Sine Rule - Worksheet

Skill

Group A - Change the subject

Make x the subject for the following equations.

1) $\frac{x}{a} = b$

2) $\frac{x}{a^2} = b$

3) $a = \frac{x}{b}$

4) $\frac{x}{ab} = 5$

5) $ax = b$

6) $\frac{x}{a} = \frac{b}{c}$

7) $\frac{x}{\sin(a)} = b$

8) $\frac{x}{\sin(a)} = \frac{b}{c}$

9) $\frac{x}{\sin(a)} = \frac{y}{\sin(b)}$

Group B - Change the subject

Make θ the subject for the following equations. Let O represent the opposing side of a right angled triangle, A is the adjacent side, and H is the hypotenuse.

1) $\sin(\theta) = O$

2) $\cos(\theta) = A$

3) $\tan(\theta) = O$

4) $\sin(\theta) = \frac{O}{H}$

5) $H\sin(\theta) = O$

6) $\frac{H}{O} = \frac{1}{\sin(\theta)}$

7) $\frac{H\sin(\theta)}{O} = 1$

8) $y = \frac{x}{\sin(\theta)}$

9) $\frac{x}{\sin(\theta)} = \frac{y}{\sin(z)}$

Group C - Evaluating the sine rule

Use a calculator to find the missing angle θ, or length x, correct to 3 significant figures.

1) $x = \frac{743\sin(60)}{\sin(60)}$

2) $\frac{x}{\sin(90)} = \frac{180}{\sin(50)}$

3) $\frac{x}{\sin(34)} = \frac{34.8}{\sin(114)}$

4) $\frac{282}{\sin(72)} = \frac{x}{\sin(36)}$

5) $\frac{x}{\sin(64)} = \frac{209}{\sin(68)}$

6) $\sin(\theta) = \frac{12.2 \times \sin(71)}{15.5}$

7) $\frac{\sin(\theta)}{111} = \frac{\sin(40)}{149}$

8) $\frac{\sin(\theta)}{1800} = \frac{\sin(63)}{2010}$

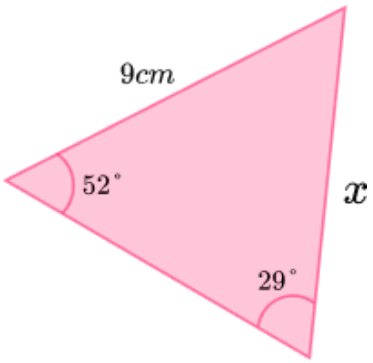
9) $\theta = \sin^{-1}\left(\frac{11.7\sin(45)}{11.9}\right)$

Sine Rule - Worksheet

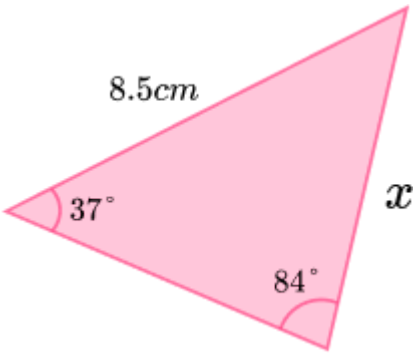
Group D - Using the sine rule

Find the missing angle θ, or length x, for each triangle. All diagrams are not drawn to scale.

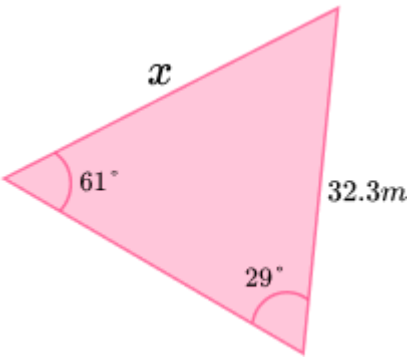
1)



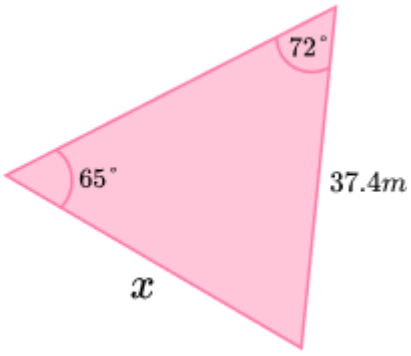
2)



