Qn	Working	Answer	Mark		Notes
1	55 × 32 (= 1760) or 52 × 28 (= 1456) or 55 × 32 + 52 × 28 (= 3216)		3	M1	for one correct product or method to find the total mark for both classes
	eg $\frac{"1760"+"1456"}{32+28}$ or $\frac{3216}{60}$			M1	for a complete method
	Correct answer scores full marks (unless from obvious incorrect working)	53.6		A1	
					Total 3 marks

Qn		Working	Answer	Mark		Notes		
2	(a)	for 0.04 × 2000 oe (= 80) or 1.04 × 2000 oe (= 2080)	OR		3	M1	for finding 4% or 104% of 2000	OR M2 for 2000×1.04^3 oe
		1.04 × "2080" oe (= 2163.2) 1.04 × "2163.2" oe	2000 × 1.04 ³ oe			M1	for completing method to find total amount in the account at the end of 3 years	or 2000 × 1.04 ⁴ oe (= 2339.72)
		Correct answer scores full marks (obvious incorrect working)	unless from	2250		A1	accept 2249 – 2250	
							SC: if no other marks gain 0.12×2000 oe or 240 or accept $(1 + 0.04)$ as equiva	hed award M1 for 1.12×2000 oe or 2240 alent to 1.04 throughout
	(b)	eg $1365 \div (1 - 0.09)$ or $1365 \div 0.91$			3	M2	for a complete method	
						(M1)	for $1365 \div (100 - 9) (= 15)$ or $(100 - 9)\% = 1365$ or 9 or eg $(1 - 0.09)T = 1365$ or eg $T - 0.09T = 1365$))1% = 1365
		Correct answer scores full marks (obvious incorrect working)	unless from	1500		A1		
								Total 6 marks

Qn	Working	Answer	Mark	Notes
3	$1600 \times 0.16 (= 256)$ oe or $1 - 0.16 (= 0.84)$ oe		4	M1
	$1600 - 256$ " or 1600×0.84 " (= 1344)			M1
	$\frac{"1344"}{1400} (= 0.96) \text{ or } \frac{1400 - "1344"}{1400} (= 0.04) \text{ or}$ $\frac{"1344"}{1400} \times 100 (= 96) \text{ or } \frac{1400 - "1344"}{1400} \times 100$			M1
	Correct answer scores full marks (unless from obvious incorrect working)	4		A1 SCB1 for 1856 seen if no other marks awarded
				Total 4 marks

Qn	Working	Answer	Mark	Notes
4	eg $\pi \times 3^2 \times 7$ (= 63 π or 197.9)		3	M1 for method to find the volume of Solid A
	eg $\frac{2000}{[\text{vol A}]}$ or $\frac{3375}{450}$ (= 7.5 oe) or $\frac{2000 + 3375}{[\text{vol A}] + 450}$			M1 (indep) for method to find the density of Solid A , B or C , allow use of their volume for Solids A and C
	<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	8.3		A1 accept 8.29 – 8.31
				Total 3 marks

Qn	Working	Answer	Mark		Notes
5 (a)	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		2	M1	for one number written as a product of prime factors or prime factors listed – numbers may be at end of factor trees or on 'ladder diagrams' or in a table or in a Venn diagram or at least two factors for each (excluding 1, 200, 420)
	Correct answer scores full marks (unless from obvious incorrect working)	20		A1	or $2^2 \times 5$ oe
(b)	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		2	M1	for $2^m \times 3^n \times 5^p \times 7^q \times 11^r$ with at least three of $m = 3$, $n = 2$, $p = 2$, $q = 2$, $r = 1$ (all 5 terms should be seen) or omission of one term with others fully correct OR prime factors seen in a Venn diagram – if so must be fully correct
	Correct answer scores full marks (unless from obvious incorrect working)	$2^3 \times 3^2 \times 5^2 \times 7^2 \times 11$		A1	allow 970 200 oe
	· · · · · · · · · · · · · · · · · · ·				Total 4 marks

