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MATHEMATICS 4400, MARK SCHEME

PAPER 1

No	Working	Answer	Mk	Notes
1ai		8753	1	B1
aii		3587	1	B1
b		3, 7	2	B1B1
c		5	1	B1
2ai		57 000	1	B1
aii		23600	1	B1
b		5000 or 1000(s)	1	B1
3ai		Correct diag	1	B1 drawn anywhere
aii		9	1	B1 on line or in table
b		11	1	B1
c	11 + (14, 15 or 16) x 2 or attempt add 14, 15 or 16 successive 2's to 11; or similar			M1
		41	2	A1
4ai		Unlikely	1	B1
aii		Impossible	1	B1
bi		3/12	2	B2 B1 each, num & denom
bii	1 – his 3/12	9/12	1	B1f
5a		Parallelogram	1	B1
b		2.8 (± 0.1) cm	1	B1 SC1: (a) Rhombus (b) 3
c	(3 + her 2.8) x 2 oe			M1
		11.6	2	A1f ft for A1 only if *AB* not integer
d		*BAD* or *BCD* marked	1	B1
e	Attempt count squares or ½x2x2 or 3x2seen			M1
		6		A1
		cm^2	3	B1
f		2	1	B1
g		0 or none oe	1	B1
h		Shape ± 0.2 mm		B2
				or correct orientation, on RHS of *D*, but wrong position: B1
			2	or 3 correct points: B1

No	Working	Answer	Mark	Notes
6ai		(-3, 2)	1	B1
aii		(4, -2) marked ± 1mm	1	B1
bi		-5, (-3), –1, 1, 3, (5)	2	B2 -B1 each error or omission
bii		Line correct (± 2mm) from $x = -3$ to 2	2	B2 or 3 plots correct (ft, ± 2mm) B1
7ai	15 / 2.25 or 6.6666…			M1
		6	2	A1
aii	15 - 6 x 2.25			M1
		$1.50	2	A1
b	1h 30 mins + 4h 45 mins or $1^1/_2 + 4^3/_4$			M1
	5h 75 mins or 25/4 or $6^1/_4$			M1
		6h 15 mins	3	A1
ci	5 – (-3) or attempt to count up from –3 to 5			M1
		8	2	A1
cii	5 – 6 or attempt to count down 6 from 5			M1
		-1	2	A1
8a		April	1	B1
b	72 000/4			M1
		18 000	2	A1
ci		138 $\pm$ 2^0	1	B1
cii	138/360 x 72 000 or equiv			M1
		27 400	2	A1ft Follow her 137^0
9	360 – (25 + 150 + 45)			M1
	180 – her 140			M1dep
		40	3	A1
10		3,8; 2,12; 1,24		B1B1B1 Allow omission of reversals
			3	-B1 each extra
11a		194 $\pm$ 2^0	2	B2 ($\pm$ 5^0: B1)
b	6.2 $\pm$ 0.1 or a length x 5			M1
		31 $\pm$ 0.5 km	2	A1
c		Correct pos'n $\pm$ 4mm	2	B2 (either 135 or 90 $\pm$ 2^0: B1)
12a		17, 26	2	B1B1 on line or in table
b	100 or 10^2 or √ seen			M1
		10	2	A1

No	Working	Answer	Mark	Notes
13a	2/3 x 5 or 10/3			M1
		$3^1/_3$	2	A1
bi		12	1	B1
bii	(9/12 and 10/12) or 19/12			M1 or 18/24 and 20/24, or 38/24 etc
	or (45/12 and 34/12) or 79/12 seen			
		$6^7/_{12}$	2	A1 or $6^{14}/_{24}$
14	2775 – 2500 OR 2775/2500 x 100			M1
	275 x 100 111 - 100			M1
	2500			
		11%	3	A1
15ai	60/260			M1
		3/13	2	A1
aii	Her 3/13 x 100			M1
		23(.076 . .)	2	A1f
b	60 x 195/260 oe or 195 x 0.23			M1
		45	2	A1f 44.8 to 45.1 ft her (a)(i) or (ii)
16a		Correct line	1	B1 thro' ≥ 3 pts ± 2mm
b		$x = 3$ OR $y = 4$ drawn		B1
		Correct region clear	4	B3 B1 each condition. ft his (a) and/or his $x = 3$ & $y = 4$ so long as vert & horiz pair
17a		Tangent, radius	1	B1
b	$\sin 40^0 = OT / 6$			M1
	$OT = 6\sin 40^0$			M1
		3.86 cm	3	A1 or better
18ai		16	1	B1
aii	Attempt find 12th or 13th student's age			M1
		17.5	2	A1
aiii	fx attempted (= 415)			M1
	/ 24			M1dep
		17.3 or better	3	A1 17, no wking, M0M0A0
				17, correct wking, M1M1A1
bi,ii		18 > old mean		B1
		Increase	2	B1dep

