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GCSE

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Mathematics A 1387

July 2004

Mark Scheme

Edexcel GCSE

Mathematics A 1387

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NOTES ON MARKING PRINCIPLES

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1 **Three types of mark are available**
M marks - awarded for correct working seen or implied.
A marks - conditional accuracy marks which are awarded for accurate working following the award of M marks.
B marks - unconditional accuracy marks (independent of M).

2 **Abbreviations**
cao - correct answer only.
ft - follow through.
$\sqrt{}$ - Denotes a "follow through" answer.

SC - special case.
isw - ignore subsequent working.
oe - or equivalent (and appropriate).
NB: a candidate cannot benefit from both isw and ft.

3 **If no working shown, then**
correct answers normally score full marks
incorrect (even though nearly correct) answers score no marks.

4 **Marking instructions**
Misread loses A marks (and sometimes B marks) on that part but ft can be allowed on subsequent parts. M marks can still be earned. If in doubt contact your team leader. If there is a wrong answer in the answer space DO CHECK the working in the body of the script.
- If it is clear from working that the "correct" answer has been obtained from incorrect working, award no marks. If in doubt contact your team leader.
- If there is a wrong answer in the answer space DO CHECK the working in the body of the script.
- If it is clear from working that the "correct" answer has been obtained from incorrect working, award no marks. If in doubt contact your team leader.

5 **Style of marking**
Answer correct: tick and write part mark in margin NEXT TO BRACKETED MARK.
Answer incorrect: cross, but show M, A or B marks if any earned in body of script and transfer the total of these to the margin next to the bracket mark.
Total for each double page at bottom right page (except for back if used), FINAL TOTAL IN RELEVANT BOX ON FRONT COVER.
Nought in margin for fully incorrect question or page AND FOR NO ATTEMPT.
Where no attempt has been made a line should be put in the answer space and zero in the margin next to the bracketed mark
CHOICE OF METHOD – No marks unless one answer is in answer space – then mark that.
CROSSED OUT WORK - if not replaced this should be marked (if legible).
There must always be a mark next to bracketed mark in the margin/

6 **Follow Through Marks**
Follow throughs are guided by two principles:

(a) Follow throughs which involve a single stage calculation can be awarded without working since you can check the answer yourself, but if ambiguous, do not award.

(b) Follow throughs which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

7 Probability

Probability answers must be given as fractions, percentages or decimals. If a candidate gives a decimal equivalent to a probability, this should be written to at least two decimal places (unless tenths).

Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.

6 Linear Equations

Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded.

8 Parts of questions

Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

PAPER 5501					
No		**Working**	**Answer**	**Mark**	**Notes**
1			K: 1020 L: 8.06	2	B1 for 1020 or 1,020 B1 for 8.06 Accept £8.06p and £8,06
2	(a)		28, 33	2	B1, B1 (B1 ft for "28" + 5 if both numbers >25)
	(b)			1	B1 for add 5, +5, for going up in 5's the difference is 5 oe
	(c)			1	B1 for they end in 3 and 8, it ends in 7; or refers to 383 and 388 are in sequence
3	(a)(i)		$\dfrac{1}{2}$	2	B2 for ½ accept half (B1 for an equivalent unsimplified fraction eg 4/8 or 50%
	(ii)		2 rectangles shaded	1	or 0.5) B1 for correct shading (any 2 rectangles)
	(b)(i)		40	4	B1 for 40 cao
	(ii)		150 000		B1 for 150 000 cao (accept 150,000 not 150.000)
	(iii)		6.55		B1 for 6.55 cao not $6.5^{½}$
	(iv)		$\dfrac{3}{8}$		B1 for $\dfrac{3}{8}$ oe accept 0.375
	(c)		Cross 3cm from *A*	1	B1 mark a cross 3 cm (±2 mm) from *A*
4	(a)(i)		metres	2	B1 for metres (m)
	(ii)		grams		B1 for grams (g)
	(b)		miles	1	B1 for miles
5	(a)		(3, 2)	1	B1 for (3, 2)
	(b)(i)		*Q* at (0, 3)	1	B1 for *Q* plotted correctly on *y*-axis at (0, 3) ±2mm
	(ii)		*R* at (−2, −3)	1	B1 for *R* plotted correctly at (−2, −3) ±2mm
6	(a)(i)		30	2	B1 for 30
	(ii)		25		B1 for 25
	(b)(i)		4 shapes	2	B1 for drawing 4 shapes
	(ii)		1½ shapes		B1 for drawing 1½ shapes

	No	Working	Answer	Mark	Notes
PAPER 5501					
7	(a)		30	1	B1 for 30
	(b)	$20 \times 3 + 5$	65	2	M1 for $20 \times 3 + 5$ oe A1 for 65
8	(a)		Draws perp.	1	B1 for correctly drawing perp must touch line or cut line $AB \pm 2$mm
	(b)		Sketches a cylinder	1	B1 for sketching cylinder
9	(a)	1974 $\underline{6580}$ $\overline{8554}$	855.4	3	M1 for complete method with relative place value correct, condone 1 error in multiplication A2 cao (A1 for digits 8554 seen or A1 for "855.4" dependent on 1 arithmetic error)
	(b)	$990 \div 69 = 14.3\ldots$ or 14 rem 24	14	4	Method 1 - Everything excluding long division M2 for a valid method with no errors …need to see 966 or 1035 (M1 for a valid method, including estimation, that reaches an answer between 901 and 1099 inclusive. Ignore errors.) A2 for 14 with a fully correct method (A1 (dep on 1st M1) for an answer between 14 and 15 inclusive. Ignore errors. Cannot have used estimation.) Note: Estimation can only score a maximum of M1 unless accompanied by another method or 966 or 1035 see (award M2) Method 2 – long division method M2 for $990 \div 69 =$ integer answer between 12 and 19 inclusive and rem 30 seen (M1 for $990 \div 69$ with 1 in tens column.) A2 for 14 with fully correct method (A1 (dep on 1st M1) for an answer between 14 and 15 inclusive.)

	No	Working	Answer	Mark	Notes
PAPER 5501					
10	(a)(i)		7	2	B1 for 7
	(ii)		−10		B1 for −10
	(b)(i)		6	2	B1 for 6 (accept −6)
	(ii)		8		B1 for 8 (accept −8)
	(c)		−7	1	B1 for −7 cao
11	(a)		B and D	2	B1, B1 (−1 each extra)
	(b)(i)		A	2	B1 for A
	(ii)		3		B1 for 3
12	(a)	$800 - 144$	656	2	M1 for at least 1 digit correct and in correct position needs to be 3 digit number A1 for 656
	(b)	144 is less than 200 so Trudy is wrong		2	B1 for 200 B1ft for 'correct' explanation based on cand's "200"
	(c)	$\dfrac{45 \times 800}{100}$	360	2	M1 for $45 \times 800 \div 100$ oe A1 for 360
	(d)	$\dfrac{176}{800} \times 100$	22	2	M1 for $\dfrac{176}{800} \times 100$ oe A1 for 22
13	(a)(i)		25	4	B1 for 25
	(ii)		28		B1 for 28
	(iii)		5 and 20		B1 for 5 and 20
	(iv)		26 and 33		B1 for 26 and 33
	(b)	$2^3 = 8$ or $2^3 = 2 \times 2 \times 2$ (which is not 6)		1	B1 for valid 'explanation'
14			10 m^2	2	B1 for 10 B1 indep for m^2.

No		Working	Answer	Mark	Notes
PAPER 5501					
15	(a)	$\dfrac{11}{12} - \dfrac{10}{12}$	$\dfrac{1}{12}$	2	M1 for correctly writing both fractions to a common denominator A1 for $\dfrac{1}{12}$ oe
	(b)	$\dfrac{70 \times 400}{200}$	140	2	B2 for 140 (accept 136) (B1 for sight of any two of 70, 400 or 200)
16	(a)		$2y$	1	B1 for $2y$ or $2 \times y$, y2, $y \times 2$
	(b)		$3p^2$.	1	B1 for $3p^2$ or $3 \times p^2$ or $p^2 \times 3$ or $p^2 3$
	(c)		$x(x-3)$	2	B2 for $x(x-3)$ (B1 for $x\,(x\ldots\ldots))$ $\dfrac{25}{60}$ wrongly cancelled gets B1 ISW
17	(a)		2 23 9 34 15 2 9 26 17 25 18 60	3	B3 for all correct (B2 for 4 or 5 entries correct) (B1 for 2 or 3 entries correct)
	(b)		$\dfrac{25}{60}$	1	B1 for $\dfrac{25}{60}$ or $\dfrac{5}{12}$ oe $\dfrac{25}{60}$ wrongly cancelled gets B1 ISW