Qn	Working	Answer	Mark		Notes	
6	$390 \div (8-2) \ (= 65) \text{ or}$ $\frac{8}{15} - \frac{2}{15} = 390 \text{ or } \frac{8}{15}x - \frac{2}{15}x = 390 \text{ or}$ $\frac{6}{15} = 390 \text{ or } \frac{6}{15}x = 390 \text{ oe}$ $(65)'' \times (2+5+8) \text{ oe or}$ $\frac{1}{15} = 65 \text{ or } \frac{1}{15}x = 65 \text{ or } \frac{1}{5} = 195 \text{ or } \frac{1}{5}x = 195$		3	M1 M1	or for 975 seen with further work and a different answer	$\frac{M2 \text{ for}}{\frac{390 \times 15}{6}} \text{ oe}$
	Correct answer scores full marks (unless from obvious incorrect working)	975		A1	SCB1 for 52, 130 390, 975, 1560 (o 97.5, 243.75, 390	, 208 or r 2925) or (or 731.25)
						i otal 3 marks

Qn		Working	Answer	Mark		Notes
7	(a)		$48 < S \leqslant 54$	1	B1	Allow 48 – 54 oe
	(b)	$(33 \times 4) + (39 \times 14) + (45 \times 18) + (51 \times 19) + (57 \times 5)$ or $132 + 546 + 810 + 969 + 285 (= 2742)$		4	M2	M2 for at least 4 correct products added (need not be evaluated) or
		[lower bound products are: 120, 504, 756, 912, 270] [upper bound products are: 144, 588, 864, 1026, 300]				If not M2 then award:
						M1 for consistent use of value within interval (including end points) for at least 4 products which must be added
						or
						correct midpoints used for at least 4 products and not added
		<u>"2742"</u> <u>60</u>			M1	dep on M1 Allow division by their Σf provided addition or total under column seen
		Correct answer scores full marks (unless from obvious incorrect working)	45.7		Aloe	$45\frac{7}{10}$ or $\frac{457}{10}$
						(accept 40 from correct working) Total 5 marks
1						i otar 5 mar Ks

Qn	Working	Answer	Mark		Notes
8	eg $\frac{x+7}{80} = \frac{1}{4}$ or $4(x+7) = 80$ or $x+7 = 20$		4	M1	for setting up a correct equation in terms of <i>x</i> only
	eg $x = 80 \times \frac{1}{4} - 7$ (=13) or $4x + 28 = 80$ and $x = \frac{80 - 28}{4}$ (=13) or $x = 13$			M1	for a complete method to find the value of x or $x = 13$. Award of this mark implies M2.
	eg 80-("13"+7+"13"-11+3×"13")(=19) or $\frac{"13"+7+"13"-11+3\times"13"}{80} \left(=\frac{61}{80}\right)$			M1	for a method to find the number of yellow counters or P(R or B or G)
	Correct answer scores full marks (unless from obvious incorrect working)	$\frac{19}{80}$		A1	oe eg accept 0.2375 or 23.75% or 0.237 or 23.7% or 0.238 or 23.8% or 0.24 or 24%
					Total 4 marks

Qn	Working	Answer	Mark		Notes
9			3	M1	For area of 2 different faces (ie not
					2 triangles)
	$0.5 \times 4.8 \times 3.6$ (= 8.64) oe or 4.8×3.6 if clear intention for			M1	For adding together 5 areas, at
	this to be 2 triangles				least 4 of which are correct
	7 × 3.6 (= 25.2)				
	7 × 4.8 (= 33.6)				NB: (3.6 + 4.8 + 6) × 7 (= 100.8) is
	$7 \times 6 (= 42)$				3 faces
	(all measurements with intention to add)				
	Correct answer scores full marks (unless from obvious	118		A1	118.1 or 118.08
	incorrect working)				
					Total 3 marks

