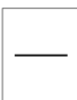


Guidance on the use of abbreviations within this mark scheme

M	method mark awarded for a correct method or partial method
P	process mark awarded for a correct process as part of a problem solving question
A	accuracy mark (awarded after a correct method or process; if no method or process is seen then full marks for the question are implied but see individual mark schemes for more details)
C	communication mark awarded for a fully correct statement(s) with no contradiction or ambiguity
B	unconditional accuracy mark (no method needed)
oe	or equivalent
cao	correct answer only
ft	follow through (when appropriate as per mark scheme)
sc	special case
dep	dependent (on a previous mark)
indep	independent
awrt	answer which rounds to
isw	ignore subsequent working

Question	Answer	Mark	Mark scheme	Additional guidance
1	$\frac{1}{4}$	M1 A1	For a correct first, step using the laws of indices to simplify Or for using exact values, e.g. $4 \div 16$ cao	
2(a)	4 or -4	M1 A1	For $2 \times 3^2 - 2 \times 1 (= 16)$ For 4 or -4, accept ± 4	
2(b)	$c = \frac{2b^2 - a^2}{d}$	M1 A1	For rearranging to get $cd = 2b^2 - a^2$ $c = \frac{2b^2 - a^2}{d}$	
3	25(%)	P1 P1 P1 P1 A1	For start to process, e.g. 40% of 12000 = 4800 For process to find the 15 salesmen's share of the bonus, e.g. $12000 - "4800" (= 7200)$ or $12000 \times \frac{60}{100}$ For process to find bonus amount each salesmen gets, " $7200 \div 15 (= 480)$ " or process to find the total bonus for all salesmen if shared equally, $\frac{12000}{20} \times 15 (= 9000)$ For process to compare what a single salesmen gets under each scheme, e.g. 480 and 600 25%, showing some working, e.g. $\frac{600}{480} = \frac{6}{5} = 1.25$ Percentage increase = 25%	
4(a)	e.g. 40 seconds	P1 P1 A1	For rounding 98 miles to 100 miles or calculating approximate number of seconds in one hour e.g. $60 \times 60 = 3600 \approx 4000$ s For correct process to estimate the number of seconds per mile e.g. $\frac{4000}{100} (= 40)$ cao	Accept correct alternative method e.g. finding the miles per second and converting value
4(b)	Overestimate	B1	cao dep	accept underestimate dep on 4(a)



Question	Answer	Mark	Mark scheme	Additional guidance
5	$x = -12, y = -6$	M1 M1 A1	Correct process to eliminate one variable (dep) for substituting found value in one of the equations For $x = -12, y = -6$ oe	
6	$64 - 9\pi$	M1 M1 M1 A1	For $8 \times 8 (= 64)$ for finding the area of the square. For $\frac{1}{2} \times 4^2\pi (= 8\pi)$, area of the semicircle For $\frac{1}{4} \times 2^2\pi (= \pi)$ For $64 - 9\pi$	
7(a)	$\frac{1}{3(x+2)}$	B1	For $\frac{1}{3(x+2)}$ or $\frac{1}{3x+6}$	
7(b)	$3(4+x)(4-x)$	M1 A1	For partial factorisation e.g. $3(16 - x^2)$ oe For $3(4+x)(4-x)$ or $-3(-4-x)(-4+x)$	
8	17%	P1 P1 A1	For start of process, e.g. $\frac{120}{100}$ oe or $\frac{100}{120}$ oe or $\frac{20}{120}$ For a suitable process to develop a percentage, either 83% or 17% e.g. $\frac{100}{120} = \frac{x}{100}$ or $\frac{120-100}{120} = \frac{x}{100}$ cao	
9	Enlargement by scale factor $\frac{1}{2}$ centre $(-1,1)$	C2 (C1)	For all of: enlargement, (scale factor=) $\frac{1}{2}$ oe (centre =) $(-1,1)$ For two of: enlargement, (scale factor=) $\frac{1}{2}$ oe (centre =) $(-1,1)$	award no marks if more than one transformation is given
10	$\frac{1}{3}$	M1 A1	For method to find the values of $x(= -4), y(= 7/3)$ and $z = -1$ $\frac{1}{3}$	



Question	Answer	Mark	Mark scheme	Additional guidance
11	Proof with $\frac{236}{495}$	M1 M1 C1	0.47676... or $0.4 + 0.07676...$ or $(10 \times 0.4\dot{7}\dot{6} =) 4.7676 ...$ or $(100 \times 0.4\dot{7}\dot{6} =) 47.676 ...$ or $(1000 \times 0.4\dot{7}\dot{6} =) 476.7676 ...$ For finding two correct recurring decimals that when subtracted would result in a terminating decimal or integer, e.g. $476.7676 ... - 4.7676 ... (= 472)$ Or for $\frac{472}{990}$ or $\frac{47.2}{99}$ Full proof seen with $\frac{236}{495}$	
12(a)	Shown	C1 C1	For first step e.g. $(4(x - 2) + 1)(4(x - 2) + 3)$ For fully correct chain of reasoning	
12(b)	$\frac{13}{4}$	M1 A1	For finding $g^{-1}(x) = \frac{1}{4}(x) + 2$ $\frac{13}{4}$ oe	
13	2 : 3	P1 P1 P1 P1 A1	Starts process e.g. $\overrightarrow{AB} = -\mathbf{a} + \mathbf{b}$ oe For process to find $\overrightarrow{OM} = \mathbf{a} + \frac{1}{2}(-\mathbf{a} + \mathbf{b}) = \frac{1}{2}\mathbf{a} + \frac{1}{2}\mathbf{b}$ oe For process to find $\overrightarrow{AP} = \frac{5}{7}(-\mathbf{a} + \frac{2}{5}\mathbf{b})$ oe Or (indep) for $\overrightarrow{AN} = -\mathbf{a} + "k"\mathbf{b}$ Process to find "k" using $\overrightarrow{AN} = -\mathbf{a} + "k"\mathbf{b}$ as a multiple of \overrightarrow{AP} cao	award fourth mark for alternative method e.g. finding the value of \overrightarrow{PN} in terms of \mathbf{a} and \mathbf{b}



Question	Answer	Mark	Mark scheme	Additional guidance
14	7	P1 P1 P1 P1 P1 A1	For a relevant probability e.g. $P(Y) = \frac{x}{2x+2}$ or $P(R) = \frac{x+2}{2x+2}$ For a relevant product, e.g. $\frac{x}{2x+2} \times \frac{x-1}{2x+1}$ or $\frac{x+2}{2x+2} \times \frac{x+1}{2x+1}$ Forms an appropriate equation, e.g. $\frac{x}{2x+2} \times \frac{x-1}{2x+1} + \frac{x+2}{2x+2} \times \frac{x+1}{2x+1} = \frac{19}{40}$ (dep P3) Process to reduce equation to $ax^2 + bx + c = 0$ e.g. $2x^2 - 17x + 21 = 0$ Process to solve quadratic equation e.g. $(2x - 3)(x - 7)$ Cao	The number of yellow sweets could be $x - 2$, and the number of red sweets could be x oe

