



KING EDWARD VI
COMMUNITY COLLEGE

Year 11 Higher Tier
Revision Materials
Booklet (1) - **Mark Scheme**

Year 11 Higher PPE **Mark Scheme**

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Ratio and Proportion – Higher Mark Scheme

Q	Answer	Mark	Comments
1(a)	$y = \frac{x}{5}$	B1	
1(b)	$5 + 1 : 5 - 1$	M1	
	$6 : 4 (= 3 : 2)$	A1	
2	Alternative method 1		
	$630 \div 100 \times 125$ or 787.5	M1	oe Works out calories in 90 nuts
	their $787.5 \div 90$	M1dep	
	8.75	A1	oe Accept 9 with working
	Alternative method 2		
	$90 \div 125 \times 100$ or 72	M1	oe Nuts per 100 g
	$630 \div$ their 72	M1dep	
	8.75	A1	oe Accept 9 with working
3	2 parts $\rightarrow$ 9	M1	oe eg $1 : 3$, $2 : 6$, ... $4.5 : 13.5$
	$9 \div 2 \times 6$	M1	oe eg $4.5 : 13.5 : 27$
	27	A1	

Q	Answer	Mark	Comments
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4	Alternative method 1		
	$6 \div (\frac{1}{2} + \frac{1}{4})$ or 8 (portions)	M1	oe eg $\frac{1}{2} : \frac{1}{4} = 4 : 2$
	their $8 \times \frac{1}{2} \times 80$ or 320	M1dep	oe eg 4×80
	their $8 \times \frac{1}{4} \times 100$ or 200	M1dep	dependent on first M oe eg 2×100
	520	A1	
	Alternative method 2		
	$6 \div (\frac{1}{2} + \frac{1}{4})$ or 8 (portions)	M1	oe
	$\frac{1}{2} \times 80 + \frac{1}{4} \times 100$ or 65	M1	
	their 40 + their 65 $\times$ their 8	M1dep	dependent on both Ms
	520	A1	

5	$(12.5 - 2) \div 5 \times 2$ or 4.2	M1	oe
	$(7.5 - 1) \div 5 \times 2$ or 2.6	M1	oe
	(6.2, 3.6)	A2	A1 for each correct coordinate

Q	Answer	Mark	Comments
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6	Alternative method 1		
	$4x - 25$ and $3x$	M1	
	$\frac{4x - 25}{3x} = \frac{7}{9}$ or $x = 15$	M1dep	oe eg $9(4x - 25) = 21x$
	45	A1	
	Alternative method 2		
	Two ratios equivalent to $4 : 3$ and $7 : 9$ with the second parts common	M1	eg $12 : 9$ and $7 : 9$
	Builds up their ratios until the first parts have a difference of 25	M1dep	eg $24 : 18, 14 : 18$ $36 : 27, 21 : 27$ $60 : 45, 35 : 45$
	45	A1	

Growth and decay/Compound interest – Higher Mark Scheme

Q	Answer	Mark	Comments																		
1	1.13	B1																			
2	2185.454	B1																			
3	$A = P\left(1 + \frac{r}{100}\right)^n$	B1																			
4	<table><tr><th>x</th><th>y</th><th>z</th></tr><tr><td>1000</td><td>1</td><td>3.30</td></tr><tr><td>2000</td><td>2</td><td>10.07</td></tr><tr><td>3000</td><td>3</td><td>34.72</td></tr><tr><td>4000</td><td>4</td><td>124.62</td></tr><tr><td>5000</td><td>5</td><td>347.29</td></tr></table>	x	y	z	1000	1	3.30	2000	2	10.07	3000	3	34.72	4000	4	124.62	5000	5	347.29	B3	B2 3307.50 and 3 and 3472.88 B1 for 3307.50 and 3
x	y	z																			
1000	1	3.30																			
2000	2	10.07																			
3000	3	34.72																			
4000	4	124.62																			
5000	5	347.29																			
5	1.038 seen	B1																			
	$4000 \times (1.038)^4$ or 4643.54...	M1																			
	643.54	A1																			
6	1.029 seen	B1																			
	$5000 \times (1.029)^3$	M1																			
	5447.74	A1																			

Q	Answer	Mark	Comments
7	10×0.6^n	M1	oe
	Any value calculated for $n > 1$ $n = 2$ gives 3.6 $n = 3$ gives 2.16 $n = 4$ gives 1.296 $n = 5$ gives 0.7776	M1	
	At least 2 values calculated accurately	A1	
	5	A1	
8	Decreases by 3.2%	B1	
9	10000×0.94^n stated or implied or 94% left each day	M1	
	Explanation that calculator used with an iterative process, using Ans $\times$ 0.94 with continually pressing equals or correct calculations seen	M1dep	
	11	A1	

Calculating with percentages – Higher Mark Scheme

Q	Answer	Mark	Comments
1	1.15	B1	
2	The final cost of the console is less than the original cost	B1	
3	23.55×1.028 or 0.028×23.55 or 0.6594 or 0.66	M1	oe
	24.21 or 24.20	A1	Do not accept 24.209..
4	$(400 +) 5 \times (400 \times 0.036)$ or 14.4	M1	oe
	472	A1	
5	$0.45 \div 1.8$ or $\frac{(2.25 - 1.8)}{1.8}$ or 2.25	M1	
	25	A1	
6(a)	290×0.7 or 203	M1	oe
	their 203×0.8	M1dep	
	162.40	A1	Do not accept 162.4
6(b)	0.7×0.8 or their $162.4 \div 290$ or 0.56 or 56	M1	
	44	A1ft	ft their $162.4 \div 290$

Q	Answer	Mark	Comments
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7	Alternative method 1		
	1.12 seen	B1	
	$190.40 \div 1.12$	M1	
	170	A1	
	Alternative method 2		
	$112\% = 190.4$	M1	
	$1\% = 190.4 \div 112$	M1dep	
	170	A1	