Qn	Working	Answer		Mark
10	$\frac{1}{2} \times 7 \times h = 42 \text{ oe or } (h =) \frac{42 \times 2}{7} (= 12) \text{ oe or}$ $3.5^2 + h^2 = y^2 \text{ or } h = \sqrt{y^2 - 3.5^2} \text{ oe}$		4	M1 A correct equation involving the height or a correct expression for height – could be in terms of y
	$y^{2} = \left(\frac{7}{2}\right)^{2} + ("12")^{2}$ oe or $\frac{1}{2} \times 7 \times "\sqrt{y^{2} - 3.5^{2}}" = 42$ oe			M1 (indep) use of <i>their</i> height (any found value that they have called 'height')
	$y = \sqrt{\left(\frac{7}{2}\right)^2 + ("12")^2}$ oe			M1 all values must come from a correct method
	Correct answer scores full marks (unless from obvious incorrect working)	12.5		A1 oe eg $\frac{25}{2}$
				Total 4 marks

Qn		Working	Answer	Mark		Notes
11	(a)		7, 17, 32, 64, 80	1	B1	values seen in table
	(b)			2	M1ft	for at least 4 points plotted correctly at end of interval or for all points plotted consistently within each interval of the associated frequency table (eg at 5, 15, 25, 35, 45 or 0, 10, 20, 30, 40) at the correct height. ft their table dep on one error only in the table
		(NB: a 'bar chart' type graph scores zero marks)	correct cf graph		A1	All points plotted correctly at end of interval (tolerance 1 small square – there is an overlay) and joined with a curve or line segments accept curve that is not joined at (0, 0).
	(c)	Accept a single value in the range OR ft their cf graph	33	1	B1ft	Accept a single value in range $32 - 34$ or ft their cf graph
	(d)	NB: readings are 21 - 23 and 37 - 39 (but for this M1 these do not have to be correct if correct working is shown – eg lines or marks indicating use of CF 20 (or 20.25)and CF 60 (or 60.75) with an indication on the Time axis at the correct points (or they can just show the correct readings))		2	M1ft	For correct use of LQ and UQ and subtraction, ft from a cum freq graph provided method is shown – eg a line horizontally to the graph from readings of CF 20 and CF 60 to meet the graph and then a vertical line to the Time axis(even if wrongly read scale) or clear marks on the graph and Time axis that correspond to the correct readings or correct values from the Time axis
		Accept a single value in the range OR ft their cf graph	16		Alft	Accept a single value in range 15 to 17 or ft from their cumulative frequency graph provided method is shown eg subtraction of values that would be correct for their graph
						Total 6 marks

Qn	Working	Answer	Mark	Notes
12	0.515		2	M1 For either bound correct (used or
	6.25			seen)
	Working required	0.0824		A1 dep on M1 Allow $\frac{103}{1250}$
				Total 2 marks

Qn	Working	Answer	Mark		Notes
13		Fully correct angle	2	B2	for a fully correct angle bisector with all relevant arcs
		bisector with all			shown
		relevant arcs shown			
					If not B2 then B1 for all arcs and no angle bisector
					drawn or for a correct angle bisector within the
					guidelines but no correct arcs or insufficient correct
					arcs
					Total 2 marks

Qn	Working	Answer	Mark		Notes	
14	$SCD = 128^{\circ} \text{ or } BCS = 32^{\circ}$ or $TSC = 180 - 128 \ (= 52)$ eg (int $\angle =$)128 + 32(=160) or (ext $\angle =$)180 - (128 + 32)(= 20) or (ext $\angle =$)"52"- 32(= 20)		4	M1 M1	angles need to be identified or may be seen marked on the diagram (dep on previous M1) for method to find the size of one interior or exterior angle, may be seen marked on the diagram.	M2 for (BCD =) 128 + 32 (= 160) or $(DCV =) 52 -32 (= 20)$ (may be seen marked on the diagram). To award these marks 160 or 20 must be clearly used or identified as the interior or exterior
	eg 180(<i>n</i> −2) = "160" <i>n</i> or 360 ÷ "20" <i>Working required</i>	18		M1 A1	for setting up an equation for th angles or 360 ÷ "20" dep on M2	e sum of interior
						Total 4 marks

