

Task 4

Question 1

Skill involved: 412b: Calculate the value of an expression using exact trigonometric ratios.

[AQA GCSE Mathematics (9-1) Nov 2023 Higher P1 Q20]

x and y are acute angles.

$$\sin x = \frac{\sqrt{3}}{2} \quad \tan y = 1$$

$$w = 3x - 2y$$

Work out the value of $\cos w$

$\cos w = \dots\dots\dots$

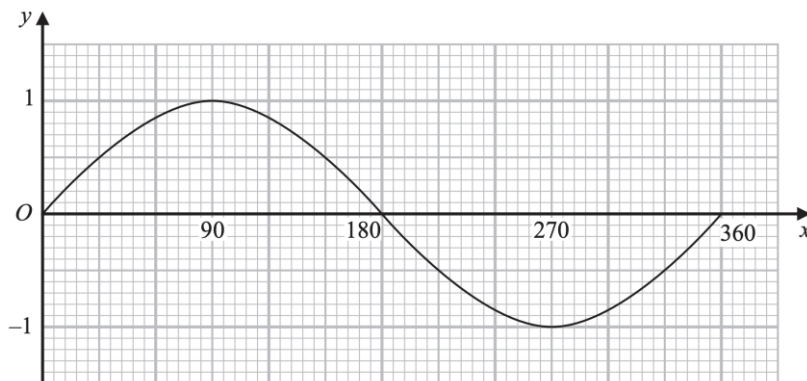
(3 marks)

Question 2

Skill involved: 434h: Use a graph to solve equations given in the form $\sin(x) = k$, $\cos(x) = k$ or $\tan(x) = k$ in a range greater than 0 to 360 degree, given only a graph for 0 to 360 degrees.

[Edexcel GCSE Nov 2021 2H Q18a]

Here is a graph of $y = \sin x^\circ$ for $0 \leq x \leq 360$.



Using this graph, find estimates of all **four** solutions of $\sin x^\circ = 0.6$ for $0 \leq x \leq 720$

$x = \dots\dots\dots$

$x = \dots\dots\dots$

$x = \dots\dots\dots$

$x = \dots\dots\dots$

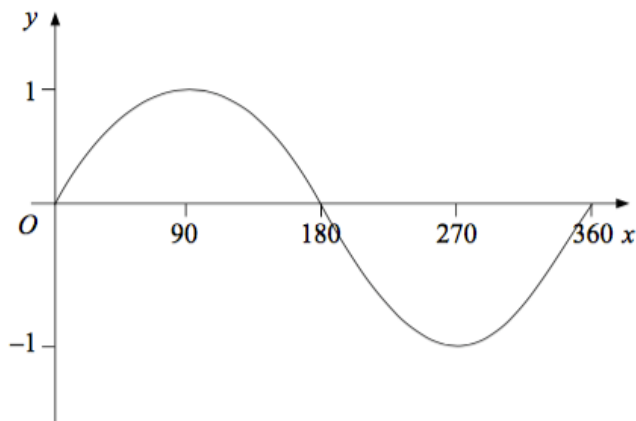
(2 marks)

Question 3

Skill involved: 434b: Recognise the values for which the output of a trigonometric function is equal but negated.

[Edexcel GCSE Nov 2006 5H Q19a(ii)]

Here is a sketch of the curve $y = \sin x^\circ$ for $0 \leq x \leq 360$.



Given that $\sin 30^\circ = \frac{1}{2}$, write down the value of $\sin 330^\circ$

.....

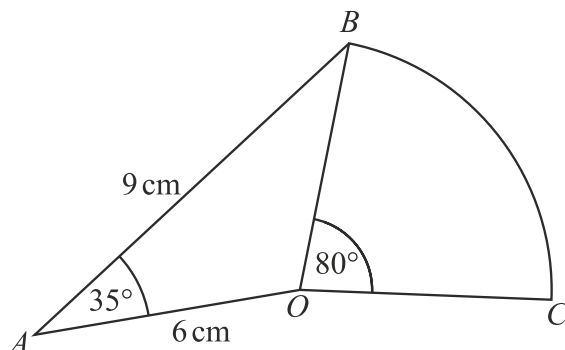
Question 4

Skill involved: E465: Sine rule (Law of Sines)

[Edexcel GCSE June 2023 3H Q14]

OAB is a triangle.

OBC is a sector of a circle, centre O



Calculate the area of OBC

Give your answer correct to 3 significant figures.

