

**MARK SCHEME for the October/November 2013 series**

**0444 MATHEMATICS (US)**

**0444/23**

Paper 2 (Extended), maximum raw mark 70

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

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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

	Answers	Mark	Part Marks
<b>1</b>	39	<b>2</b>	<b>M1</b> for $52 \times 45 \div 60$ oe
<b>2</b>	Any two of (20, 8) (-4, 0) (12, 24)	<b>2</b>	<b>B1</b> for one correct
<b>3</b>	-8	<b>2</b>	<b>M1</b> for $2x = -16$ or $\frac{1}{2} + x = -7.5$
<b>4</b>	64	<b>2</b>	<b>M1</b> for (their $(5 - 1)^3$ )
<b>5</b>	[domain] $0 \leq x \leq 3$ [range] $2$	<b>1</b> <b>1</b>	
<b>6 (a)</b>	600 000	<b>1</b>	
<b>(b)</b>	90	<b>2</b>	<b>M1</b> for $\div 1000 \times 60 \times 60$
<b>7</b>	30	<b>3</b>	<b>M2</b> for $24 \div 0.8$ or <b>M1</b> for recognition of $80\% = 24$
<b>8</b>	5	<b>3</b>	<b>M2</b> for $(x - 5)(x - 1)$ or <b>M1</b> for evidence of a factorisation which gives the correct coefficient of $x$ or positive prime constant term e.g. $(x - 7)(x + 1)$ , $(x - 4)(x - 2)$ , $(x - 3)(x - 1)$
<b>9</b>	1600	<b>3</b>	<b>M1</b> for $m = kx^3$ <b>A1</b> $k = 25$ or <b>M2</b> for $200 \times \left(\frac{4}{2}\right)^3$
<b>10 (a)</b>	$a^2 + 2ab + b^2$ final answer	<b>2</b>	<b>B1</b> for $a^2$ [+] $ab$ [+] $ab$ [+] $b^2$ seen
<b>(b)</b>	22	<b>1</b>	
<b>11</b>	12	<b>3</b>	<b>M2</b> for $\sqrt{15^2 - 9^2}$ or <b>M1</b> for $AB^2 + 9^2 = 15^2$ oe

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12 (a)	[amplitude] 2 [period] 360	1 1	
(b)	$4 \sin x$	1	
13 (a)	2	1	
(b)	Accurate bisector of <b>either</b> side of rectangle	2	<b>B1</b> for correct ruled line (cross two sides) <b>B1</b> for 2 pairs of correct arcs
14 (a)	$4.8 \times 10^6$	2	<b>B1</b> for 4 800 000
(b)	$9.3 \times 10^7$	2	<b>B1</b> for 93 000 000 or $93 \times 10^6$ or $0.93 \times 10^8$ oe
15 (a)	24	2	<b>M1</b> for $MOC = 48$
(b)	24	2	<b>M1</b> for $ACM = 66$ or <b>B1</b> for 48 – <i>their (a)</i>
16 (a)	$8q^{-1}$ or $\frac{8}{q}$	2	<b>B1</b> for $8q^k$ or $kq^{-1}$
(b)	$\frac{1}{5}$ or 0.2	2	<b>M1</b> for $5^{-2}$ , $\frac{1}{5^2}$ or [0].04seen oe
17 (a)	triangle at (0, 2) (0, 4) and (– 1, 2)	2	<b>SC1</b> for rotation $90^\circ$ clockwise about (0, 1) or any other rotation $90^\circ$ anticlockwise
(b)	stretch $x$ -axis invariant [factor] 2	1 1 1	
18	[ $c =$ ] 6 [ $d =$ ] 9	4	accept any correct method e.g. <b>M1</b> for $\frac{30}{360} \times \pi \times 6^2$ [ $\times 2$ ] <b>A1</b> for $6\pi$ or 6  <b>M1</b> for $\frac{1}{2} \times 6^2 \times \sin 120$ or <b>B1</b> for $\sin 120 = \frac{\sqrt{3}}{2}$
19 (a)	19 – 19.1	1	
(b)	3	2	<b>M1</b> for 47 seen
(c)	4.9 to 5.7	2	<b>B1</b> for [UQ] 21.7 to 22.2 and [LQ] 16.5 to 16.8
(d)	$\frac{45}{50}$ oe	2	<b>B1</b> for 45 seen or <b>SC1</b> for $\frac{5}{50}$ isw

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<b>20 (a)</b>	75	<b>2</b>	<b>B1</b> for $[g(6)=] 36$
<b>(b)</b>	3.5    -6.5	<b>3</b>	<b>M1</b> for $(2x + 3)^2 = 100$ <b>M1</b> for $2x + 3 = [\pm]10$  if 0 scored <b>SC1</b> for one correct value as answer
<b>(c)</b>	$\frac{x-3}{2}$ oe final answer	<b>2</b>	<b>M1</b> for $x = 2y + 3$ or $y - 3 = 2x$ or $\frac{y}{2} = x + \frac{3}{2}$
<b>(d)</b>	5	<b>1</b>	