PAPER 2F

No	Working	Answer	Mark	Notes
1 a		five hundred and seven	1	B1
b		238	1	B1 cao
c	507 ÷ 54 or 9.388…		2	M1
		10		A1 cao SC if M0, B1 for 9
2 i		cube	2	B1 Accept cuboid
ii		cylinder		B1 Accept circular prism
3 a		90	1	B1 cao
b		$\frac{3}{10}$	1	B1 oe
c		0.03	1	B1 cao
d		62.5	2	B2 (B1 for digits 625 seen or for 62 or 63)
4 a		3	1	B1 cao
b		243, 729	1	B1 cao
c	eg all terms are odd or 2176 is even or 2176 is not a multiple of 3		1	B1
5 a		bar chart	3	B2 for correct heights of bars (B1 for 2 correct) B1 for label or scale on vertical axis
b	12 : 18		2	M1 for 12:18 or 6:9 or 4:6
		2 : 3		A1 SC if M0, B1 for 3:2 or 1:1.5

No	Working	Answer	Mark	Notes
6 a		8 rectangles shaded	1	B1
b		$\frac{6}{10}$ $\frac{12}{20}$	2	B2 B1 for each correct (−B1 for each incorrect)
c		$\frac{3}{4}$	1	B1
d	78 ÷ 6 or 13		2	M1
		65		A1 cao
e	eg 0.375, 0.4, 0.3, 0.35		2	M1 for 3 correct conversions to decimals, % or common denominator
		$\frac{3}{10}$ $\frac{7}{20}$ $\frac{3}{8}$ $\frac{2}{5}$		A1
7 ai		metres, m	2	B1
ii		kilograms, kg tonnes, t		B1
bi		200	2	B1 cao
ii		1500		B1 cao
8 a		7	1	B1 cao
b		6*nt* or 6*tn*	1	B1 Accept *nt*6 or *tn*6
c	$3\times5-4\times\frac{1}{2}$		2	M1
		13		A1 cao
9 a		57	1	B1 cao
b		3	1	B1 Condone 1:3 or ×3
ci		27	2	B1 cao
ii		6		B1 cao
d		drawing	2	B2 for 9 cm, 4 cm, 90° and 57° ie ignore *y* (B1 for 9 cm, 4 cm and 90° or for 57° angle)

No	Working	Answer	Mark	Notes
10 a		30	1	B1 cao
b		3 4 7 8 8	3	B3 for correct answer or ft from (a) for "4" (B2 for 3 X 7 8 8 B1 for mode or median correct)
11 ai		38	2	B1 cao
ii	eg sum of angles on a straight line is 180°			B1 indep
bi	$\frac{180-"38"}{2}$		3	M1
		71		A1 ft from (a)(i)
ii		Reason		B1 for mentioning isosceles and equal or base angles or equal sides and equal or base angles
12 a	(1, H) (2, H) (3, H) (4, H) (1, T) (2, T) (3, T) (4, T)		2	B2 Condone omission of (2,T) (B1 for at least 4 correct)
b	$1-(0.2+0.1+0.4)$		2	M1
		0.3		A1
c		170	1	B1 cao
13 a	eg $\frac{45}{100}\times 60$		2	M1
		27		A1 cao
b	$\frac{68}{80}$ or 0.85		2	M1
		85		A1 cao
c	eg $\frac{72}{0.6}$		2	M1
		120		A1 cao

No	Working	Answer	Mark	Notes
14 ai		$3x + 2y$	4	B2 (B1 for $3x$ or $2y$)
ii		$p - 7q$		B2 (B1 for (1)p or $-7q$)
b		$5(2c - 3)$	1	B1
15	$525 \div 3$ or 175	875	2	M1 A1 cao
16	$\pi \times 3.8$	11.9	2	M1 A1 for 11.9 or better (11.93805…) 3.14→11.932
17 a	Splits shape appropriately eg 90×70 (6300) or 150×90 (13 500) eg $\left(\frac{110+90}{2}\right) \times 80$ (8000) or $\frac{1}{2} \times 80 \times 20$ (800)	14 300	4	M1 eg rectangle + triangle or rectangle + trapezium M1 dep on 1st M1 for relevant rectangle area M1 dep on 1st M1 for relevant triangle or trapezium area A1 cao
b	$\frac{"14300"}{10000} \times 160$	228.8	2	M1 A1 ft from (a) Condone rounding to nearest kg (229 if (a) correct)
18	$5x - 2x = 3 - 1$ $3x = 2$	$\frac{2}{3}$ oe	3	M1 M1 A1 Accept 0.66 or 0.67 or better

No	Working	Answer	Mark	Notes
19	2.366	1.5381…	2	M1 A1 for at least first 5 figures
20 a		$y^2 + 2y$	1	B1 oe inc $y \times y + 2 \times y$
b	$6x + 3$ and $2x - 8$	$8x - 5$	2	M1 A1 cao
21 a	$\frac{3 \times 4}{2}$ or 6 "6"×7	42	3	M1 M1 A1
b	"6"×2 $3 \times 7 + 4 \times 7 + 5 \times 7$ or $21 + 28 + 35$	96	3	M1 M1 A1 ft from "6"
22	eg $x + 4x = 10$ or sum of $x + y = 10$ and $4x - y = 0$ $5x = 10$	2, 8	3	M1 eg for clear attempt to substitute for y or add $x + y = 10$ and $4x - y = 0$ M1 A1 cao for both
23 a		$40 < v \leq 50$	1	B1
b		$\frac{36}{200}$ oe	2	M1 for fraction with denominator of 200 A1 for numerator of 36
24 ai		7^5	3	B1 cao
ii		2^7		B1 cao
iii		3^6		B1 cao
b		4	1	B1 Condone 5^4

