

Sine and Cosine Rules and Area of a Triangle MS (From OCR 4722)

Q1, (Jan 2008, Q4)

<p>(i) $\frac{BD}{\sin 62} = \frac{16}{\sin 50}$ $BD = 18.4 \text{ cm}$</p>	<p>M1</p> <p>A1 2</p>	<p>Attempt to use correct sine rule in $\triangle BCD$, or equiv.</p> <p>Obtain 18.4 cm</p>
<p>(ii) $18.4^2 = 10^2 + 20^2 - 2 \times 10 \times 20 \times \cos \theta$ $\cos \theta = 0.3998$</p> <p>$\theta = 66.4^\circ$</p>	<p>M1</p> <p>M1</p> <p>A1 3</p>	<p>Attempt to use correct cosine rule in $\triangle ABD$</p> <p>Attempt to rearrange equation to find $\cos BAD$ (from $a^2 = b^2 + c^2 \pm (2)bc \cos A$)</p> <p>Obtain 66.4°</p>
<p>5</p>		

Q2, (Jun 2008, Q6)

<p>(i) $ABC = 360 - (150 + 110) = 100^\circ$ A.G.</p>	<p>B1</p> <p>1</p>	<p>Show convincingly that angle ABC is 100°</p>
<p>(ii) $CA^2 = 15^2 + 27^2 - 2 \times 15 \times 27 \times \cos 100^\circ$ $= 1094.655\dots$ $CA = 33.1$</p>	<p>M1</p> <p>A1</p> <p>2</p>	<p>Attempt use of correct cosine rule</p> <p>Obtain 33.1 km</p>
<p>(iii) $\frac{\sin C}{15} = \frac{\sin 100}{33.1}$ or $\frac{\sin A}{27} = \frac{\sin 100}{33.1}$</p> <p>$C = 26.5^\circ$ $A = 53.5^\circ$</p> <p>Hence bearing is 263°</p>	<p>M1</p> <p>A1√</p> <p>A1</p> <p>A1√</p> <p>4</p>	<p>Attempt use of sine rule to find angle C or A (or equiv using cosine rule)</p> <p>Correct unsimplified eqn, following their CA</p> <p>Obtain $C = 26.5^\circ$ or $A = 53.5^\circ$ (allow 53.4°)</p> <p>Obtain 263 or 264 (or 290° – their angle C / $210 +$ their angle A)</p>

Q3, (Jun 2011, Q1)

<p>(i) $BC^2 = 9^2 + 17^2 - 2 \times 9 \times 17 \times \cos 40^\circ$ $BC = 11.6 \text{ cm}$</p>	<p>M1</p>	<p>Attempt use of correct cosine rule</p>
<p>A1 2 Obtain 11.6, or better</p>		
<p>(ii) $\text{area} = \frac{1}{2} \times 9 \times 17 \times \sin 40$ $= 49.2 \text{ cm}^2$</p>	<p>M1</p>	<p>Attempt triangle area using $(\frac{1}{2})ab \sin C$, or equiv</p>
<p>A1 2 Obtain 49.2, or better</p>		

(iii) $\frac{BD}{\sin 40} = \frac{9}{\sin 63}$

$BD = 6.49 \text{ cm}$

M1 Attempt use of correct sine rule, or equiv, to find length BD

A1 Obtain correct unsimplified expression involving BD as the only unknown

A1 3 Obtain 6.49, or better

Q4, (Jan 2012, Q4)

(i)	$b^2 = 2.4^2 + 2^2 - 2 \times 2.4 \times 2 \times \cos 40^\circ$ $b = 1.55 \text{ km}$	M1	Attempt use of correct cosine rule
		A1	Obtain 1.55, or better
		[2]	
(ii)	$\frac{\sin A}{2} = \frac{\sin 40}{1.55} \quad \frac{\sin C}{2.4} = \frac{\sin 40}{1.55}$ $A = 56^\circ \quad C = 84^\circ$ <p>hence bearing is 124°</p>	M1	Attempt to find one of the other two angles in triangle
		A1	Obtain $A = 56^\circ$, or $C = 84^\circ$
		A1ft	Obtain 124° , following their angle A or C
		[3]	
(iii)	$d = 2 \times \sin 40^\circ$ $= 1.29 \text{ km}$	M1	Attempt perpendicular distance
		A1	Obtain 1.29, or better
		[2]	

Q5, (Jun 2017, Q1)

<p>(i)</p>	$(2\sqrt{7})^2 = x^2 + (x + 2)^2 - 2x(x + 2)\cos 60$ $x^2 + 2x - 24 = 0$ $(x + 6)(x - 4) = 0$ $x = 4$	<p>M1</p>	<p>Attempt use of correct cosine rule</p>
		<p>A1</p>	<p>Obtain correct 3 term quadratic</p>
		<p>M1</p>	<p>Attempt to solve 3 term quadratic equation</p>
		<p>A1</p> <p>[4]</p>	<p>Obtain $x = 4$ only</p>
<p>(ii)</p>	$\frac{1}{2} \times 4 \times 6 \times \sin 60$ $= 6\sqrt{3}$	<p>M1</p>	<p>Attempt area of the triangle, using their x</p>
		<p>A1</p>	<p>Obtain $6\sqrt{3}$</p>
		<p>[2]</p>	