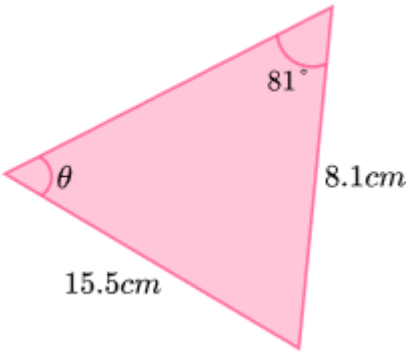
3)



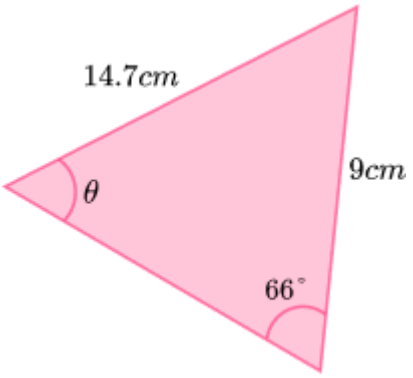
4)



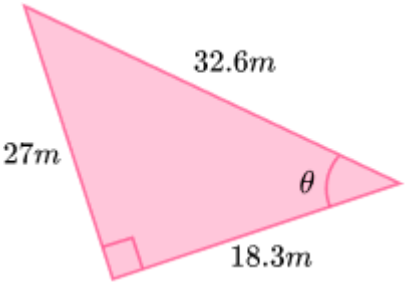
5)



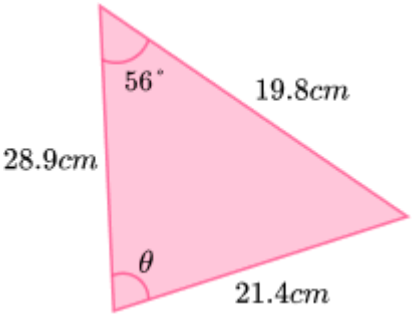
6)



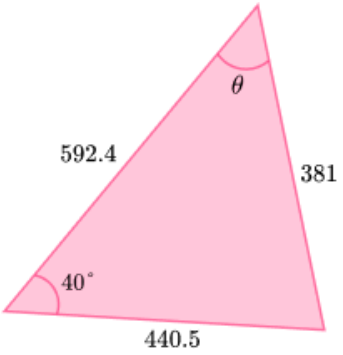
7)



8)



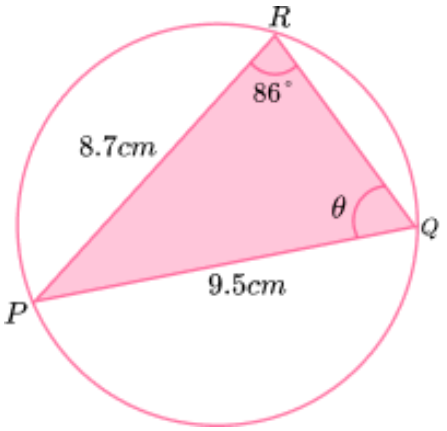
9)



Sine Rule - Worksheet

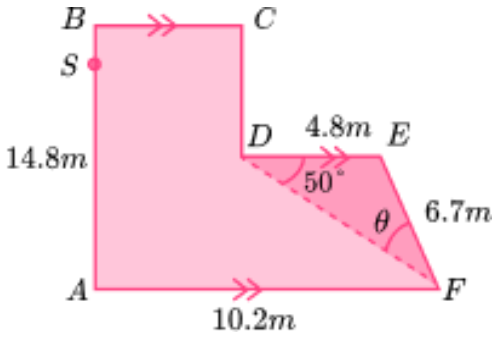
Applied

1) **(a)** Triangle PQR is inscribed in a circle.
Calculate the size of angle θ.



(b) Hence or otherwise find the length of QR to 2 decimal places.

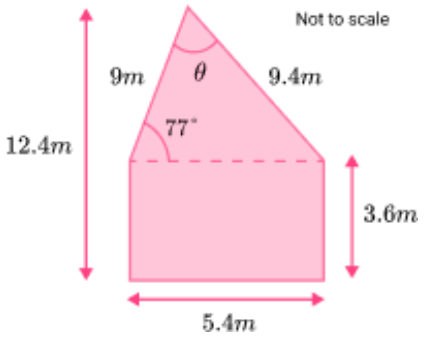
2) A security camera is placed on the wall AB in position S. The region DEF is not covered by the security camera.



Calculate the angle between the line of sight between S and F and the corner E correct to 2 decimal places.

