

Question	Working	Answer	Mark	Notes
4	$(1 - 0.64) \times 75$ or $0.64 \times 75$ or $75 - 0.64 \times 75$ oe			M1
		27	2	A1 Working not required, so correct answer scores full marks (unless from obvious incorrect working)
<b>Total 2 marks</b>				

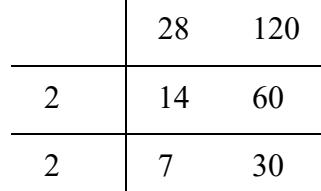
5	Method 1	Method 2			
	$2y = 17$ oe	$4x = -16$ oe			M1 Eliminating either $x$ or $y$ to get a correct equation in one unknown
	$4x + 4 \times "8.5" = 18$ or $4x = -16$	$4 \times (" - 4") + 6y = 35$ or $2y = 17$			M1 Subst their $x$ or $y$ value into either equation or start again. If M1 has already been awarded this can be implied by a correct value for $x$ and $y$ . <b>NB</b> The Speech marks around the $-4$ (" - 4") means this follows through from their value
			$x = -4$ $y = 8.5$	3	A1 dep on 1 <sup>st</sup> M1 being awarded
<b>Total 3 marks</b>					

6	$[AD =] \sqrt{25^2 - (50 - 35)^2} [= 20]$			M1 Correct calculation to find $AD$ or [ $AD = ] 20$ Allow using their $h = (50 - 35)$ if marked on their diagram provided $h$ is between 5 and 25. Must see the Pythagoras calculation eg $\sqrt{25^2 - 18^2}$ <b>NB</b> Anything appearing in square brackets is not required
	$[\text{Perimeter } =] 50 + 25 + 35 + "20"$			M1 dep on previous method mark being awarded. Follow through their "20".
		130	3	A1 Working not required, so correct answer scores full marks (unless from obvious incorrect working)
<b>Total 3 marks</b>				

Question	Working	Answer	Mark	Notes
7	Sight of $3n$ or $3n - 8$ or $n + 20$			M1 One correct expression seen. May be seen as part of an equation
	$n + 20 = 3n - 8$ oe			A1 Correct equation
		14	3	A1 dep on previous A mark awarded
				<b>Total 3 marks</b>

8	Arc, centred $B$ , radius 4 cm, drawn within $ABCD$			M1 Ignore any parts outside of $ABCD$ . Arc drawn should lie between an arc radius 3.8 cm and arc radius 4.2 cm. It should intersect $AB$ and $BC$ and be complete within $ABCD$
	2 pairs of intersecting arcs of equal radius centred at $A$ and $D$ with line drawn through intersection points oe			M1 Ignore any parts outside of $ABCD$ . Construction lines <b>must</b> be shown. Line should lie between 4.3 cm and 4.7cm from $AB$ .
		$R$ identified by shading and labelled	3	A1 dep on both previous method marks awarded. Allow just shading or just $R$ if it is clear which the area is.
				<b>Total 3 marks</b>

9	$\frac{27}{1.08}$ or $\frac{27}{108} \times 100 [=25]$			M1 For a correct method to find the original price.	M2 for $\frac{135}{108} \times 27$ oe
	" $\frac{27}{1.08}$ " $\times 1.35$ or " $\frac{27}{108} \times 100$ " $+\frac{35}{100} \times "25"$ oe			M1 dep on previous method mark being awarded. For a correct method to increase their original price by 35%	
		33.75	3	A1 oe Working not required, so correct answer scores full marks (unless from obvious incorrect working)	
					<b>Total 3 marks</b>

Question	Working	Answer	Mark	Notes
10	$28 = 2 \times 2 \times 7$ or $4 \times 7$ $120 = 2 \times 2 \times 2 \times 3 \times 5$ or $4 \times 30$ oe Or factor trees 			M1 For prime factorisation of 28 and 120 (may be at ends of a factor tree), must have $2 \times 2 \dots$ or $4 \times \dots$ or for multiples of 120 up to at least 840 or for multiples of 28 up to at least 840
	$\text{LCM}(28, 120) = 840$			A1 Allow $2 \times 2 \times 2 \times 3 \times 5 \times 7$
		843	3	A1ft For adding 3 to their LCM. The M1 must be awarded. An answer with no working gains no marks
<b>Total 3 marks</b>				

11	$(68 - 32) \times 34$ or $(32 + x) \times 42$ oe			M1 Calculating the cost for either R or C. May be seen as part of a calculation
	$(68 - 32) \times 34 + (32 + x) \times 42 = 3702$ or $\frac{3702 - 36 \times 34 - 32 \times 42}{42}$ oe			M1 Setting up a correct equation or expression.
		27	3	A1 Working not required, so correct answer scores full marks (unless from obvious incorrect working)
<b>Total 3 marks</b>				

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**

Question	Working	Answer	Mark	Notes
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18	$[AD =] \frac{25}{\tan 33^\circ} - 20 [=18.496\dots]$			M1 A correct method to find $AD$ eg $25\tan 57^\circ - 20$ Must use correct angle.
	$\tan(\angle DBA) = \frac{"18.496\dots"}{25} [\angle DBA = 36.496^\circ]$			M1 dep on previous M mark awarded Allow use of their $AD$ (maybe marked on the diagram)
	Angle of depression = $90^\circ - "36.49\dots"$			M1 dep on previous M mark awarded.
		53.5	4	A1 awrt 53.5 Working not required, so correct answer scores full marks (unless from obvious incorrect working) Allow marked on diagram if clearly the angle of depression.
Alt 1	$[AD =] \frac{25}{\tan 33^\circ} - 20 [=18.496\dots]$			M1 A correct method to find $AD$ eg $25\tan 57^\circ - 20$ Must use correct angle
	$[BD =] \sqrt{25^2 + "18.496\dots"{}^2} [=31.098\dots]$ and $\cos \angle DBA = \frac{25}{"31.098\dots"}$ or $\sin \angle DBA = \frac{"18.496\dots"}{"31.098\dots"}$			M1 dep on previous M mark awarded Allow use of their $AD$ if clearly labelled or marked on the diagram for $AD$ . Also allow use of their "31.098..." M2 for $BD = \sqrt{25^2 + "18.496\dots"{}^2} [=31.098\dots]$ and $\cos \angle BDA = \frac{"18.496\dots"}{"31.098\dots"}$ or $\sin \angle BDA = \frac{25}{"31.098\dots"}$ oe
	Angle of depression = $90^\circ - 36.49\dots$			M1 dep on previous M mark awarded
		53.5	4	A1 awrt 53.5 Allow marked on diagram if clearly the angle of depression.
Alt 2	$[AD =] \frac{25}{\tan 33^\circ} - 20 [=18.496\dots]$			M1 A correct method to find $AD$ eg $25\tan 57^\circ - 20$ Must use correct angle
	$\cos \angle CBD = \frac{(25^2 + (20 + "18.496\dots")^2) + (25^2 + 18.496\dots{}^2) - 20^2}{2 \times \sqrt{25^2 + (20 + "18.496\dots")^2} \times \sqrt{(25^2 + 18.496\dots{}^2)}}$			M1 dep on previous M mark awarded. Allow use of their $AD$ if their value of $AD$ is labelled or marked on the diagram for $AD$
	Angle of depression = $33^\circ + "20.51\dots"$			M1 dep on previous M mark awarded
		53.5	4	A1 awrt 53.5 Allow marked on diagram if clearly the angle of depression.

**Total 4 marks****NB:** Allow use of sine or cosine rule for calculations on triangle  $ABD$  or  $ACB$  but need to rearrange to get  $\cos \angle BDA$  etc

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