Name: _____

IGCSE (9-1) Maths
topics new to Foundation tier:
Knowing Pythagoras and trigonometry

Date:

Time: 60 minutes

Total marks available: 55

Total marks achieved: _____

Q1.

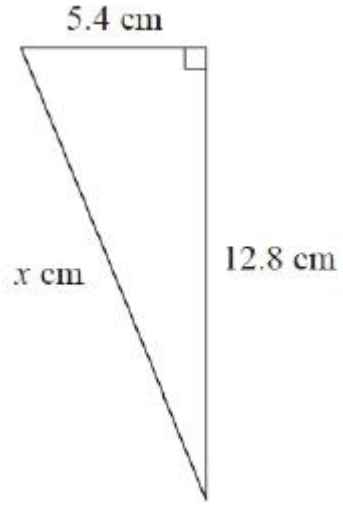


Diagram **NOT** accurately drawn

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

x = ...

(Total 3 marks)

Q2.

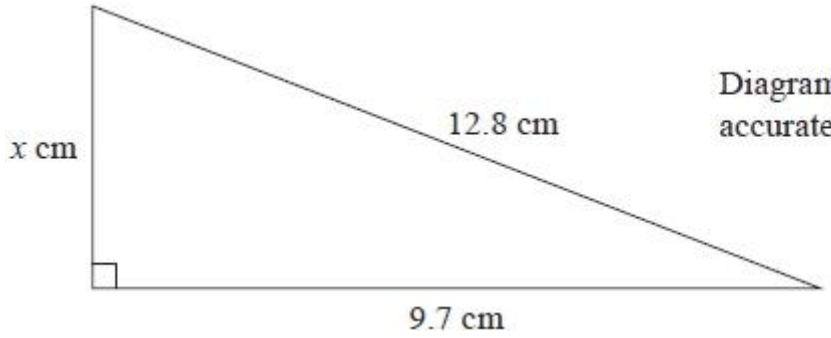


Diagram **NOT** accurately drawn

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

x = ...

(Total 3 marks)

Q3.

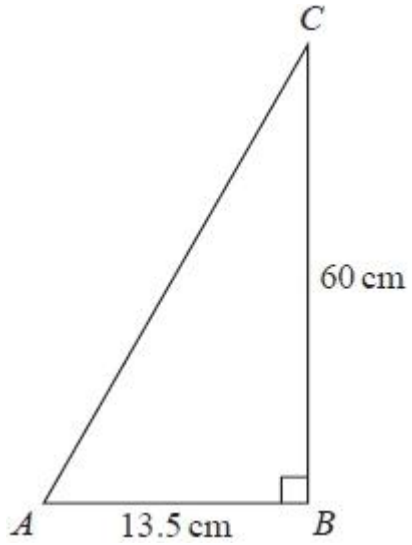


Diagram **NOT** accurately drawn

(*a*) Work out the perimeter of the triangle.

..... cm
(4)

(*b*) The length of *AB* is 13.5 cm correct to 3 significant figures.
Write down the lower bound of the length of *AB*.

..... cm
(1)

(Total 5 marks)

Q4. Here is an isosceles triangle.

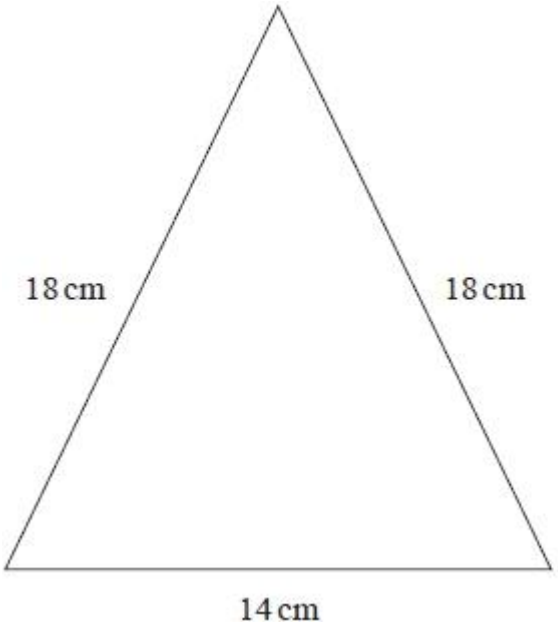


Diagram **NOT** accurately drawn

Work out the area of the triangle.
Give your answer correct to 3 significant figures.

..... cm^2
(1)

(Total 4 marks)

Q5. Here is a trapezium *ABCD*.