..... cm²

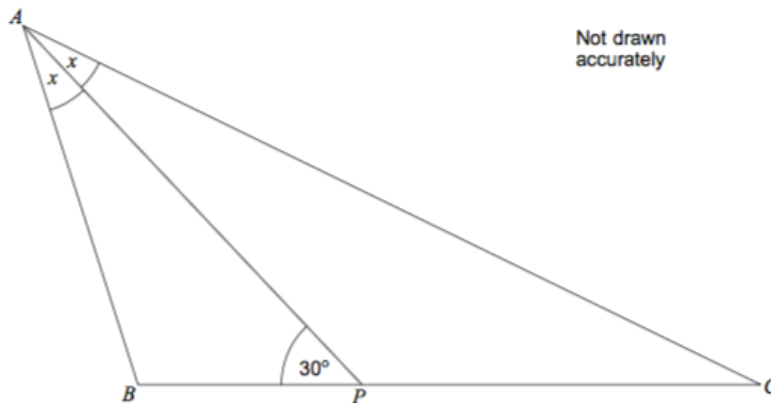
(4 marks)

Question 5

Skill involved: E465: Sine rule (Law of Sines)

[Edexcel GCSE Nov 2021 3H Q23 Edited]

In triangle ABC , AP bisects angle BAC .



Use the sine rule in triangles ABP and ACP to prove that $\frac{AB}{AC} = \frac{BP}{?}$ where $?$ is a line segment.

$? =$

(4 marks)

Question 6

Skill involved: 466c: Use the cosine rule/Law of Cosines to determine unknown angles in non right-angled triangles.

[WJEC GCSE Mathematics Jun 2022 Higher U2 Q15]

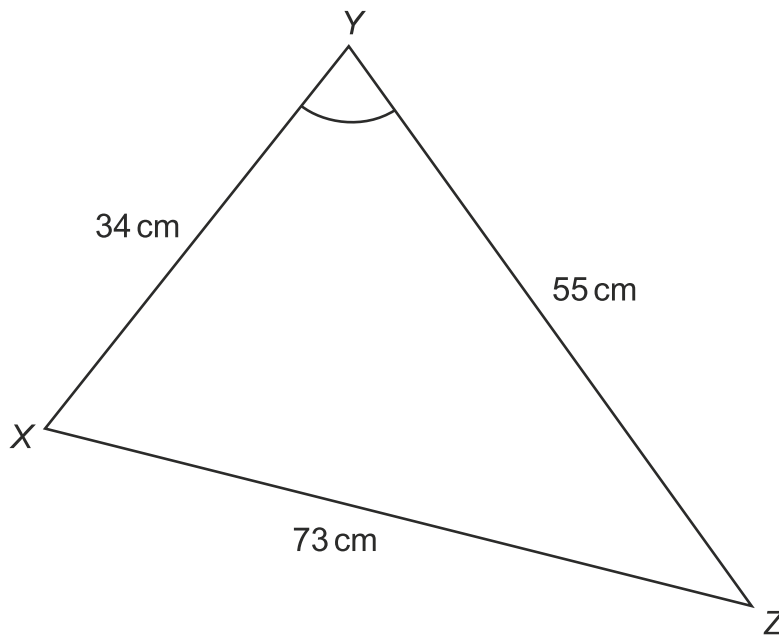


Diagram not drawn to scale

Calculate the size of $\angle XYZ$.

.....[°]
(3 marks)

Question 7

Skill involved: 465b: Use the sine rule/Law of Sines to determine acute angles in non right-angled triangles.

[Edexcel GCSE Nov2005-6H Q19a]

The diagram shows some of the markings on a baseball field.

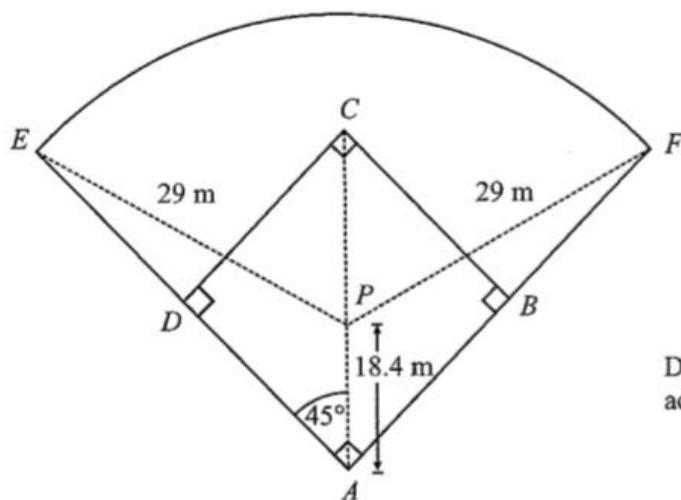


Diagram NOT
accurately drawn

$ABCD$ is a square.
 AC is a diagonal of $ABCD$.
 P is a point on AC .
 ADE and ABF are straight lines.

$AP = 18.4$ m.
 Angle $PAE = 45^\circ$

EF is an arc of the circle, centre P and radius 29 m.