Qn	Working	Answer	Mark		Notes
15	$(AD =)\frac{2.2}{\tan 18}$ (= 6.77) or		4	M1	a correct method to find AD or AE
	$(EA =)\frac{2.2}{\sin 18}(=7.11)$				
	$(DB =)\sqrt{("6.77")^2 + 6^2} (= 9.04)$ or			M1	a correct method to find <i>DB</i> or <i>EB</i>
	$(EB =)\sqrt{6^2 + "7.11"^2} (= 9.31)$ or				
	$(EB =)\sqrt{6^2 + "6.77"^2 + 2.2^2} (= 9.31)$				
	$\tan DBE = \frac{2.2}{"9.04}$ or			M1	complete method to find one of tan <i>DBE</i> or sin <i>DBE</i> or cos <i>DBE</i> -
	$\sin DBE = \frac{2.2}{"9.31"}$ or $\sin DBE = \frac{2.2 \sin 90}{"9.31"}$				NB: if using cosine, the student will need to have found <i>DB</i> and <i>EB</i>
	$\cos DBE = \frac{"9.04"}{"9.31"} \text{ or use of cosine rule}$				previously
	Correct answer scores full marks (unless from obvious incorrect working)	13.7		A1	Allow answers in range 13.59 –
					Total 4 marks
L			1	l	

Qn	Working	Answer	Mark		Notes
16	eg 1.2 × 0.65 (= 0.78) or 1.2L × 0.65W (= 0.78LW) or 1.2 × 0.65 × 100 (= 78) or 1.2L × 0.65W × 100 (= 78LW)		3	M1	allow use of other variables to L and W as long as clearly labelled as length and width allow $(1 + 0.2)$ as their 1.2 and (1 - 0.35) as their 0.65
	eg $(1 - "0.78") \times 100$ or $(LW - "0.78LW") \times 100 (= 22LW)$ or 100 - "78" or $100LW - "78LW" (= 22LW)$			M1	method to find the percentage reduction, allow the subtraction to be written the other way around eg "78" - 100
	<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	22		A1	allow –22
					Total 3 marks

ALTERNATIVE Q16 mark scheme (using values for *L* and *W*)

Qn	Working	Answer	Mark		Notes
16	eg $1.2 \times x$ and $0.65 \times y$ where x and y are positive		3	M1	accept any positive values for x and y
	numbers				allow $(1 + 0.2)$ as their 1.2 and
					(1 - 0.35) as their 0.65
	$eg\left(1 - \frac{1.2x \times 0.65y}{xy}\right) \times 100$ or $\left(\frac{xy - 1.2x \times 0.65y}{xy}\right) \times 100$			M1	method to find the percentage reduction, allow the subtraction to be written the other way around eg $\left(\frac{1.2x \times 0.65y}{xy} - 1\right) \times 100$
	Correct answer scores full marks (unless from obvious incorrect working)	22		A1	allow –22
					Total 3 marks

Qn	Workking	Answer		Mark	
17	$12 = \frac{1}{2} \times 4.6 \times 8.3 \times \sin ABC$ or $\frac{4.6h}{2} = 12$ (<i>h</i> = 5.217)		5	M1	a correct equation for the area to find angle <i>ABC</i> or to find the perpendicular height of the triangle.
	$ABC = \sin^{-1} \left(\frac{12}{\frac{1}{2} \times 4.6 \times 8.3} \right) (= 38.947) \text{ oe or}$ $ABC = \sin^{-1} (0.6286) (= 38.947) \text{ or}$ $ABC = \sin^{-1} \left(\frac{"5.217"}{8.3} \right) (= 38.947) \text{ or}$ $BM^{2} = 8.3^{2} - "5.217"^{2}$			M1	A correct method to find angle <i>ABC</i> or a correct method to find <i>BM</i> ² where <i>CMB</i> is 90 ^o
	$AC^{2} = 4.6^{2} + 8.3^{2} - 2 \times 4.6 \times 8.3 \times \cos("38.947") \text{[allow } \cos 39^{\circ}\text{]}$ or $AC^{2} = 30.6(627)$ $BM = \sqrt{8.3^{2} - "5.217"^{2}} (=6.455)$			M1	a correct start to the cosine rule to find length AC or a fully correct method for <i>BM</i>
	or $AC = \sqrt{"30.6(6)"}$ or 5.5(3739)			A1	A correct value for AC which can be the square root of $30.6(6)$
	Correct answer scores full marks (unless from obvious incorrect working)	18.4		A1	Allow answers in range 18.4 to 18.45
					Total 5 marks