8(a)	$270 \div 2.25$ or 120 or $x + x + 0.25x = 270$	M1	oe
	150	A1	
8(b)	$0.4 \times \text{their } 150 + 0.3 \times (270 - \text{their } 150)$ or $60 + 36$ or 96	M1	oe
	[35, 36]	A1ft	

Number, fractions and decimals – Higher Mark Scheme

Q	Answer	Mark	Comments
1	$\frac{1}{5}$	B1	
2	4.i	B1	
3	1.05	B1	
4	3.772	B2	B1 0.4715×8 or digits 3772 eg 0.3772
5	$\frac{5}{3} \times \frac{21}{5}$ or $\frac{105}{15}$ or $\frac{21}{3}$ or $\frac{35}{5}$	M1	Converts both fractions to improper with at least one correct
	7	A1	
6	Any two numbers rounded to 1 significant figure 200, 4 or 0.1	M1	
	200 and 4 and 0.1 or $\frac{800}{0.1}$	M1	
	8000	A1	Must come from $\frac{200 \times 4}{0.1}$

Q	Answer	Mark	Comments
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7	$1 - \frac{5}{8}$ or $\frac{3}{8}$ or $1 - \frac{9}{20}$ or $\frac{11}{20}$ or $\frac{5}{8} + \frac{9}{20}$ or $\frac{43}{40}$	M1	oe
	$\frac{9}{20}$ – their $\frac{3}{8}$ or $\frac{5}{8}$ – their $\frac{11}{20}$ or their $\frac{43}{40}$ – 1	M1	oe
	$\frac{3}{40}$	A1	oe

8	$240 \div \frac{2}{5}$ or 600	M1	oe
	their $600 - 240$ or 360	M1	$240 \div 2 \times 3$ scores M2
	their $360 \div 4$ or 90	M1	Condone $600 \div 4$
	270	A1	SC3 450 SC2 150

Q	Answer	Mark	Comments
9	Alternative method 1		
	$10x = 2.33\dots$ and $9x = 2.1$	M1	oe $100x = 23.33\dots$ and $99x = 23.1$
	$\frac{21}{90}$	M1	oe fraction $\frac{231}{990}$
	$\frac{7}{30}$	A1ft	ft correct simplification of fraction with M1 scored
	Alternative method 2		
	$0.2 + 0.033\dots = \frac{2}{10} + 0.033\dots$ and $100x = 3.33\dots$ and $99x = 3.3$	M1	oe
	$\frac{198}{990} + \frac{33}{990}$ or $\frac{231}{990}$	M1	oe fractions
	$\frac{7}{30}$	A1ft	ft correct simplification of fraction with M1 scored
	Alternative method 3		
	$\frac{2}{10} + \frac{3}{90}$	M1	
	$\frac{18}{90} + \frac{3}{90}$ or $\frac{21}{90}$	M1	
	$\frac{7}{30}$	A1ft	ft correct simplification of fraction with M1 scored
	Alternative method 4		
	$10x = 2.33\dots = \frac{7}{3}$	M1	
	$\frac{7}{3} \div 10$	M1	
	$\frac{7}{30}$	A1	

Indices and roots – Higher Mark Scheme

Q	Answer	Mark	Comments
1(a)	0.2	B1	oe
1(b)	4.5	B1	
2	14 or 2^{14}	B1	
3	4	B1	
4	12	B1	
5	$11^2 + 14^2 = 317$ or $12^2 + 15^2 = 369$ $13^2 + 16^2 = 425$	M1	
	12 and 15	A1	
6(a)	11^6	B1	Accept 6
6(b)	2^{30}	B1	Accept 30
7	$216 + 8$	B1	
8	[9.2, 9.5]	B1	
9	4 and 5	B1	
10	10^4	B1	

Q	Answer	Mark	Comments
11	7	B1	
	-7	B1	
12	Yes ticked and odd $\times$ odd = odd even $\times$ even = even odd - even = odd and even - odd = odd	B2	B1 for Yes ticked and 2 examples shown to be true or B1 for Yes ticked and partial explanation
13	[2.8, 2.95]	B1	
14	Two of $a = 2, b = 6$ $a = 8, b = 2$ $a = 4, b = 3$	B2	B1 any one correct

Standard form – Higher Mark Scheme

Q	Answer	Mark	Comments
1	Selects 5×10^3 and 2.8×10^5	B1	
	275 000	M1	oe May be implied by correct standard form Condone their largest – their smallest correctly evaluated
	2.75×10^5	A1ft	ft B0M1 converts their difference to standard form
2	2565.(...)	B1	oe May be implied by correct final answer
	2.6×10^3 or 3×10^3	B2ft	ft their answer converted to standard form and rounded to 2sf or 1sf B1ft Correct use of standard form $2.565... \times 10^3$ or Correct rounding to 2sf or 1sf 2600 or 3000 oe
3	0.000 006 2	B1	oe May be implied by correct final answer
	6.2×10^{-6}	B1ft	ft their answer converted to standard form
4	$5.2 \times 10^8 \div 645$	M1	oe
	806 201.(...)	A1	oe May be implied by correct standard form
	8×10^5 or 8.1×10^5 or 8.06×10^5 or $8.062... \times 10^5$	B1ft	ft their answer converted to standard form