No	Working	Answer	Mk	Notes
1a		194 ± 2^0	2	B2 (± 5^0: B1)
b	6.2 ± 0.1 or a length x 5			M1
		31 ± 0.5 km	2	A1
c		Correct pos'n ± 1mm	2	B2 (either 135 or 90 ± 2^0: B1)
2a		17, 26	2	B1B1
b	100 or √ seen			M1
		10	2	A1
3a	2/3 x 5 or 10/3			M1 Allow 0.666… x 5
		$3^1/_3$	2	A1
bi		12	1	B1
bii	9/12 and 10/12 or 19/12 or 45/12 and 34/12 or 79/12			M1 or 18/24 and 20/24, or 38/24 etc
		$6^7/_{12}$	2	A1 or $6^{14}/_{24}$
4	2775 – 2500 OR 2775/2500 275 x 100 111-100 2500			M1 M1
		11%	3	A1
5a	60/260			M1
		3/13	2	A1
b	60 x 195/260 oe or her 3/13 x 195			M1
		45 44.8 to 45.1	2	A1f Follow her grad or %
6a		Correct line	1	B1 thro' ≥ 3 pts ± 2mm
b		$x = 3$ OR $y = 4$ drawn		B1
		Correct region clear	4	B3 B1 $x+y \geq 4$ B1 $x \leq 3$ OR $y < 4$ B1 if correct region clear. ft his (a) and/or his $x = 3$ & $y = 4$ so long as vert & horiz pair
7a		Tangent, radius	1	B1
b	$\sin 40^0 = OT / 6$			M1
	$OT = 6\sin 40^0$			M1
		3.86 cm	3	A1 or better
c	$\cos 36^0$ = his 3.86 / OQ			M1
	OQ = (his 3.86) / cos36			M1
		4.77 or 4.8 cm	3	A1f or betters

No	Working	Answer	Mark	Notes
8ai		16	1	B1
aii	Attempt find 12th or 13th student's age			M1
		17.5	2	A1
aiii	Σfx attempted (= 415)			M1
	/ 24			M1dep
		17.3 or better	3	A1 17, no wking, M0M0A0 17, correct wking, M1M1A1
bi,ii		18 > old mean Increase		B1
			2	B1
9a	v/h attempted			M1
b		2	2	A1
		$y = 2x - 1$	2	B2 $2x$: B1 -1: B1; omit "$y =$": -B1
c		$y = 2x + c$, $c \neq 1$	1	B1 incl $y = 2x$
10a		Mars	1	B1
b	$4.5 \times 10^9 / 1.5 \times 10^8$ or inverted or 30 or $^1/_{30}$ seen			M1
		1:30	2	A1
11ai		$A \cap B'$ shaded	1	B1
aii		Eg 5, 10, 20	1	B1 No ft from diag
bi		Shape, wholly within A & overlapping B	1	B1
bii		Eg 15, 45, 75	1	B1 SC1: aii 30,15,45 & bii 30,60,90
12ai		55^0		B1
aii	<s in same seg		2	B1 or equiv, eg both stand on DC
bi		85^0		B1
bii	Opp <s of cyc quad			B1 or BDC =40, <s in same seg
	$180 - (40 + 55)$		3	B1
c		No. DCB (or DAC) $\neq 90^0$	1	B1

No	Working	Answer	Mark	Notes
13a		4/9 or 5/9 seen		B1
		Correct structure		B1 With labels correct or omitted
		4/9 or 5/9 correctly placed once		B1
		All correct		B1
			4	M2 (M1 for one product)
b	4/9 x 5/9 + 5/9 x 4/9	40/81 or 0.49…. oe	3	A1f ft his tree if p's <1
14a	0.006 x 3^3			M1
		0.162	2	A1
b	3240 or 20 000 seen			M1
	her 0.162			
	0.2 x 3^2 or 1.8 seen			M1
	her 20 000 x her 1.8 x 1.2			M1 Dep both M1s scored
		$43 200	4	A1
15	$\frac{-2 \pm \sqrt{\{4 - (-72)\}}}{6}$ oe			M1
		1.12, -1.79 or better	3	A1,A1
16a		$(2x-1)(x+3)$	2	B2 (Signs interchanged, B1)
b	$\frac{(x+3)(x-3)}{(x-6)(x-3)}$			M1 (Num.)
				M1 (Denom.)
		$\frac{x+3}{x-6}$	3	A1
17ai		$2x - 4$		B1
aii	his $2x - 4 = 0$			M1
		$x = 2$		A1f Follow her linear y'
		(2,-3)	4	A1f Follow her x
b		Coeff of x^2 +ve or shape is "U"		
		oe	2	B1 or any correct method
		Min		B1dep B1
c	x = constant	$x = 2$	2	M1
				A1
18	$\frac{1}{3}\pi r^2 h = 12\pi$			M1 $\frac{1}{3}\pi r^2 h = 12$ M0
	$r^2 = \frac{36}{h}$			M1 $r^2 = \frac{36}{\pi h}$ M1
		$r = \frac{6}{\sqrt{h}}$ oe	3	A1

No	Working	Answer	Mark	Notes
19	7^2 or 49 seen			M1
		$7\sqrt{2}$	2	A1
20ai	3/10 x 2/9			M1
		1/15 or 0.066(66..) oe	2	A1
ii	1 – her 1/15			M1
		14/15 oe	2	A1f
b	4/12 x 3/11 x 8/10			M1
		4/55 or 0.072(72..) oe	2	A1

