Question			Answer	Mark	Part marks and guidance	
1			$\frac{17}{18}$ oe	4	**B2** for [–] $\frac{8}{9}$ oe or **M1** for [–] $\frac{2}{3}\times\frac{4}{3}$ oe or [–] $\frac{8}{12}\div\frac{9}{12}$ oe **M1** for $\frac{33}{18}-\frac{16}{18}$ oe FT *their* $\frac{8}{9}$ or [1] $\frac{15}{18}-\frac{16}{18}$ oe FT *their* $\frac{8}{9}$ If 0 or 1 scored, award instead **SC2** for answer $\frac{14}{9}$ oe If 0 scored, **SC1** for $\frac{7}{6}$ oe in working	Allow pairs of equivalent fractions for the product or division for M1 Allow pairs of equivalent fractions both over a common denominator for M1 From correct processing but wrong order
2	(a)		60	2	**M1** for 360 ÷ 6 or for 180 – $\frac{180\times(6-2)}{6}$ oe	
2	(b)		120	1	Correct or FT 180 – *their* 60	FT dep on (a) < 180
3	(a)		30	3	**M2** for $\frac{90}{60+150+90}$ [× 100] oe or **M1** for 60 + 150 + 90 oe seen	M2 implied by 0.3 oe M1 for 300 seen
3	(b)		200	3	**M2** for 150 ÷ $\frac{100-25}{100}$ oe or **M1** for $\frac{100-25}{100}$ oe isw	**M1** implied by 75%, $\frac{75}{100}$ or 0.75
4			30 + 22*n* oe final answer	2	**B1** for final answer 30 + *kn* or *k* + 22*n* (*k* > 0) or for correct answer seen then spoiled If 0 scored, **SC1** for $30 + 22^n$	Ignore units Condone poor notation, use of other letters for 2 marks or B1 e.g. 30 + 22 × *n*, 30 + 22*y*, *n* = 30 + 22*n*

Question			Answer	Mark	Part marks and guidance	
5			1.6 with correct working	5	**M2** for $\frac{79.6-2\times5}{3.4}$ oe or **M1** for 79.6 – 2 × 5 oe implied by 69.6 AND **B1** for 20 [. …] or [total length of books =] 68 [cm] AND **M1** for 79.6 – (*their* 20 × 3.4 + 2 × 5) If **0** or **1** scored, instead award **SC2** for answer 1.6 with no working or insufficient working	"Correct working" requires evidence of at least **M2** For M2 allow for use of trials to try to make 69.6 e.g. 3.4 × 20 [= 68] with 79.6 – 2 × 5 oe seen Accept attempt with repeated addition/subtraction of 3.4 for M2 isw using estimation only after correct values shown for M2 20[. …] seen or used as max number of books For B1 ignore remainders with 20 68 must be *their* total length of books and not just a value in working *their* 20 must be written and working shown for M1 . M1 Dep on answer < 3.4 Could be implied by e.g. repeated subtraction Alternative method: **M2B1M1** or **M2B0M1** depending on "20" for $(\frac{79.6-2\times5}{3.4}$ – *their* 20) × 3.4 Alt scheme if <u>consistent</u> omission of two paperweights or one paperweight with no adjustment later **M1** for $\frac{79.6[-5]}{3.4}$ oe **B2** for answer 11.6 or **B1** for 68 [cm] OR **M1** for $\frac{79.6[-5]}{3.4}$ oe **B1** for 23.[…] ignore remainders or for 78.2 or 21.[…] ignore remainders or for 71.4 **A1** for answer 1.4 or 3.2

Question			Answer	Mark	Part marks and guidance	
6			The two events are not mutually exclusive oe and $\frac{6}{10}$ oe	2	**B1** for correct reason or $\frac{6}{10}$ oe	e.g. He has counted the same card/number/20 twice It should be $\frac{1}{10}+\frac{5}{10}$ or $\frac{2}{10}+\frac{4}{10}$ No contradictory statements for the reason See appendix 1
7	(a)		30	3	**M2** for $\frac{4\times60}{40}\times5$ oe or **M1** for interpreting the proportional relationship given e.g. 1 figure takes 8 mins or for $\frac{4\times60}{40}$ [×5] oe or $\frac{5\times60}{40}$ [×4] oe	10 figures take 80 mins, 7.5 figures take 1 hr etc
7	(b)		108	3	**M2** for $40\times\frac{15}{5}\times\frac{100-10}{100}$ oe **M1** for $\frac{90}{100}\times$ *their* time or [*their* time –] $\frac{10}{100}\times$ *their* time seen If 0 scored, **SC1** for answer 132	M2 e.g. 3 × 0.9 × 40 or 7.2 × 15 *their* time = 8, 40 or 120 M1 implied by 12, 36, 4, 7.2, 0.8 seen or as part of a subtraction

