Paper: 1MA1/1H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
1	682	M1	for a start to a method, eg 8184 ÷ 12 (or 818.4 ÷ 1.2) that leads to 6 as the first digit **or** for a complete method with no more than one arithmetic error	A start to a repeated subtraction method or build-up method is acceptable if a correct first digit of 6 is found
		A1	for digits 682	
		A1	ft (dep M1) for correct placement of the decimal point into their final answer	

Paper: 1MA1/1H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
2 (a)	75	P1	for process to find sum of unknown probabilities eg 1 – (0.10 + 0.30 + 0.05 + 0.25) (= 0.3) oe or for process to find number of times dice lands on 3, 4, 5 or 6 eg (0.10 + 0.30 + 0.05 + 0.25) × 500 (= 350) oe	Award mark for any two probabilities that sum to 0.3 eg in the table or probability of 2 = 0.15
		P1	for a complete process, eg (“0.3” ÷ 2) × 500 oe or (500 – “350”) ÷ 2 oe	P1P1A0 for answer of 75:500 or $\frac{75}{500}$
		A1	cao	
(b)	Answer to part (a) will be greater	C1	for an explanation that the answer will be greater **Acceptable examples** It makes the answer an underestimate The number will be higher The answer will increase / will go up The number of 2s will increase It would be more than [75] **Not acceptable examples** My answer will change My answer is incorrect The calculation will change The probability will change It would make the probability of 2 go up My answer won’t change	Where [75] is their answer to (a)

Paper: 1MA1/1H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
3 (a)	$2\frac{1}{3}$	M1	for a method to subtract by writing both fractions with a common denominator with at least one correct numerator, eg $3\frac{3}{6}-1\frac{1}{6}$ **or** $\frac{3}{6}-\frac{1}{6}\left(=\frac{2}{6}\right)$ **or** $\frac{21}{6}-\frac{7}{6}\left(=\frac{14}{6}\right)$ **or** $\frac{42}{12}-\frac{14}{12}\left(=\frac{28}{12}\right)$	
		A1	for $2\frac{1}{3}$ or an equivalent mixed number	Do not isw incorrect further work from correct equivalent mixed number
(b)	Shown	M1	for conversion to improper fractions, eg $\frac{21}{4}$ **or** $\frac{7}{3}$ **or** $\frac{9}{4}$	
		M1	(dep) for method to divide by a fraction, eg $\frac{21}{4}\times\frac{3}{7}$ or $\frac{63}{12}\div\frac{28}{12}$	
		C1	for complete work showing each stage as far as $\frac{9}{4}$ **or** $2\frac{7}{28}$	Must see an intermediate step, eg $\frac{63}{28}$ must be seen and then cancelled or correct cancelling seen before the multiplication

Paper: 1MA1/1H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
4	180 – 4*e* and reason	M1	for angle *ACD* = *e* **or** for angle *ADC* + angle *BAD* = 180 **or** for angle *BAX* = 3*e* (where *X* lies on *DA* extended)	Angles must be clearly labelled on the diagram or otherwise identified
		A1	for 180 – 4*e* oe	May be unsimplified
		C1	(dep M1) for an appropriate reason relating to parallel lines from eg <u>alternate</u> angles are equal or <u>allied</u> angles / <u>co-interior</u> angles add up to 180 or for <u>corresponding</u> angles are equal	Underlined words need to be shown Reason needs to be linked to their method, which can be implied from correctly identified angles (stated or written on the diagram)
5 (a)	Estimated time	P1	for rounding of distance = 5 (miles) or speed = 30 (mph)	
		P1	(dep) for using time = distance/speed eg 5 ÷ 30 **or** for a complete process, eg 30 ÷ 60 (= 0.5) **and** 5 ÷ "0.5" or 30 ÷ 5 (= 6) **and** 60 ÷ "6" or $4.96 \times \frac{60}{30}$	
		A1	for a correct answer following through their correct rounded distance and/or speed	
(b)	Overestimate with reason	C1	ft from (a) for decision with correct reasoning, eg overestimate as dividing a larger number by a smaller number or overestimate as miles rounded up and speed rounded down	Ft the rounding and process from (a) Must relate to estimation and not rounding of their final answer and they must have a final answer to part (a)