Qn		Working	Answer	Mark		Notes
18	(a)	$15 \div 15 (= 1)$ $18 \div 5 (= 3.6)$ $32 \div 20 (= 1.6)$ $4 \div 10 (= 0.4)$	Correct histogram	3	B3	for a fully correct histogram If not B3 then B2 for 3 correct frequency densities (can be implied by heights) or 3 correct bars drawn If not B2 then B1 for 2 correctly calculated
						frequency densities (can be implied by heights) or 2 correct bars drawn
						 SC: award B2 for all 4 bars of correct width with heights in the correct ratio (eg drawn at 0.5, 1.8, 0.8, 0.2) SC: award B1 for 3 bars of correct width with heights in the correct ratio
	(b)	eg $\frac{15}{20} \times 32(=24)$ or $\frac{5}{20} \times 32(=8)$ or $\frac{15}{20} \times 32 + 18(=42)$ or $32 + 18 - \frac{5}{20} \times 32(=42)$		2	M1 ft	for a method to find an estimate for the number of students who took between 30 and 45 minutes or between 45 and 50 minutes or between 25 and 45 minutes ft incorrect histogram
		Correct answer scores full marks (unless from obvious incorrect working)	$\frac{42}{50}$		A1	oe eg $\frac{21}{25}$, 0.84, 84%
						Total 5 marks

Qn	Working	Answer	Mark		Notes
19	$\sqrt{\frac{3600}{625}} \text{ or } \frac{12}{5} \text{ oe or } 2.4 \text{ or } 12:5 \text{ oe}$ or $\sqrt{\frac{625}{3600}} \text{ or } \frac{5}{12} \text{ oe or } 0.416 \text{ or } 5:12 \text{ oe}$ or $\frac{3600^3}{625^3} = \frac{(\text{vol of statue})^2}{750^2} \text{ oe}$ or $\frac{3600}{625} = \frac{(\text{vol of statue})^{\frac{2}{3}}}{750^{\frac{2}{3}}} \text{ oe}$		3	M1	for a correct length scale factor or a correct length ratio or setting up a correct equation involving the volume of the statue
	eg 750 × $\left(\left\ \frac{12}{5}\right\ \right)^3$ oe or 750 ÷ $\left(\left\ \frac{5}{12}\right\ \right)^3$ oe or $\sqrt{\frac{3600^3 \times 750^2}{625^3}}$ oe or $\left(\frac{3600 \times 750^{\frac{2}{3}}}{625}\right)^{\frac{3}{2}}$ oe Correct answer scores full marks (unless from obvious incorrect working)	10 368	-	M1 A1	(dep on M1) for a correct method to work out the volume of the statue
<u> </u>					Total 3 marks

Qn		Working	Answer	Mark	Notes
20	(a)	11 - 2		2	M1 2 and 11 clearly identified either in list or stated
		Working required	9		A1 dep on M1
	(b) (i)		Kim as she has a higher median	1	 B1 oe, ft their median if value given Acceptable examples Kim as she has a higher median Kim as/because her median is 11 and/but/whereas Rutger's is 8 Kim's median is 3 more (than Rutger's) Kim as Rutger's median is 3 less Not acceptable examples Kim's median is 11 and Rutger's is 8 Kim as she has a higher median and a lower IQR
	(ii)		Kim as she has a smaller IQR	1	 B1 oe, ft their part (a) Acceptable examples Kim as she has a smaller IQR Kim as/because her IQR is 5 and/but/whereas Rutger's is 9 Kim's IQR is 4 less (than Rutger's) Kim as Rutger's IQR is 4 more Not acceptable examples Kim's IQR is 5 and Rutger's is 9 Kim as she has a higher median and a lower IQR
					Total 4 marks

