

Q	Working	Answer	Mark	Notes	
1	$7200 \times 0.025 (= 180)$ or $7200 \times 1.025 (= 7380)$ oe or $7200 \times 1.075 (= 7740)$ oe or $7200 \times 0.075 (= 540)$ oe		3	M1	M2 for $7200 \times (1.025)^3$
	$(7200 + '180') \times 0.025 (= 184.5)$ and $(7200 + '180' + '184.5') \times 0.025 (= 189.1125)$ and $7200 + '180' + '184.5' + '189.1...'$ (= 7753.6125)			M1 NB year end values are 7380 and 7564.5(0) 7753.6125	
		7754		A1 answer in range 7753 – 7754	
				Total 3 marks	

2	(a)	$1 - (0.24 + 0.16 + 0.38)$ oe		2	M1
			0.22		A1 oe
	(b)	$0.24 + 0.16 (= 0.4)$ oe		2	M1
			0.4		A1 oe
					Total 4 marks

Q	Working	Answer	Mark	Notes
3 (a)	$720 \div 12 (= 60)$ or $78 \times 12 (= 936)$		4	M1
	$78 - '60' (= 18)$ or $'936' - 720 (= 216)$	$'x' \times 720 = 936$ or $720(1 + \frac{P}{100}) = '936'$ or $('x' =) \frac{936}{720} (= 1.3)$ oe		M1
	$\frac{'18'}{60} \times 100$ or $\frac{'216'}{720} \times 100$	$'1.3' \times 100 - 100$ oe or $(1.3 - 1) \times 100$		M1 complete method to find P
		30		A1 ignore extra % sign if given by candidate.
(b)	$0.18 \times 1600 (= 288)$ oe or $0.82 \times 1600 + 800 (= 2112)$		3	M1 if $1600 \times 18\%$ seen, must have further processing of the 18% or the value (288) given. M2 for $1.5 \times 12.5 (= 18.75)$ or $18 \div 1.5 (= 12)$
	$0.125 \times (1600 + 800) (= 300)$ oe or $(1600 + 800) \times 0.875 (= 2100)$			M1
		Coupon B and correct figures seen		A1 for Coupon B and 288 and 300 or 18.75(%) and 18(%) or 12(%) and 12.5(%) or 2112 and 2100
				Total 7 marks

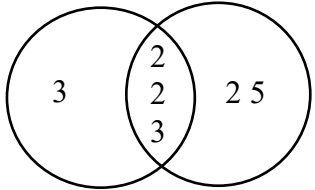
Q	Working	Answer	Mark	Notes
4	$(4.2 \times 10^{10}) \div (8.7 \times 10^6)$ (= 4827.58...) or $(3.7 \times 10^9) \div (6.3 \times 10^5)$ (= 5873.01...) or 42 000 000 000 \div 8 700 000 (= 4827.58...) or 3 700 000 000 \div 630 000 (= 5873.01...)		3	M1
	‘5873.01...’ – ‘4827.58...’ (= 1045.42...) or $\frac{42000000000}{8700000} - \frac{3700000000}{630000}$ oe			M1 dep on M1
		1045		A1 Answer in range 1045 – 1045.5 or 1.045×10^3 to 1.0455×10^3
				Total 3 marks

5	$12.8^2 + x^2 = 16^2$ oe or $163.84 + x^2 = 256$ or $(x^2 =) 16^2 - 12.8^2$ (= 92.16) or $(x^2 =) 256 - 163.84$ (= 92.16)		4	M1 for applying Pythagoras theorem correctly Allow $\cos^{-1}\left(\frac{12.8}{16}\right)$ (= 36.9...) and $\frac{x}{16} = \frac{16}{\sin(36.9...)}$ (sin 90)
	$(x =) \sqrt{16^2 - 12.8^2}$ (= $\sqrt{92.16}$) (= 9.6) or $(x =) \sqrt{256 - 163.84}$ (= $\sqrt{92.16}$) (= 9.6)			M1 for square rooting Allow $x = \frac{16}{\sin(36.9...)}$ \times sin(36.9...)
	(12.8 – “9.6”) + “9.6” + “9.6” + 16 + 16 + 16 oe			M1 (dep on M1) for a complete method to find the perimeter
		70.4		A1 oe e.g. $\frac{352}{5}$
				Total 4 marks