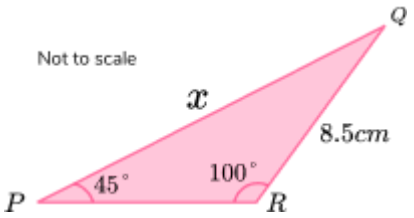
Sine Rule - Worksheet

3) Below is a diagram of the cross section of a building. Using the information provided, calculate the size of angle θ correct to 3 significant figures.



Sine Rule - Exam Questions

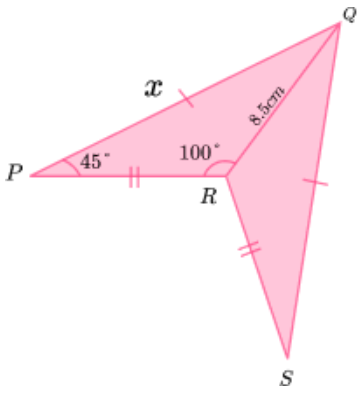
1) **(a)** Work out the length of side PQ, correct to 2 decimal places.



.....

(2)

(b) Using your solution to part (a), calculate the perimeter of the arrowhead $PQSR$.



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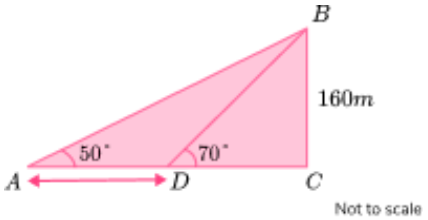
(4)

(6 marks)

Sine Rule - Exam Questions

2) A firework explodes in the air at B, $160m$ directly above C. Two people watch it explode from A and D.



What is the distance between A and D.

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(4 marks)

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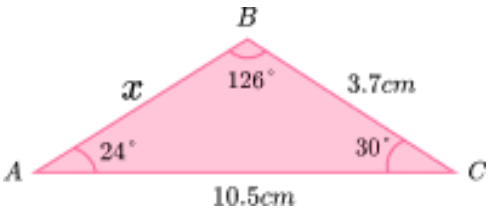
3) (a) To the right is a triangle ABC.



Circle the correct equation.

$$\frac{sin(x)}{30} = \frac{10.5}{sin(126)} \qquad \frac{x}{sin(30)} = \frac{3.7}{sin(126)}$$

$$\frac{x}{sin(30)} = \frac{3.7}{sin(24)} \qquad \frac{sin(30)}{x} = \frac{sin(126)}{sin(24)}$$

(1)

(b) Hence or otherwise, calculate the value for x.

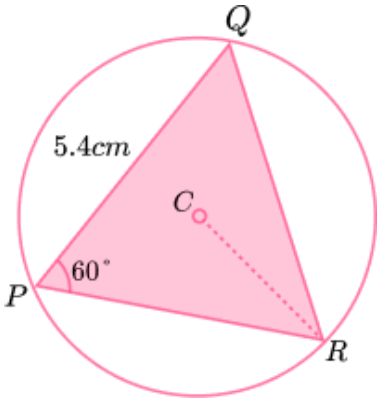
.....

(1)

(2 marks)

Sine Rule - Exam Questions

4) The equilateral triangle PQR is inscribed in a circle with centre C.
Calculate the radius of the circle.



.....

(4 marks)

Sine Rule - Answers

	Question	Answer
	Skill Questions	
Group A	Make x the subject for the following equations. **1)** $\frac{x}{a} = b$ **2)** $\frac{x}{a^2} = b$ **3)** $a = \frac{x}{b}$ **4)** $\frac{x}{ab} = 5$ **5)** $ax = b$ **6)** $\frac{x}{a} = \frac{b}{c}$ **7)** $\frac{x}{\sin(a)} = b$ **8)** $\frac{x}{\sin(a)} = \frac{b}{c}$ **9)** $\frac{x}{\sin(a)} = \frac{y}{\sin(b)}$	 **1)** $x = ab$ **2)** $x = a^2b$ **3)** $x = ab$ **4)** $x = 5ab$ **5)** $x = \frac{b}{a}$ **6)** $x = \frac{ab}{c}$ **7)** $x = b\sin(a)$ **8)** $x = \frac{b\sin(a)}{c}$ **9)** $x = \frac{y\sin(a)}{\sin(b)}$

