Topic 20 Further trigonometry (Pre-TT) [36] MARKSCHEME

1.

$HF^2 = 5^2 + 12^2$ M1

$DF^2 = 5^2 + 5^2 + 12^2 = 194$
$DF = 13.9(2....)$ gets M1,A1.

$HF = 13$ A1

B2 if HF = 13 stated

Correct Right angled triangle DFH M1

Follow through their HF if first M1 awarded
Do not accept lines on diagram joining DF and FH as evidence unless right angled marked or something done with lengths

$\tan^{-1}(5/13)$ DM1

DM1 if both previous M's awarded.
DM1 for appropriate ratio if other lengths used.

$=21(.0...)°$ A1ft

Ft on HF or DF only.

[5]

2.

(a) $\frac{\text{Sin B}}{19} = \frac{\text{Sin 60}}{17}$ M1

Accept $\frac{19}{\sin B} = \frac{17}{\sin 60}$

Sin B = 0.9679(1...) A1

B = 75.4(...) A1

(b) $x^2 = 22^2 + 23^2 - 2 \times 22 \times 23 \times \cos 48$ M1

$x^2 = 335.8(...)$ A1

$x = 18.32(....)$ A1ft

ft only if an error made in calculation of x^2
but not on $(22^2 + 23^2 - 2 \times 22 \times 23\ (=1))\cos 48$
$(=\sqrt{0.669} = 0.818)$

18 or 18.3 B1ft

Independent mark. Award if value > 3sf seen or calculation seen.

[7]

3.

Angle APB = 82° B1

$x^2 = 18^2 + 25^2 - 2 \times 18 \times 25 \times \cos 82$ M1

Use of cosine rule 324 + 625 – 900 cos (their angle)
(= 949 – 125.25 = 823.7....)
f.t their angle for M1.

$x^2 = 823.7(.....)$ A1ft

x = 49 cos 82 or 6.81948.....gets M1, A0, A0

x = 28.7(.....) A1ft

Follow through on an incorrect angle only

[4]

4.

Identifying VAC B1

Can be implied by working

$AC^2 = 15^2 + 15^2$ *oe* M1

$\frac{1}{2}$ AC = 10.6(066...) A1

$\sqrt{450} \div 2$ *is A1,* $\sqrt{450}$ *is Al if used in cos rule on VAC*

VAC = $\cos^{-1}$ (their $\frac{1}{2}$AC ÷20) M1

VAC = 57.97 ... ° or 58° A1

[5]

5.

Choosing ∠ B M1

$5^2 + 8^2 - 9^2$ M1

this is positive, so ∠ B is acute A1

SC 1 for cosine rule on ∠A or C with same conclusion

[3]

6.

Angle ATB = 13° B1

$\frac{BT}{\sin 18} = \frac{20}{\sin 13}$ M1, A1

M1 for use of sine rule,
A1 for correct substitution.
$\frac{AT}{sin149} = \frac{20}{sin13}$

BT = 27.47 (41539..) A1
AT = 45.79112344

H = BT × sin31 M1

H=14.2 or 14.15(.....) A1ft
Ft only if both Ms awarded.
NB 14.2 can come from BT = 27.5 or AT = 46
Deduct 1 for pa if seen.

[6]

7.

	$\cos x = \frac{OA}{15}$ or $OA = 15 \cos x$	M1	
(a)	$OA = 15 \cos x$ and $OB = 15 + 2$ and $h = OB - OA = 17 - 15 \cos x$	A1	
(b)	17 – 15 cos 120 or 15 sin 30 or 7.5	M1	
	24.5	A1	oe
(c)	(180, 32)	B2	B1 one correct coordinate SC1 (32, 180)