Paper: 1MA1/1H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
6	55	P1	for process to find the sum of the interior angles of a pentagon, eg $180 \times (5 - 2)$ (= 540) oe	Can be implied by the shape correctly divided into triangle and quadrilateral or three triangles with correct angle sums marked
		P1	for the start to a process of giving each angle in a common form, eg $d = 3c$ **or** $e = 2c$ **or** x, $3x$, $2x$	Can be implied by division by 7 or 1, 1, 3, 2 given in a ratio eg 1 : 2 : 1 : 3
		P1	for process to find the value of c, eg ([540] – 155) ÷ 7 oe or for a correct equation in one variable, eg $c + 155 + c + 3c + 2c = [540]$ oe	Where [540] is what they believe to be the angle sum of the pentagon
		A1	cao	
7	Rate of change of volume	C1	for a correct explanation **Acceptable examples** The rate of water poured Speed of pouring water out from the tank How fast the water is being used (in the tank over time) Amount of water decreasing in the tank each second **Not acceptable examples** Negative correlation / negative gradient Amount of water decreasing in the tank in seconds As time increases the volume of water in the tank decreases It is negative, the volume of litres is going down It represents the deceleration or changing speed	Allow amount of water increasing in the tank each second

Paper: 1MA1/1H					
Question		**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
8		4.5	P1	for process to find the area, eg $80 = \frac{720}{A}$ **or** (area =) $\frac{720}{80}$ (= 9) **or** $80 = \frac{720}{2x}$ **or** $2x = \frac{720}{80}$	
			P1	for complete process to find the length, eg "9" ÷ 2 or 720 ÷ (2 × 80)	
			A1	for 4.5 oe	
9	(a)	Box plot	B3	for a fully correct box plot	Box can be any height. Accept ends that are marked (eg line, cross, dot) or defined by the ends of the whiskers if clear
			(B2	for a box drawn **and** at least **three** correctly plotted values from 8, 25, 34, 42, 74)	For LQ accept value in range 24 to 26
			(B1	for correctly identifying one of LQ (25), Median (34), UQ (42) from the cf graph)	May be implied by one of these values being correctly plotted
	(b)	Yes with supporting evidence	M1	for 30 ÷ 100 × 60 (= 18)	
			M1	for reading from the graph at cf = 60 – "18" (= 40)	
			C1	for correct decision and correct figures	
				Alternative	
			M1	for reading from the graph at mark = 40 (= 42)	
			M1	for (60 – "42") ÷ 60 × 100 (= 30) **or** for 60 – "42" (= 18) **and** 30 ÷ 100 × 60 (= 18)	
			C1	for correct decision and correct figures	

Paper: 1MA1/1H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
10 (a)	10	M1	for $25^{\frac{1}{2}} = 5$ **or** $8^{\frac{1}{3}} = 2$	Accept $25^{\frac{1}{2}} = -5$ for M1 only
		A1	cao	
(b)	$\frac{1}{8}$	M1	for $\left(\frac{1}{\sqrt[5]{32}}\right)^3$ **or** $\left(\frac{1}{2}\right)^3$ **or** $\sqrt[5]{\frac{1}{32^3}}$ **or** $\sqrt[5]{\frac{1}{32768}}$	
		A1	for $\frac{1}{8}$ oe	
			SCB1 for answer of 8 if M0 scored	

Paper: 1MA1/1H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
11 (a)	Explanation	C1	for explanation **Acceptable examples** the sum must be 5 and the product must be 6 she had the sum and the product the wrong way round it should be the other way around *a* and *b* must be multiplied together to make 6 **Not acceptable examples** the answer should be $(x + 3)(x + 2)$ the product of *a* and *b* is not 5	
(b)	$2(m – 1)(m + 1)$	M1	for a correct partial factorisation, eg $2(m^2 – 1)$ **or** $(2m – 2)(m + 1)$ **or** $(m – 1)(2m + 2)$	
		A1	cao	
(c)	$(a + b)(x – y)$	M1	for a correct partial factorisation, eg $x(a + b) – y(a + b)$ **or** $x(a + b) + y(–a – b)$ **or** $a(x – y) + b(x – y)$	
		A1	for $(a + b)(x – y)$ oe	
12	64 : 25	P1	for start of process to find ratio of lengths of **A** to **B**, eg $\sqrt[3]{64}$ (= 4) **or** $\sqrt[3]{125}$ (= 5) **or** 4 : 5	
		P1	for $\sqrt[3]{125} \div 2$ (= 2.5) oe **or** $\left("\sqrt[3]{64}"\right)^2$ (= 16)	
		P1	for process to find ratio of areas of **A** to **C**, eg "4"^{2} : "2.5"^{2} (= 16 : 6.25)	
		A1	for 64 : 25 oe in form *a* : *b* where *a* and *b* are integers	