No	Working	Answer	Mark	Notes
1	$525 \div 3$ or 175	875	2	M1 A1 cao
2	$5x - 2x = 3 - 1$ $3x = 2$	$\frac{2}{3}$ oe	3	M1 M1 A1 Accept 0.66 or 0.67 or better
3	Splits shape appropriately eg 90×70 (6300) or 150×90 (13 500) eg $\left(\frac{110+90}{2}\right) \times 80$ (8000) or $\frac{1}{2} \times 80 \times 20$ (800)	14 300	4	M1 eg rectangle + triangle or rectangle + trapezium M1 dep on 1st M1 for relevant rectangle area M1 dep on 1st M1 for relevant triangle or trapezium area A1 cao
4 a	$1 - (0.2 + 0.1 + 0.4)$	0.3	2	M1 A1
b		170	1	B1 cao
5	2.366	1.5381…	2	M1 A1 for at least first 4 figures
6 a		$y^2 + 2y$	1	B1 oe inc $y \times y + 2 \times y$
b	$6x + 3$ and $2x - 8$	$8x - 5$	2	M1 A1 cao
7 a	$\frac{68}{80}$ or 0.85	85	2	M1 A1 cao
b	eg $\frac{72}{0.6}$	120	2	M1 A1 cao

No		Working	Answer	Mark	Notes	
8	a		-4	1	B1	cao
	b	$3n = 20 + 22$ or $-3n = -22 - 20$		2	M1	
			14		A1	cao
	c		$3n + 5$ oe	2	B2	B1 for $3n$ oe seen
9	a	$\frac{3\times 4}{2}$ or 6		3	M1	
		"6"×7			M1	
			42		A1	
	b	"6"×2		3	M1	
		$3\times 7 + 4\times 7 + 5\times 7$ or $21 + 28 + 35$			M1	
			96		A1	ft from "6"
10	a		$40 < v \leq 50$	1	B1	
	b	$\frac{36}{200}$		2	M1	for fraction with a denominator of 200
			0.18 oe		A1	for numerator of 36
	c		20, 96, 164 192, 200	1	B1	
	d		Points correct	2	B1	
			Curve or lines		B1	ft
	e	50 (or 50¼) & 150 (or 150¾) indicated		2	M1	
			~ 13		A1	ft from graph if B1 or B2 in (d)
11	i		2^7	3	B1	cao
	ii		3^6		B1	cao
	iii		0		B1	cao

No	Working	Answer	Mark	Notes
12	$12x-10y=26$ $18x-15y=39$ $12x-9y=24$ $20x-15y=40$ $y=-2$ $2x=1$	$\frac{1}{2}$, -2	4	M1 for coefficients of x or y the same followed by correct operation. Condone one arithmetical error A1 cao M1 (dep on 1st M1) for substituting for other variable A1 cao
13 a	$5.6\times\frac{5}{8}$	3.5	2	M1 A1 cao
b	$4.5\times\frac{3}{5}$	2.7	2	M1 A1 cao
14 a	$75=3\times5^2$ and $105=3\times5\times7$ or 1, 3, 5, 15, 25, 75 and 1, 3, 5, 15, 21, 35, 105	15	2	M1 A1 cao
b	$3\times5^2\times7$ or 75, 150, 225, 300, 375, 450, 525 and 105, 210, 315, 420, 525	525	2	M1 Must be at least 3 correct in each list of multiples A1 cao
15	$mv-mu=I$ $mv=I+mu$	$\frac{I+mu}{m}$ or $u+\frac{I}{m}$	3	M1 or M2 for $v-u=\frac{I}{m}$ M1 A1

No	Working	Answer	Mark	Notes
16 a	$d = \frac{k}{n}$ or $d \propto \frac{1}{n}$		3	M1
	$15 = \frac{k}{9}$			M1
		$\frac{135}{n}$		A1
b	$\frac{135}{7.5}$		2	M1
		18		A1 cao
17 a		720, 1520	2	B2 B1 for each cao
b		bar of height 12 little squares	1	B1
18	$5.3^2 - 3.8^2 = 28.09 - 14.44$		5	M1 for squaring and subtracting
	13.65			A1
	"13.65"+6.2^2 or 52.09			M1 for squaring and adding
	$\sqrt{\text{"13.65"}+6.2^2}$			M1 (dep on previous M1) for square root
		7.22		A1 for 7.21 or 7.22 or answers rounding to either of these

No	Working	Answer	Mark	Notes
19 a		5.4 3.3 3 4.5	2	B2 for all 4 correct (B1 for 2 correct)
b		Points	2	B1 dep on at least B1 in (a) for plotting at least 7 points which are correct or ft correctly ± ½ square
				B1 dep on previous B1 for joining points with a smooth curve
c		0.59, 3.41	2	B2 B1 for each solution ft from graph Accept 1 or 2 dp
d	$x+\frac{2}{x}=7-x$		2	M1
		$y=7-x$ or $x+y=7$		A1
20 a	$\frac{60}{360}$ oe or $\frac{180}{360}$ oe seen		3	B1
	$\frac{2\pi\times4}{2}$			M1
		12.6		A1 for 12.6 or better (12.5663…)
b	eg $\frac{1}{2}\times8\times8\times\sin60°$		4	M1 for any method of finding Δ area
	$\frac{1}{2}\times\pi\times4^2$			M1
		25.1 or 27.7		A1 for one correct evaluation to 3sf or better 27.7 (27.7128…) or 25.1 (25.1327…)
		2.6		A1 for 2.6 or better (2.580…)