Q	Answer	Mark	Comments
5(a)	$(2.7 \times 10^{-2}) \div (3.4 \times 10^{-4})$	M1	oe $0.0270 \div 0.000\ 340$
	79.(...) or 80	A1	
5(b)	$(2.7 \times 10^{-2}) \times (1 - (3.4 \times 10^{-4}))$ or $(3.4 \times 10^{-4}) \times (1 - (2.7 \times 10^{-2}))$	M1	oe $0.0270 \times 0.999\ 66$ or $0.000\ 340 \times 0.973$
	$(2.7 \times 10^{-2}) \times (1 - (3.4 \times 10^{-4}))$ and $(3.4 \times 10^{-4}) \times (1 - (2.7 \times 10^{-2}))$	M1	oe
	0.02732164	A1	oe May be implied by correct final answer
	0.0273	A1ft	ft their answer rounded to 3sf if M1M1 scored
6	$3.72 \times 10^{13} \div 9 \times 5$	M1	
	$2.066... \times 10^{13}$	A1	oe May be implied by correct final answer
	2.07×10^{13} or 2.1×10^{13} or 2×10^{13}	A1ft	ft their answer in standard form and rounded to 3sf, 2sf or 1sf if M1scored

Forming and solving equations – Higher Mark Scheme

Q	Answer	Mark	Comments
1	$7n - 6n^2$	B1	
2	$a^2 - 4a$	B1	
3	$5x(2x - y)$	B2	B1 $x(10x - 5y)$ or $5(2x^2 - xy)$
4	$(3x^2 +) 36x$ or $36 = c^2$	M1	May be implied by 6 or -6
	6	A1	
	-6	A1	
5	$3(4x + 2) + 3(4x + 2) + 6(x - 2) + 6(x - 2)$	M1	oe
	$36x - 12$	M1	Expands brackets and collects terms Allow one error
	their $(36x - 12) \div 3$	M1	
	$12x - 4$	A1	SC2 $12x + 6$ and $6x - 12$ seen SC1 $12x + 6$ or $6x - 12$ seen
6	$6x - 6k = 5x + 4$	M1	
	$6x - 5x = 6k + 4$ or $x = 6k + 4$	M1	
	Explanation that $6k + 4$ is an even number eg shows that both terms are divisible by 2 or $6k + 4 = 2(3k + 2)$	A1	oe

Q	Answer	Mark	Comments
7	$10x^2 - 5x$ or $3x + 3$	M1	
	$5x(2x - 1) - 3(x + 1)$ or their $(10x^2 - 5x) - \text{their } (3x + 3)$	M1	
	$10x^2 - 8x - 3$	A1	
8	$21x - 3 - 6x - 24 + 2$	M1	Allow one error
	$15x - 25$	A1	
	$5(3x - 5)$	A1	

Equations of lines – Higher Mark Scheme

Q	Answer	Mark	Comments
1	$y - 2x = 0$	B1	
2	$y = \frac{8-x}{2}$	B1	
3	$y - 2x = 0$	B1	
4	$y = (3x + 8) \div 2$ or substitutes $x = 0$	M1	oe
	(0,4)	A1	
5	$\frac{6-0}{0-2}$	M1	oe
	- 3	A1	
	$y = - 3x + 6$	A1ft	oe ft their gradient
6	$3x = 2 - 14$	M1	
	- 4	A1	
7	[0.2, 0.4]	B1	oe
8	$2x + 8$	B1	
	$5x - \text{their } 2x = \text{their } 8 - 1$	M1	
	$\frac{7}{3}$	A1	

Q	Answer	Mark	Comments
9(b)	$\frac{20}{75}$ or 1.25 seen	M1	oe
	16	A1	
10(a)	Correct values in table: 2, 4, 16 and 32.	B1	
	Points plotted correctly	B1ft	ft their values in table
	Smooth curve through all points	B1ft	ft their values in table
10(b)	Gets close to zero or gets close to x-axis	B1	oe Do not accept equals 0.

Equations – Higher Mark Scheme

Q	Answer	Mark	Comments
1	Alternative method 1		
	$25 + \frac{9 \times 56}{2}$ or 277	M1	
	277 and No	A1	
	Alternative method 2		
	$(275 - 25) \times 2 \div 9$ or 55	M1	
	55 and No	A1	
2	$(-2)^3$ and $\sqrt{12 \times -2 + 40}$	M1	Correct substitution in both sides of the equation
	$(2)^3$ and $\sqrt{12 \times 2 + 40}$	M1	Correct substitution in both sides of the equation
	$-2 \rightarrow -8 = 4$ No and $2 \rightarrow 8 = 8$ Yes	A1	SC2 correct substitution and decision for one value

Q	Answer	Mark	Comments
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3	Alternative method 1		
	$\frac{2x}{3} + 4 = x + 1$	M1	
	$3 = \frac{x}{3}$	M1	
	9	A1	
	Alternative method 2		
	$\frac{x}{3} + 2 = \frac{x}{2} + \frac{1}{2}$ and $\frac{x}{3} - \frac{x}{2} = 2 - \frac{1}{2}$	M1	
	$\frac{x}{6} = 1\frac{1}{2}$	M1	
	9	A1	

4	$5x - 2$	B1	
	$3(x + 1) = 3x + 3$	B1	
	their $(5x - 2) =$ their $(3x + 3)$ or $2x = 5$	M1	oe
	$\frac{5}{2}$ or $2\frac{1}{2}$ or 2.5	A1ft	ft incorrect bracket expansion

Q	Answer	Mark	Comments
5	$7(2x + 3) = 14x + 21$ or $3(x - 1) = 3x - 3$	M1	
	their $(14x + 21) - \text{their } (3x - 3) = 84.5$ or $11x + 24 = 84.5$	M1dep	oe
	$\frac{11}{2}$ or $5\frac{1}{2}$ or 5.5	A1	
	$2 \times (x - 1 + 3)$	M1	
	15	A1ft	ft $2 \times (\text{their } 5.5 + 2)$
6	$3w - 5 = 2w + 4$ or $\frac{3w}{2} - \frac{5}{2} = w + 2$	B1	
	$3w - 2w = 4 + 5$ or $\frac{3w}{2} - w = 2 + \frac{5}{2}$ or $\frac{w}{2} = 4.5$	M1	ft their four terms
	9	A1ft	ft B0M1