Q	Working	Answer	Mark	Notes
6	$\frac{110}{360} \times \pi \times 7.1^2$ oe or $\frac{110}{360} \times 3.14 \dots \times 7.1^2$ oe		2	M1 for a complete method to find the area
		48.4		A1 accept 48.3 – 49.2
				Total 2 marks

7	$\cos 30 = \frac{24}{(AC)}$ or $\sin'60' = \frac{24}{(AC)}$ or $\frac{\sin'60'}{24} = \frac{\sin 90}{(AC)}$ oe		5	M1 for correct trig ratio involving AC	M2 for use of tan and Pythagoras to obtain AC (AB =) $24 \tan 30 (= 13.856\dots)$ and $\sqrt{13.856\dots^2 + 24^2} (= 27.712\dots)$
	(AC =) $\frac{24}{\cos 30} (= 16\sqrt{3} = 27.712\dots)$ or (AC =) $\frac{24}{\sin'60'}$ (= $16\sqrt{3} = 27.712\dots$) (AC =) $\frac{24 \times \sin 90}{\sin'60'}$			M1 for a correct trig ratio for AC	If not M2, then M1 for use of tan and Pythagoras to obtain AC ² (AB =) $24 \tan 30 (= 13.856\dots)$ and $13.856\dots^2 + 24^2 (= 768)$
	$\frac{1}{2} \times 2 \times \pi \times 3 (= 3\pi = 9.424\dots)$			M1 for using $\pi \times 2 \times 3$ or $2\pi \times 3$	
	'27.712...' + '9.424...' – 2 × 3			M1 for a complete method to find the length AFEDC	
		31		A1 accept answers in range from 31 to 31.15	
					Total 5 marks

Q	Working	Answer	Mark	Notes
8	$22 \times 260 (= 5720)$ or $50 \times 218 (= 10\,900)$		3	M1
	$\frac{'10900' - '5720'}{28} = \left(\frac{5180}{28}\right)$			M1
		185		A1
				Total 3 marks

Q	Working	Answer	Mark	Notes												
<p>9 (a)</p>	<p>36, 72, 108, ... and 120, 240, 360, ... or 2, 2, 3, 3 and 2, 2, 2, 3, 5 or</p>  <table border="1" data-bbox="815 547 1043 691"> <tr> <td>2</td> <td>36</td> <td>120</td> </tr> <tr> <td>2</td> <td>18</td> <td>60</td> </tr> <tr> <td>3</td> <td>9</td> <td>30</td> </tr> <tr> <td></td> <td>3</td> <td>10</td> </tr> </table> <p>or $\frac{36 \times 120}{12}$ or 2, 2, 2, 3, 3, 5 oe</p>	2	36	120	2	18	60	3	9	30		3	10		2	<p>M1 for any correct valid method e.g. for starting to list at least three multiples of each number</p> <p>2, 2, 3, 3 and 2, 2, 2, 3, 5 seen (may be in a factor tree or a ladder diagram and ignore 1) (Allow 2×2 as 4)</p> <p>or a fully correct “Venn” diagram</p>
2	36	120														
2	18	60														
3	9	30														
	3	10														
		360		A1 or $2^3 \times 3^2 \times 5$ oe (allow $2^3 \cdot 3^2 \cdot 5$)												
(b)		$5^2 \times 7^4 \times 11$	2	<p>B2 for $5^2 \times 7^4 \times 11$ (in any order) (B1 for 660 275 or correct unsimplified product or $5^a \times 7^b \times 11^c$ where 2 of a, b and c are correct)</p>												
				Total 4 marks												

Q	Working	Answer	Mark	Notes
10	$220 \div 80 (= 2.75 \text{ or } \frac{11}{4}) \text{ oe}$			M1 for a method to find the time from B to C
	$72 \times \frac{50}{60} (= 60) \text{ oe}$			M1 for a method to find the distance from C to D Allow 0.83(333...) to 2 dp truncated or rounded
	$\frac{245 + 220 + "60"}{2.5 + "2.75" + \frac{50}{60}} \left(= \frac{525}{73/12} \right) \text{ oe}$			M1 for a complete method to find the average speed for entire journey 0.83(333...) to 2 dp truncated or rounded 6.0(8333...) to 2 sf truncated or rounded
		86.3		A1 for 86.3 – 86.4
				Total 4 marks