No	Working	Answer	Mark	Notes
21 a	6.5×8.5	55.25	2	B2 for 55.25 (B1 for 6.5 or 8.5 seen)
b	$\frac{7.5}{8.5}$	0.882…	3	B1 for numerator 7.5 B1 for denominator 8.5 B1 for 0.88 or better (0.8823529…) Accept 0.9 if 7.5 and 8.5 seen
22	$(x-6)^2 = x+6$ $x^2-12x+36 = x+6$ $x^2-13x+30=0$ $(x-10)(x-3)=0$	$x=10$ or $x=3$	5	B1 for $(x-6)^2$ B1 for $x+6$ M1 for $x^2-13x+30=0$ M1 for $(x-10)(x-3)=0$ A1 cao
23	$\frac{n}{10}\times\frac{n-1}{9}=\frac{1}{3}$ $3n(n-1)=90$ or $n(n-1)=30$ $3n^2-3n=90$ or $n^2-n=30$		4	B1 for $\frac{n}{10}$ and $\frac{n-1}{9}$ seen M1 for $\frac{n}{10}\times\frac{n-1}{9}=\frac{1}{3}$ M1 A1

MATHEMATICS 4400, CHIEF EXAMINER'S REPORT

PAPER 1F

General Comments

All candidates found plenty of opportunity to display their knowledge and understanding, although few gained high marks. The only question which proved to be too difficult for almost all candidates was question 16, on graphical inequalities.

Question 1

(a) Some candidates misunderstood what was required and used addition or multiplication. Those who understood the meaning generally scored both marks, although some ignored the word "odd" in (ii).
(b) This was generally answered well.
(c) Many candidates gave both 5 and 8.

Question 2

This was well answered on the whole. A few candidates rounded up in part (a). Some gave answers of 7000 in (a) and 600 in (b).

Question 3

This was also well answered. A few candidates omitted the diagram for (a)(i). Candidates who wrote out the whole series in (c) frequently made an error. Common errors in (c) were 5 x 9 = 45 and 4 x 11 = 44, presumably using proportion based on either diagram number 4 or 5.

Question 4

(a) This was almost always answered correctly.
(b) Here many candidates gave words from the box instead of values. Those who gave values usually gave the correct ones.

Question 5

(a) Rhombus and trapezium were common wrong answers.
(b) 2cm was often seen, as was 3cm which is a result of imprecise measurement.
(c) was frequently correct, allowing for in incorrect (b)
(d) Candidates variously marked an obtuse, acute or reflex angle.
(e) was well answered.
(f) 4 was common, as were 1 and 0. Many candidates misunderstood the word "order and gave the answer *ACBD*.
(g) Very few gave the correct answer of 0. Most frequent was 2.
(h) Almost all candidates did this correctly. A few correctly reflected the top line but translated the reflection of the bottom line one unit to the left.

Question 6

(a) was almost always correctly answered.
(b) Many candidates did not complete the table correctly. Those who did sometimes plotted (2, 5) at (2, 6).

Question 7

(a) This was well answered. In (ii) many number of candidates gave \$1.5 instead of \$1.50.
(b) Very few correct answers were seen. There was confusion between 24 hour clock and am/pm. Those candidates who understood 24 hour time often gave 5h 15 mins or 7h 15 mins as the answer.
(c) This part was well answered although many candidates who counted from –3 to 5 included both starting and finishing numbers in their count.

Question 8

(a) was generally answered correctly
(b) was also often correct
(c) The angle was often inaccurately measured as 140^0. The profit was calculated correctly by many candidates, although many tried to use a percentage method instead of a fraction of 360.

Question 9

The most common wrong answers were 45 (based on "alternate angles") and 180 – 150 = 30.

Question 10

This question was very well answered. A few candidates missed the 1, 24 pair.

Question 11

(a) The bearing gave great difficulty because it was greater than 180^0.
(b) Many candidates measured *PQ* as 6cm.
(c) Some candidates drew the 135^0 correctly, but most did not appear to understand "due East".

Question 12

(a) was well answered
(b) was also answered correctly by many, but some found the 101th term.

Question 13

In both parts a few candidates resorted to decimals and therefore could not give the final answers as mixed number.
(a) Very few candidates could multiply 2/3 by 5 correctly.
(b) In (i) most candidates found the HCF. In (ii) most candidates wrote 3/4 + 5/6 = 8/10 or gave a similar wrong calculation after finding a common denominator.

Question 14

Most candidates calculated the profit correctly, but then either divided by 2500 or by 100.

Question 15

Many candidates showed no understanding of gradient and used Pythagoras' theorem in various creative but irrelevant ways. A few calculated the gradient upside down.

Question 16

(a) Only a few candidates drew the line correctly. Many drew $y = x + 4$. Others drew two lines.
(b) Only a few candidates understood about regions. For $x \leq 3$ many drew both $x = 3$ and $y = 3$ or drew lines such as $x + y = 3$ or $y = x + 3$. Even those candidates who drew correct lines shaded in such a way that it was impossible to tell whether they intended a single region as the answer. No candidates shaded OUT, which is undoubtedly the clearest way to answer questions of this type.