Algebraic fractions – Higher Mark Scheme

Q	Answer	Mark	Comments
1	$\frac{2a^2 + 3b^2}{ab}$	B1	
2	$\frac{x}{4y}$	B1	
3	$\frac{2}{5e}$	B1	
4	$\frac{2}{xy}$	B1	
5	y^2	B1	Accept $1y^2$
6	Mya's answer is correct but from wrong working. She should have factorised the top and cancelled the common bracket ie $\frac{(3x - y)(3x + y)}{3x - y}$ $= 3x + y$	B2	B1 for partial explanation Or B1 for sight of $(3x - y)(3x + y)$
7(a)	$(x - 4)(x + 4)$	B1	Either order
7(b)	$(x \pm a)(2x \pm b)$	M1	Allow where $ab = 12$
	$(x - 4)(2x + 3)$	A1	
	$\frac{x + 4}{2x + 3}$	A1	

Q	Answer	Mark	Comments
8	$(3y \pm a)(y \pm b)$	M1	$ab = 2$
	$(3y - 2)(y + 1)$	A1	
	$y + 1$	A1	
9	$\frac{(3x - 2)(3x + 2)}{(4x - 1)(3x + 2)}$	M1	
	$a = 9 \ b = 4 \ c = 12 \ d = 5 \ e = -2$	A1	
10	Attempt to factorise numerator or denominator	M1	
	$(2x + 1)(x - 5)$	A1	either order
	$(2x + 1)(3x + 4)$	A1	either order
	$\frac{x - 5}{3x + 4}$	A1	

Quadratics and rearranging formula – Higher Mark Scheme

Q	Answer	Mark	Comments
1(a)	x^6	B1	
1(b)	$4y^6$	B2	B1 for 4, B1 for y^6
2	$x^2 - 5x + 2x - 10$	M1	Allow one sign or arithmetic error but must have 4 terms, one in x^2 two in x and a constant term
	$x^2 - 3x - 10$		
3	$2w = P - 2l$	M1	
	$w = \frac{P - 2l}{2}$	A1	
4(a)	$(x - 6)(x + 6)$	B1	Either order
4(b)	$(3x - 4)(3x + 4)$	B2	Either order B1 for $\pm 3x$ B1 for ± 4
5	$9a - 6b$ or $15a - 10b$	M1	oe
	$\frac{3(3a - 2b)}{5(3a - 2b)} = \frac{3}{5}$	A1	
6	$(x \pm a)(x \pm b)$	M1	$ab = 14$
	$(x + 7)(x - 2)$	A1	

Q	Answer	Mark	Comments
7	(width $\Rightarrow$) $2x + 1$	B1	
	$(3x - 1) \times$ their $(2x + 1)$	M1dep	
	$6x^2 + x - 1$	A1ft	ft their width
8(a)	$r = \frac{A}{pl}$	B1	
8(b)	$l^2 = r^2 + h^2$	B1	
8(c)	$V = \frac{1}{3}pr^2\sqrt{l^2 - h^2}$	B1	

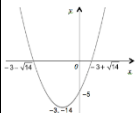
Functions, quadratics, identities and rearranging formula – Higher Mark Scheme

Q	Answer	Mark	Comments
1(a)	$\frac{x-3}{2}$	B1	
1(b)	$2x^2 + 3$	B1	
2	πr or πR	M1	oe
	$\pi r + \pi R + 2R$	A1	
3	$27x^6y^3$	B2	B1 for 2 of 27 or x^6 or y^3 correct
4	$2x^2 - 9x - 5$ or $6x^2 + 7x + 2$ or $3x^2 - 13x - 10$	M1	
	$6x^3 - 23x^2 - 33x - 10$	A2	A1 Any 2 terms correct
5	$(p-a)^2 \equiv p^2 - 2ap - a^2$	B1	
6	$2(9a^2 - 16)$	M1	
	$2(3a-4)(3a+4)$	A1	
7	$(ax \pm c)(bx \pm d)$	M1	$ab = 12$ and $cd = 3$
	$(3x+1)(4x-3)$	A1	

Q	Answer	Mark	Comments
8	$y(4x + 5) = 2x - 1$	M1	
	$4xy - 2x = -1 - 5y$	M1dep	
	$x = \frac{-1 - 5y}{4y - 2} \text{ or } \frac{1 + 5y}{2 - 4y}$	A1	
9	$(3x + 2)(3x - 2)$ and $(2x + 3)(3x - 2)$	M1	
	$d = 9$	A1	
	$a = 6$ and $b = 5$ and $c = -6$	A1	

Linear and quadratic equations and their graphs – Higher Mark Scheme

Q	Answer	Mark	Comments
1(a)	Straight line graph from $(-3, -5)$ to $(3, 7)$	B2	B1 for partial graph or B1 for at least 2 correct coordinates seen in table or on graph
1(b)	Line from $y = 4$ and line from intersection to $x = 1.5$	B1	
2	$2x + 1 + 12 = 12(x - 1)$	M1	
	$10x = 25$	M1	
	2.5	A1	
3	$3x - 5 + 2x + 20 + x + 15 = 180$	M1	
	$6x + 30 = 180$	A1	
	$x = 25$	A1	
	$3x - 5 = 70$ and $2x + 20 = 70$ and statement about equal angles in isosceles triangle	A1	
4	Intercept = $(0, -1)$ Turning point = $(-1, -2)$ Negative root = $[-2.5, -2.4]$ Positive root = $[0.4, 0.5]$	B3	B2 3 correct B1 1 or 2 correct
5(a)	$(-4, 0)$ and $(1, 0)$	B1	
5(b)	$(-2\frac{1}{2}, -5\frac{1}{4})$	B1	

Q	Answer	Mark	Comments
6(a)	$(x + 3)^2$	M1	
	$(x + 3)^2 - 14 = 0$	A1	
6(b)		B3	B2 3 points correct B1 2 points correct