PAPER 5501					
No		**Working**	**Answer**	**Mark**	**Notes**
18	(a)(i)		60	2	B1 for 60
	(ii)				B1 for all **angles equal** so equilateral triangle oe
	(b)(i)		130	3	B1 for 130
	(ii)				B1 for isosceles triangle oe or 2 angles equal accept $\angle Q = \angle R$
					B1 for angles on a straight **line** add up to **180**°oe (180º could be in working)
	(c)		64	1	B1 for 64
19	(a)		1	1	B1 for 1
	(b)		3	1	B1 for 3
	(c)	$9 \times 1 + 3 \times 2 + 5 \times 3 + 3 \times 4$ $(= 42)$	2.1	3	M1 for $9 \times 1, 3 \times 2, 5 \times 3, 3 \times 4$ or for 42 seen
		"42" $\div 20$			M1 (dep) for "42" $\div 20$
					A1 for 2.1 or $2\dfrac{1}{10}$ or $2\dfrac{2}{20}$
20	(a)		09 05	1	B1 for 09 05 oe
	(b)		7	1	B1 for 7
	(c)		10	1	B1 for 10
	(d)	7km in 20 mins	21	3	B1 for 20 (minutes) oe or $\times 3$ seen
					M1 for $\dfrac{"7"}{"20"}$
					A1 cao
					[SC: "7" $\times 3$ seen gets B1 M1]

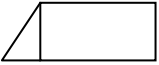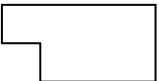| PAPER 5501				
No	Working	Answer	Mark	Notes
21	Vertices of new triangle at (2, −2) (2, 6) and (6, −2)	Correct triangle drawn	3	B3 cao (B2 for either correct triangle in wrong translated position or for 2 vertices correct) (B1 a right angled triangle with horizontal length 4 or vertical length 8 in the same orientation as the shaded triangle) SC B2 for s + 3 totally correct
22 (a) (b) (c)	$8560 \div (10 \times 10)$	8 Pentagon 85.6	1 1 2	B1 for 8 B1 for pentagon M1 for $8560 \div (10 \times 10)$ oe A1 for 85.6
23	$2x + x + 100 + 47 = 360$ $2x + x = 360 - 100 - 47$ $x = 71$ Largest angle = $2x$ =	142	4	M1 for $2x + x + 100 + 47 = 360$ or 360 – 147 or 213 seen M1 dep for correctly separating x-terms and non x terms or "360 – 147" ÷ 3 A1 for $x = 71$ provided M2 awarded A1 ft for 142

	No	Working	Answer	Mark	Notes
PAPER 5502					
1	(a)		Diagram	1	B1 cao
	(b)		22, 26	1	B1 cao
	(c)		46	1	B1 cao
2	(a)	£5.95 + £1.62 + 25p + 2 × 48p = £8.78	1.22	3	M1 for 3 of £5.95, £1.62, 25p, 48p seen with intention to add or 170 seen A1 for £8.78 A1 ft from " 8.78"
	(b)	160 ÷ 12 = 13.(333…)	14	2	M1 for 160 ÷ 12, or 13 or better or 12×13 or 12×14 A1 14 cao
	(c)	"14" × £12.20 = £170.8**0**	170.80	2	M1 for "14" × 12.20 A1 for 170.8**0** or 158.6**0** if 13 in (b) NB: 170.8 or 158.6 gets M1 A0
3	(a)(i)		1459	1	B1 cao
	(ii)		9541	1	B1 cao
	(b)		9 + 5 = 14	1	B1 cao
	(c)		0	1	B1 cao
4	(a)		1123	1	B1 cao
	(b)		1125	1	B1 cao
	(c)		43	1	B1 cao
	(d)	67 – "43"	24	2	M1 for 67 – "43" A1 ft from "43"
	(e)(i)		80	2	B1 cao
	(ii)		56 – 58		B1 answer in range 56 to 58 inc
	(f)		Completes graph	2	B2 for (Apr , 70) and (May , 60 < p < 65) plotted and joined (B1 for one point plotted)

			PAPER 5502			

PAPER 5502

No		Working	Answer	Mark	Notes
5	(a)(i)		4	1	B1 cao
	(ii)		10	1	B1 cao
	(b)		28	2	B2 for 28 (B1 for 29 or 14×2)
6	(a)		$\dfrac{3}{4}$	1	B1 accept 0.75, 75%
	(b)	$\dfrac{3}{4} \times 28 = 21$	15.54	3	M1 for $\dfrac{3}{4} \times 28$ or 21 seen M1 for "21" $\times$ 74 or 28×74 or 7×74 A1 cao
	(c)(i)		44 – 46	2	B1 44 – 46 inc
	(ii)		5.2 – 5.4		B1 5.2 – 5.4 inc
7	(a)		Correct shape	1	B1
	(b)		Correct shape	1	B1
8	(a)		Hexagon	1	B1
	(b)		Right	1	B1 cao
	(c)		Drawing	2	B2 for 7 additional hexagons with at least 2 points at which 3 hexagons meet (B1 for one point at which 3 hexagons meet)
9	(a)		$\dfrac{3}{4}$	2	M1 $\dfrac{80-20}{80}$ or $\dfrac{60}{80}$ or 0.75 (oe) A1 cao Do not accept equivalents
	(b)		15	1	B1 cao
	(c)		Iron and Cook set	1	B1 for both Accept mixer and fryer
	(d)		Microwave	1	B1 cao
	(e)		Bar chart	2	B1 one column (mixer): 70, 90 B1 second column (fryer): 70, 85 [SC: B1 columns correct but reversed]

No		Working	Answer	Mark	Notes
10	(a)		Acute	1	B1
	(b)		Reflex	1	B1
	(c)		reason	1	B1 reason eg $120 + 230 = 350 \neq 360$
11	(a)		$\dfrac{1}{2}$	1	B1 for $\dfrac{1}{2}$ oe
	(b)		reason	1	B1 for reason e.g could get 30 heads
12	(a)	7.5×4	30	2	M1 for 7.5×4 or $7\frac{1}{2} \times 4$ A1 cao
	(b)	$\sqrt{(42.25)}$	6.5	2	B2 for 6.5 (B1 for 42.25)
13	(a)		$6x$	1	B1 accept $6 \times x$, $x6$ oe
	(b)		$x - 4$	1	B1 cao
	(c)		$12(x - 4)$	1	B1 for $12(x - 4)$ or $12x - 48$ or $12 \times x - 48$ oe
	(d)		$18x - 48$	2	M1 for " $6x$ " + " $12(x-4)$ " or " $6x$ " + " $12x - 48$ " oe A1 ft $18x - 48$, $2(9x - 24)$, $3(6x - 16)$, $6(3x - 8)$
14	(a)		90	2	B2 for 90 ± 2 (B1 for 9 ± 0.2)
	(b)		317	1	B1 for 317 ± 4
15	(a)	Accurate drawing of triangle		2	B1 cao for 38º (±2º) B1 cao (indep) for BC drawn 7.3 cm (±2mm) and completing the triangle.
	(b)	Measure angle A	63º	1	B1 for 63º (±2º) or ft their diagram (±2º)

PAPER 5502					
No		**Working**	**Answer**	**Mark**	**Notes**
16	(a)	$0 \times 1 = 0$ $1 \times 1 = 1$ $2 \times 4 = 8$ $3 \times 8 = 24$ $4 \times 8 = 32$ $5 \times 7 = 35$	100	3	M1 col 1 × col 2 (at least 3 shown) M1 (dep) sum of totals A1 cao SC: M1 M1 A0 for 101
	(b)	Either $35.50 \div 1.42 = 25$; $26.99 - 25 = 1.99$ Cheaper in the USA Or $26.99 \times 1.42 = 38.33$; $38.33 - 35.50 = 2.83$ Cheaper in the USA		3	M1 $35.50 \div 1.42$ A1 25 seen B1 ft (dep on M1) £1.99 with conclusion (must have units) **OR** M1 26.99×1.42 A1 38.32 or 38.33… seen B1 ft (dep on M1) $2.83 or $2.82 with conclusion (must have units) must be to 2dp
17	(a)		-1, (1), (3), 5, 7, 9	2	B2 cao (B1 for 2 values)
	(b)		Graph	2	B1 ft for plotting points ±1/2 square B1 cao for line between $x = -2$ and $x = 3$
	(c)(i)		0.4	2	B1 for 0.4 or ft from single straight line with positive gradient
	(ii)		1.2		B1 for 1.2 or ft from single straight line with positive gradient

