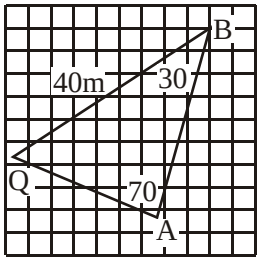
MARKSCHEME for Triangle Trig Review Questions from past IB exams

1. (a) $\frac{PQ}{40} = \tan 36°$

$\Rightarrow PQ \approx 29.1$ m (3 sf) (A1) (C1)

(b)



$A\hat{Q}B = 80°$ (A1)

$\frac{AB}{\sin 80°} = \frac{40}{\sin 70°}$ (M1)

Note: *Award (M1) for correctly substituting.*

$\Rightarrow AB = 41\ 9.$ m (3 sf) (A1) (C3)

[4]

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2. (a) $\frac{\sin(A\hat{C}B)}{20} = \frac{\sin 50°}{17}$ (M1)

$\Rightarrow \sin(A\hat{C}B) = \frac{20\sin 50°}{17} = 0.901$

$A\hat{C}B > 90° \Rightarrow A\hat{C}B = 180° - 64.3° = 115.7°$

$A\hat{C}B = 116$ (3 sf) (A1) (C2)

(b) In Triangle 1, $A\hat{C}B = 64.3°$

$\Rightarrow B\hat{A}C = 180° - (64.3° + 50°)$

$= 65.7°$ (A1)

Area $= \frac{1}{2}(20)(17)\sin 65.7° = 155\ (cm^2)$ (3 sf) (A1) (C2)

[4]

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3. note this is an HL question

METHOD 1

$\frac{\sin 50°}{8.71} = \frac{\sin \hat{B}}{10.9}$ (M1)

$\sin \hat{B} = 0.958(65...)$ (A1)

Finding the obtuse value of $\hat{B}$ from the range 106 to 107 M1

Finding $\hat{C}$ from the range 23 to 24 (M1)

Area ABC $= \frac{1}{2} \times 10.9 \times 8.71 \times \sin \hat{C}$ M1

$= 18.9\ (cm^2)$ A1 N0

METHOD 2

Using cosine rule (M1)

$8.71^2 = AB^2 + 10.9^2 - 2AB \times 10.9 \cos 50°$ (A1)

Solving a quadratic in AB (M1)

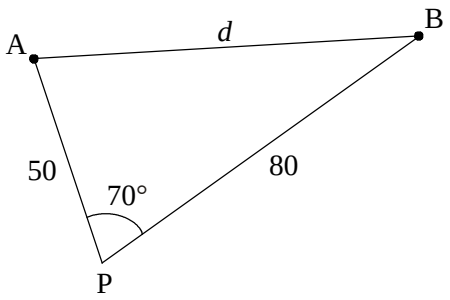
choosing AB = 4.52(7...) M1

Area triangle ABC = $\frac{1}{2} \times 10.9 \times AB \sin 50°$ M1

= 18.9 (cm^2) A1 N0

[6]

4.



(M1)(A2)

OR

2.5 × 20 = 50 (M1)(A1)

2.5 × 32 = 80 (A1)

$d^2 = 50^2 + 80^2 - 2 \times 50 \times 80 \times \cos 70°$ (M1)(A1)

d = 78.5 km (A1) (C6)

[6]

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5. Area of a triangle = $\frac{1}{2} \times 3 \times 4 \sin A$ (A1)

$\frac{1}{2} \times 3 \times 4 \sin A = 4.5$ (A1)

$\sin A = 0.75$ (A1)

A = 48.6° and A = 131° (or 0.848, 2.29 radians) (A1)(A2) (C6)

Note: *Award (C4) for 48.6° only, (C5) for 131° only.*

[6]

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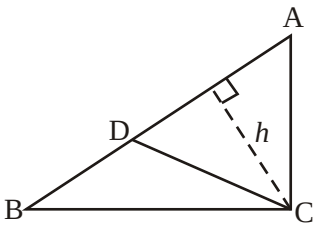
6. (a) $\frac{6}{\sin A} = \frac{\frac{7\sqrt{2}}{2}}{\sin 45°}$ (M1)

$\sin A = 6 \times \frac{\sqrt{2}}{2} \times \frac{2}{7\sqrt{2}}$ (A1)

$= \frac{6}{7}$ (AG) 2

(b)



(i) $B\hat{D}C + B\hat{A}C = 180°$ (A1)

(ii) $\sin A = \frac{6}{7}$

=> A = 59.0° or 121° (3 sf) (A1)(A1)

=> $B\hat{C}D = 180° - (121° + 45°)$

= 14.0° (3 sf) (A1)

(iii) $\frac{BD}{\sin 14°} = \frac{\frac{7\sqrt{2}}{2}}{\sin 45°}$ (M1)

=>BD = 1.69 (A1) 6

(c) $\frac{\text{Area } \Delta BDC}{\text{Area } \Delta BAC} = \frac{\frac{1}{2} \times BD \times h}{\frac{1}{2} \times BA \times h}$ (M1)(A1)

$= \frac{BD}{BA}$ (AG) 2

OR

$\frac{\text{Area } \Delta BCD}{\text{Area } \Delta BAC} = \frac{\frac{1}{2} BD \times 6 \sin 45}{\frac{1}{2} BA \times 6 \sin 45}$ (M1)(A1)

$= \frac{BD}{BA}$ (AG) 2

[10]

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7. (a) For **correct** substitution into cosine rule A1

BD = $\sqrt{4^2 + 8^2 - 2 \times 4 \times 8 \cos\theta}$

For factorizing 16, BD = $\sqrt{16(5 - 4\cos\theta)}$ A1

$= 4\sqrt{5 - 4\cos\theta}$ AG N0

(b) (i) BD = 5.5653 ... (A1)

$\frac{\sin C\hat{B}D}{12} = \frac{\sin 25}{5.5653}$ M1A1

sin $C\hat{B}D$ = 0.911 (accept 0.910, subject to ***AP***) A1 N2

(ii) $C\hat{B}D$ = 65.7° A1 N1

Or $C\hat{B}D$ = 180 – their acute angle (M1)

= 114° A1 N2

(iii) $B\hat{D}C$ = 89.3° (A1)

$\frac{BC}{\sin 89.3} = \frac{5.5653}{\sin 25}$ or $\frac{BC}{\sin 89.3} = \frac{12}{\sin 65.7}$ (or cosine rule) M1A1

BC = 13.2 (accept 13.17…) A1

Perimeter = 4 + 8 + 12 + 13.2

= 37.2 A1 N2

(c) Area = $\frac{1}{2} \times 4 \times 8 \times \sin 40°$ A1

= 10.3 A1 N1

[16]