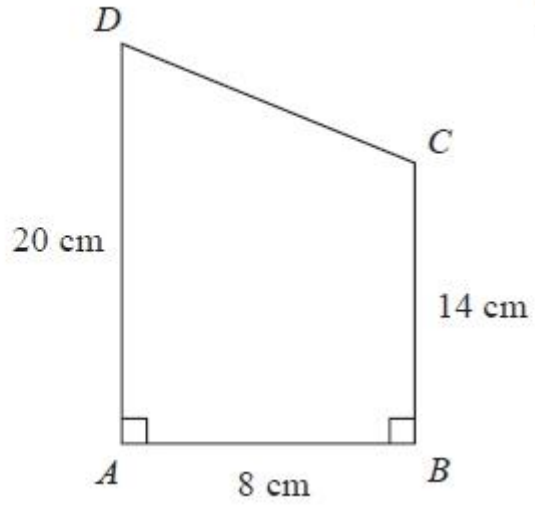


Diagram **NOT** accurately drawn

Angle *DAB* = angle *ABC* = 90°
AD = 20 cm
AB = 8 cm
BC = 14 cm

(*a*) Calculate the area of the trapezium *ABCD*.

..... cm^2
(2)

(*b*) Calculate the length of *CD*.

..... cm
(4)

(Total 6 marks)

Q6.

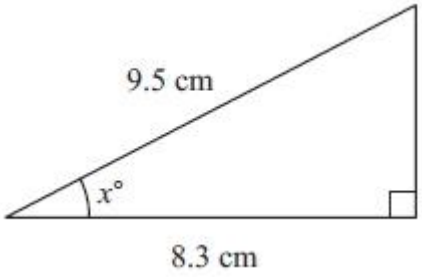


Diagram **NOT** accurately drawn

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

x = ...

(Total 3 marks)

Q7.

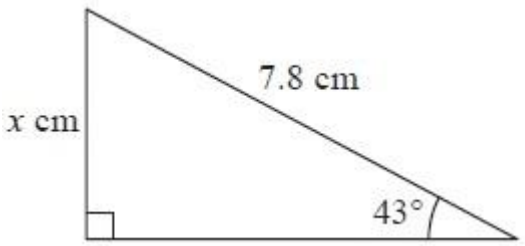


Diagram **NOT** accurately drawn

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

x = ...

(Total 3 marks)

Q8.

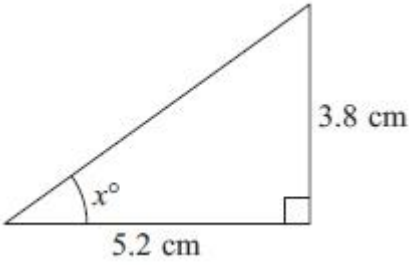


Diagram **NOT** accurately drawn

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

x = ...

(Total 3 marks)

Q9. The diagram shows a ladder, *EF*, leaning against a vertical wall.
The foot, *E*, of the ladder is on horizontal ground.

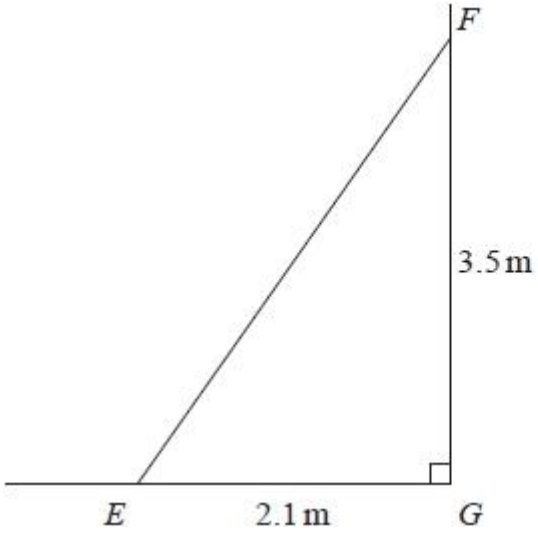


Diagram **NOT** accurately drawn

EG = 2.1 m *FG* = 3.5 m angle *EGF* = 90°

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

..... m
(3)

(*b*) Work out the size of angle *EFG*.
Give your answer correct to the nearest degree.

..... °
(3)

(Total 6 marks)

Q10. The diagram shows the positions of two towns, *A* and *B*.

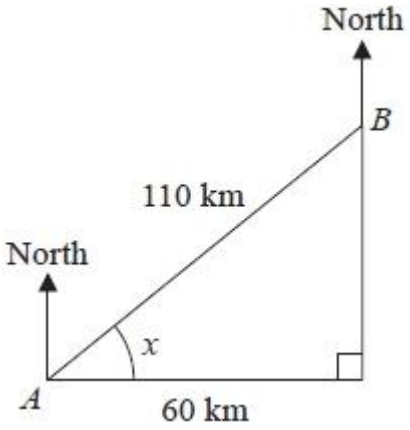


Diagram **NOT** accurately drawn

The distance from *A* to *B* is 110 km.
B is 60 km east of *A*.