PAPER 5502					
No		**Working**	**Answer**	**Mark**	**Notes**
18	(a)		Plots	1	B1 cao
	(b)		description	1	B1 dynamic relationship or "positive" (correlation)
	(c)		line of best fit	1	Line within overlay region, and to the extent of.
	(d)(i)	280 g →	reading	2	B1 ft from single straight line of positive gradient (±1/2 square)
	(ii)	120 pages →	reading		B1 ft from single straight line of positive gradient (±1/2 square)
19			200 150 225 150 10	3	B3 cao (B2 for three correct, or B1 for one correct)
20	(a)			2	B1 B1 for correct sketch – ignore additional internal lines B1 B0 for rectangle or right-angled triangle or correct shape without line NB 3-D sketch gets B0 B0
	(b)			2	B1 B1 for correct plan – ignore internal lines – accept a rotated plan, not reflected B1 B0 for a single rectangle drawn NB 3-D sketch gets B0 B0
21	(a)	163.25 – 35.50 = 127.75 127.75 ÷ 18.25 = 7	8	3	M1 163.25 – 35.50 (or sight of 127.75) M1 (dep) "127.75" ÷ 18.25 A1 cao SC: M2 for 7 days
	(b)	$1.175 \times £64$ or $\dfrac{17.5}{100} \times 64$ or £11.20 seen	75.20	2	M1 1.175×64, 0.175×64 oe or 11.20 or 75.2 seen or 6.40, 3.20 and 1.60 seen A1 cao

14
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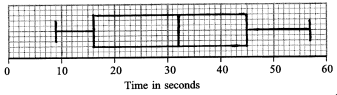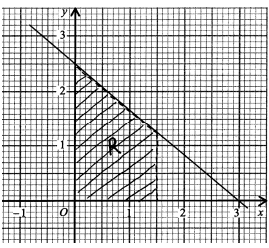| PAPER 5502					
No		**Working**	**Answer**	**Mark**	**Notes**
22	(a)		6	1	B1 cao
	(b)		$t^2 - 2t$	1	B1 oe
	(c)		$3(y-4)$	1	B1 Accept $3 \times (y-4)$ or $3(y-4$
23	(a)		Reason	1	B1 Makes some mention of bias either directly or making reference to an insufficient or biased range of responses
	(b)		Reason	1	B1 (a) an insufficient range of responses (b) No mention of money (c) No time frame in the question (d) Misunderstanding of "A lot" and "Not much"

	No	Working	Answer	Mark	Notes
PAPER 5503					
1			10.	1	B1 for 10
2	(a)(i)		$3e + 2f$	2	B1 for $3e + 2f$
	(ii)		$3p^2$		B1 for $3p^2$
	(b)	$5 \times -3 + 1$	-14	2	M1 for $5 \times -3 + 1$ A1 for -14
3		$\begin{array}{r} 1974 \\ 6580 \\ \hline 8554 \end{array}$	855.4	3	M1 for complete correct method with relative place value correct, condone 1 error in multiplication. A2 cao (A1 for digits 8554 seen or A1 ft for "855.4" dependent on one arithmetic error only)
4	(a)		$\begin{array}{cccc} 2 & 23 & 9 & 34 \\ 15 & 2 & 9 & 26 \\ 17 & 25 & 18 & 60 \end{array}$	3	B3 all correct (B2 for 4 or 5 entries correct) (B1 for 2 or 3 entries correct)
	(b)		$\dfrac{25}{60}$	1	B1 for $\dfrac{25}{60}$ or $\dfrac{5}{12}$ oe
5	(a)	$\dfrac{45}{100} \times 800$	360	2	M1 for $\dfrac{45}{100} \times 800$ oe A1 for 360
	(b)	$\dfrac{176}{800} \times 100$	22	2	M1 for $\dfrac{176}{800} \times 100$ oe A1 for 22

	No	Working	Answer	Mark	Notes
PAPER 5503					
6	(a)	$\dfrac{11}{12} - \dfrac{10}{12}$	$\dfrac{1}{12}$	2	M1 for correctly writing both fractions to a common denominator A1 for $\dfrac{1}{12}$ oe
	(b)	$\dfrac{70 \times 400}{200}$	140	2	B2 for 140 (accept 136) (B1 for sight of any two of 70, 400 or 200)
7	(a)(i)		60	2	B1 for 60 B1 for all angles equal so equilateral triangle oe
	(ii)				
	(b)(i)		130	3	B1 for 130
	(ii)				B1 for isosceles triangle oe B1 for angles on a straight line add up to 180°oe
	(c)		64	1	B1 for 64
8		$9 \times 1 + 3 \times 2 + 5 \times 3 + 3 \times 4 \ (=42)$ "42" $\div 20$	2.1	3	M1 for 9×1, 3×2, 5×3, 3×4 or for 42 seen M1 (dep) "42" $\div 20$ A1 for 2.1 or $2\dfrac{1}{10}$ or $2\dfrac{2}{20}$
9	(a)		09 05	1	B1 for 09 05 oe
	(b)		7	1	B1 for 7
	(c)		10	1	B1 for 10
	(d)	7 km in 20 minutes	21	3	B1 for 20 (minutes) oe or $\times 3$ seen M1 for $\dfrac{"7"}{"20"}$ A1 cao SC: "7" $\times 3$ gets B1 M1

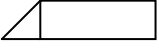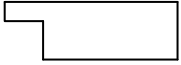| No		Working	Answer	Mark	Notes
10		Vertices of new triangle at $(2, -2)$ $(2, 6)$ and $(6, -2)$	Correct triangle drawn	3	B3 cao (B2 for either correct triangle in wrong translated position or for 2 vertices correct) (B1 for a right-angled triangle with horizontal length 4 or vertical length 8 in the same orientation as shaded triangle) SC B2 for scale factor 3, totally correct
11		$2^2 + 3 =$	7 which is not even	2	B2 (B1 for correctly evaluating $n^2 + 3$ with a prime number value for n.)
12	(a)	$360 \div 5$	72	2	M1 for $360 \div 5$ oe A1 for 72
	(b)	$8560 \div (10 \times 10)$	85.6	2	M1 for $8560 \div (10 \times 10)$ oe A1 for 85.6
	(c)(i) (ii)	Least length = 100.5 Greatest length = 101.5	100.5 101.5	2	B1 for 100.5 B1 for 101.5 or 101.499 or better
13		$2x + x + 100 + 47 = 360$ $2x + x = 360 - 100 - 47$ $x = 71$ Largest angle = $2x =$	142	4	M1 for $2x + x + 100 + 47 = 360$ or $360 - 147$ or 213 seen M1 (dep) for correctly separating x-terms and non x terms or $\dfrac{"360 - 147"}{3}$ A1 for $x = 71$ A1 ft (provided M2 awarded) for "142"
14	(a)(i) (ii)		2.21 0.013	2	B1 for 2.21 B1 for 0.013
	(b)	LCM = $3 \times 13 \times 17 = 3 \times 221$	663	2	M1 for $3 \times 13 \times 17$ oe A1 for 663

No		Working	Answer	Mark	Notes
PAPER 5503					
15			Tick boxes 1,3 & 6	3	B1 for $\dfrac{\pi abc}{2d}$; B1 for $2a^2$; B1 for $2(c^2 + d^2)$ (−B1 for each additional expression ticked (>3) to a minimum of 0)
16		200×0.2	40	2	M1 for 200×0.2 or $\dfrac{40}{200}$ seen A1 for 40
17	(a)	eg $\begin{array}{r|l} 2 & 108 \\ 2 & 54 \\ 3 & 27 \\ 3 & 9 \\ & 3 \end{array}$	$2^2 \times 3^3$	3	M2 for full systematic method of at least 4 divisions by prime numbers oe factor trees; condone 1 calculation error (M1 for 108 written as a correct product(s) with only one non-prime or equivalent division or a full process with 2 calculation errors.) A1 for $2^2 \times 3^3$ (accept $2 \times 2 \times 3 \times 3 \times 3$)
	(b)		12	1	B1 for 12
18		Perpendicular from P to intersecting arcs (within tramlines); perpendicular at least 2cm long		2	M1 relevant pair of arcs crossing within tramlines A1 SC M1 A0 for a full construction of a perpendicular to AB not passing through P.
19		15×10	150 cm^3.	3	M1 for 15×10 A1 for 150 B1 for cm^3.

