

MARK SCHEME for the October/November 2013 series

0580 MATHEMATICS

0580/43

Paper 4 (Extended), maximum raw mark 130

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Abbreviations

- cao correct answer only
- cso correct solution only
- dep dependent
- ft follow through after error
- isw ignore subsequent working
- oe or equivalent
- SC Special Case
- www without wrong working
- art anything rounding to
- soi seen or implied

Qu.	Answers	Mark	Part Marks
1 (a)	(i) 45	2	M1 for $5 \times 63 \div 7$
	(ii) 20	2	M1 for $5 \times 56 \div 14$
	(iii) 23.4 or 23.38 to 23.41	3	M2 for $\frac{13 \times 4.9 - 48.8}{13 \times 4.9} \times 100$ or $\frac{4.9 - 48.8 \div 13}{4.9} \times 100$ Or M1 for $\frac{13 \times 4.9 - 48.8}{13 \times 4.9}$ or $\frac{48.8}{13 \times 4.9} \times 100$ or 76.6[...]
(b)	128	4	Using fractions (percentages / decimals): M1 for $\frac{3}{4} \times \frac{3}{8} \left[= \frac{9}{32} \right]$ or $\frac{75}{100} \times 37.5$ [= 28.125%] A1 for $\frac{9}{32}$ or 28.125[%] M1 for $36 \div \frac{9}{32}$ oe or $36 \times \frac{100}{28.125}$ oe Partial percentages M1 for (Remaining) $\frac{100 \times 36}{37.5}$ [= 96] A1 for 96 M1 for $96 \div \frac{75}{100}$ oe SC1 for 288

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2	(a)	119.94[...] nfw	3	M2 for $\frac{62 \times \sin 122}{\sin 26}$ or M1 for $\frac{AC}{\sin 122} = \frac{62}{\sin 26}$ oe SC2 for correct answer from alternative methods
	(b)	109 or 108.7 to 108.8 nfw	4	M2 for $119.9..^2 + 55^2 - 2 \times 119.9.. \times 55 \cos 65$ A1 for 11827[...] or 11834 to 11835[...] or M1 for implicit version
	(c)	1970 or 1969 to 1970.4	2	M1 for $\frac{1}{2} \times 119.9.. \times 62 \times \sin 32$
	(d)	22300 or 22310 to 22320	3	M2 for $(their\ (c) + 0.5 \times 55 \times 119.9.. \times \sin 65) \times 4.5$ or M1 for $their\ (c) + 0.5 \times 55 \times 119.9.. \times \sin 65$
3	(a)	$9 - 2x, 7 - 2x$ oe	2	B1 for each, accept in any order
	(b)	$x(9 - 2x)(7 - 2x)$ $4x^3 - 32x^2 + 63x$	M1FT A1	Correct expansion and simplification with no errors
	(c)	24 20	2	B1 for each correct value
	(d)	Correct curve	3	B2FT for 5 correct plots or B1FT for 3 or 4 correct plots
	(e)	$0.65 \text{ to } 0.75 \leq x \leq 2$ oe	2	B1 for 0.65 to 0.75 seen
	(f) (i)	36 to 37	1	
(f) (ii)	1.2 to 1.4	1		
4	(a)	48 and 84 66 and 66	2	B1 for each pair
	(b)	540	2	M1 for 3×180 or $(2 \times 5 - 4) \times 90$ or $5 \times (180 - 360 \div 5)$ oe
	(c)	1620	2	M1 for $7 \times 360 - their\ 540 - 360$
	(d) (i)	$2x + 5 + 3y - 20 + 4x - 5 + x + y - 10 = 360$ oe	1	Allow partial simplification but not $7x + 4y - 30 = 360$
	(d) (ii)	$2x + 5 + 3y - 20 = 180$	1	
	(d) (iii)	$[x =] 30, [y =] 45$ nfw	4	M1 for correct multiplication M1 for correct elimination A1 $x = 30$ or $y = 45$ If 0 scored SC1 for correct substitution to find the other variable
(d) (iv)	65, 115, 115, 65	1	Accept in any order	

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<p>5 (a) (i)</p> <p>(ii)</p> <p>(b) (i)</p> <p>(ii)</p> <p>(iii)</p>	<p>3.81 or 3.812 to 3.813 or 3h 49min nfw</p> <p>Correct histogram</p> <p>$\frac{2}{5}, \frac{1}{4}, \frac{3}{4}, \frac{1}{4}$ oe</p> <p>$\frac{18}{20}$ nfw $\left[\frac{9}{10} \right]$</p> <p>$\frac{27}{125}$ [0.216]</p>	<p>4</p> <p>M1 for midpoints soi (condone 1 error of ... and</p> <p>M1 for use of $\sum fx$ with x in correct interval including both boundaries (condone 1 further error or omission) and</p> <p>M1 (dep on 2nd M1) for $\sum fx \div 80$ (305 \div 80)</p> <p>4</p> <p>B1 for each correct block and</p> <p>B1 for correct widths</p> <p>2</p> <p>B1 for $\frac{2}{5}$ or both $\frac{1}{4}$s in correct place</p> <p>3</p> <p>M2 FT for $1 - \text{their } \frac{2}{5} \times \text{their } \frac{1}{4}$</p> <p>or $\frac{3}{5} \times \frac{3}{4} + \frac{3}{5} \times \text{their } \frac{1}{4} + \text{their } \frac{2}{5} \times \frac{3}{4}$ oe</p> <p>or</p> <p>M1 FT for $\text{their } \frac{2}{5} \times \text{their } \frac{1}{4}$</p> <p>or $\frac{3}{5} \times \text{their } \frac{1}{4} + \text{their } \frac{2}{5} \times \frac{3}{4}$ oe</p> <p>2</p> <p>M1 for $\frac{3}{5} \times \frac{3}{5} \times \frac{3}{5}$</p>
<p>6 (a)</p> <p>(b)</p> <p>(c)</p>	<p>329.7 to 330</p> <p>2970 or 2967 to 2969.[...]</p> <p>11.5 or 11.6 or 11.53 to 11.55</p>	<p>3</p> <p>M2 for $\frac{1}{2}\pi(12^2 + 8.75^2 - 3.25^2)$ oe</p> <p>or M1 for $\frac{1}{2}\pi 12^2$ or $\frac{1}{2}\pi 8.75^2$ or $\frac{1}{2}\pi 3.25^2$</p> <p>SC2 for answer 1318 to 1320</p> <p>4</p> <p>M3 for $\frac{1}{2}\pi(24 + 17.5 + 6.5) \times 35 + \text{their (a)}$ or</p> <p>M2 for $\frac{1}{2}\pi(24 + 17.5 + 6.5) \times 35$ or</p> <p>M1 for $\frac{1}{2}\pi \times 24$ or $\frac{1}{2}\pi \times 17.5$ or $\frac{1}{2}\pi \times 6.5$</p> <p>SC3 for 3955 to 3960 dep on SC2 in (a)</p> <p>3FT</p> <p>M1 for $\text{their (a)} \times 35$</p> <p>A1 for 11500 or 11530 to 11550</p>

