

Question	Working	Answer	Mark	Notes
9	<p>eg <math>(3 \times 5 + 2 \times 15 + 3.6 \times 10 + 0.6 \times 20 + 1.7 \times 10)</math>  <b>or</b>  <math>(6 \times 5 + 4 \times 15 + 7.2 \times 10 + 1.2 \times 20 + 3.4 \times 10)</math>  <b>or</b>  <math>(30 \times 5 + 20 \times 15 + 36 \times 10 + 6 \times 20 + 17 \times 10)</math></p> <p><math>(3 \times 5 + 2 \times 15 + 3.6 \times 10 + 0.6 \times 20 + 1.7 \times 10) [= 110]</math>  <b>or</b>  <math>(6 \times 5 + 4 \times 15 + 7.2 \times 10 + 1.2 \times 20 + 3.4 \times 10) [= 220]</math>  <b>or</b>  <math>(30 \times 5 + 20 \times 15 + 36 \times 10 + 6 \times 20 + 17 \times 10) [= 1100]</math></p> <p>freq of 30 – 50 bar = <math>20 \times 2.4 [= 48]</math>  or freq of 50 – 60 bar = <math>10 \times 6.8 [= 68]</math>  or freq of 45 – 50 = <math>5 \times 2.4 [= 12]</math></p> <p><math>\frac{"80"}{440} \times \frac{"80" - 1}{439}</math></p>	0.0327	5	<p>M1 for use of area of bar, showing at least 2 products or for statement such as 44 blocks of 25 squares or 11 blocks of 100 squares. Allow 44 squares. Implied by following Method mark</p> <p>M1 for complete method to find total area of bars  <b>or</b> for <math>&gt; 45 = \frac{8}{44}</math> or <math>\frac{2}{11}</math> <b>or</b>  for FD scale of 1cm = FD of 2 , 0.4 [per small square] oe</p> <p>M1 for correct method to find frequency of 30-50 <b>or</b> 50-60 bar <b>or</b> 45 – 50 <b>or</b> for <math>\frac{8}{44} \times 440</math> or <math>\frac{2}{11} \times 440</math> oe</p> <p>M1 oe</p> <p>A1 <math>0.032718989\dots, \frac{158}{4829}</math> awrt 0.0327</p>

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10 (a)	$8x^2 + 8xy = 240$	$8x^2 + 8xy = 240$ $x^2 + xy = 30$ $x^2 + xy - 30 = 0$		M1  A1 cso Completely correct rearrangement
(b)	(volume = ) $4x^2y$ $y = \frac{30 - x^2}{x}$ (volume = ) $4x^2 \times \left(\frac{30 - x^2}{x}\right) = 120x - 4x^3$ $\frac{dy}{dx} = 120 - 12x^2 = 0$	$\sqrt{10}$	2	M1 Correct volume M1 Finding $y$ in terms of $x$ allow 1 sign error M1 Subst $y$ into Volume M1 Multiplying out and Differentiating one term correct A1 Must be exact

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11 (a)		$\frac{25}{3}$	1	B1 oe
(b)		50	1	B1
(c)	$\frac{x}{3x-25} = 7$ and $7(3x-25) = x$ e.g. $21x - x = 175$	8.75	3	M1 for $h = 7$ and for getting rid of denominator M1 collecting terms in $x$ on one side and number terms the other in correct equation A1 oe
(d)	$g(4) = 11$	1.375	2	M1 $hg(x) = \frac{2x+3}{3(2x+3)-25}$ A1 oe
(e)	$y(3x-25) = x$ or $x(3y-25) = y$ $3xy - x = 25y$ or $3xy - y = 25x$ oe	$h^{-1}: x \mapsto \frac{25x}{3x-1}$	3	M1 for $y =$ or $x =$ and first stage of rearrangement. M1 for collecting terms in $x$ or $y$ (as appropriate) on the same side. A1 $\frac{25x}{3x-1}$
(f)	$[fg(x)] = (2x+3)^2 + 3(2x+3) - 4$ $4x^2 + 18x + 14 (=0)$ oe $2(2x+7)(x+1) (=0)$	-3.5, -1	4	M1 $fg(x)$ correct or $x^2 + 3x - 4 = 0$ oe M1 Allow for $g(x) = 1$ or $g(x) = -4$ M1 a correct method to solve their quad or for $2x + 3 = 1$ and $2x + 3 = -4$ A1 both answers