Question 17

(a) A few candidates mentioned either "tangent" or "radius". Almost none mentioned both. The most common types of answer were something like "because it is a right angled triangle" or "because they are a vertical and a horizontal line".
(b) Trigonometry was disappointingly rare here. When attempted, it was often incorrect, eg 6cos40 or 40sin6. Incorrect rounding was common.

Question 18

(a)(i) was usually answered correctly.
(a)(ii) Many candidates gave 17 or 18 rather than 17.5. Others found the "middle" of the frequency column or found (16 + 17 + 18 + 19)/4. These yielded the correct answer for the median but gained no marks.
(a)(iii) All the usual errors, such as (16 + 17 + 18 + 19)/4, were seen more commonly than the correct method.
(b) Very few candidates answered this correctly. Some wrote that the mean increased because there were more people.

PAPER 2F

General Comments

The overwhelming majority of candidates were well prepared and took the opportunity to show what they knew. As in June, a number of candidates' marks were in the 90s, indicating that they might have obtained a higher grade, had they been entered for the Higher tier. Answers were generally well presented with working clearly shown.

Question 1

Errors in the first two parts were very rare but the final part proved more demanding, although it still had a high success rate. A small minority of candidates gave non-integer answers and 9, obtained by rounding down, was not uncommon. Division was the most popular method but trial methods were also used, usually successfully.

Question 2

This was very well answered, both "cube" and "cuboid" being accepted in part (i),
where "square" appeared occasionally.

Question 3

Many candidates scored full marks, although regular wrong answers were 9 in part (a), 0.3 in part (c) and, to a lesser extent, $\frac{1}{3}$ in part (b). In part (d), 62.5 gained both marks, even if it were then rounded to 62 or 63. If, however, only a rounded values were shown, only 1 mark out of 2 was awarded.

Question 4

Hardly any candidates lost a mark on either of the first two parts and, in the final part, few failed to give an acceptable explanation such as “2176 is an even number”, “All the terms are odd”, “It doesn’t end in an odd number” and “It isn’t a multiple of 3”.

Question 5

This was another very well answered question, full marks often being awarded. An awkward vertical scale, such as 1 cm to 3 medals, was sometimes used for the bar chart. This was not penalised but representing numbers which were not multiples of 3 to the necessary degree of accuracy (½ a square) was made more difficult.
Virtually every candidate knew how to write a ratio. It was occasionally left unsimplified or simplified incorrectly but the correct simplest form was usually obtained. The correct ratio with the numbers reversed gained 1 mark out of 2.

Question 6

Many candidates scored full marks with commendably few errors being made on parts (a), (c) and (d). In part (b), a minority gave an answer of $\frac{4}{6}, \frac{5}{7}, \frac{8}{10}$ presumably under the misapprehension that equivalent fractions can be obtained by adding the same number to both the numerator and the denominator.
In part (e), the most popular method was to convert each fraction to a decimal. Percentages, fractions with a denominator of 40 and diagrams were also used but much less often. When no working was shown it was not unusual to see the order $\frac{2}{5}, \frac{3}{8}, \frac{3}{10}, \frac{7}{20}$ the result of ordering the denominators.

Question 7

3 marks out of 4 was the most common score, the error usually being made in converting litres to cm^3 with 15 and 150 appearing more often than the correct answer.

Question 8

Again, many candidates answered all parts correctly, especially the first. In the second part, candidates were expected to remove all multiplication signs. The majority understood the formula in the third part and evaluated it accurately but a few interpreted $3p$ as 3 + 5 or 35 and $4q$ as $4\frac{1}{2}$.

Question 9

Part (a) proved to be far from trivial, a substantial minority of candidates, including some who went on to score high marks, multiplying 57 by 3. The rest of the question posed few problems.

Question 10

There were many completely correct solutions, although there was a little confusion between mode and median.

Question 11

The success rate for finding the angles was very high but, predictably, a little lower for giving acceptable reasons. The minimal requirements were, in part (a)(ii), mention of “line” and “180” and, in part (b)(ii), “isosceles” or “equal sides” and “equal angles” or “base angles”.

Question 12

There were very few errors in the first two parts, although a handful of candidates just added the probabilities in the second part. The majority of candidates interpreted the third part correctly, although a few missed the point and evaluated expressions like 85 × 0.4.

Question 13

Candidates showed their proficiency with percentages and most gained full marks.

Question 14

Although $x^3 + y^3$ was seen occasionally as the answer to part (a)(i), it was part (a)(ii) on which errors were much more common. Many candidates found one coefficient correctly but only the best found both. Expressions such as $p + 3q$, $p - 3q$ and $7p - 7q$ appeared regularly.
Understanding of factorisation was variable and part (b) was often not attempted. The most common wrong answer was $2c - 3$.

Question 15

This was very well answered, although a few candidates just multiplied 525 by 5.

Question 16

The majority of candidates found the circumference successfully, the use of πd and $2\pi r$ being equally popular. The latter expression proved to be marginally more risky, if the diameter were halved inaccurately or substituted into it instead of the radius. πr^2 was occasionally used.

Question 17

This question was quite well answered but there were pitfalls in the first part. Most split the shape up but some the used incorrect lengths or failed to halve the product when finding the area of the triangle.
Even if the area was wrong, full marks could still be gained in the second part, if the weight followed correctly from the candidate’s area.