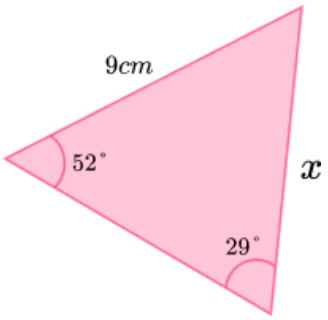
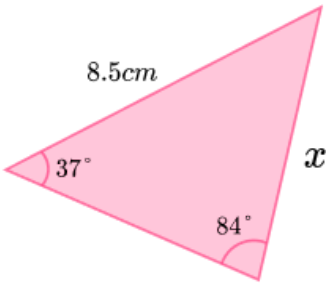
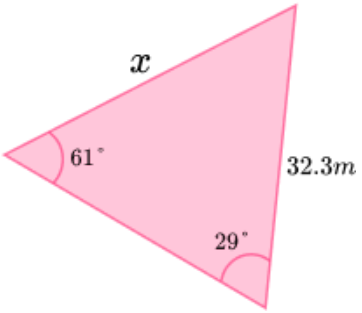
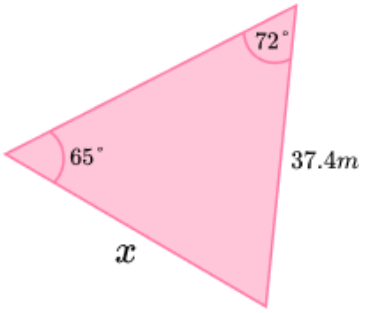
Sine Rule - Answers

Group B	Make θ the subject for the following equations. Let O represent the opposing side of a right angled triangle, A is the adjacent side, and H is the hypotenuse.	
	1) $\sin(\theta) = O$	**1)** $\theta = \sin^{-1}(O)$
	2) $\cos(\theta) = A$	**2)** $\theta = \cos^{-1}(A)$
	3) $\tan(\theta) = O$	**3)** $\theta = \tan^{-1}(O)$
	4) $\sin(\theta) = \frac{O}{H}$	**4)** $\theta = \sin^{-1}\left(\frac{O}{H}\right)$
	5) $H\sin(\theta) = O$	**5)** $\theta = \sin^{-1}\left(\frac{O}{H}\right)$
	6) $\frac{H}{O} = \frac{1}{\sin(\theta)}$	**6)** $\theta = \sin^{-1}\left(\frac{O}{H}\right)$
	7) $\frac{H\sin(\theta)}{O} = 1$	**7)** $\theta = \sin^{-1}\left(\frac{O}{H}\right)$
	8) $y = \frac{x}{sin(\theta)}$	**8)** $\theta = \sin^{-1}\left(\frac{x}{y}\right)$
	9) $\frac{x}{\sin(\theta)} = \frac{y}{\sin(z)}$	**9)** $\theta = \sin^{-1}\left(\frac{x\sin(z)}{y}\right)$

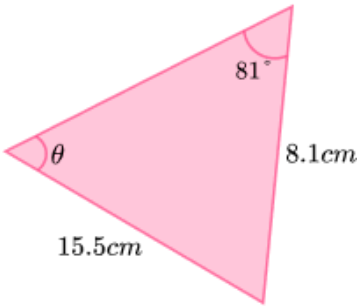
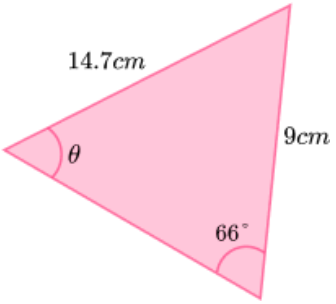
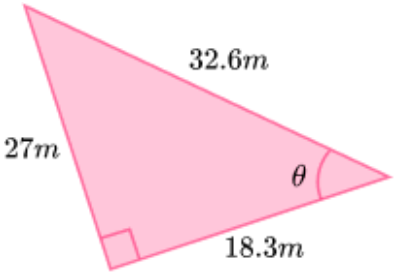
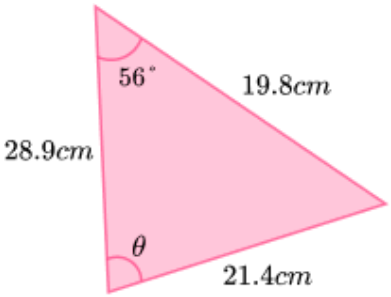
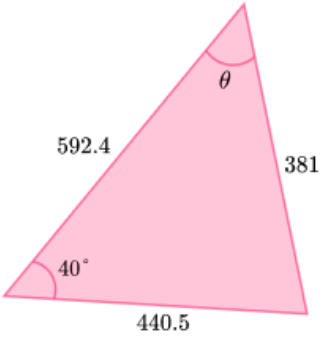
Sine Rule - Answers