Q	Working	Answer	Mark	Notes
11	$3 \times 2.5 (= 7.5)$ oe or $2 \times 3 \times 2.5 (= 15)$ oe or $12 \times 3 (= 36)$ oe or $2 \times 12 \times 3 (= 72)$ oe or $12 \times 2.5 (= 30)$		6	M1 for area of rectangle
	$(2 \times 3 \times 2.5) + (2 \times 12 \times 3) + (12 \times 2.5) (= 117)$ or $(2 \times 7.5) + (2 \times 36) + (12 \times 2.5) (= 117)$ or $15 + 72 + 30 (= 117)$			M1 for a complete method to find the surface area
	$1 + 0.1 (= 1.1)$ or $100(\%) + 10(\%) (= 110(\%))$ or $\frac{26.95}{110} (= 0.245)$ oe			M1
	$26.95 \div "1.1" (= 24.5(0))$ or $26.95 \div "110" \times 100 (= 24.5(0))$ or $26.95 \times 100 \div "110" (= 24.5(0))$ oe or $"0.245" \times 100 (= 24.5(0))$ oe			M1 dep on previous M1
	$"117" \div 15 (= 7.8 \text{ or } 8)$ and $"8" \times "24.50" (= 196)$ or $"117" \div 15 (= 7.8 \text{ or } 8)$ and $200 \div "24.5" (= 8.1\dots)$ or $"117" \div 15 (= 7.8 \text{ or } 8)$ and $200 \div "8" (= 25)$			M1 for working with a whole number of tins (rounded up) to reach figures where a decision can be made
		Correct figures to show that Jonty is correct		A1 e.g. 196 7.8 or 8 and 8.1... 24.5 and 25
				Total 6 marks

Q	Working	Answer	Mark	Notes
12	$16 \div 0.5 (= 32)$ or a correct value on the FD scale or 10 small squares =1 watermelon oe 25 small squares (1 large square) = $16 \div 6.4 = 2.5$ watermelon oe			M1 for use of area to represent frequency or one correct frequency from the 4 remaining bars
	$15 \times 1 + 16 + 23 \times 1 + 30 \times 1 + 12 \times 1.5$ or $15 + 16 + 23 + 30 + 18$ or $16 + 0.1 \times (15 \times 10 + 23 \times 10 + 30 \times 10 + 12 \times 15)$ oe or $(150 + 160 + 230 + 300 + 180) \times 0.1$ oe or $(6 + 6.4 + 9.2 + 12 + 7.2) \times 2.5$ oe			M1 (dep on M1) for a fully correct method, allow one error in products or number of squares but must be the sum of 5 parts
		102		A1
				Total 3 marks

13	$\sqrt{8} + 4 - (\sqrt{8} - 4) (= 8)$ and $\sqrt{8} + 4 - (\sqrt{8} - 4) (= 2\sqrt{8} = 4\sqrt{2})$	$(a + b)(a - b) = a^2 - b^2$ and $(\sqrt{8} + 4)^2 - (\sqrt{8} - 4)^2$	3	M1 for correct substitutions into expression for $a + b$ and $a - b$ or expand the expression to get $a^2 - b^2$ and substitute into this expression.
	$(\sqrt{8})^2 - (\sqrt{8} - 4)^2$ or $\sqrt{2048}$ or $16\sqrt{8}$ or $32\sqrt{2}$ or $8\sqrt{32}$ or $8\sqrt{8 \times 4}$ oe			M1 (dep M1)
		8		A1 (dep both M marks)

Q	Working	Answer	Mark	Notes
				Total 3 marks
14	$360 \div 8 (= 45)$ or $360 \div 5 (= 72)$ or $180 - (360 \div 8) (= 135)$ oe or $180 - (360 \div 5) (= 108)$ oe		4	M1 finding interior or exterior angle of octagon or pentagon Angles may be seen on diagram – but must be obtuse if interior and acute if exterior.
	'72' – '45' (= 27) or '135' – '108' (= 27)			M1 (dep 1st M1) using a pair of interior or pair of exterior angles to find angle <i>IBC</i> Angle may be seen on diagram.
	$\frac{180 - '27'}{2} (= 76.5)$			M1
		76.5		A1
				Total 4 marks

15			4	B1 for 80
	for $\frac{a+75}{2} = 74$ oe or 73			M1 for setting up an equation using the median or for 73
	for $80 - 16 (= 64)$ oe			M1 for using the range correctly or for 64
		64, 73, 80		A1 answers can be in any order
				Total 4 marks