Qn	Working	Answer	Mark		Notes
21	$(\angle AOC =)132 \times 2(= 264)$ eg $\frac{"264"}{360} \times 2 \times \pi \times 8.5 \ (= 39.1 \text{ or } \frac{187}{15}\pi)$ or $2 \times \pi \times 8.5 - \frac{360 - "264"}{360} \times 2 \times \pi \times 8.5 \ (= 39.1 \text{ or } \frac{187}{15}\pi)$ or $\frac{"264"}{360} \times 2 \times \pi \times 8.5 + 2 \times 8.5$ or $2 \times \pi \times 8.5 - \frac{360 - "264"}{360} \times 2 \times \pi \times 8.5 + 2 \times 8.5$		3	M1 M1	for method to find angle at the centre. Do not award this mark if contradicted on the diagram eg if obtuse AOC is labelled as 264 for a method to find the length of arc AC or perimeter of the sector – allow use of their AOC as long as clearly labelled
	<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	56.2		A1	accept 56.1 – 56.2
					Total 3 marks

					Edexcel averages: scores of candidates who achieved grade:								
		Mean	Max	Mean				_					
Qn	Skill tested	score	score	%	ALL	9	8	/	6	5	4	3	U
1	Statistical measures	2.35	3	78	2.35	2.97	2.84	2.68	2.41	1.61	0.91	0.23	0.07
2	Percentages	4.78	6	80	4.78	5.91	5.55	5.32	4.80	3.61	2.43	1.16	0.40
3	Percentages	3.16	4	79	3.16	3.83	3.65	3.35	2.87	2.60	2.16	1.60	0.63
4	Measures	2.25	3	75	2.25	2.89	2.64	2.51	2.17	1.53	1.04	0.64	0.19
5	Powers and roots	2.88	4	72	2.88	3.78	3.38	3.03	2.42	1.99	1.47	0.00	0.00
6	Ratio and proportion	2.18	3	73	2.18	2.96	2.68	2.23	2.04	1.50	0.87	0.31	0.10
7	Statistical measures	3.36	5	67	3.36	4.71	4.26	3.63	2.62	1.85	1.23	0.00	0.00
8	Probability	2.74	4	69	2.74	3.81	3.49	2.87	2.41	1.47	0.96	0.36	0.09
9	3D shapes and volume	2.07	3	69	2.07	2.75	2.53	2.14	1.95	1.35	0.98	0.34	0.28
10	Trigonometry and Pythagoras' Theorem	2.62	4	66	2.62	3.59	3.08	2.79	2.44	1.61	1.23	0.62	0.24
11	Graphical representation of data	4.06	6	68	4.06	5.64	4.96	4.15	3.14	2.74	1.83	0.00	0.00
12	Degree of accuracy	1.22	2	61	1.22	1.87	1.66	1.23	0.88	0.55	0.19	0.08	0.02
13	Construction	1.19	2	60	1.19	1.76	1.38	1.20	0.96	0.71	0.43	0.16	0.01
14	Angles, lines and triangles	2.35	4	59	2.35	3.78	3.00	2.22	1.54	0.93	0.52	0.19	0.03
15	3D shapes and volume	2.24	4	56	2.24	3.81	3.14	2.21	1.12	0.60	0.12	0.03	0.06
16	Percentages	1.51	3	50	1.51	2.43	1.84	1.63	1.03	0.56	0.16	0.01	0.00
17	Mensuration of 2D shapes	2.54	5	51	2.54	4.38	3.44	2.45	1.39	0.54	0.27	0.12	0.02
18	Graphical representation of data	2.60	5	52	2.60	4.28	3.38	2.33	1.49	0.99	0.58	0.00	0.00
19	Similarity	1.55	3	52	1.55	2.74	2.18	1.30	0.78	0.30	0.07	0.04	0.00
20	Statistical measures	1.95	4	49	1.95	3.27	2.43	1.66	1.17	0.91	0.41	0.00	0.00
21	Mensuration of 2D shapes	1.17	3	39	1.17	2.13	1.42	1.03	0.58	0.36	0.05	0.03	0.01
	TOTAL	50.77	80	63	50.77	73.29	62.93	51.96	40.21	28.31	17.91	5.92	2.15

Suggested grade boundaries

Grade	9	8	7	6	5	4	3
Mark	68	57	46	34	23	18	4