Question 18

Algebra often differentiates between Foundation tier candidates and so it proved with this question. Trial and improvement methods were probably more common than formal algebra and, when algebraic methods were attempted, $5x + 2x = -3 - 1$ was a frequent first step. Obtaining 3*x* = 2 was no guarantee of a correct solution and was sometimes followed by *x* = $1\frac{1}{2}$.

Question 19

−11.017…, the result of calculating the value of $\sqrt{2.6^3} - 3.9^2$ appeared as often as the correct answer.

Question 20

Only a minority were able to score the mark for expanding *y*(*y* + 2), even though simplification was not required, and many were unable to make an attempt.
In the second part, incorrect expanding, usually $6x + 1 + 2x - 4$, was quite common but more surprising was that a substantial proportion of those who had expanded both brackets correctly then made errors in simplifying, particularly with the coefficient of *x*, which was often given as 4.

Question 21

Many candidates understood the concepts and gained full marks but others appeared to be finding products and sums in a fairly random way. In particular, 3 × 4 × 5 × 7 was a popular calculation for both parts. The most common errors made as part of meaningful attempts were, in part (a), failure to halve the product when finding the area of cross-section and, in part (b), omitting either the area of one of the triangles or the area of the
5 cm by 7 cm rectangle.

Question 22

The use of formal algebra was rare, as were correct solutions. The minority who found them did do using trial methods.

Question 23

The majority achieved some success but 50 < *v* ≤ 60 appeared regularly as the modal class. For the probability, many gave a fraction with a denominator of 200 but the numerator was sometimes 28, instead of 36.

Question 24

Most gave 7^5 as the answer to part (a)(i) but, after that, it was apparent that there was wide variation in candidates' familiarity with laws of indices. While many scored full marks, there were numerous wrong answers, especially 4^7 in part (a)(ii) and 3^4, 1^4 and 1^6 in part (a)(ii).
5^4 was awarded the mark in part (b) even though it was not strictly correct.

PAPER 3H

General Comments

Almost all candidates found little difficulty with this paper. Many gained extremely high marks. There were just a few candidates who might have benefited by entering Foundation Tier. Verbal answers (in questions 8, 12 and 17) were sometimes given in a roundabout or even verbose manner. Many candidates failed to use the appropriate mathematical language and therefore risked a penalty for lack of clarity.

Question 1

This question was very well answered.
(a) The bearing gave a few candidates difficulty because it was greater than 180^0.
(b) A few candidates measured *PQ* as 6cm.
(c) Some candidates appeared not to understand “due East”.

Question 2

(a) was well answered.
(b) was also answered correctly by many, but a few found the 101th term.

Question 3

This question was very well answered. A few used decimals and therefore could not gain more than one mark overall.
(b) In (i) a few candidates found the HCF.

Question 4

Most candidates calculated the profit correctly, but then a few divided by 2500 or by 100.

Question 5

Many candidates showed a good understanding of gradient. A small minority used Pythagoras’ theorem in various creative but irrelevant ways. A few calculated the gradient upside down.

Question 6

This question was generally well answered.
(a) A few candidates drew $y = x + 4$. Others drew two lines.
(b) Most candidates understood about regions. Some had all the lines correct but chose the wrong side of just one of them, usually $y = 4$. Some shaded IN and others shaded OUT. The latter is the clearest and safest way to answer questions of this type. When a diagram contained several pieces of overlapping shading, it was not always possible to distinguish the actual region intended as the answer.
Some weaker candidates drew both $x = 3$ and $y = 3$ or drew lines such as $x + y = 3$ or $y = x + 3$.

Question 7

(a) Most candidates gave an adequate answer, although some used long-winded non-technical language. Some answers were inadequate, involving “the line from the centre to the tangent”.
(b) (c) Trigonometry was good. A few candidates attempted the sin rule in (c), often making an error in an angle.

Question 8

(a)(i) was usually answered correctly.
(a)(ii) Many candidates gave 17 or 18 rather than 17.5. A few found the “middle” of the frequency column or found (16 + 17 + 18 + 19)/4. These yielded the correct answer for the median but gained no marks.
(a)(iii) This was generally correct although (16 + 17 + 18 + 19)/4, was occasionally seen.
(b) Many candidates answered this correctly. Others suggested that because 18 is very near the mean it will not have a great effect on the mean. A few gave a vague answer – the total age is increased, and so is the total number of students, but the increase in the former will outweigh the increase in the latter. Some wrote that the mean increased simply because there were more people.

Question 9

This question was very well answered.

Question 10

Again, a well answered question. A few candidates subtracted before finding the ratio and so gave the answer 1:29.

Question 11

(a) Many candidates answered this correctly.
(b) Most candidates answered (ii) correctly but many placed the circle for *C* overlapping *A* and *B* and also overlapping the outside.

A large minority of candidates ignored the “dash” in both parts of the question.

Question 12

Many candidates scored full marks in (a) and (b). Almost all found both angles correctly, but explanations were sometimes incorrect or obscure. Occasionally there was mention of “alternate angles” or “bow tie”. In (c) some inadequate answers were “No, because it doesn’t pass through the centre,” and “No, because we are not told that *BD* is a diameter,”

Question 13

This question proved to be easy for most candidates. In (a) a few candidates either omitted probabilities or gave products instead of individual probabilities on the second set of branches. In (b) an occasional candidate found P(*BW*) but not P(*WB*).