By considering triangle PAE , calculate the size of angle AEP .
 Give your answer correct to 3 significant figures.

..... °

Question 8

Skill involved: 467a: Calculate the area of a triangle using two lengths and the included angle.

[Edexcel IGCSE Jan 2018 4H Q16a]

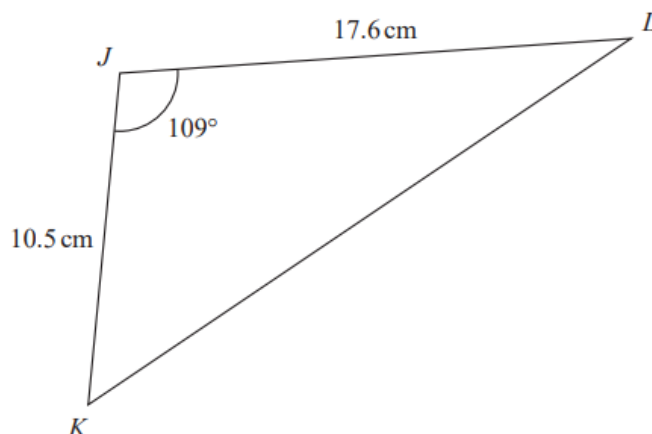


Diagram **NOT**
accurately drawn

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

..... cm²

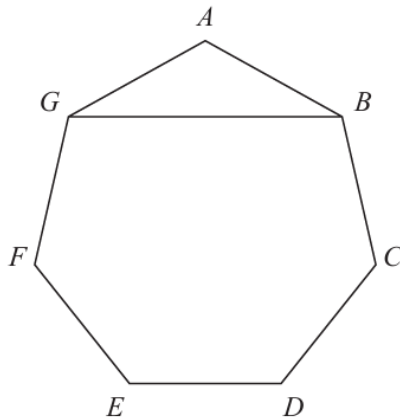
(2 marks)

Question 9

Skill involved: 467g: Calculate the length of the side opposite an angle in a triangle, using its area and another side.

[Edexcel GCSE Mathematics (9-1) Nov 2022 Higher P3 Q26]

$ABCDEFGH$ is a regular heptagon.



The area of triangle ABG is 30 cm^2

Calculate the length of GB .

Give your answer correct to 3 significant figures.

..... cm

(5 marks)

Question 10

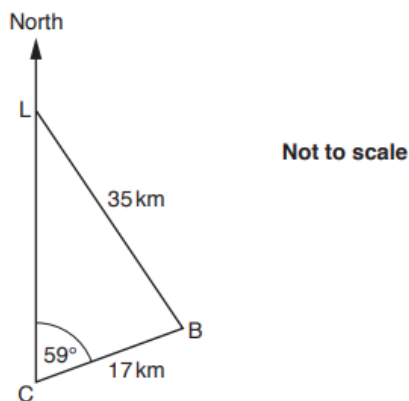
Skill involved: 469c: Use the sine rule/Law of Sines to determine a bearing.

[OCR GCSE Nov 2015 4H Q18]

A lighthouse, L , is due north of a coastguard station, C .

A boat, B , is 17 km from the coastguard station on a bearing of 059° .

The boat is 35 km from the lighthouse.



Calculate the bearing of the boat from the lighthouse.

.....^o

(4 marks)

Mark scheme

Question 1

$$\cos w = 0$$

Q	Answer	Mark	Comments
20	$(x =) 60$ or $(3x =) 180$ or $(y =) 45$ or $(2y =) 90$	M1	implied by $\sin 60$ or $\tan 45$ must be selected and not just in a table
	$3 \times 60 - 2 \times 45$ or $180 - 90$ or $(w =) 90$ or $\cos 90$	M1dep	
	0 with M2 awarded	A1	
	Additional Guidance		
	0 with no working		M0M0A0
	Condone degrees sign on answer with correct working		M1M1A1

Question 2

$$x = 37$$

$$x = 143$$

$$x = 397$$

$$x = 503$$

18	(a)	37, 143, 397, 503	M1	for any two correct angles within the ranges below or for a correct method to find a solution beyond 360, eg. "angle read from 0 to 360" + 360	Accept given as coordinates for M1 only
			A1	for all 4 angles in the range, 35 to 40, 140 to 145, 395 to 400 and 500 to 505	

Question 3

$$-\frac{1}{2}$$

Question 4

$$\text{cm}^2$$

19.9	P1	for substituting into the cosine rule to find OB , eg $(OB^2) = 9^2 + 6^2 - 2 \times 9 \times 6 \times \cos 35$	May be implied by $OB = 5.34...$ Values may be rounded or truncated.
	P1	for using correct order of operations eg $81 + 36 - 88.46... (= 28.5...)$	
	P1	for process to find the area of the sector, eg $\frac{80}{360} \times \pi \times "5.34..."^2$	
	A1	for answer in the range 19.8 to 20	

If a correct answer within the range is shown but incorrectly rounded award full marks.

