"$ or $\cos x = \frac{15^2 + "10.(2956...)"^2 - 7^2}{2 \times 15 \times "10.(2956...)"}$ or $\cos x = 0.913(009)$ or $\sin x = \frac{7 \sin "36.(8698...)"}{\sqrt{106}}$ or $\sin x = \frac{7 \sin "119.(054...)"}{15}$ or $\sin x = 0.407(940...)$			M1	For a complete method to find x or $\sin x$ or $\cos x$ Accept $0.912 \leq \cos x \leq 0.9152$ Accept $0.407 \leq \sin x \leq 0.413$
		24		A1	Awrt 24
Total 4 marks					