Simultaneous equations – Higher Mark Scheme

Q	Answer	Mark	Comments
1	$2x + y = 180$ and $x + y = 130$	B1	
2	$4x + 2y = 26$	M1	$2x + 4y = 34$
	$x = 3$	A1	$y = 7$
	$y = 7$	A1ft	$x = 3$
3	$2T + 4B = 600$	M1	
	$B = 90$ and $T = 120$	A1	
	£3.30	A1	
4	$c + d = 22$	M1	oe
	$d - c = 3$	M1	oe
	$d = 13$	A1	DVD = 13
	$c = 9$	A1	CD = 9
5	$6x + 9y = 210$ and $6x + 4y = 260$	M1	oe
	$5y = -50$	M1	oe
	$y = -10$	A1	
	$x = 50$	A1	

Q	Answer	Mark	Comments
6	$x^2 + x - 3 = 2x + 3$	M1	oe
	$x^2 - x - 6 = 0$	M1dep	oe
	$(x - 3)(x + 2) = 0$	M1dep	$\frac{- -1 \pm \sqrt{(-1)^2 - (4 \times 1 \times -6)}}{2 \times 1}$
	$x = 3$ and $x = -2$	A1	
	$y = 9$ and $y = -1$	A1ft	ft their x values

Perimeter and area – Higher Mark Scheme

Q	Answer	Mark	Comments
1	$4(x - 1.5)$ or $4x - 6$ or $3x$	M1	oe
	$4(x - 1.5) = 3x$ or $4x - 6 = 3x$	M1dep	oe Forms an equation in x from their two perimeters
	6	A1	
2	$0.5 \times 4 \times (5 + 11)$	M1	oe
	(their $32 \div 4$) = $3.2x$ or (their $32 \div 4$) $\div 3.2$	M1	oe
	2.5	A1	
3	One correct relevant expression $12(2x + 6)$ or $8(2x + 6)$ or $4(x + 4)$ or $12(x + 4)$ or $8(x + 4)$ $8(x + 2)$ or $4(x + 2)$	M1	oe
	A complete 'set' of areas that would combine to give total area $12(2x + 6)$ and $4(x + 2)$ $8(2x + 6)$ and $4(x + 4)$ or $12(x + 4)$ and $8(x + 2)$ $4(x + 4)$ and $8(x + 4)$ and $8(x + 2)$	M1dep	oe The first pair are for the subtraction method
	$20x + 64$	A1	

Q	Answer	Mark	Comments
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4a	$13.7^2 - 10.5^2$	M1	
	$\sqrt{13.7^2 - 10.5^2}$ or 8.8	M1	
	$(10.5 \times \text{their } 8.8) \div 2$ or 46.2	M1	Allow 10.5×8.8 or 92.4 for area of both triangles
	12×13.7 or 164.4 and $12 \times \text{their } 8.8$ or 105.6 and 12×10.5 or 126	M1	Allow one error
	488.4	A1	
4b	Too small – always overlap	B1	oe

5	$504 - 144$ or 360	M1	
	$(\text{their } 360 \div 2) \div 12$ or $(\text{their } 360 \div 4) \div 6$	M1	oe
	15	A1	

6	$\frac{1}{2}x \times 6 \times (\sin 30 \text{ or } \frac{1}{2}) = 15$	M1	
	10	A1	

Circumference and area – Higher Mark Scheme

Q	Answer	Mark	Comments
1	πr^2 and $\pi(2 \times \text{their } r)^2$ or πr^2 and $4\pi r^2$	M1	Allow a value used for r eg $\pi \times 10^2$ and $\pi(2 \times \text{their } 10)^2$ or 100π and 400π
	their $4\pi r^2$ – their πr^2 or $3\pi r^2$	M1dep	eg their 400π – their 100π or 300π
	$\frac{\text{their } 3\pi r^2}{\text{their } 4\pi r^2}$	M1dep	oe eg $\frac{\text{their } 300\pi}{\text{their } 400\pi}$
	$\frac{3}{4}$	A1	SC2 $\frac{1}{4}$
2	$\pi \times 5^2$ or 25π or $[78.5, 78.55]$	M1	
	$\pi \times 5 \times 24$ or 120π or $[376.8, 377.04]$	M1	
	their $[78.5, 78.55]$ + their $[376.8, 377.04]$	M1dep	145π
	$[455.3, 455.59]$	A1	
3	$4\pi r^2 = 4.5$	M1	oe
	$r^2 = 4.5 \div (4\pi)$ or $0.358\dots$	M1dep	oe
	$0.598\dots$ or $0.6(0)$ or $\sqrt{\frac{4.5}{4\pi}}$	A1	
4	$6\pi + 24$ or $\frac{72}{\pi}$	B1	

Q	Answer	Mark	Comments
5	$\frac{45}{360} \times 2\pi r = 18$	M1	oe
	$r = \frac{18 \times 360}{45 \times 2\pi}$	M1dep	oe
	[22.91, 22.93] or 23	A1	
6	$\frac{\theta}{360} \times \pi \times 5^2 = 5\pi$	M1	oe
	$\theta = \frac{5\pi \times 360}{25\pi}$	M1dep	oe
	72(°)	A1	
	$\frac{\text{their } 72}{360} \times 2 \times \pi \times 5$ or [6.28, 6.284]	M1	oe
	2π	A1ft	ft their 72°

Geometry and measure – Higher

Mark Scheme

Q	Answer	Mark	Comments
1	(3, 0)	B1	
2	(1, 3)	B1	
3	(2, 1)	B1	
4	Enlargement	B1	
	(SF) $\frac{1}{2}$	B1	
	Centre (1, 1)	B1	
5	$\frac{x}{360} \times \pi \times 2 \times 4$	M1	oe
	$(\frac{x}{360} \times \pi \times 2 \times 4) + 4 + 4 = 12$	M1dep	oe
	[57.2, 57.3]	A1	

