

Question	Working	Answer	Mark	Notes
12	$\frac{4(x-6)-3(8x+2)}{12}$ oe			M1 Correct method to reduce to a single fraction. Condone invisible brackets if multiplied out correctly with one sign error only. Implied by next M1
	$\frac{4x-24-24x-6}{12}$ oe			M1 Multiplying out correctly (allow one sign error if 4 terms given - if incorrect answer this line must be seen) If M1 has already been awarded this can be implied by a correct answer
		$\frac{-10x-15}{6}$	3	A1 oe with denominator of 6 or -6 Dependent on both M marks being awarded.
				<b>Total 3 marks</b>

13	$\angle BAE = \angle CDE$ <b>angles in the same segment OR angles at the circumference subtend from the same arc of the circle</b>			Allow $BAC$ and $CDB$ Do not accept other notations such as $\hat{A}$ and $\hat{D}$
	$\angle ABE = \angle DCE$ <b>angles in the same segment OR angles at the circumference subtend from the same arc of the circle</b>			Allow $ABD$ and $DCA$ Do not accept other notations such as $\hat{B}$ and $\hat{C}$
	$\angle BEA = \angle CED$ <b>vertically opposite angle OR vertically opposite angle</b>			M2 For two correct corresponding pairs of angles with at least one correct reason. Words in bold needed. Allow $\angle$ for angles (Allow M1 for 2 correct corresponding pair of angles)
		Two/Three angles are equal therefore $ABE$ is similar to $DCE$	3	A1 A correct conclusion and 2 corresponding angles stated equal with correct reason for both angles. Ignore a third angle given even if incorrect. Allow Two/Three angles are equal therefore similar
				<b>Total 3 marks</b>

Question	Working	Answer	Mark	Notes
14	$[AX =] \sqrt{4^2 + 4^2} [= \sqrt{32} \text{ or } 5.656\ldots] \text{ oe}$			M1 Allow $[AX =] \frac{1}{2}\sqrt{8^2 + 8^2}$
	$\tan(\angle EAX) = \frac{15}{\sqrt{4^2 + 4^2}}$			M1 dep on previous M mark being awarded. A correct method to find $\angle EAX$ eg using $\tan(\angle AEX) = \frac{\sqrt{4^2 + 4^2}}{15}$ <b>and</b> $\angle EAX = 90 - \angle AEX$
		69.3	3	A1 awrt 69.3 Working not required, so correct answer scores full marks (unless from obvious incorrect working)
<b>Alternatives for the 2<sup>nd</sup> M1</b>				
$[AE =] \sqrt{\sqrt{(4^2 + 4^2)^2} + 15^2} [= \sqrt{257}] \text{ and } \sin EAX = \frac{15}{\sqrt{257}} \text{ or } \sin EAX = \frac{15 \sin 90}{\sqrt{257}} \text{ or } \cos EAX = \frac{\sqrt{32}}{\sqrt{257}}$				
$[AE =] \sqrt{\sqrt{(4^2 + 4^2)^2} + 15^2} [= \sqrt{257}] \text{ and } \angle EAX = 90 - \angle AEX \text{ and } \sin AEX = \frac{\sqrt{32}}{\sqrt{257}} \text{ or } \sin AEX = \frac{\sqrt{32} \sin 90}{\sqrt{257}} \text{ or } \cos AEX = \frac{15}{\sqrt{257}}$				
$[AE =] \sqrt{\sqrt{(4^2 + 4^2)^2} + 15^2} [= \sqrt{257}] \text{ and } \cos(\angle EAX) = \left( \frac{\sqrt{257} + \sqrt{32} - 15^2}{2 \times \sqrt{257} \times \sqrt{32}} \right)$				
$[AE =] \sqrt{\sqrt{(4^2 + 4^2)^2} + 15^2} [= \sqrt{257}] \text{ and } \cos(\angle AEX) = \frac{\sqrt{257} + 15^2 - \sqrt{32}}{2 \times \sqrt{257} \times 15} \text{ and } \angle EAX = 90 - \angle AEX$				
<b>Alternative for M1M1 -Finding EA from triangle EAD</b>				
M1 $[AE =] \sqrt{\sqrt{(4^2 + 15^2)^2} + 4^2} [= \sqrt{257}]$ M1dep $\sin EAX = \frac{15}{\sqrt{257}}$ or $\sin EAX = \frac{15 \sin 90}{\sqrt{257}}$ or another correct method to find $EAX$				
<b>Total 3 marks</b>				

Question	Working	Answer	Mark	Notes
15	$\frac{4-\sqrt{12}}{4+\sqrt{12}} \times \frac{4-\sqrt{12}}{4-\sqrt{12}}$ oe			M1 multiplying by $\frac{4-\sqrt{12}}{4-\sqrt{12}}$ or $\frac{2-\sqrt{3}}{2+\sqrt{3}} \times \frac{2-\sqrt{3}}{2-\sqrt{3}}$ or $\frac{4-\sqrt{12}}{4-\sqrt{12}} \times \frac{2-\sqrt{3}}{2-\sqrt{3}}$ oe
	$\frac{16+12-8\sqrt{12}}{16-12}$ or $\frac{28-8\sqrt{12}}{4}$ oe			M1 multiplies out correctly but need not be simplified. Allow $\frac{4+3-4\sqrt{3}}{4-3}$ or $\frac{7-4\sqrt{3}}{1}$ or $7-4\sqrt{3}$ or $\frac{14-2\sqrt{12}-4\sqrt{3}}{2+2\sqrt{12}-4\sqrt{3}}$ oe
		$7-\sqrt{48}$	3	A1 dep on both the previous method marks being awarded. Correct answer with no working is no marks. Allow $a = 7$ and $b = 48$ ISW once $7-\sqrt{48}$ seen <b>NB</b> Do not allow for $7-4\sqrt{3}$ unless $7-\sqrt{48}$ seen in working

**Total 3 marks**

16(a)	$25a^4b^6$			M1 Any 2 terms correct $25a^4\dots$ or $\dots a^4b^6$ or $25\dots b^6$
		$25a^4b^6$	2	A1
(b)	$\frac{3x^2y^1}{3x^2y^{-4}}$ or $\frac{y^1}{y^{-4}}$			M1 Allow $y$ for $y^1$
		$y^5$	2	A1 Working not required, so correct answer scores full marks (unless from obvious incorrect working)

**Total 4 marks**

17(a)	$10 \leqslant 5x$ or $x < 8$ oe			M1 Condone $10 < 5x$ and $x \leqslant 8$
	$10 \leqslant 5x$ and $x < 8$ oe			M1 Correct inequality signs must be used.
		$2 \leqslant x < 8$	3	A1 oe ISW Working not required, so correct answer scores full marks (unless from obvious incorrect working) Allow $[2,8)$ or other notation eg $\{x : 2 \leqslant x < 8\}$
(b)			1	B1 ft their inequality if answer to (a) is in the form $a \leqslant x < b$ or $a < x \leqslant b$ (one closed dot one open dot – do not accept alternative notation)

**Total 4 marks**

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