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

..... °

(3)

(*b*) Work out the bearing of *B* from *A*.
Give your answer correct to the nearest degree.

..... °

(2)

The distance from *A* to *B* is 110 km correct to 2 significant figures.

(*c*) (i) Write down the lower bound for the distance from *A* to *B*.

..... km

(ii) Write down the upper bound for the distance from *A* to *B*.

..... km

(2)

(Total 7 marks)

Q11.

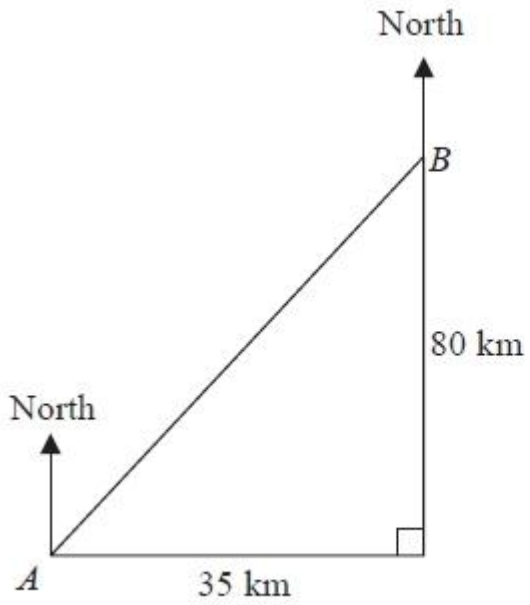


Diagram **NOT** accurately drawn

Town *B* is 35 km east and 80 km north of town *A*.

Work out the bearing of town *A* from town *B*.
Give your answer correct to the nearest degree.

.....°

(Total 4 marks)

Q12.

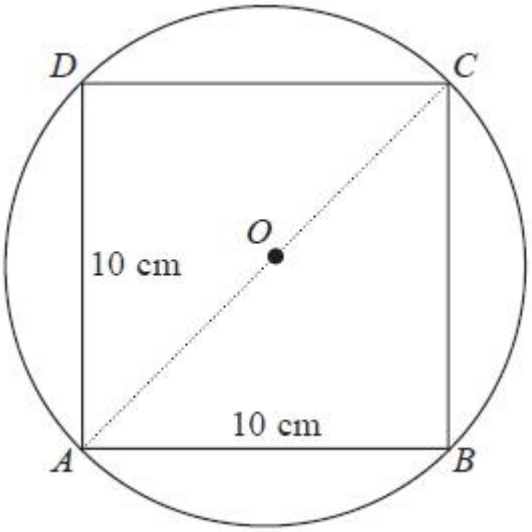


Diagram **NOT** accurately drawn

The diagram shows a square *ABCD* drawn inside a circle, centre *O*.

A, *B*, *C* and *D* are points on the circle.
The lengths of the sides of the square are 10 cm.
AC is a diameter of the circle.

Calculate the circumference of the circle.
Give your answer correct to 3 significant figures.

..... cm

(Total for Question is 4 marks)

Q13. Here is the quadrilateral *ABCD*.

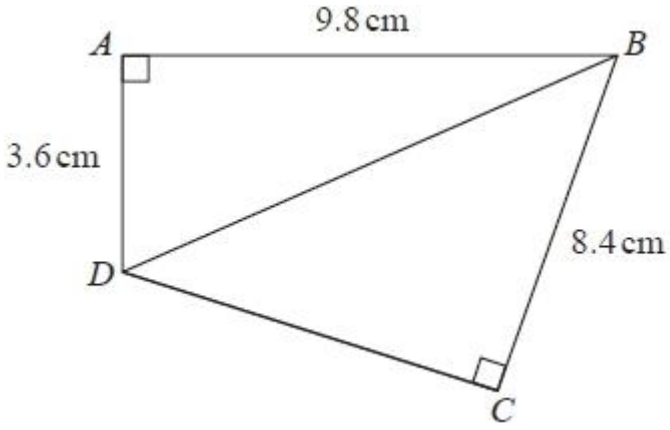


Diagram **NOT** accurately drawn

Angle *BAD* = 90° and angle *BCD* = 90°

AB = 9.8cm
AD = 3.6cm
BC = 8.4cm

Calculate the length of *DC*.

..... cm

(Total 4 marks)

Mark Scheme

Q1.