Q	Answer	Mark	Comments
6	$\frac{1}{2} \times \frac{4}{3} \times \pi \times r^3$	M1	oe
	$(3r)^2 - r^2$ or $8r^2$	M1	oe
	$\sqrt{8r^2}$ or $\sqrt{8}r$	M1dep	oe
	$\frac{1}{3} \times \pi \times r^2 \times \text{their } \sqrt{8r^2}$	M1dep	oe
	$\frac{2\sqrt{2}}{3} \pi r^3 + \frac{2}{3} \pi r^3$	A1	
7	$\pi \times 20 \times 15$ or 300π or 942.47..	M1	
	their 9.4247.. $\times 3.60$ or 33.93	M1dep	
	$1000 \div 33.93$ or 29.47..	M1dep	
	29	A1	
8	$(\cos A =) \frac{5^2 + 6^2 - 7^2}{2 \times 5 \times 6}$	M1	
	$\frac{-8}{60}$ or answer negative so obtuse	A1	

Volume – Higher Mark Scheme

Q	Answer	Mark	Comments
1	$60 \div 8$ or 7.5	M1	
	$\frac{1}{2} \times 5 \times h = \text{their } 7.5$	M1dep	
	3	A1	
2(a)	4^3	M1	
	64	A1	
2(b)	1.2 and 3.6	B1	
	Only two comparable sides (8 and 2) are needed to get the scale factor	B1	
3	Any side correctly identified, 3, 5 or 7	M1	
	All 3 sides correctly identified	M1dep	
	105	A1	
4	$\frac{2}{3}pr^3 = \frac{1}{3}pr^2h$	M1	
	$2r$	A1	
5	8 : 27	B1	
6	$2(ab + bc + ac)$	B1	

Q	Answer	Mark	Comments
7	6^3 or $216 = 8 \times 9 \times h$ or $72h$	M1	
	3	A1	
8	$\frac{1}{3}\pi \times 3^2 \times 4$	M1	
	12π	A1	Accept 37.68 or 37.704
9	$r^3 = \frac{3}{4} \times 36$	M1	oe
	$r = 3$	A1	

Pythagoras' Theorem and basic trigonometry – Higher Mark Scheme

Q	Answer	Mark	Comments
1	$\frac{2}{\sqrt{13}}$	B1	
2	$180 \div 40 \times 2$ or 9	M1	
	$\sqrt{\text{their } 9^2 + 40^2}$ or 41	M1dep	
	their 41 + their 9 + 40	M1dep	
	90	A1	
3	$\sqrt{2.5^2 - 2.2^2}$	M1	
	No and [1.18, 1.2]	A1	
4	$\tan A = \frac{b}{a}$	B1	
5(a)	$AC = \sqrt{x^2 + y^2}$	M1	
	$AD^2 = x^2 + y^2 + x^2$	M1 dep	
	$\sqrt{2x^2 + y^2}$	A1	

Q	Answer	Mark	Comments
5(b)	$\frac{x}{\sqrt{x^2 + y^2}} = \frac{1}{3}$	M1	
	$9x^2 = x^2 + y^2$	M1	
	$8x^2 = y^2$ $\frac{x}{y} = \frac{1}{\sqrt{8}}$	M1	oe
	$\tan 19.5 = 0.354\dots$ and $\frac{1}{\sqrt{8}} = 0.3535\dots$	A1	oe
6	$\tan 30 = \frac{1}{\sqrt{3}}$	B1	
7	$\sin 60 = \frac{\sqrt{3}}{2}$	B1	
	$4\sqrt{3}$	A1	
8	$AC = \sqrt{12}$	M1	
	$\frac{\sqrt{12}}{\sqrt{3}} = \sqrt{4} = 2$	A1	oe

Trigonometry – Higher Mark Scheme

Q	Answer	Mark	Comments
1	$\frac{4}{\sqrt{41}}$	B1	
2	$18 \div \cos 31$	M1	
	[20.99, 21]	A1	
3	$\tan x = \frac{23}{30}$ or $\tan^{-1}\left(\frac{23}{30}\right)$	M1	
	[37, 37.5]	A1	
4	Alternative method 1		
	$\sqrt{25^2 - 7^2}$ or $\sqrt{576}$	M1	
	24	A1	
	$\frac{1}{2} \times 14 \times$ their 24	M1dep	
	168	A1	
	Alternative method 2		
	$\cos^{-1} \frac{7}{25}$	M1	
	[73.7, 74]	A1	
	$\frac{1}{2} \times 14 \times 25 \times \sin$ (their 73.70	M1dep	
	168	A1	

Q	Answer	Mark	Comments
5	Alternative method 1		
	$\sqrt{5^2 + 12^2}$ or 13 or $\sqrt{5^2 + 15^2}$ or 15.8 or $\sqrt{12^2 + 15^2}$ or 19.2	M1	
	$\sqrt{\text{their } 13^2 + 15^2}$ or $\sqrt{\text{their } 15.8^2 + 12^2}$ or $\sqrt{\text{their } 19.2^2 + 5^2}$	M1dep	
	[19.8, 20]	A1	
	Alternative method 2		
	$\sqrt{5^2 + 12^2 + 15^2}$	M2	
	[19.8, 20]	A1	
6	$(BC) = 12 \div \tan 35$ or $(AB) = 12 \div \tan 42$	M1	
	$AB = [13, 13.33]$	A1	
	$BC = [17, 17.14]$	A1	
	$\sqrt{\text{their } 17^2 + \text{their } 13^2}$	M1dep	
	[21.7, 22]	A1	
7	$\sin A = \frac{a}{c}$ and $\cos A = \frac{b}{c}$	M1	
	$\left(\frac{a}{c}\right)^2 + \left(\frac{b}{c}\right)^2 = \frac{a^2 + b^2}{c^2}$	M1 dep	
	$\frac{a^2 + b^2}{a^2 + b^2} = 1$	A1	