Question			Answer	Mark	Part marks and guidance	
8			Reason includes $a4$ should be written as $4a$ oe or the 4 is written after the a oe and $6 \times b$ should be written as $6b$ oe or the 6 and b should not be separated oe	2	**B1** for correct explanation for one term $a4$ should be written as $4a$ oe or the 4 is written after the a oe or $6 \times b$ should be written as $6b$ oe or the 6 and b should not be separated oe or correct expression written $4a + 6b$	Must refer to error in each term for 2 marks Incorrect statements apply penalty 1 mark if 2 marks earned See appendix 2
9			-0.3 oe	3	**M1** for correct first step **M1** FT *their* first step to to $ax = b$	Embedded answer scores **M2** max If not shown, **M1** implied by $10x = b$ or $ax = -3$ $10x = -3$ or $-10x = 3$
10	(a)		4	1		
10	(b)		No and $4 \times 3 + 9 = 21$ oe Or No and $(23 – 9) \div 4 = 3.5$ oe Or No the equation would need to be $y = 4x + 11$	2	**M1** for $4 \times 3 + 9$ or for $23 – 9 \div 4$	For 2 marks no errors seen accept No and (3, 21) or (3.5, 23) For M1 allow no/incorrect evaluation

Question			Answer	Mark	Part marks and guidance	
11	(a)		1300 with correct working	5	**M3** for $(1 - (0.35 + 0.25)) \times \frac{3}{4} \times 2000$ oe **M1** for 0.35×2000 oe OR **B2** for rel freq of yellow disc = 0.3 or for 1200 Green and red discs in bag or **M1** for 0.35+ 0.25 + P(y) + P(b) = 1 or better or for $(0.35 + 0.25) \times 2000$ oe **M2dep** for (*their* 0.3 + 0.35) × 2000 oe or **M1dep** for (*their* 0.3 + 0.35) oe If 0 or M1 only scored, instead award **SC2** for answer 1300 If 0 scored, award **SC1** for 700	'Correct working' requires evidence of M3 Condone 1300 rounded to 1000 as answer for 5 marks For M3 accept 600 yellow M1 implied by 700 For B2 accept 700 for green and 500 for red M1 for e.g.1 – (0.35 + 0.25) oe M2dep and M1 dep on at least M1 earned M1dep implied by 0.65
11	(b)		She may not have done the experiment a lot of times oe	1		
12			Answer 800 with 2, 5 and 4000 seen	4	**B1** for at least two of the values 5, 2 and 4000 **M2** for $\frac{their\ 4000}{0.5 \times their\ 5 \times their\ 2}$ oe or **M1** for $\frac{1}{2} \times their\ 5 \times their\ 2$	For B1 condone trailing zeros For M2 and M1 *their* values can be 3951, 5.03, 1.96 or other rounded relatable values
13			$0.\dot{3}\dot{6}$	2	**M1** for $4 \div 11$ soi	Accept e.g. $0.\overline{36}$ M1 implied by 0.36…
14	(a)		2500	1		

Question			Answer	Mark	Part marks and guidance	
14	(b)		20	1		
14	(c)		Correct increasing curve with 2500 indicated as *y* – intercept	3	**B1** for 3 of 4 correct plots at 1, 2, 3, 4 **B1** for plot or intercept at 2500 **B1** for increasing curve from $x = 1$ to $x = 4$ through *their* 4 points	Accuracy use overlay as a guide 4320 and 5187 should be in the correct small square including the boundaries Do not accept ruled linear graph Ignore if joined to (0, 0) Maximum 2 marks if curve incorrect
14	(d)		That the annual percentage increase stays the same oe	1		Accept % increase/interest/%change remains constant each year If % value is given then accept 20% or *their*(b) See appendix 3
15	(a)		20π final answer	4	**M2** for $\sqrt{8^2+6^2}$ oe or **M1** for 6^2 and 8^2 oe **M1dep** for $2 \times \pi \times$ *their r*	Accept e.g. C = 20π M2 implied by 10 M1 dep on at least M1
15	(b)		8π final answer	4	**B2** for $x = 45$ or $\frac{45}{360}$ oe or $\frac{2[\pi]}{2[\pi]8}$ oe or **M1** for $\frac{x}{360} \times 2 \times \pi \times 8 = 2\pi$ oe **M1** for $\frac{their\ 45}{360} \times \pi \times 8^2$ oe or $\frac{x}{360} \times \pi \times 8^2$	0 < *their* 45 < 90 M1 for e.g. $\frac{2[\pi]}{2[\pi]8} \times \pi \times 8^2$