No	Working	Answer	Mark	Notes
20		$y = 2x + 6$	2	B2 for $y = 2x + 6$ (B1 for $y = 2x + k$, $k \neq 1$ or for $y = mx + 6$, m $\neq 0$ or for $2x + 6$)
21	$6\dfrac{2}{5} = \dfrac{32}{5}$ Area of triangle $= \dfrac{1}{2} \times \dfrac{5}{8} \times 6\dfrac{2}{5}$ (=2) Length of a side of sq. = $\sqrt{18 \times "2"}$ (=6) Perimeter of square = 4 × 6	24	5	B1 for $6\dfrac{2}{5} = \dfrac{32}{5}$ oe or $3\dfrac{1}{5} = \dfrac{16}{5}$ or $\dfrac{30}{8} + \dfrac{2}{8}$ oe (or implied by area of triangle=2) M1 for $\dfrac{1}{2} \times \dfrac{5}{8} \times 6\dfrac{2}{5}$ oe M1 for area of square $= 18 \times$ product of two lengths A1 for $\sqrt{18 \times "2"}$ A1 for 24
22 (a)		$x(x-3)$	2	B2 for $x(x-3)$ (B1 for x (.......))
(b)		k^3.	1	B1 for k^3.
(c)(i)	$4x + 20 + 3x - 21$	$7x - 1$	4	M1 for **three** of 4 terms $4x + 20 + 3x - 21$ (or better) A1 for $7x - 1$
(ii)	$x^2 + 3yx + 2xy + 6y^2$	$x^2 + 5xy + 6y^2$		M1 for **three** of 4 terms $x^2 + 3yx + 2xy + 6y^2$ A1 for $x^2 + 5xy + 6y^2$
(d)		$(p+q)(p+q+5)$	1	B1 for $(p+q)(p+q+5)$

	No	Working	Answer	Mark	Notes
23	(a)		32	1	B1 for 32 (accept 31.5 to 33.5 inclusive)
	(b)	Median(B)>Median(G); on average boys take longer		3	B1 for ends of whiskers at 9 and 57, (with a box) B1 for ends of box at 16 and 45 (± 0.5) B1 for median marked at 32 or a complete box and whisker diagram drawn with a median inside the box
	(c)	IQR(B)>IQR(G); times for boys have a greater spread		2	B1 eg for comparison of medians B1 eg for comparison of (interquartile) ranges
24	(a)	$6y = 15 - 5x$	$y = \dfrac{15 - 5x}{6}$	2	M1 for either $6y = 15 - 5x$ or $-6y = 5x - 15$ or for $\dfrac{5x}{6} + y = \dfrac{15}{6}$ or a correct ft on sign error to $y=$ A1 for $y = \dfrac{15 - 5x}{6}$ oe
	(b)	$6k + 5(-21) = 15$	20	2	M1 for substitution of $x = -21$ (or $x = 21$) into given equation or candidate's answer to (a) A1 for $k = 20$
	(c)(i)		Region R indicated	3	B2 correct region shaded (accept unshaded if R clear) (B1 shaded or R region satisfies 3 of the 4 given inequalities with same boundaries)
	(ii)		(1,1)		B1 for (1,1)

	No	Working	Answer	Mark	Notes
PAPER 5503					
25	(a)		60	1	B1 for 60
	(b)	eg Angle $BDC = 25$ $ADB = 60 - 25$	35	2	B1 for $BDC = 25$ [Award the mark for equivalent approaches] B1 ft for (a) -25
	(c)	Ben is correct; angle $DAB = 65 + 25 = 90$ and since angle in a semi-circle is 90°, BD must be a diameter		1	B1 for full valid justification

	No	Working	Answer	Mark	Notes
PAPER 5504					
1	(a)	Accurate drawing of triangle		2	B1 cao for 38º (±2º) B1 cao (indep) for BC drawn 7.3 cm (±2mm) and completing the triangle.
	(b)	Measure angle A	63º	1	B1 for 63º (±2º) or ft their diagram (±2º)
2	(a)	$0 \times 1 = 0$ $1 \times 1 = 1$ $2 \times 4 = 8$ $3 \times 8 = 24$ $4 \times 8 = 32$ $5 \times 7 = 35$	100	3	M1 col 1 × col 2 (at least 3 shown) could be implied by answers. M1 (dep) sum of totals A1 cao SC: M1 M1 A0 for 101
	(b)	Either $35.50 ÷ 1.42 = £25$; £26.99 - £25 = £1.99 Cheaper in the USA Or £26.99 × 1.42= 38.33; $38.33 - $35.50 = 2.83 Cheaper in the USA		3	M1 35.50 ÷ 1.42 A1 25 seen B1 ft (dep on M1) £1.99 with conclusion; units needed OR: M1 26.99 × 1.42 A1 38.33 or 38.32…seen B1 ft (dep on M1) $2.83 or $2.82 with conclusion; units needed
3	(a)		-1, (1), (3), 5, 7, 9	2	B2 cao (B1 for 2 values)
	(b)		Graph	2	B1 ft for plotting points ±1/2 square B1 cao for line between $x = -2$ and $x = 3$
	(c)(i) (ii)		0.4 1.2	2	B1 0.4 or ft single straight line with positive gradient B1 1.2 or ft single straight line with positive gradient

	No	Working	Answer	Mark	Notes
PAPER 5504					
4	(a)			2	B1 Rectangle drawn B1 Triangle attached Ignore additional internal lines; 3D sketch gets B0
	(b)			2	B1 single Rectangle drawn B1 Attached smaller rectangle drawn Accept rotated plan, Ignore internal lines down; Nets get B0
5	(a)	£163.25 - £35.50 = £127.75 £127.75 ÷ £18.25 = 7	8	3	M1 163.25 − £35.50 (or sight of £127.75) M1 (dep) "127.75" ÷ 18.25 A1 cao SC: M2 for 7 days
	(b)	$1.175 \times £64$ or $\dfrac{17.5}{100} \times 64$ or £11.20 seen	75.20	2	M1 1.175 × 64.00 0.175 × 64 oe or 11.20 or 75.2 seen OR 6.40, 3.20, and 1.60 seen A1 cao
	(c)	54 × £2.38 =	128.52	2	M1 54 × £2.38 A1 cao
6		Tessellation	Drawing	2	B2 seven additional hexagons, with at least 2 points at which 3 hexagons meet (B1 one point at which 3 hexagons meet).
7			200 150 225 150 10	3	B3 cao (B2 for three correct, or B1 for one correct)
8	(a)(i) (ii)	Bearing measured Bearing measured	70 317	2	B1 70 ± 4 B1 317 ± 4
	(b)	Locus (circle) drawn & shaded		2	B1 circle ±2 mm centre Manchester B1 shading with accurate or approximate circle within tolerance

	No	Working	Answer	Mark	Notes
PAPER 5504					
9	(a)		Plots	1	B1 cao
	(b)		Description	1	B1 dynamic relationship or "positive" (correlation)
	(c)		Line of best fit	1	Line within overlay region, and to the extent of.
	(d)(i)	280 g →	Reading	2	B1 ft from single straight line of positive gradient (±1/2 square)
					B1 ft from single straight line of positive gradient (±1/2 square)
	(ii)	120 pages →	Reading		
10	(a)	$\dfrac{1}{6}, \dfrac{3}{8}, \dfrac{1}{2}, \dfrac{2}{3}, \dfrac{3}{4}$		2	B2 for all correct (B1 for 1 error or all correct but wrong order, or use of a common denominator decimals).
	(b)	3/5, 65%, 2/3, 0.72, 3/4		2	B2 for all correct (B1 for 1 error or all correct but wrong order or conversions to decimals oe)
11	(a)		182, 178, 180, 184	2	M1 mean of any three consecutive months, eg (147 + 161 + 238) ÷ 3 oe A1 cao
	(b)	Sale price = 80% Fun Friday price = 70% of 80% = 56% (oe)		2	B1 B1 for a fully correct explanation involving a worked example (oe) B1 a partially complete explanation
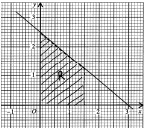
	No	Working	Answer	Mark	Notes
PAPER 5504					
12	(a)		Reason	1	B1 makes a mention of bias, either directly, or making reference to an insufficient or biased range of responses.
	(b)(i)		Reason	1	B1 make some mention of any one of (a) an insufficient range of responses (b) no mention of money (c) no time frame in the question (d) misunderstanding of "a lot" or "not much" B2
	(ii)		Question	2	B1 for each of the following upto B2 (a) an improved question eg time frame made clear (b) response boxes (imperfect) (c) response boxes no errors OR For suggesting a generally improved question (a) a question clearly in the context of changes to the canteen (b) at least 3 boxes showing a full range of responses
13	(a)	$20y - 18y = 16 - 9$ oe $2y = 7$	3½ oe	3	M1 $20y - 18y = 16 - 9$ oe M1 $2y = 7$ A1 cao
	(b)	$40 - x = 3(4 + x)$ $40 - x = 12 + 3x$ $40 - 12 = x + 3x$ $4x = 28$	7	3	M1 multiplying through by 3: $3 \times \dfrac{40 - x}{3} = 3 \times 4 + 3 \times x$ A1 $40 - 12 = x + 3x$ A1 cao
14	(a)		12(x-4)	1	B1 for $12(x - 4)$ or $12x - 48$ or $12 \times x - 48$ oe $x = 12(x - 4)$ gets B0
	(b)		18x-48	2	M1 $6x +$ "$12(x - 4)$" or $6x +$ "$12x - 48$" A1 ft a linear expression $18x - 48$, $2(9x - 24)$, $3(6x - 16)$, $6(3x - 8)$