Sine and Cosine Rule - Higher Mark Scheme

Q	Answer	Mark	Comments
1	$\frac{a}{\sin A} = \frac{b}{\sin B}$	B1	
2	$a^2 = b^2 + c^2 - 2bc \cos A$	B1	
3	$\frac{1}{2}bc \sin A$	B1	
4	$\frac{1}{2} \times 8 \times 14 \times \sin A = 28$	M1	
	30	A1	
5	$\frac{9}{\sin 48} = \frac{5}{\sin C}$	M1	oe
	$\sin C = \frac{5 \times \sin 48}{9}$	M1	
	[24.2, 24.4]	A1	
6	$\frac{\sqrt{3}}{2} - \frac{1}{\sqrt{2}}$	M1	
	$\frac{\sqrt{3}}{\sqrt{2}\sqrt{2}} - \frac{\sqrt{2}}{\sqrt{2}\sqrt{2}}$	M1dep	
	$a = 3$	A1	
	$b = 2$	A1	

Q	Answer	Mark	Comments
7	$\frac{15 \times 6}{2}$ or 45	M1	
	$\frac{1}{2} \times 12 \times 16 \times \sin 75$ or 92.7(...)	M1	
	their 45 + their 92.7(...)	M1dep	
	137.7(...)	A1	
8	135 seen or used	B1	May be shown by diagram
	$5^2 + 6^2 - (2 \times 5 \times 6 \times \cos \text{their } 135)$	M1	
	103.4	A1	
	[10.1, 10.2]	A1	

Collecting ad representing data – Higher Mark Scheme

Q	Answer	Mark	Comments
1	$5 + 6 + 4 + 3 + 1 + 1$ or 20	M1	Allow one error or omission
	$(5 \times 0 +) 6 \times 1 + 4 \times 2 + 3 \times 3 + 1 \times 4 + 1 \times 5$ or $(0 +) 6 + 8 + 9 + 4 + 5$ or 32	M1	Allow one error or omission
	$(40 - \text{their } 32) \div (24 - \text{their } 20)$	M1	
	2	A1	
2(a)	Primary and Continuous	B2	B1 one correct (and one incorrect)
2(b)	Points should be plotted at midpoints of classes	B1	oe Points shouldn't be at upper class boundaries
	Third point is wrong height	B1	oe Point should be at 44, not 48

Q	Answer	Mark	Comments
3(a)	300, 425, 500	B1	
3(b)	Plotted at UCBs ($\pm \frac{1}{2}$ sq) 10, 40, 60, 80, 100	B1	
	Heights correct ($\pm \frac{1}{2}$ sq) at 0, 60, 300, 425, 500	B1ft	ft their values from table Must be an increasing function and not a straight line
	Smooth curve or polygon through all their points	B1ft	ft their 5 plots Must be an increasing function and not a straight line
3(c)	36 or 37 or 38	B1ft	ft reading across and down from 50 on the vertical scale of their graph
4	$D = 60^\circ$ or $\frac{1}{6}$ or $1^\circ = 20$ or $10^\circ = 200$ or $B = 600$ or $C = 1800$ or $A = 3600$	B1	Allow $\pm 1^\circ$ This mark may not be seen but may be implied by other work
	$360 \div \text{their } 60 \times 1200$ or 6×1200 or 1800×4 or $600 + 1800 + 3600 (+ 1200)$ or $(600 + 1800 + 1200) \times 2$	M1	oe
	7200	A1	Accept integer in range [7322, 8471] if their angle is $\pm 1^\circ$

Q	Answer	Mark	Comments
5	Correct vertical scale or key shown or 120 or 100 in correct position in table	M1	1 large square = 20 hamsters oe or 5 small squares = 4 hamsters oe or scale of 2 per cm
	120 and 100 in correct positions in table	A1	
	Either bar correct area in histogram (120 – 140 bar 4.5 large squares high or 140 – 180 bar 1 large square high)	M1	
	Table correct, histogram correct and correct vertical scale or key shown	A1	One graduation is sufficient for scale One bar labelled with correct frequency is sufficient for key

Statistics recap and review – Higher Mark Scheme

Q	Answer	Mark	Comments
1(a)	$45 \times (800 - 255)$	M1	
	245.25	A1	
1(b)	140p	B1 ft	ft their line of best fit [125, 150]
1(c)	No, as production costs would never be zero or negative and 600 is beyond the range of the graph	B1	oe
2	Values of Monday 10, Tuesday 18, Wednesday 12, Thursday 14, Friday 18	B1	
	Bar chart or vertical line graph drawn and fully labelled	B1	
3	$6 \times 210 - (208 + 367 + 156 + 132 + 98)$	M1	
	299	A1	
4(a)	Table 40 and 90	B2	B1 each
	Histogram, bar from 110 to 120 to height of 3 and bar from 130 to 150 to height of 4.5	B2	B1 each
4(b)	130 th value mentioned and	B1	
	$15 + 30 + 40 + 45 = 130$	B1	oe
4(c)	That the data is spread out proportionately within the class interval	B1	oe

Q	Answer	Mark	Comments
5(a)	[37, 38] read from graph	B1	
	[24, 26]	B1	
5(b)	That the sample is representative but as it is only meat eaters this is unlikely and as meat is a factor in high cholesterol then the actual percentage may be lower	B1	
5(c)	The vegetarian had a lower cholesterol on average as their median was less	B1	
	The meat eaters has a more consistent cholesterol level as their IQR was lower.	B1	