Question	Working	Answer	Mark	Notes
	$5.4^2 + 12.8^2$ (=193)		3	M1
	$\sqrt{5.4^2 + 12.8^2}$ **or** $\sqrt{"193"}$ (=13.89244399)			M1 dep
		13.9		A1 awrt 13.9
				Total 3 marks

Q2.

Question	Working	Answer	Mark	Notes
	$12.8^2 - 9.7^2$ or 163.84 − 94.09 or 69.75		3	M1 For squaring and subtracting [$a = \cos^{-1}\left(\frac{9.7}{12.8}\right)(= 40.7...)$ **and** $\sin 40.7.. = \frac{x}{12.8}$ *or* $\tan 40.7.. = \frac{x}{9.7}$]
	$\sqrt{12.8^2 - 9.7^2}$			M1dep For square root [$x = 12.8\sin 40.7..$ *or* $x = 9.7\tan 40.7..$]
		8.35		A1 Allow 8.35 - 8.352
				Total 3 marks

Q3.

Q	Working	Answer	Mark	Notes
(a)	$13.5^2 + 60^2$ or $182.25 + 3600$ or 3782.25 $\sqrt{"3782.25"}$ or awrt 61.5 $13.5 + 60 + \sqrt{"3782.25"}$ or $13.5 + 60 + 61.5$	135	4	M1 For squaring and adding M1 (Dep) for square root M1 Dep A1 Cao NB: A0 if 61.5 is rounded from an inexact value (eg 61.505…)
	Alternative method – using Trigonometry Eg $A = 77.3(196…)$ **and** $\sin"77.3" = \frac{60}{AC}$ $(AC =) \frac{60}{\sin"77.3"}$ or awrt 61.5 $13.5 + 60 + \frac{60}{\sin"77.3"}$ or $13.5 + 60 + 61.5$	135	4	M1 For finding a correct angle **AND** a correct trig statement M1 (Dep) For an expression for AC M1 Dep A1 cao NB: A0 if 61.5 is rounded from an inexact value (eg 61.505…)
(b)		13.45	1	B1
				Total 5 marks

Q4.

Question	Working	Answer	Mark	Notes	
	$18^2 - (14 \div 2)^2$ (=275)		4	M1	or M1 for $\cos x = \frac{7}{18}$ or $\sin y = \frac{7}{18}$ or $\cos z = \frac{18^2 + 18^2 - 14^2}{2 \times 18 \times 18}$
	$\sqrt{18^2 - (14 \div 2)^2}$ or $\sqrt{275}$ or $5\sqrt{11}$ or 16.5… or 16.6			M1	or M1 for $x = \cos^{-1}\left(\frac{7}{18}\right)$ or $x = 67.1\ldots$ or $y = \sin^{-1}\left(\frac{7}{18}\right)$ or $y = 22.8\ldots$ or $z = \cos^{-1}\left(\frac{18^2 + 18^2 - 14^2}{2 \times 18 \times 18}\right)$ or $z = 45.77\ldots$
	$0.5 \times 14 \times$ "16.5…" or $35\sqrt{11}$			M1	or M1 for $0.5 \times 14 \times 18 \times \sin(\text{"67.1…"})$ or $0.5 \times 18 \times 18 \times \sin(2 \times \text{"22.8…"})$ or $0.5 \times 18 \times 18 \times \sin(\text{"45.77..."})$
		116		A1	116 – 116.1 NB Allow use of Hero's formula
					Total 4 marks
	Alternative scheme				
	$25(25 - 18)(25 - 18)(25 - 14)(= 13475)$ oe		4	M2	
	$\sqrt{13475}$ oe			M1	
		116		A1	
					Total 4 marks

Q5.

Ques	Working	Answer	Mark	Notes
a	$\frac{1}{2}(14+20)\times 8$ **or** $8\times 14+\frac{1}{2}\times 6\times 8$		2	M1 for a complete method
		136		A1
b	$20-14\ (=6)$		4	M1
	$'6'^2+8^2$ **or** $36+64$ **or** 100			M1 dep on previous M1
	$\sqrt{('6'^2+8^2)}$			M1 dep on previous M1
		10		A1
				Total 6 marks

Q6.

	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 **or** correct Pythag and then correct use of sine or cosine rule with "21.36"
	$\cos("x")=\frac{8.3}{9.5}$ (=0.87…) **or** $("x"=)\cos^{-1}(\frac{8.3}{9.5})$			M1		
		29.1		A1	for ans rounding to 29.1 (29.1103…)	
						Total 3 marks

Q7.