Group C	Use a calculator to find the missing angle (θ) or length (x) correct to 3 significant figures. **1)** $x = \frac{743\sin(60)}{\sin(60)}$ **2)** $\frac{x}{\sin(90)} = \frac{180}{\sin(50)}$ **3)** $\frac{x}{\sin(34)} = \frac{34.8}{\sin(114)}$ **4)** $\frac{282}{\sin(72)} = \frac{x}{\sin(36)}$ **5)** $\frac{x}{\sin(64)} = \frac{209}{\sin(68)}$ **6)** $\sin(\theta) = \frac{12.2 \times \sin(71)}{15.5}$ **7)** $\frac{\sin(\theta)}{111} = \frac{\sin(40)}{149}$ **8)** $\frac{\sin(\theta)}{1800} = \frac{\sin(63)}{2010}$ **9)** $\theta = \sin^{-1}\left(\frac{11.7\sin(45)}{11.9}\right)$	**1)** $x = 743$ **2)** $x = 235$ **3)** $x = 21.3$ **4)** $x = 174$ **5)** $x = 203$ **6)** $\theta = 48.1°$ **7)** $\theta = 28.6°$ **8)** $\theta = 52.9°$ **9)** $\theta = 44.0°$

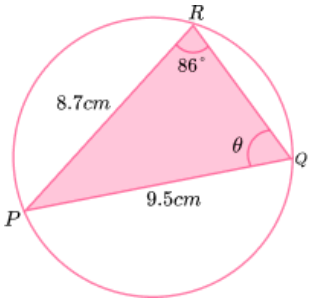
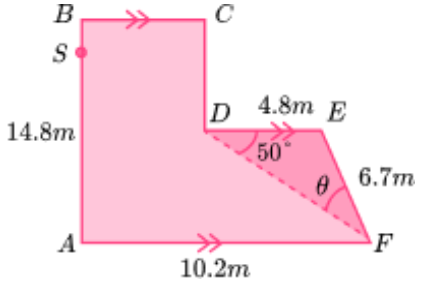
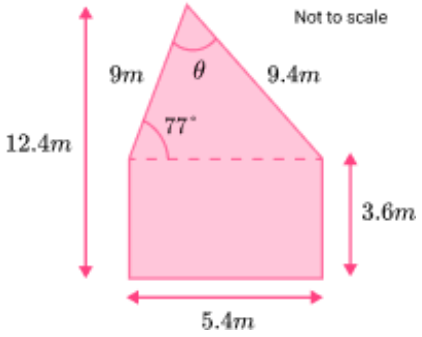
Sine Rule - Answers

Group D	Find the missing angle (θ) or length (x) for each triangle. All diagrams are not drawn to scale. **1)**  **2)**  **3)**  **4)**  	**1)** $x = 14.6\ cm$ **2)** $x = 5.14\ cm$ **3)** $x = 17.9\ m$ **4)** $x = 39.25\ m$

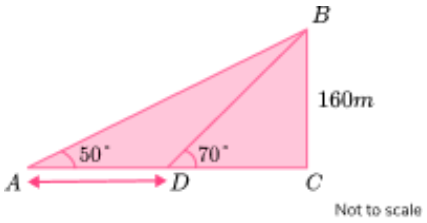
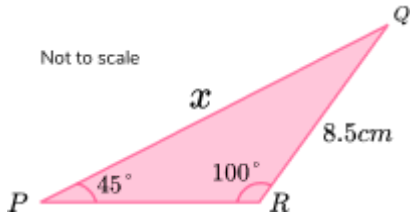
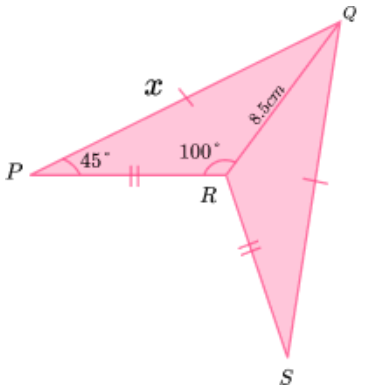
Sine Rule - Answers