Statistical measures – Higher Mark Scheme

Q	Answer	Mark	Comments
1(a)	270	B1	
1(b)	The owners salary will bias the data as it is much bigger than anyone else	B1	
2	Reference to collecting data of time spent revising and mark in test	B1	
	Reference to plotting this data on a scatter graph	B1	
	Reference to how the scatter graph can be analysed, eg drawing a line of best fit to see the correlation	B1	
	Reference to how the correlation will prove or disprove the hypothesis, ie a positive correlation would indicate that the hypothesis is true.	B1	
3(a)	Midpoints seen, 52.5, 57.5, 62.5, 67.5 and 72.5 and sum of products of midpoint $\times$ frequency (3190)	M1	Allow one error
	Their Sum $\div$ 50	M1dep	
	63.8	A1	
3(b)	That all values in any group are equal to the midpoint	B1	oe
4a)	$22 \times 43\,697 \div 170$	M1	
	5655	A1	
4(b)	That the sample is representative	B1	
5(a)	[37, 39]	B1	
5(b)	[15, 17]	B1	

5(c)	The university students were quicker overall with a lower median	B1	
	The high school students were more consistent with a lower IQR	B1	

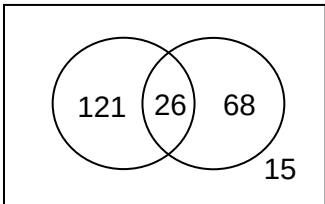
Basic probability – Higher Mark Scheme

Q	Answer	Mark	Comments
1	6×6 or 36	M1	May be implied from a diagram eg sample space or as the denominator of a fractional answer
	$4 + 3 + 2 + 2 + 1 + 1$ or 2, 3, 5, 7, 3, 5, 7, 5, 7, 5, 7, 7, 7 or 13	M1	May be shown by exactly 13 single-digit primes in a list, grid or table or as the numerator of a fractional answer
	$\frac{13}{36}$	A1	oe fraction, decimal, percentage SC2 $\frac{15}{36}$ oe
2(a)	21 men and 63 women	B1	
	15 men pass and 6 fail	B1ft	ft their 21 divided in ratio 5 : 2
	42 women pass and 21 women fail	B1ft	ft their 63 divided in ratio 2 : 1 SC2 Any three correct values SC1 Any two correct values
	Fully correct: (84) 21 63 15 6 42 21		
2(b)	$\frac{\text{their } 42}{84}$	M1	
	$\frac{1}{2}$	A1ft	ft $\frac{\text{their } 42}{84}$ cancelled down

Q	Answer	Mark	Comments
3	60 – 27 or 33 (tench) or (60 + 10) ÷ 2 or 35 (carp or tench) or 60 ÷ 2 or 30 (carp or tench)	M1	
	their 35 – 27 or 8 (carp added) or their 35 – their 33 or their 30 – 27 + 10 ÷ 2 or their 33 – their 30 + 10 ÷ 2	M1dep	
	2	A1	SC2 8
4	Alternative method 1		
	1 – 0.25 – 0.35 – 0.3 or 0.1	M1	oe May be seen in table
	40 ÷ 0.25 or 160 or 0.25 ÷ 0.1 or 2.5	M1	oe
	their 160 × their 0.1 or 40 ÷ their 2.5	M1dep	oe dep on previous M
	16	A1	
	Alternative method 2		
	40 ÷ 0.25 or 160	M1	oe
	0.35 × their 160 or 56 and 0.3 × their 160 or 48	M1dep	oe
	their 160 – 40 – their 56 – their 48	M1dep	
	16	A1	

Q	Answer	Mark	Comments															
5(a)	66 total boys and 54 total girls	B1																
	48 total maths and 72 total science	B1																
	18 girls maths and 36 girls science	B1ft	ft their 54 divided in ratio 1 : 2															
	30 boys maths and 36 boys science	B1ft	ft their 48 – their 18 and their 72 – their 36															
	<table border="1"> <thead> <tr> <th></th><th>Boys</th><th>Girls</th><th>Total</th></tr> </thead> <tbody> <tr> <td>Maths</td><td>30</td><td>18</td><td>48</td></tr> <tr> <td>Science</td><td>36</td><td>36</td><td>72</td></tr> <tr> <td>Total</td><td>66</td><td>54</td><td>120</td></tr> </tbody> </table>				Boys	Girls	Total	Maths	30	18	48	Science	36	36	72	Total	66	54
	Boys	Girls	Total															
Maths	30	18	48															
Science	36	36	72															
Total	66	54	120															
5(b)	$\frac{30}{120}$	B1ft	oe fraction, decimal or percentage B1ft their 30 from (a)															

Venn diagrams, tree diagrams and relative frequency – Higher Mark Scheme

Q	Answer	Mark	Comments
1	$\frac{1}{10}$	B1	
2(a)	15 inside the rectangle but outside the circles	B1	
	147 in total in F and 94 in total in S	B1	
	26 in the overlap	B1	
	Fully correct: 		
2(b)	$\frac{68}{230}$	B1	oe
3	$\frac{20}{100} \times \frac{20}{100}$	M1	May be on tree diagram
	$\frac{4}{100}$ or 4%	A1	oe fraction, decimal or percentage
4(a)	Correctly plots (100, 0.16)	B1	
4(b)	$0.1 \times 20\,000$	M1	oe
	2000	A1	
5(a)	$1 - a$	B1	
5(b)	$(1 - a)(1 - b)$	B2	B1 $1 - b$ seen

Q	Answer	Mark	Comments
6(a)	$25 + 30 + 20 + 45$ or 120	M1	
	$\frac{45}{120}$	A1	oe fraction, decimal or percentage
6(b)	$\frac{(25 + 30)}{120} \times \frac{(20 + 45)}{119}$ or $\frac{(25 + 30)}{120} \times \frac{(120 - \text{their } 55)}{119}$ or $\frac{3575}{14280}$	M1	oe ft their 120 from (a)
	$\frac{55}{120} \times \frac{65}{119} \times 2$	M1	oe
	$\frac{7150}{14280}$	A1	oe fraction, decimal or percentage SC2 $\frac{7150}{14400}$
7(a)	28	B1	
7(b)	$\frac{27}{40}$	B1	oe fraction, decimal or percentage
7(c)	$\frac{32}{60}$	B1	oe fraction, decimal or percentage