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	(d) (i)	$\frac{r}{h} = \frac{20}{40}$ or $\frac{r}{20} = \frac{h}{40}$	1	Accept $20 : 40 = r : h$ leading to $40r = 20h$ $\frac{20}{40} = \frac{1}{2}$ and $\frac{r}{h} = \frac{1}{2}$
	(ii)	35.3 or 35.31 to 35.34	3	M2 for $\sqrt[3]{\frac{\text{their } 11545 \times 12}{\pi}}$ oe or $2 \times \text{their } r$ or M1 for $\text{their } 11545 = \frac{1}{3} \times \pi \times \left(\frac{h}{2}\right)^2 \times h$ oe or $\text{their } 11545 = \frac{1}{3} \times \pi \times r^2 \times 2r$ oe
7	(a) (i)	$\frac{3}{2}$ or 1.5	2	M1 for $\frac{14 - (-4)}{8 - (-4)}$ oe
	(ii)	$y = \frac{3}{2}x + 2$ oe	2	B1 for $y = \text{their } \frac{3}{2}x + c$ o.e. or $y = mx + 2, m \neq 0$ SC1 for $\frac{3}{2}x + 2$
	(iii)	$\begin{pmatrix} 12 \\ 18 \end{pmatrix}$	1	
	(iv)	21.6 or 21.63[...]	2	M1 FT for $\text{their } 12^2 + \text{their } 18^2$ oe
(b)	(i) (a)	$3b - 4a$	1	
	(b)	$\frac{1}{5}(6b - 8a)$ oe simplified	2	M1 for $\frac{1}{5}(12a + 6b) - 4a$ or $AR = AO + OR$
	(c)	$6a + 3b$ oe simplified	1	
	(ii)	OR is parallel to OT	1	Dep on \overrightarrow{OT} correct
	(iii)	$\frac{9}{4}$ or 2.25	2	M1 for $\left(\frac{3}{2}\right)^2$

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8	(a)	$\frac{2(s - ut)}{t^2}$ oe nfw	3	M1 for a correct rearrangement to isolate t and M1 for a correct multiplication by 2 and M1 for a correct division by t^2
	(b)	36.75 cao	3	M2 for $15.5 + 2.5 \times 8.5$ B1 for two of 15.5, 2.5, 8.5 seen
	(c) (i)	$\frac{16}{5}$ or better [3.2]	1	
	(ii)	11.2	4	M2 for $\frac{1}{2}(25 + 10)16$ (= 280) or M1 for appreciation of distance from area and M1 for <i>their</i> $280 \div 25$ (dep on M1)
9	(a)	15 18 $3n + 3$ or $3(n + 1)$ 6 10 25 36 $(n + 1)^2$	9	B2 for 15, 6, 25 or B1 for two correct values B3 for 18, 10, 36 or B1 for each correct value B2 for $3n + 3$ oe or M1 for $3n + k$, for any k B2 for $(n + 1)^2$ oe or M1 for a quadratic expression
	(b)	14	2	M1 for $(n + 1)(n + 2) = 240$ or better or $15 \times 16 = 240$
	(c) (i)	$\frac{1}{2} + p + q = 9$	1	
	(ii)	$[p =] 3$ $[q =] \frac{11}{2}$	5	B2 for $4p + 2q = 23$ or B1 for $\frac{1}{2} \times 2^3 + p \times 2^2 + q \times 2$ oe M1 for correct multiplication and subtraction of <i>their</i> equations A1 for $[p =] 3$ or $[q =] \frac{11}{2}$ If 0 scored then SC1 for either correct

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<p>10 (a)</p>	$\frac{x}{x+3}$ cao	<p>3</p>	<p>B1 for $(x+3)(x-3)$ B1 for $x(x-3)$</p>
<p>(b)</p>	$\frac{3}{2}$ and -5	<p>7</p>	<p>M2 for $15(x+1) - 20x = 2x(x+1)$ or M1 for multiplication by one denominator only or $\frac{15(x+1) - 20x}{x(x+1)}$ and B2 for $2x^2 + 7x - 15 [= 0]$ or B1 for $15x + 15 - 20x$ or $2x^2 + 2x$ and M2 for $(2x-3)(x+5)$ or <i>their</i> correct factors or formula or M1 for $(2x+a)(x+b)$ where $ab = -15$ or $a + 2b = 7$ A1 for $x = \frac{3}{2}$ and -5</p>