PAPER 5504					
No		**Working**	**Answer**	**Mark**	**Notes**
15		x $x^3 - 2x$ 4.1 60.7(21) 4.2 65.6(88) 4.3 70.9(07) Accept answer to 1 dp 4.22 66.7(114) or more 4.23 67.2(269) 4.24 67.7(45) 4.25 68.2(656)	4.2	4	B2 for trial $4.1 \leq x \leq 4.3$ evaluated (B1 for trial $4 < x < 5$ evaluated) B1 for different trial $4.225 \leq x \leq 4.25$ evaluated B1 (dep on at least one previous B1) for 4.2 cao
16	(a) (b)	$1 \div 5 \times 10^{-9}$	1.0×10^{-9} 2×10^{8}	1 2	B1 accept 1×10^{-9} or just 10^{-9} M1 for $1 \div$ ("5×10^{-9}") or digit 2 with zeros only seen Condone omission of bracket for M1. A1 cao
17	(a) (b)	$\dfrac{6.27 \times 4.52}{4.81 + 9.63} = \dfrac{28.3404}{14.44} = 1.962631579$	$1.9626\ldots$ 1.96	2 1	B2 for $1.9626\ldots$ (B1 for 28.34 or 14.44) B1 ft from (a) as rounded to 1dp or 2dp. Do not accept 2, 2.00, but accept 2.0
18			$d = 4n + 6$	2	B2 $d = 4n + 6$ oe (B1 $d = 4n + k$, k an integer or 0, $4n + 6$, $n = 4n +6$)
19		Vol $= \pi \times 3.8^2 \times 2.5 = \pi \times 14.44 \times 2.5$ $= 45.36\ldots \times 2.5 = 113.411$ Mass $=$ "113" $\times 1.5 = 170.1165$	170	4	M1 for $\pi \times r^2 \times 2.5$ where $r =$ is 3.8 or 7.6 A1 if $r = 3.8$ M1 for "113" $\times 1.5$ A1 for 169.5 – 170.3 cao

	No		Working	Answer	Mark	Notes

PAPER 5504

No		Working	Answer	Mark	Notes
20	(a)	$10^2 + 6^2$ or 136 $\sqrt{(100+36)}$ or $\sqrt{136} = 11.66\ldots$	11.7	3	M1 $10^2 + 6^2$ or 136 seen M1 (dep) $\sqrt{100+36}$ or $\sqrt{136}$ A1 11.66 – 11.7
	(b)	$\cos x = \dfrac{8}{10}$ or 0.8 $x = \cos^{-1} 0.8 = 36.869°$	36.9	3	M1 for $\cos = \dfrac{8}{10}$, $\cos = 0.8$ (oe) M1 (dep) for $\cos^{-1}$ (oe) A1 for 36.86 – 36.9
21		$18x - 6y = 99 \qquad 12x - 4y = 66$ $\dfrac{8x + 6y = 18}{26x = 117} \qquad \dfrac{12x + 9y = 27}{-13y = 39}$	$x = 4\,\tfrac{1}{2}$ $y = -3$	4	M1 correct process to eliminate either x or y (condone one error) A1 cao for non – eliminated one. M1 (dep on 1st M1) for correct substitution of their found value. A1 cao (need both)
22		$\dfrac{133}{72} = 1.8472$, $\dfrac{160}{82} = 1.9512$ OR $\dfrac{72}{133} = 0.54135$, $\dfrac{82}{160} = 0.5125$ OR $\dfrac{160}{133} = 1.203\ldots$, $\dfrac{82}{72} = 1.1388\ldots$ OR $\dfrac{133}{160} = 0.83125\ldots$, $\dfrac{72}{82} = 0.878$	$1.84..\neq$ $1.95..$ $1.20..\neq$ $1.13..$	3	M1 for $\dfrac{133}{72}$ (= 1.8472…) oe Accept 1.8, 1.85 M1 for $\dfrac{160}{82}$ (=1.9512…) oe consistent pairing Accept 2.0, 1.9 **OR** M1 for $\dfrac{160}{133}$ (= 1.203…) oe M1 for $\dfrac{82}{72}$ (=1.1388) oe A1 for enough decimal places to show that the ratios are not equal; since the scale factors are different the shapes cannot be similar. NB Do Not need conclusion

	No	Working	Answer	Mark	Notes
PAPER 5504					
23	(a)		0.4, 0.6 0.4, 0.6, 0.4	2	B1 for LHS: (0.6), 0.4 B1 for RHS: 0.6, 0.4, 0.6, 0.4
	(b)	$(30 \times 42) - (25 \times 42.8) = 1260 - 1070 = 190$ $190 \div 5 =$	38	3	M1 for $(30 \times 42) - (25 \times 42.8)$ or $1260 - 1070$ or 190 seen M1 (dep) for "190" $\div$ 5 A1 cao
24	(a)	£12000 $\times$ 0.25 = £3000; £12000 – £3000 = £9000 £9000 $\times$ 0.25 = £2250; £9000 – £2250 = £6750 £6750 $\times$ 0.25 = £1687.50; £6750 – £1687.50 =	£5062.50	3	M1 for 12000×0.75 (=9000) oe or £3000 or £23437.50 seen M1 (dep) for at least two further depreciation calculations (complete steps) A1 cao **OR** M2 for $12000 \times (0.75)^3$ or 5062.50 seen (M1 for $12000 \times (0.75)^n$, $n = 2$ or 4)
	(b)	$0.8 \times 0.8 \times 0.8 \times 0.8$ (oe)	0.4096	2	M1 0.8^4 (oe) A1 cao

	No	Working	Answer	Mark	Notes
PAPER 5505					
1	(a)(i) (ii) (b)	LCM = 3 × 13 × 17 = 3 × 221	2.21 0.013 663	2 2	B1 for 2.21 B1 for 0.013 M1 for 3 × 13 × 17 oe A1 for 663
2			Tick boxes 1,3 & 6	3	B1 for $\dfrac{\pi abc}{2d}$; B1 for $2a^2$; B1 for $2\left(c^2+d^2\right)$ (−B1 for each additional expression ticked (>3) to a minimum of 0)
3	(a)	200 × 0.2	40	2	M1 for 200×0.2 or $\dfrac{40}{200}$ seen A1 for 40
	(b)	0.2 + 0.4	0.6	2	M1 for 0.2 + 0.4 A1 for 0.6

4	(a)	eg 2 | 108
		     2 | 54
		     3 | 27
		     3 | 9
		       3
			$2^2 \times 3^3$	3	M2 for full systematic method of at least 4 divisions by prime numbers oe factor trees; condone 1 calculation error
					(M1 for 108 written as a correct product with only one non-prime or equivalent division or a full process with 2 calculation errors.)
					A1 for $2^2 \times 3^3$ (accept 2 × 2 × 3 × 3 × 3)

	(b)		12	1	B1 for 12
5		Perpendicular from P to intersecting arcs (within tramlines); perpendicular at least 2 cm long		2	M1 relevant pair of arcs crossing within tramlines A1 SC M1A0 for full construction of a line perpendicular to AB not through P
6		15 × 10	150 cm^3.	3	M1 for 15 × 10 A1 for 150 B1 for cm^3

	PAPER 5505				
No		**Working**	**Answer**	**Mark**	**Notes**
7	(a)		k^3.	1	B1 for k^3.
	(b)(i)	$4x + 20 + 3x - 21$	$7x - 1$	4	M1 for **three** of 4 terms $4x + 20 + 3x - 21$ (or better)
					A1 for $7x - 1$
	(ii)	$x^2 + 3yx + 2xy + 6y^2$	$x^2 + 5xy + 6y^2$		M1 for **three** of 4 terms $x^2 + 3yx + 2xy + 6y^2$
					A1 for $x^2 + 5xy + 6y^2$
	(c)		$(p+q)(p+q+5)$	1	B1 for $(p+q)(p+q+5)$
	(d)		m^8	1	B1 for m^8.
	(e)		$6r^3t^6$	2	B2 for $6r^3t^6$
					(B1 for $.....r^3t^6$ or for $6...t^6$)
8	(i)	Least length = 100.5	100.5	2	B1 for 100.5
	(ii)	Greatest length = 101.5	101.5		B1 for 101.5; ACCEPT 101.499 or better
9		$6\dfrac{2}{5} = \dfrac{32}{5}$ Area of triangle = $\dfrac{1}{2} \times \dfrac{5}{8} \times 6\dfrac{2}{5}$ (= 2) Length of a side of sq. = $\sqrt{18 \times "2"}$ (=6) Perimeter of square = 4×6	24	5	B1 for $6\dfrac{2}{5} = \dfrac{32}{5}$ oe or $3\dfrac{1}{5} = \dfrac{16}{5}$ oe or $\dfrac{30}{8} + \dfrac{2}{8}$ oe (or implied by area of triangle=2) M1 for $\dfrac{1}{2} \times \dfrac{5}{8} \times 6\dfrac{2}{5}$ oe M1 for (area of square) = $18 \times$ product of two lengths A1 = $\sqrt{18 \times "2"}$ A1 for 24

