| 1 | | | 5.86 | M1 | for $\sin 23 = \frac{AB}{15}$
 NB Allow any alternative equivalent method to form an equation in AB | |
| | | | | A1 | 5.8 to 5.9 | |

2			32.3	P1	for using Pythagoras to find length of third side of triangle, eg $7.5^2 - 6^2$ or $6^2 + x^2 = 7.5^2$ or uses trigonometry to find angle in triangle, eg $\sin A = \frac{6}{7.5}$ or $\cos B = \frac{6}{7.5}$	
				P1	(dep P1) for complete process to find length of third side of triangle eg $\sqrt{7.5^2 - 6^2}$ or $\sqrt{56.25 - 36}$ or $\sqrt{20.25}$ $(=4.5)$ or uses trigonometry to find base length of triangle, eg $7.5 \times \cos "A"$ or $7.5 \times \sin "B"$ or $\frac{6}{\tan "A"}$	
				P1	(dep P2) for $24 - 10 - "4.5"$ $(=9.5)$	
				P1	(indep) for process to find angle CDA, eg $\tan CDA = \frac{6}{\text{base}}$ from right-angled triangle	
				A1	for answer in the range 32.2 to 32.3	

3	(a)		50.5	M1	for $\cos ABC = \frac{7}{11}$ $(0.63...)$ oe	Must be a complete statement for cos, sin or tan with all three elements present.
				A1	for answer in the range 50.4 to 50.51	If an answer is in the range 50.4 to 50.51 is given in the working space then incorrectly rounded, award full marks.
	(b)		Increase (supported)	C1	States increase with supporting reason eg " $\frac{7}{10}$ is greater than $\frac{7}{11}$ " " 0.636 is less than 0.7" ...."cos increases as angle decreases" "decreasing the denominator increases the value of the fraction" "angle is now 45.6" (accept 45.5 – 45.6)	If figures are given they must be correct (truncated or rounded).

4			$\frac{5}{3}$	P1	for process to derive an equation in x, eg $\frac{x}{4x-1} = \frac{6x+5}{12x+31}$	
				P1	for complete process to remove fractions, eg $x(12x + 31) = (6x + 5)(4x - 1)$	Must be correct use of brackets
				P1	for process to reduce to a quadratic equation, eg $12x^2 - 17x - 5 = 0$	Award for correct LHS only.
				P1	for process to solve the quadratic equation by factorisation or use of quadratic formula, eg $(4x + 1)(3x - 5) = 0$	Award for correct LHS only. Accept substitution into the formula; $\frac{--17\pm\sqrt{(-17)^2 - 4\times 12\times 5}}{2\times 12}$
				A1	for $\frac{5}{3}$ oe	Accept answers in the range 1.66 to 1.67 as equivalent

5	(a)		1	B1	cao	
	(b)		8	M1	starts process, eg $\cos(60) = \frac{4}{x}$ or $0.5 = \frac{4}{x}$ oe or $\sin 30 = \frac{4}{x}$ or $\frac{\sin 30}{4} = \frac{\sin 90}{x}$ oe	All three elements of cos, 4, x must be present in an equation. eg cos = 4/x is acceptable but $\cos(4/x)$ is insufficient
				A1	cao	

| 6 | | | $\frac{1}{2}$ | M1 | for $\frac{1}{\sqrt{3}} \times \frac{\sqrt{3}}{2}$ or $\frac{\sqrt{3}}{3} \times \frac{\sqrt{3}}{2}$ or $(\frac{1}{2} \div \frac{\sqrt{3}}{2}) \times \frac{\sqrt{3}}{2}$

 OR $\tan 30 = \frac{1}{\sqrt{3}}$ oe or $\sin 60 = \frac{\sqrt{3}}{2}$ | |
| | | | | A1 | for $\frac{1}{2}$ or 0.5 | |

| 7 | 9.85 | M1 | for $\sin(38) = \frac{AB}{16}$ oe
 or alternative method to find AB | |
| | | A1 | for an answer in the range 9.76 to 9.92 | |

8	2.5	P1	use of $\sin 30 = \frac{1}{2}$ to find OA (= 8) or $OAB = 90°$ eg $OA = 16\sin30°$ or right angle marked on diagram	
		P1	recognition that equation of circle is $x^2 + y^2 = r^2$	Accept $3p^2 + p^2 = r^2$ for the award of this mark
		P1	Correct substitution of p, $3p$ and r in $x^2 + y^2 = r^2$ eg $9p^2 + p^2 = OA^2$ or $(3p)^2 + p^2 = $ "8²"	Do not accept $3p^2 + p^2 = 8^2$ for the award of this mark
		A1	for answer in the range 2.5 to 2.53	Accept $\sqrt{6.4}$ or $\frac{4\sqrt{10}}{5}$ If an answer within the given range is seen in working and rounded incorrectly award full marks. Award 0 marks for the answer without supportive working.

9	32.1	P1	starts process, eg $\sin 40 = \frac{DB}{8.6}$ oe or for $8.6 \times \sin 40$ (=5.52797...)	Accept values rounded or truncated to 2 dp.
		P1	complete process to find ED, eg $(8.6 \times \sin40) \div 2$ (=2.76...)	
		P1	process to find angle EAD, eg $\tan^{-1}\left(\frac{"2.76...."}{4.4}\right)$ or $\tan^{-1}$ ("0.628...")	
		A1	answer in range 32.09 to 32.2	If an answer in the range is seen in working and then incorrectly rounded award full marks

| 10 | 99.5 | M1 | for $\sin(34) = \frac{x}{178}$ oe
 or alternative method to find x | |
| | | A1 | for answer in range 99.5 to 99.7 | If an answer in the range 99.5 to 99.7 is given in the working space then incorrectly rounded, award full marks |

11 (a)	17.8	M1	for $\tan 56 = \frac{x}{12}$ or $(BC) = 12 \times \tan 56$ oe **or alternative method to find** BC	For any alternative method candidates must arrive at an equation with BC as the only unknown
		A1	for an answer in the range 17.7 to 17.8	If an answer in the range 17.7 to 17.8 is given in the working space then incorrectly rounded, award full marks.
(b)	33.6	M1	for $\cos x = \frac{15}{18}$ or $\cos x = 0.83..$ or $x = \cos^{-1}\frac{15}{18}$ **or alternative method to find** x	For any alternative method candidates must arrive at an equation with x as the only unknown
		A1	for an answer in the range 33.5 to 33.91	If an answer in the range 33.5 to 33.91 is given in the working space then incorrectly rounded, award full marks.