Question 14

This fairly difficult question was well answered by many candidates. The most common error was using the linear SF instead of the area and volume SFs. Some candidates tried to work out the height and radius of one or both sizes. None succeeded. One common error seen in this type of solution was Vol/S.A. = *h.*

In part (b) a few candidates divided by 1.2.

Question 15

This presented few problems. A few candidates used an incorrect version of the formula, despite the fact that it is given on page 2. A few omitted the minus sign in the second answer.

Question 16

Also well answered. In (a) a few interchanged the signs and in (b) there were a very few cases of illegitimate "cancelling".

Question 17

(a) was generally correct although occasionally the *y* coordinate was incorrect.
(b) "The coefficient of x^2 is positive" was accepted as an adequate reason, but any correct method was acceptable. There were some inadequate answers such as "the parabola is positive". Some candidates gave their reason as "The *x* value is positive" or "The *y* value is negative" - presumably referring to the coords of the TP.
(c) A few candidates had no idea of the general shape of the curve and of the connection between minimum point and line of symmetry. A few found the equation of the tangent at (2, -3) or the reflection of the original curve in $y = 0$.

A significant minority of candidates unnecessarily used completing the square in (a)(ii) or (b) or (c).

Question 18

Many correct solutions were seen. The most common errors were using a volume of 12 instead of 12□ and having *h* in the numerator instead of the denominator.

Question 19

Most candidates showed a good understanding of surds.

Question 20

A significant minority of candidates did the whole question **with** replacement.
(a)(ii) Some candidates failed to use 1 – part (i). Many of these found only P(GB) and P(BG) but not P(GG).
(b) Some candidates read this as "exactly three **good** oranges".

PAPER 4H

General Comments

There were few errors which occurred regularly and hardly any at all on the first half of the paper. In fact, although some candidates found Questions 21, 22 and 23 difficult, it was only the last part of Question 19 that caused widespread problems.

It is regretted that there was an error in the table in Question 19(a); 5.2 should have been 5.4. This was noticed by several candidates but, fortunately, it had no significant effect on the rest of the question.

Question 1

This question proved to be a straightforward and successful start for virtually every candidate.

Question 2

The equation was almost always solved correctly.

Question 3

Again, errors were rare.

Question 4

The first part was extremely well answered and the second parts caused only occasional problems.

Question 5

Almost all candidates evaluated the expression accurately.

Question 6

The expansion in part (a) caused no difficulties and, apart from a few errors in the simplification, part (b) also proved routine.

Question 7

Hardly any candidates failed to score full marks.

Question 8

The vast majority gained full marks.

Question 9

The first part was usually correct. There were occasional errors in the second part; some candidates either omitted a rectangle or used an incorrect dimension, while others included only one triangle.

Question 10

This was very well answered and full marks were often awarded but, if an error were made, it was most likely to be in part (b).

Question 11

This was yet another question which was almost always answered completely correctly.

Question 12

Candidates demonstrated their proficiency at solving simultaneous equations and most obtained the correct solutions.

Question 13

A minority of otherwise strong candidates had some problems, particularly with the first part but there was no pattern to the errors. Overall, though, there was a very high success rate.

Question 14

Hardly any marks were lost on this question.

Question 15

Almost every candidate changed the subject of the formula correctly. Many gave $\frac{I+mu}{m}$ but a sizeable minority obtained $u+\frac{I}{m}$.

Question 16

Inverse proportionality posed few problems for most candidates.

Question 17

While there were many completely correct answers, the first entry in the table and completion of the histogram caused occasional problems.

Question 18

This was extremely well answered, almost always by using Pythagoras' Theorem twice, although the Cosine Rule was also used. On the rare occasions that errors were made, it was usually in finding *QS*, with the sum of 5.3^2 and 3.8^2 being used instead of their difference.

Question 19

The first three parts were usually correct but the final part proved to be the most demanding of the whole paper. A minority found the equation of **L** correctly but the rest usually either omitted part (d) or embarked on tortuous and irrelevant algebra.

Question 20

Most candidates scored full marks, producing clear and accurate solutions. The most likely error was in find the area of triangle *ABC* in part (b), $\frac{1}{2}\times 8\times 8$ sometimes being used.

Question 21

The success rate for the first part was extremely high but somewhat lower in the second part, where some candidates used the upper bound of both *x* and *y*.

Question 22

This was well answered but there was considerable scope for errors and so it proved to be one of the more demanding questions on the papers. Some mistakes occurred at the beginning with fg(*x*), which was sometimes given as $x^2 - 6$, or $f^{-1}(x)$. Candidates who cleared those two hurdles sometimes went on to make errors in their simplifying or in the solution of the quadratic equation, factorising and the use of the formula being equal in both popularity and success for the latter.

Question 23

Many candidates gave concise, algebraic proofs. Some saw that *n* was 6 and then showed that $6^2 - 6 - 30 = 0$, which was also accepted.

MATHEMATICS 4400, GRADE BOUNDARIES

Grade	A*	A	B	C	D	E	F	G
Foundation				73	57	42	27	12
Higher	81	63	45	28	15	8		

Note: Grade boundaries may vary from year to year and from subject to subject, depending on the demands of the question paper.

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