Q	Working	Answer	Mark	Notes
16	$\frac{100}{2}[2 \times 1 + (100 - 1) \times 4] (= 19\,900)$ oe or $1 + (41 - 1) \times 4 (= 161)$ oe or $1 + (100 - 1) \times 4 (= 397)$ oe		4	M1 for method to find the sum of the first 100 terms or for finding the 41 st term or for finding the 100 th term
	$\frac{40}{2}(2 \times 1 + (40 - 1) \times 4) (= 3160)$ oe or $\frac{41}{2}(2 \times 1 + (41 - 1) \times 4) (= 3321)$ oe or $100 - 41 + 1 (= 60)$ oe			M1 for method to find the sum of the first 40 terms or 41 terms or for finding the number of terms from the 41 st term to the 100 th term
	"19900" – "3160" or $\frac{"60"}{2}["161" + "397"]$ or $\frac{"60"}{2}[2 \times "161" + ("60" - 1) \times 4]$ oe			M1 for finding the difference or for finding the sum from the 41 st term to the 100 th term
		16740		A1
				Total 4 marks

Q	Working	Answer	Mark	Notes
17	$y = \frac{k}{\sqrt{x}} \text{ or } ky = \frac{1}{\sqrt{x}} \text{ or}$ $x = pT^3 \text{ or } y = \frac{k}{\sqrt{pT^3}} \text{ or } y = \frac{c}{\sqrt{T^3}}$	<p>Alternative</p> $y^2 T^3 = n \text{ oe}$	4	M1 Constant of proportionality must be a symbol such as k or p or c or n $k \neq 1, p \neq 1$ and $c \neq 1$ and $n \neq 1$
	$c = 8 \times \sqrt{25^3} (=1000) \text{ oe}$	$n = 8^2 \times 25^3 (=1000000) \text{ oe}$		M1 dep M1 for rearranging for c or n with ($y =$) 8 and ($T =$) 25 substituted correctly into their equation
	$27 = \frac{'1000'}{\sqrt{T^3}} \text{ and } T^3 = \left(\frac{'1000'}{27} \right)^2 \text{ oe}$ $27 = \frac{'1000'}{\sqrt{T^3}} \text{ and } T^{\frac{1}{2}} = \left(\frac{'1000'}{27} \right)^{\frac{1}{3}}$	$T^3 = \frac{'1000000'}{27^2} \text{ oe}$		M1 for substitution of y and a correct rearrangement for T^3 or $T^{\frac{1}{2}}$ or T .
			$\frac{100}{9}$	A1 oe eg $11\frac{1}{9}$ or 11.1 or 11.111(...)
				Total 4 marks

Q	Working	Answer	Mark	Notes
18	$\pi x^2 + 2\pi x \times 3x + \frac{1}{2} \times 4\pi x^2 = 81\pi$ oe or $9x^2 = 81$ oe or $2\pi x \times 3x + \frac{1}{2} \times 4\pi x^2 = 81\pi$ oe or $8x^2 = 81$		6	M1 for setting up an equation (in a single variable ie x or r) for the total surface area of the shape or for the curved surface area.
	$(x =) \frac{81}{9} (= 3)$			M1 solving their equation in the form $kx^2\pi = 81\pi$ (where k follows correctly from their surface area) to find x
	$\pi \times 3^2 \times 3 \times 3 + \frac{1}{2} \times \frac{4}{3} \pi 3^3$ oe $(= 81\pi + 18\pi = 99\pi = 311.(017\dots))$			M1 (indep) for substituting their value of x to find the volume of the shape.
	99π or $311.(017\dots)$			A1
	$\frac{840}{311} (= 2.7\dots)$ oe			M1 (dep on the 3rd M) for using the formula for density
		aluminium		A1 for aluminium and correct working leading to 2.7
				Total 6 marks

Q	Working	Answer	Mark	Notes
19	$\sqrt{4} : \sqrt{9} (= 2 : 3)$ or $\frac{\sqrt{4}}{\sqrt{9}} (= \frac{2}{3})$ oe or $\sqrt{9} : \sqrt{4} (= 3 : 2)$ or $\frac{\sqrt{9}}{\sqrt{4}} (= \frac{3}{2})$ oe		4	M1 for finding the ratio or fraction for lengths for $A : B$ or $B : A$
	$\sqrt[3]{125} : \sqrt[3]{343} (= 5 : 7)$ or $\frac{\sqrt[3]{125}}{\sqrt[3]{343}} (= \frac{5}{7})$ oe or $\sqrt[3]{343} : \sqrt[3]{125} (= 7 : 5)$ or $\frac{\sqrt[3]{343}}{\sqrt[3]{125}} (= \frac{7}{5})$ oe			M1 for finding the ratio or fraction for lengths for $B : C$ or $C : B$
	$A : B = 10 : 15$ and $B : C = 15 : 21$ oe			M1 for manipulating $A : B$ and $B : C$ so that both B values are equal
		10 : 21		A1 Allow 1 : 2.1 SC3 for 21 : 10 with all working shown
				Total 4 marks