Group D continued	**5)** 	**5)** $\theta = 31.07°$
	6) 	**6)** $\theta = 34.01°$
	7) 	**7)** $\theta = 55.92°$
	8) 	**8)** $\theta = 50.09°$
	9) 	**9)** $\theta = 48.00°$

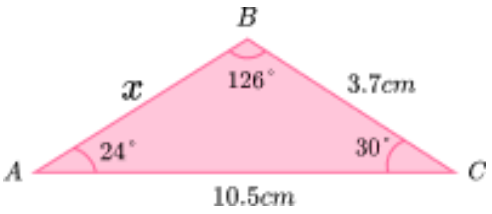
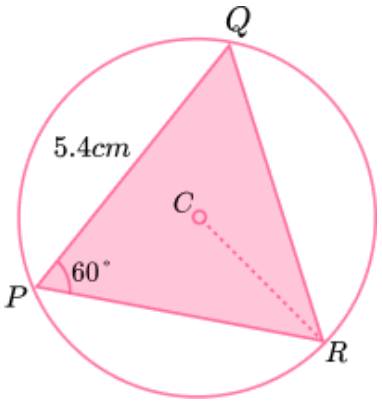
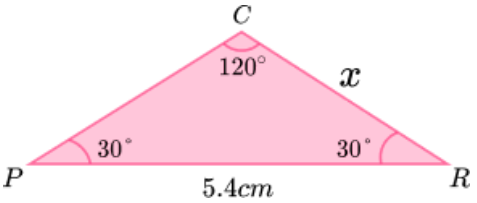
Sine Rule - Answers

	Question	Answer
	Applied Questions	
1)	**a)** Triangle PQR is inscribed in a circle. Calculate the size of angle θ.  **b)** Hence or otherwise find the length of QR to 2 decimal places.	**a)** $66.0°$ **b)** $4.47\ cm$
2)	A security camera is placed on the wall AB in position S. The unshaded region is not covered by the security camera.  Calculate the angle between the line of sight between S and F and the corner E correct to 2 decimal places.	$\theta = 33.29°$
3)	Below is a diagram of the cross section of a building. Using the information provided, calculate the size of angle θ correct to 3significant figures.  	$\theta = 34.0°$

Sine Rule - Mark Scheme

	Question	Answer	
	Exam Questions		
1)	A firework explodes in the air at B, $160m$ directly above C. Two people watch it explode from A and D.  What is the distance between A and D.	$\sin(70) = \frac{160}{BD}$ $BD = 170.268...$ $\frac{AD}{\sin(20)} = \frac{170.268...}{\sin(50)}$ $76.0\ m$ (3sf)	**(1)** **(1)** **(1)** **(1)**
2) (a)	Work out the length of side PQ, correct to 2 decimal places. 	**(a)** $\frac{x}{\sin(100)} = \frac{8.5}{\sin(45)}$ $11.84\ cm$ (2dp)	**(1)** **(1)**
(b)	Using your solution to part (a), calculate the perimeter of the arrowhead $PQSR$. 	**(b)** $\frac{PR}{\sin(35)} = \frac{8.5}{\sin(45)}$ $PR = 6.89...$ Perimeter $= 2 \times (6.89 + 11.84)$ $37.5\ cm$ (1dp)	**(1)** **(1)** **(1)** **(1)**

Sine Rule - Mark Scheme

3) (a)	Below is a triangle ABC.  Circle the correct equation. $\frac{\sin(x)}{30} = \frac{10.5}{\sin(126)}$ $\frac{x}{\sin(30)} = \frac{3.7}{\sin(126)}$ $\frac{x}{\sin(30)} = \frac{3.7}{\sin(24)}$ $\frac{\sin(30)}{x} = \frac{\sin(126)}{\sin(24)}$	**(a)** $\frac{x}{\sin(30)} = \frac{3.7}{\sin(24)}$	**(1)**
(b)	Hence or otherwise, calculate the value for x.	**(b)** $x = 4.55\ cm$ (2dp)	**(1)**
4)	The equilateral triangle PQR is inscribed in a circle with centre C. Calculate the radius of the circle.  	 Angles 120°, 30°, 30° **seen** PR = 5.4cm $\frac{x}{\sin(30)} = \frac{5.4}{\sin(120)}$ $r = 3.12$ (3sf)	**(1)** **(1)** **(1)** **(1)**

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