	No	Working	Answer	Mark	Notes
10	(a)	$6y = 15 - 5x$	$y = \dfrac{15 - 5x}{6}$	2	M1 for either $6y = 15 - 5x$ or for $\dfrac{5x}{6} + y = \dfrac{15}{6}$ or $-6y = 5x - 15$ or a correct ft on sign error to $y =$ A1 for $y = \dfrac{15 - 5x}{6}$ oe
	(b)	$6k + 5(-21) = 15$	20	2	M1 for subst. of $x = -21$ (or $x = 21$) into given eq^n or answer to (a) A1 for $k = 20$
	(c)(i)		Region R indicated	3	B2 correct region shaded (accept unshaded if R clear) (B1 shaded (R) region satisfies 3 of the 4 given inequalities with same boundaries)
	(ii)		(1,1)		B1 for (1,1)
11	(a)		$y = 2x + 6$	2	B2 for $y = 2x + 6$ (B1 for $y = 2x + k$, $k \neq 1$ or for $y = mx + 6$, $m \neq 0$ or for $2x+6$)
	(b)	Grad of $AB = 2$; Grad of $BC = \dfrac{-1}{"2"}$	$y = -\dfrac{1}{2}x + 6$	2	M1 for Grad of $BC = \dfrac{-1}{"2"}$, $-\dfrac{1}{2}$ or grad of $BC = -\dfrac{1}{\text{grad of } AB}$ A1 ft for $y = -\dfrac{1}{2}x + 6$ oe ft on wrong coeff. of x in (a)
	(c)	Eg A rectangle is always a cyclic quadrilateral because the opposite angles of a rectangle always add up to 180° (90+90)		1	B1 for valid explanation. (eg lines from the pt of int. of diagonals of rect to all 4 vertices are equal(radii))
12		Vertices of new triangle at $(-1, -4)$ $(-4, 2)$ and $(2, 2)$	Correct triangle drawn	3	B3 cao (B2 for 3 correct vertices no triangle or triangle with 2 correct vertices (B1 for triangle with two of six co-ordinates correct from using P as centre or any isosceles triangle with base 6 and height 6)

	No	Working	Answer	Mark	Notes
PAPER 5505					
13	(a)		32	1	B1 for 32 (accept 31.5 to 33.5 inclusive)
	(b)			3	B1 for ends of whiskers at 9 and 57 (with a box) B1 for ends of box at 16 and 45/46 ($\pm$ 0.5) B1for median marked at "32"or complete box and whisker diagram drawn with a median inside the box
	(c)	Median(B)>Median(G); on average boys take longer IQR(B)>IQR(G); times for boys have a greater spread		2	B1 eg for comparison of medians (ft on diagrams) B1 eg for comparison of (interquartile) ranges (ft on diagram)
14		Reading top to bottom frequencies are 20; 18; 45; 52		2	B2 all correct (B1 for one frequency correct)
15	(a)	$1600 = p \, q^0$.; $400 = pq^2$ $q^2 = 0.25$	$p = 1600$ $q = 0.5$	3	M1 for either $400 = pq^2$ or $1600 = pq^0$ B1 for $p = 1600$ A1 for $q = 0.5$
	(b)	$V = pq^{-2}$	6400	2	M1 for recognition that t = –2 A1 for 6 400

	No	Working	Answer	Mark	Notes
16	(a)	(I) $AB = AC$ (triangle ABC is isosceles) (II) PB = PC tangents (from a point to a circle are) equal (III) AP = AP (common side) so the 2 triangles are congruent ,SSS.		3	B3 for I, II, III with congruency reason (B2 for any two of I, II or III) (B1 for any one of the I, II or III)
	(b)	$BPC = 20°$ PBC (or PCB) = 90-1/2 "20" (= 80°) $BAC = PBC$ = "80"	50°	4	B4 for 50° (B3 for $BAC = 80°$) (B2 for $PBC = 80°$ or $PCB = 80°$) (B1 for $APC = 10°$ or $BPC = 20°$ or a middle angle = 90°) SC if clear numerical slip seen eg "$PBC = 180 - 90 - 10 = 70$" then goes on to get correct ft angle $ABC = 55$ deduct 1 from total so this cand would get B4–1 = B3
17	(a)	$\overrightarrow{OP} = \overrightarrow{OA} + \overrightarrow{AP}$ $= \overrightarrow{OA} + \dfrac{2}{3}(6\mathbf{c} - 6\mathbf{a})$ $= 6\mathbf{a} + 4\mathbf{c} - 4\mathbf{a}$	$2\mathbf{a} + 4\mathbf{c}$	3	M1 for $\overrightarrow{OP} = \overrightarrow{OA} + \overrightarrow{AP}$ or any correct vector journey involving $\overrightarrow{OP}$ M1 for $\overrightarrow{AP} = \dfrac{2}{3}(6\mathbf{c} - 6\mathbf{a})$ oe or $\overrightarrow{CP} = \dfrac{1}{3}(-6\mathbf{c} + 6\mathbf{a})$ oe or reverse vectors A1 for $2\mathbf{a} + 4\mathbf{c}$ oe (accept unsimplified)
	(b)	Eg $\overrightarrow{OM} = \overrightarrow{OC} + \overrightarrow{CM} = 6\mathbf{c} + 3\mathbf{a}$ $\overrightarrow{OM} = 1.5\overrightarrow{OP}$	$\overrightarrow{OM} = 1.5\overrightarrow{OP}$ so OPM is a straight line	2	B1 for $\overrightarrow{OM} = 6\mathbf{c} + \dfrac{1}{2}(6\mathbf{a})$ or $\overrightarrow{PM} = 2\mathbf{c} + \mathbf{a}$ unsimplified or reverse vectors B1 for a fully correct proof.

PAPER 5505					
No		**Working**	**Answer**	**Mark**	**Notes**
18	(a)		4	1	B1 for 4 condone ± 4
	(b)		2	1	B1 for 2 condone ± 2
	(c)	$\sqrt{160}=4\sqrt{10}$; $\left[\dfrac{\sqrt{8}\left(\sqrt{5}+\sqrt{20}\right)-\sqrt{2}\times\sqrt{5}}{\sqrt{8}\left(\sqrt{5}+\sqrt{20}\right)}\right]\times 100$ $\left[\dfrac{6\sqrt{10}-\sqrt{10}}{6\sqrt{10}}\right]\times 100$	$\dfrac{500}{6}$	4	B1 for **either** $\sqrt{160}=4\sqrt{10}$ or $\sqrt{8}=2\sqrt{2}$ **or** $\sqrt{20}=2\sqrt{5}$ M1 for $\left[\dfrac{\sqrt{8}\left(\sqrt{5}+\sqrt{20}\right)-\sqrt{2}\times\sqrt{5}}{\sqrt{8}\left(\sqrt{5}+\sqrt{20}\right)}\right]$ oe ($\times 100$) B1 for either $6\sqrt{10}-\sqrt{10}$ or $6\sqrt{10}$ A1 for $\dfrac{500}{6}$ (accept 83.3 if no obvious earlier error)

	PAPER 5505				
No	**Working**	**Answer**	**Mark**	**Notes**	

No	Working	Answer	Mark	Notes
19 (a)(i)		$(2x-7)(x-14)$	3	M1 x^2 term and constant term (± 98) obtained or $2x(x-14) - 7(x-14)$ or $x(2x-7) - 14(2x-7)$ A1 for $(2x-7)(x-14)$
(ii)		$x = \dfrac{7}{2}$; $x = 14$		B1ft ft (i) provided of form $(2x\pm a)(x\pm b)$
(b)(i)		$\dfrac{7}{n+7}$	3	B1 for $\dfrac{7}{n+7}$ oe
(ii)	$\dfrac{7}{n+7} = \dfrac{2}{5} \Rightarrow 2(n+7)= 5 \times 7$ $2n = 21$	$n=10.5$ is not possible since n has to be an integer		M1 for $2(n+7)= 5\times 7$ or $n+7=5\times3.5$ (can be implied) ft (b)(i) fractional in terms of n and < 1 A1 ft for $n=10.5$ not possible (since n not integer) oe
(c)	$2\times\left(\dfrac{n}{n+7}\right)\times\left(\dfrac{7}{n+7}\right)=\dfrac{4}{9}$ $14n\times 9 = 4(n+7)^2$ $14n\times 9 = 4(n^2 +14n + 49)$ $4n^2 + 56n +196 - 126n = 0$	$2n^2 - 35n + 98 = 0$	5	M1 for $\left(\dfrac{n}{n+7}\right)\times\left(\dfrac{7}{n+7}\right)$ seen M1 for $2\times\left(\dfrac{n}{n+7}\right)\times\left(\dfrac{7}{n+7}\right)$ oe $(=\dfrac{4}{9})$ M1(dep on 1st M) elimination of fractions within an equation B1 3 terms correct in expansion of $(n+7)^2 = n^2 + 7n + 7n + 49$ A1 full valid completion to printed answer