Question 5

PC or CP

Question	Answer	Mark	Mark scheme	Additional guidance
23	Proof (supported)	M1	for using the sine rule on triangle ABD or on triangle ADC , to involve sides AB , BD , AC , or DC eg $\frac{AB}{\sin ADB} = \frac{BD}{\sin x}$ or $\frac{AC}{\sin ADC} = \frac{DC}{\sin x}$ or OR for an expression for the area of triangle ABD or for the area of triangle ADC eg $\frac{1}{2} AB \cdot AD \sin x$ or $\frac{1}{2} AD \cdot AC \sin x$ or $\frac{1}{2} h \cdot BD$ or $\frac{1}{2} h \cdot DC$	Accept extra letters eg y shown on diagram for any angle used
		M1	for using the sine rule on both triangle ABD and on triangle ADC , to involve sides AB , BD , AC , or DC eg $\frac{AB}{\sin ADB} = \frac{BD}{\sin x}$ or $\frac{AC}{\sin ADC} = \frac{DC}{\sin x}$ or OR for two expressions for the area of either triangle ABD or for triangle ADC eg $\frac{1}{2} AB \cdot AD \sin x$ and $\frac{1}{2} h \cdot BD$ or $\frac{1}{2} AD \cdot AC \sin x$ and $\frac{1}{2} h \cdot DC$	
		M1	for stating or showing $\sin ADB = \sin ADC$, eg $\sin y = \sin (180 - y)$ OR for using two expressions to form an equation eg $\frac{1}{2} AB \cdot AD \sin x = \frac{1}{2} h \cdot BD$ or $\frac{1}{2} AD \cdot AC \sin x = \frac{1}{2} h \cdot DC$	
		C1	for a full method to arrive at the given answer	

Question 6

 108°

15. $(\cos XYZ =) \frac{34^2 + 55^2 - 73^2}{2 \times 34 \times 55}$ ($= -\frac{287}{935}$ OR $-0.30695...$)	M2
$(XYZ =) 107.8(75...^\circ)$ or $107.9(^\circ)$ or $108(^\circ)$	A1

Question 7

 26.7°

Question 8

 87.4 cm^2

$\frac{1}{2} \times 10.5 \times 17.6 \times \sin(109^\circ)$	87.4
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Question 9

cm

15.8	P1 starts process by finding an angle, eg exterior angle = $360 \div 7$ (= 51.42...) or interior angle = $\frac{900}{7}$ or $180 - (360 \div 7)$ (= 128.57...) oe P1 start of process to find length of side by using area, eg $\frac{1}{2} \times AB \times AG \times \sin GAB = 30$ oe or $\frac{1}{2} \times a \times b \times \sin [128.5 \dots] = 30$ oe or $\frac{1}{2} \times x \times x \times \sin [128.5 \dots] = 30$ oe or $\frac{1}{2} \times AG \times \frac{1}{2}GB \times \sin AGB = 15$ oe or for a relationship linking GB and h, $\frac{1}{2} \times GB \times h = 30$ oe P1 for process to find the length of a side of the polygon eg $\sqrt{\frac{2 \times 30}{\sin "128.5..."}}$ oe (= 8.76...) or for process to get a second relationship linking AG and $\frac{1}{2}GB$, eg $AG \times \cos "25.7..." = \frac{1}{2}GB$ oe or for process to get a second relationship linking GB and h, eg $\tan "25.7..." = \frac{h}{\frac{1}{2}GB}$ oe	Accept values to 3 figures rounded Any symbols used in formulae must be consistent with any labels on the diagram. For this mark, [128.5...] does not have to be from a correct process but is the value the student believes is the interior angle
	P1 for complete process to find GB eg $\frac{"8.76..." \times \sin "128.5..."}{\sin "25.7..."}$ oe or $\sqrt{"8.76"{}^2 + "8.76"{}^2 - 2 \times "8.76"{}^2 \times \cos "128.5..."}$ oe or $2 \times "8.76..." \times \sin "64.2..."$ or $2 \times "8.76..." \times \cos "25.7..."$ oe or $\sqrt{\frac{2 \times 60}{\tan "25.7..."}}$ oe A1 for answer in the range 15.7 to 15.8	

Question 10

155°

155[4...]	4	B3 for 24.6[0...] seen OR M2 for $\sin L = \frac{17 \sin 59}{35}$ Or M1 for $\frac{\sin L}{17} = \frac{\sin 59}{35}$ oe AND M1 for $180 - \text{their } L$	<i>Their L in range $0 < L < 90$ and resulting from trig</i>
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