Q	Working	Answer	Mark	Notes
20 (c)	$\frac{7}{12} \times \frac{5}{12} \times \frac{x}{15} \text{ oe or } \frac{7}{12} \times \frac{5}{12} \times y \text{ or}$ $2 \times \frac{7}{12} \times \frac{5}{12} \text{ oe}$		3	M1 for <i>GRB</i> or <i>RGB</i> or $2 \times GR$ or $2 \times RG$
	$2 \times \frac{7}{12} \times \frac{5}{12} \times \frac{x}{15} = \frac{7}{24} \text{ oe or}$ $2 \times \frac{7}{12} \times \frac{5}{12} \times y = \frac{7}{24} \text{ oe or}$ $\frac{\frac{7}{24}}{2 \times \frac{7}{12} \times \frac{5}{12}} \left(= \frac{3}{5} \right) \text{ oe}$			M1 (ft their tree diagram) for a complete method 0.29(166...) to 2 dp truncated or rounded
		9		A1
				Total 3 marks

Q	Working	Answer	Mark	Notes
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Qn	Mean score	Max score	Mean %	Edexcel averages: scores of candidates who achieved grade:								
				ALL	9	8	7	6	5	4	3	U
1	2.60	3	87	2.60	2.97	2.81	2.69	2.45	1.97	1.21	0.33	0.10
2	3.48	4	87	3.48	3.88	3.68	3.54	3.35	2.73	2.43	0.50	0.00
3	5.84	7	83	5.84	6.73	6.40	5.98	5.20	3.98	3.15	2.04	0.00
4	2.32	3	77	2.32	2.87	2.75	2.35	1.72	1.07	0.82	0.29	0.00
5	2.99	4	75	2.99	3.74	3.54	3.06	2.39	1.38	0.50	0.19	0.00
6	1.49	2	75	1.49	1.95	1.75	1.53	1.06	0.61	0.16	0.00	0.00
7	2.08	3	69	2.08	2.85	2.47	1.99	1.19	0.70	0.16	0.00	0.00
8	3.42	5	68	3.42	4.63	4.10	3.35	2.16	0.97	0.24	0.00	0.00
9	2.72	4	68	2.72	3.53	2.85	2.64	1.92	1.53	1.00	0.78	0.00
10	2.49	4	62	2.49	3.32	2.84	2.33	1.77	1.04	0.44	0.15	0.00
11	3.58	6	60	3.58	5.11	4.06	3.14	2.12	0.98	0.71	0.07	0.09
12	1.75	3	58	1.75	2.64	2.07	1.41	0.71	0.39	0.16	0.04	0.00
13	1.67	3	56	1.67	2.55	1.67	1.28	0.85	0.58	0.15	0.08	0.00
14	1.90	4	48	1.90	2.49	2.10	1.70	1.42	1.07	0.41	0.17	0.00
15	2.14	4	54	2.14	3.07	2.37	1.58	1.36	0.78	0.60	0.22	0.27
16	1.60	4	40	1.60	2.72	1.50	0.96	0.65	0.28	0.10	0.00	0.00
17	1.27	4	32	1.27	2.24	1.07	0.75	0.35	0.25	0.06	0.00	0.00
18	2.34	6	39	2.34	4.58	1.76	0.83	0.37	0.09	0.00	0.00	0.00
19	1.59	4	40	1.59	2.98	1.43	0.66	0.22	0.12	0.12	0.00	0.00
20	1.20	3	40	1.20	2.33	1.10	0.38	0.12	0.04	0.00	0.00	0.00
	48.47	80	61	48.47	67.18	52.32	42.15	31.38	20.56	12.42	4.86	0.46

Suggested grade boundaries

Grade	9	8	7	6	5	4	3
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Q	Working	Answer	Mark	Notes
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Mark	60	47	37	26	17	9	4
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