Question	Working	Answer	Mark	Notes		
	sin 43 used		3	M1	or M1 for $7.8\cos 43°$ (5.704...) **and** $7.8^2 - "5.704"^2$ (28.298) M1 for $\sqrt{"28.298"}$	or M1 for correct statement of Sine Rule eg $\frac{7.8}{\sin 90°} = \frac{x}{\sin 43°}$ M1 for correct expression for x eg $x = \frac{7.8 \sin 43°}{\sin 90°}$
	$7.8 \sin 43°$			M1		
		5.32		A1	for awrt 5.32 (5.319587...)	
						Total 3 marks

Q8.

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

Q9.

Question	Working	Answer	Mark	Notes
(a)	$(EF^2 =)2.1^2+3.5^2 (=4.41+12.25=16.66)$		3	M1
	$(EF =)\sqrt{2.1^2+3.5^2}$ or $\sqrt{16.66}$			M1 dep
		4.1		A1 allow 4.08(166…) rounded or truncated to at least 2DP
(b)	$\tan F = \frac{2.1}{3.5}$ or $\tan F = 0.6$ $\sin F = \frac{2.1}{4.1}$ or $\sin F = 0.512(195...)$ $\cos F = \frac{3.5}{4.1}$ or $\cos F = 0.853(658...)$		3	M1 ft 4.1 from (a)
	$\tan^{-1}\left(\frac{2.1}{3.5}\right)$ or $\tan^{-1}0.6$ or $\sin^{-1}\left(\frac{2.1}{4.1}\right)$ or $\sin^{-1}0.512(195…)$ or $\cos^{-1}\left(\frac{3.5}{4.1}\right)$ or $\cos^{-1}0.853(658…)$			M1 ft 4.1 from (a)
		31		A1 ft 4.1 from (a) Accept 30.8 – 31.4
				Total 6 marks

Q10.

Question	Working	Answer	Mark	Notes
(a)	$\cos x = \frac{60}{110}$ or $\cos x =$ 0.545(4545...)		3	M1
	$(x =)\ \cos^{-1}\left(\frac{60}{110}\right)$			M1
		56.9		A1 56.9 – 57
(b)	90 – 56.9(4426885...) oe	033	2	M1ft for complete method, ft from (a) if "(a)" < 90, A1ft 90 – their x accept (0)33 – (0)33.1 or ft
(c)(i)		105	2	B1
(c)(ii)		115		B1 Accept 114.$\dot{9}$
				Total 7 marks

Q11.

Q	Working	Answer	Mark	Notes
	$\tan A = \frac{80}{35}$ or $\tan B = \frac{35}{80}$		4	M1
	$(A =) \tan^{-1}\left(\frac{80}{35}\right)$ or $(B =) \tan^{-1}\left(\frac{35}{80}\right)$			M1
	$(A =)$ 66.37... or $(B =)$ 23.62...			A1 Accept answers that round to 66 or 24(allow answers without labels)
		204		B1 Allow answers in range 203.6 – 204 ft for correct conversion to bearing unless 180 + 66
				Total 4 marks

Q12.

Question	Working	Answer	Mark	Notes	
	$(AC^2 =)\ 10^2 + 10^2$ $(=200)$ $(AC =)\ \sqrt{(10^2 + 10^2)}$ $(= 14.1...)$ $\pi \times \sqrt{(10^2 + 10^2)}$ oe or 14.1π or $2\pi \times 7.07$	44.4	4	M1 M1 dep M1 dep	$(AO^2 =)\ 5^2 + 5^2\ (= 50)$ $(AO =)\ \sqrt{(5^2 + 5^2)}$ $(=7.07..)$ $2 \times \pi \times \sqrt{(5^2 + 5^2)}$
	Alternative method: M1 $\cos 45 = \frac{10}{x}$ or $\sin 45 = \frac{10}{x}$ M1 dep $(x =) \frac{10}{\cos 45}$ or $(x =) \frac{10}{\sin 45}$ oe $(= 14.1..)$ M1 dep $\pi \times \frac{10}{\cos 45}$ or $\pi \times \frac{10}{\sin 45}$ oe			M1 M1dep M1 dep A1 awrt 44.3 or 44.4	
					Total 4 marks

Q13.

Q	Working	Answer	Mark	Notes	
	$3.6^2 + 9.8^2$ or 109 $\sqrt{"3.6^2 + 9.8^2"}$ or $\sqrt{109}$ (=10.4…) $\sqrt{"109" - 8.4^2}$	6.2	4	M1 M1 M1 A1	A correct first step to find *DB* Accept 10.4(403065...) rounded or truncated to at least 3 SF oe
					Total 4 marks