Question			Answer	Mark	Part marks and guidance	
16	(a)		$y \leq x + 4$ oe and $y < 9$	3	**B2** for $y \leq x + 4$ oe or **B1** for y … $x + 4$ oe but with = or an incorrect inequality symbol **B1** for $y < 9$	Accept inequalities in either order
16	(b)		12 nfww	4	**B2** for (2, 6) and (6, 6) or (5, 9) and (9, 9) identified or for base 4 and perpendicular height 3 both identified or **B1** for (2, 6) or (6, 6) or (5, 9) or (9, 9) or for base = 4 or height = 3 AND **M1** for *their* base × *their* perpendicular height	May be seen on diagram Must identify base and perpendicular height of parallelogram in working or on diagram Do not allow if slant height used
17	(a)		60, 74, 80	1		
17	(b)		Correct curve	3	**B1** for correct horizontal plots **B1FT** for correct vertical plots **B1FT** *their* (a) for smooth increasing curve through 5 points	Condone polygon, ignore curve to left of $m = 5$ Accuracy ½ small sq radially on curve and plots Condone increasing linear graph Ignore blocks
17	(c)		15	1		

Question			Answer	Mark	Part marks and guidance	
17	(d)		Strict FT *their* curve $\frac{80 - \textit{their}\text{ reading at }18\text{ kg}}{80}$ oe	2	**B1** for 80 – *their* reading at 18 kg or $\frac{\textit{their}\text{ reading at }18\text{ kg}}{80}$	For 2 marks, accept fract/dec/% equivalents isw cancelling/conversion Accept FT polygon for curve For 2 marks or B1 accept *their* reading ± 1
18			$\frac{1}{3}$ and 5 with correct working	6	**B3** for $3x^2 - 16x + 5$ [= 0] oe or **M2** for $x^2 - 5 = 4x^2 - 16x$ or better or **M1** for $x^2 - 5 = 4x(x - 4)$ **M2** for $(3x - 1)(x - 5)$ [= 0] or **M1** for $3x(x - 5) - 1(x - 5)$ or for $x(3x - 1) - 5(3x - 1)$ or for $(3x + a)(x + b)$ where $ab = 5$ or $3b + a = -16$ If **0** or **1** scored instead award **SC2** for correct answers	Correct working requires at least B3 and M1 For B3 accept negative version, accept $3x^2 - 16x = -5$ M2 and M1 FT *their* 3-term quadratic M2 alt method correct substitution into formula or correct complete square M1 condone 1 error in substitution into formula For complete square, correct FT $(x + a)^2$
19	(a)		Angle in a semi-circle [= 90]	1		Accept: Angle subtended by diameter [= 90] Angle at centre is twice angle at circumference

Question			Answer	Mark	Part marks and guidance	
19	(b)		EBD or EBO or FBD or FBO and angle between radius and tangent [= 90]	2	**B1** for EBD or EBO or FBD or FBO or for correct reason	Accept DBE etc but not B Accept diameter for radius
19	(c)		35	1		
19	(d)		25	1		
20			$4\sqrt{5}$ final answer	2	**B1** for $\sqrt{80}$ or $2\sqrt{20}$ or $\frac{4\sqrt{10}}{\sqrt{2}}$	Do not award B1 for e.g. $\sqrt{160} = \sqrt{2}\ \sqrt{80}$ alone
21	(a)		$\frac{1}{2}$ oe	1		
21	(b)		$2^x \times 2^{2y} = 2^4$	M2	**B1** for 2^{2y} or 2^4	For M2 accept equivalent work with all terms in other bases e.g. 4 Accept $(2^2)^y$ for 2^{2y} Allow B1 for writing one other term correctly in base 4 or base 16 e.g. [2^x =] $4^{\frac{x}{2}}$ or [4^y =] $16^{\frac{y}{2}}$
			$x + 2y = 4$	M1	**M1 dep on M2**	For M1 accept correct equivalent equation
			one further step leading to $y = 2 - \frac{x}{2}$	A1		

Question			Answer	Mark	Part marks and guidance	
22			$2n^2 + 1 + 2(n + 1)^2 + 1$	M2	**M1** for $2(n + 1)^2 + 1$ or $2(n – 1)^2 + 1$	Accept $2(n + a)^2 + 1 + 2(n + b)^2 + 1$ oe where there is a difference of 1 between a and b
			$2n^2 + 1 + 2n^2 + 4n + 2 + 1$ or better	M2	Dep on M2 FT *their* consecutive algebraic terms For all brackets correctly expanded **M1** for a squared bracket correctly expanded e.g. [2] $(n^2 + n + n + 1)$ or better	M1 accept any bracket squared expansion seen e.g. $(2n + 3)^2 = 4n^2 + 6n + 6n + 9$ or better or [2]$(n^2 – n – n + 1)$ if $2(n – 1)^2$ used
			$4n^2 + 4n + 4$	A1	**FT** *their* consecutive algebraic terms after M2M2 earned	Accept e.g. $4n^2 – 4n + 4$ if n and $n – 1$ used
			Correct conclusion e.g. $4(n^2 + n + 1)$ and multiple of 4 Each of the terms is divisible by 4 so multiple of 4	A1	With no errors or omissions seen	