PAPER 5505					
No	**Working**	**Answer**	**Mark**	**Notes**	
(d)	$\dfrac{7}{n+7} \times \dfrac{7}{n+7} = \dfrac{7}{21} \times \dfrac{7}{21} =$	$\dfrac{1}{9}$	2	M1 for $\dfrac{7}{n+7} \times \dfrac{7}{n+7}$ or better or ft [answer (b)(i)]^2 or $1 - \dfrac{4}{9} - (\dfrac{n}{n+7})^2$ A1 for $\dfrac{1}{9}$ oe cao	
20 (a)(i) (ii) (b)		$y = 1 + \sin x$ $y = 2\sin x$ Stretch parallel to y-axis scale factor 3 Stretch parallel to x-axis scale factor $\dfrac{1}{2}$	2 3	B1 for $y = 1 + \sin x$ B1 for $y = 2\sin x$ SC both (i) f(x) + 1, (ii) 2f(x) B1 M1 for 'stretch' A1 for Stretch parallel to y-axis scale factor 3 oe A1 for Stretch parallel to x-axis scale factor $\dfrac{1}{2}$ oe SC if M0 award BI for "sf 3 vertically" **and** "sf $\dfrac{1}{2}$ horizon."	

PAPER 5506				
No	Working	Answer	Mark	Notes
1		Question	2	B1 for each of the following upto B2 (a) an improved question eg time frame made clear (b) response boxes (imperfect) (c) response boxes no errors OR For suggesting a generally improved question (a) a question clearly in the context of changes to the canteen (b) at least 3 boxes showing a full range of responses
2	Locus (circle) drawn & shaded		2	B1 circle centre Manchester ±2mm B1 shading with accurate or approximate circle within tolerance
3 (a)		182, 178, 180, 184	2	M1 mean of any three consecutive months, eg $(147 + 161 + 238) \div 3$ oe A1 cao
(b)	Sale price = 80% Fun Friday price = 70% of 80% = 56% (oe)		2	B1 B1 for a fully correct explanation involving a worked example (oe) B1 a partially complete explanation
4	x　　$x^3 - 2x$ 4.1　　60.7(21) 4.2　　65.6(88) 4.3　　70.9(07) 4.22　66.7(114) 4.23　67.2(269) 4.24　67.7(45) 4.25　68.2(656)	4.2	4	B2 for trial $4.1 \le x \le 4.3$ evaluated (B1 for trial $4 < x < 5$ evaluated) B1 for different trial $4.225 \le x \le 4.25$ evaluated B1 (dep on at least one previous B1) for 4.2 cao

	No	Working	Answer	Mark	Notes
		PAPER 5506			
5	(a)		1.0×10^{-9}	1	B1 accept 1×10^{-9} or just 10^{-9}
	(b)	$1 \div (5 \times 10^{-9})$	2×10^{8}	2	M1 for $1 \div$ ("5×10^{-9}") or digit 2 with zeros only seen. Condone omission of bracket for M1. A1 cao
6	(a)	$\dfrac{6.27 \times 4.52}{4.81 + 9.63} = \dfrac{28.3404}{14.44} = 1.962631579$	1.9626…	2	B2 for 1.9626… (B1 for 28.34… or 14.44)
	(b)		1.96	1	B1 ft from (a) as rounded to 1dp or 2dp. Do not accept 2, 2.00, but accept 2.0
7			$d = 4n + 6$	2	B2 $d = 4n + 6$ oe (B1 $d = 4n + k$, k an integer $\neq 6$, $4n + 6$, $n = 4n + 6$)
8		Vol $= \pi \times 3.8^{2} \times 2.5 = \pi \times 14.44 \times 2.5$ $= 45.36\ldots \times 2.5 = 113.411$ Mass $=$ "113" $\times 1.5 = 170.1165$	170	4	M1 for $\pi \times r^{2} \times 2.5$ where $r =$ is 3.8 or 7.6 A1 if $r = 3.8$ M1 for "113" $\times 1.5$ A1 for 169.5 – 170.3 cao

	No	Working	Answer	Mark	Notes
9	(a)	$10^2 + 6^2$ or 136 $\sqrt{(100+36)}$ or $\sqrt{136}$ = 11.66…	11.7	3	M1 for $10^2 + 6^2$ or 136 seen M1 (dep) $\sqrt{100+36}$ or $\sqrt{136}$ A1 11.66 – 11.7
	(b)	Cos x = 8/10 or 0.8 $x = \cos^{-1} 0.8 = 36.869°$	36.9	3	M1 for cos = $\dfrac{8}{10}$, cos = 0.8(oe) M1 (dep) for $\cos^{-1}$ (oe) A1 for 36.86 – 36.9 M1 Use of sine rule and x found M1 for $x = 90 - \sin^{-1}(\text{"0.8"})$ A1 for 36.86 – 36.9
10		$18x - 6y = 99$ $\qquad$ $12x - 4y = 66$ $8x + 6y = 18$ $\qquad$ $12x + 9y = 27$ $26x = 117$ $\qquad$ $-13y = 39$	$x = 4\,\tfrac{1}{2}$ $y = -3$	4	M1 correct process to eliminate either x or y (condone one error) A1 cao for non – eliminated one. M1 (dep on 1st M1) for correct substitution of their found value. A1 cao (need both)

No	Working	Answer	Mark	Notes
11	$\dfrac{133}{72} = 1.8472$, $\dfrac{160}{82} = 1.9512$ OR $\dfrac{72}{133} = 0.54135$, $\dfrac{82}{160} = 0.5125$ OR $\dfrac{160}{133} = 1.203....$, $\dfrac{82}{72} = 1.1388....$ OR $\dfrac{133}{160} = 0.83125....$, $\dfrac{72}{82} = 0.878$	1.84..≠ 1.95.. 1.20..≠ 1.13..	3	M1 for $\dfrac{133}{72}$ (= 1.8472…) oe Accept 1.8, 1.85 M1 for $\dfrac{160}{82}$ (=1.9512…) oe consistent pairing Accept 2.0, 1.9 **OR** M1 for $\dfrac{160}{133}$ (= 1.203…) oe M1 for $\dfrac{82}{72}$ (=1.1388) oe A1 for enough decimal places to show that the ratios are not equal; since the scale factors are different the shapes cannot be similar. NB Do Not need conclusion
12 (a)	£12000 × 0.25 = £3000; £12000 – £3000 = £9000 £9000 × 0.25 = £2250; £9000 – £2250 = £6750 £6750 × 0.25 = £1687.50; £6750 – £1687.50 =	£5062.50	3	M1 for 12000 × 0.75 (=9000) oe or £3000 or £23437.50 seen M1 (dep) for at least two further depreciation calculations (complete steps) A1 cao **OR** M2 for $12000 \times (0.75)^3$ or 5062.50 seen (M1 for $12000 \times (0.75)^n$, n = 2 or 4)
(b)	0.8 × 0.8 × 0.8 × 0.8 (oe)	0.4096	2	M1 0.8^4 (oe) A1 cao

No		Working	Answer	Mark	Notes
13		$r^2 = \dfrac{3 \times 10}{\pi h} = \dfrac{3 \times 10}{\pi 1.5} = \dfrac{3 \times 10}{4.712..} = 6.36, 6.37$ $r = \sqrt{6.366\ldots}$	2.52-2.54	3	M1 for correct rearrangement to give $r^2 = \dfrac{3V}{\pi h}$ or $30 \div 4.712..$ or $6.36 - 6.37$ *Allow 0.3, 0.33 for* $\dfrac{1}{3}$ M1 (dep) for $\sqrt{}$ A1 cao 2.52 – 2.54
14	(a)		0.4 0.6,0.4, 0.6,0.4	2	B1 for LHS: (0.6), 0.4 B1 for RHS: 0.6, 0.4, 0.6, 0.4
	(b)	0.6×0.6	0.36	2	M1 $0.6 \times$ "0.6" $[0 <$ "0.6" $< 1]$ A1 cao
	(c)	$(30 \times 42) - (25 \times 42.8) = (1260 - 1070 = 190$ $190 \div 5 =$	38	3	M1 for $(30 \times 42) - (25 \times 42.8)$ or $1260 - 1070$ or 190 seen M1(dep) for "190" $\div 5$ A1 cao 38

No		Working	Answer	Mark	Notes
15	(a)	$S = \dfrac{k}{f^2}$; $125 = \dfrac{k}{8^2}$; $k = 8000$	$S = \dfrac{8000}{f^2}$	3	M1 for $S = \dfrac{k}{f^2}$ M1 for $125 = \dfrac{k}{8^2}$ A1 cao These marks can be awarded if the full formula appears in part (b), rather than in part (a). [SC: $S = \dfrac{125}{64} f^2$ M1 M0 A0, $S = 1.95(3125) f^2$ M1 M0 A0 $S = \dfrac{1000}{f}$ M1 M0 A0]
	(b)		500	1	B1 cao

No	Working	Answer	Mark	Notes
16	$0.5 \times 3.2 \times 8.4 \times \text{Sin } B = 10$ $\sin B = 0.74404\ldots$ $\quad\quad 48.077$ $AC^2 = 3.2^2 + 8.4^2 - 2 \times 3.2 \times 8.4 \times \cos B$ $AC^2 = 44.8815\ldots$ $AC = 6.69 \, (936\ldots)$ Perimeter = 18.3 Use the altitude AD, $\dfrac{h \times 8.4}{2} = 10 \Rightarrow h = (2.381)$ $BD = \sqrt{3.2^2 - h^2} = 2.139$ $DC = 6.261$ $AC = \sqrt{2.38^2 + '6.261'^2} = 6.69(936)$ Perimeter = 18.3	18.3	6	M1 for $0.5 \times 3.2 \times 8.4 \times \sin B \, (= 10)$ A1 for $\sin B = 0.74(404\ldots)$ or B = 47.7 – 48.1 M1 for $3.2^2 + 8.4^2 - 2 \times 3.2 \times 8.4 \times \cos$ "48.077" M1(dep) for $AC^2 =$ "44.8(815)"….. with correct order of evaluation A1 $AC = 6.69 - 6.7$ A1 18.29 – 18.3 **for** $\dfrac{h \times 8.4}{2} = 10 \Rightarrow h = (2.381)$ M1 for $BD^2 = 3.2^2 - "2.381"^2$ A1 $BD = 2.1 - 2.2$ M1 (dep) $AC^2 = "2.381"^2 + "6.261"^2$ A1 $AC = 6.69 - 6.7$ A1 18.29 – 18.3

	No	Working	Answer	Mark	Notes
PAPER 5506					
17	(a)	$(x + 8)^2 = x^2 + (x + 5)^2$ $x^2 + 16x + 64 = 2x^2 + 10x + 25$		4	B1 for angle OTA = 90º (implied by use of Pythagoras with OA as hypotenuse) M1 $(x + 8)^2 = x^2 + (x + 5)^2$ oe M1 for correct squaring of $x+8$ or $x+5$ A1 for completion following correct working
	(b)	$(+6 + \sqrt{(6^2 - - 4 \times 39)})/2$ $= (6 \pm \sqrt{(36 + 156)})/2$ $= (6 \pm \sqrt{192})/2 = (6 + 13.856)/2$	9.93	3	M1 for substitution into quadratic formula, allow sign errors in b and c M1 for $x = (6 \pm \sqrt{192})/2$ [+ alone will do] A1 for 9.92 – 9.93 M1 for $(x-3)^2 - 9 - 39$ M1 for $x = 3 \pm \sqrt{48}$ [+ alone will do it] A1 for 9.92 – 9.93 T&I= 9.93 gets M1,M0,A0
18		$EB = 60 \times \tan 30°$ $BD = \sqrt{(60^2 + 60^2)}$ $\tan BDE = 34.64 \div 84.85$ $EB = 60 \times \tan 30^o$ $(= 34.64)$ $ED^2 = 60^2 + (\dfrac{60}{\cos 30})^2$ $ED = \sqrt{8400} = (91.65)$ Angle $= \sin^{-1}\left(\dfrac{EB}{\sqrt{8400}}\right) = 22.2$	22.2º	4	M1 for $EB = 60 \times \tan30$ M1 for $BD = \sqrt{(60^2 + 60^2)}$ M1 for $\tan BDE$ = "34.64" ÷ "84.85" A1 22.17 – 22.21 M1 for $EB = 60 \times \tan 30^o$ oe M1 for fully correct method for ED M1 for $\sin BDE = \left(\dfrac{'34.84'}{'\sqrt{8400}'}\right)$ (oe) A1 22.17 – 22.21

	No	Working	Answer	Mark	Notes
19	(a)	$x^2 + 6^2 = 25$ $x^2 = -11$		2	M1 substitutes $y=6$ to get $x^2+36 = 25$ A1 deduces $x^2=25-36<0$; impossible, (so line does not intersect curve)
	(b)	$y^2 = (2x - 2)^2$ $x^2 + (2x - 2)^2 = 25$ $x^2 + 4x^2 - 8x + 4 = 25$ $5x^2 - 8x + 4 - 25 = 0$ $5x^2 - 8x - 21 = 0$ $(5x + 7)(x - 3) = 0$ or $x = \dfrac{--8 \pm \sqrt{(-8)^2 - 4 \times 5 \times (-21)}}{10} = \dfrac{8 \pm \sqrt{484}}{10}$ So $x = 3$, or $x = -1.4$ Subs into either equation gives: $y = 4$, or $y = -4.8$	$x = 3$ $y = 4$ $x = -1.4$ $y = -4.8$	6	M1 $y^2=(2x-2)^2$ seen or implied A1 $x^2 + 4x^2 - 8x + 4 = 25$ (oe expanded form) M1 correct attempt to solve 3 term quadratic equation A1 $x = 3$, $x = -1.4$ M1 (dep on previous Ms) Sub one value of x into either equation gives: A1 $y = 4$, $y = -4.8$ NB: incorrectly matched pairs loses the final A1.

	No	Working	Answer	Mark	Notes
PAPER 5506					
20	(a)	$400.005 \div 59.95 = 6.672310$ $6.672310 \div 1000 \times 3600 = 24.02032$ $399.995 \div 60.05 = 6.661032$ $6.661032 \div 1000 \times 3600 = 23.97972$	24.020 23.980	5	B1 for 400.005 or 59.95 seen oe M1 for "400.005" ÷ "59.95" where "400.005" $\in [400.005, 400.5]$ and "59.95" $\in [59.5, 59.95]$ oe B1 for 399.995 or 60.05 seen oe M1 for "399.995" ÷ "60.05" where "399.995" $\in [399.5, 399.95]$ and "60.05" $\in [60.05, 60.5]$ oe A1 23.979-23.980 and 24.020-24.0204
	(b)	24.0 because to 1dp the answers are the same		1	B1cao for 24.0 with reason
	(c)	$177 \times 50/477 = 18.553 \rightarrow 19 \rightarrow 18$ $111 \times 50/477 = 11.635 \rightarrow 12$ $86 \times 50/477 = 9.0147 \rightarrow 9$ $82 \times 50/477 = 8.595 \rightarrow 9$ $21 \times 50/477 = 2.201 \rightarrow 2$	18 12 9 9 2	3	M1 for $\dfrac{50}{"477"} \times 177$ or 111 or 86 or 82 or 21 A1 for all integers or better answers, at least 3 correct A1 cao
21	(a)	$40 - x = 3(4 + x)$ $40 - x = 12 + 3x$ $40 - 12 = x + 3x$ $4x = 28$	7	3	M1 multiplying through by 3: $3 \times \dfrac{40 - x}{3} = 3 \times 4 + 3 \times x$ A1 $40 - 12 = x + 3x$ A1 cao
	(b)	$\dfrac{2x(2x-3)}{(2x-3)(2x+3)} = \dfrac{2x}{2x+3}$	$\dfrac{2x}{2x+3}$	3	B1 for (2x-3)(2x+3) B1 for 2x(2x-3) or (2x + 0)(2x + 3) B1 cao

No	Working	Answer	Mark	Notes
22	Distance from x axis is y. Distance from $(0, 2)$ is $\sqrt{(x^2 + (y-2)^2)}$ $y^2 = x^2 + (y-2)^2$ $y^2 = x^2 + y^2 - 4y + 4$ $0 = x^2 - 4y + 4$ $4y = x^2 + 4$ and finish		4	B1 for $(x-0)^2 + (y-2)^2$ or $\sqrt{((x-0)^2 + (y-2)^2)}$ oe seen B1 for $y = \sqrt{(x-0)^2 + (y-2)^2}$ or $y^2 = (x-0)^2 + (y-2)^2$ oe B1 $(y-2)^2 = y^2 - 4y + 4$ seen B1 for $4y = x^2 + 4$ and finish