Paper: 1MA1/1H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
13	7	P1	for setting up an equation using volumes, eg $(x + 2)(2x – 1)(x – 1) = 2x(x +3)(x – 3) + 142$	May occur later in the process Must use expressions for volumes but these may have been incorrectly expanded and simplified
		P1	for process to find an expanded expression for the area of **one** face, eg $(x + 2)(2x – 1) = 2x^2 – x + 4x – 2$ or $2x^2 + 3x – 2$ or $(x + 2)(x – 1) = x^2 – x + 2x – 2$ or $x^2 + x – 2$ or $(2x – 1)(x – 1) = 2x^2 – 2x – x + 1$ or $2x^2 – 3x + 1$ or $2x(x + 3) = 2x^2 + 6x$ or $2x(x – 3) = 2x^2 – 6x$ or $(x + 3)(x – 3) = x^2 – 3x + 3x – 9$ or $x^2 – 9$	Condone one incorrect term in expansion of two brackets
		P1	for a complete process to find a fully expanded expression for the volume of **one** cuboid, eg $2x^3 + 3x^2 – 2x – 2x^2 – 3x + 2$ or $2x^3 + x^2 – 5x + 2$ **or** $2x^3 + 6x^2 – 6x^2 – 18x$ or $2x^3 – 18x$	Expression need not be fully simplified, but must be correct
		P1	(dep P3) for correct rearrangement of the expanded terms in their equation leading to a 3-term quadratic eg $x^2 + 13x – 140$ (= 0) or $x^2 + 13x = 140$	
		A1	cao	

Paper: 1MA1/1H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
14	6	M1	for either sin 30 = 0.5 oe **or** sin 45 = $\frac{1}{\sqrt{2}}$ or $\frac{\sqrt{2}}{2}$	
		M1	for $\frac{AB}{\sin 45} = \frac{3\sqrt{2}}{\sin 30}$ oe	
		A1	cao	
15	4 : 1	P1	for $\overrightarrow{OM} = \frac{1}{4}\mathbf{a}$ or $\overrightarrow{MO} = -\frac{1}{4}\mathbf{a}$ or $\overrightarrow{ON} = \frac{1}{3}\mathbf{b}$ or $\overrightarrow{NO} = -\frac{1}{3}\mathbf{b}$ $\overrightarrow{OX} = \mathbf{a} - \mathbf{b}$ or $\overrightarrow{XO} = -\mathbf{a} + \mathbf{b}$ or $\overrightarrow{ZY} = \mathbf{a} - \mathbf{b}$ or $\overrightarrow{YZ} = -\mathbf{a} + \mathbf{b}$	
		P1	for $\overrightarrow{XN} = \mathbf{b} - \mathbf{a} + \frac{1}{3}\mathbf{b}$ **(=** $\frac{4}{3}\mathbf{b} - \mathbf{a}$ **)** oe **or** $\overrightarrow{MN} = \frac{1}{3}\mathbf{b} - \frac{1}{4}\mathbf{a}$ oe **or** $\overrightarrow{XM} = \mathbf{b} - \mathbf{a} + \frac{1}{4}\mathbf{a}$ (= $\mathbf{b} - \frac{3}{4}\mathbf{a}$) oe	Implies 1st P1
		P1	for $\overrightarrow{XN} = \mathbf{b} - \mathbf{a} + \frac{1}{3}\mathbf{b}$ oe **and** $\overrightarrow{MN} = \frac{1}{3}\mathbf{b} - \frac{1}{4}\mathbf{a}$ or $\frac{4}{3}\mathbf{b} - \mathbf{a} - \mathbf{b} + \frac{3}{4}\mathbf{a}$ oe	
		A1	for 4 : 1 oe	A correct answer with no supportive working gets 0 marks

Paper: 1MA1/1H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
16 (a)	$3\sqrt{5}$	M1	for $\frac{15}{\sqrt{5}}\times\frac{\sqrt{5}}{\sqrt{5}}$ or $\frac{15}{\sqrt{5}}\times\frac{-\sqrt{5}}{-\sqrt{5}}$	
		A1	for $3\sqrt{5}$ or $\sqrt{45}$	
(b)	$\frac{32-9\sqrt{3}}{11}$	M1	(indep) for writing $\sqrt{75}$ as $5\sqrt{3}$	This mark can be awarded whenever this is seen, which might be later in the process.
		M1	for method to rationalise the denominator, eg $\frac{\sqrt{75}-2}{1+2\sqrt{3}}\times\frac{1-2\sqrt{3}}{1-2\sqrt{3}}$ **or** $\frac{5\sqrt{3}-2}{1+2\sqrt{3}}\times\frac{1-2\sqrt{3}}{1-2\sqrt{3}}$	
		M1	(dep on previous M1) for expanding terms, condone one error in numerator or denominator eg $\frac{\sqrt{75}-2\sqrt{75}\sqrt{3}-2+4\sqrt{3}}{1-2\sqrt{3}+2\sqrt{3}-4\sqrt{3}\sqrt{3}}$ **or** $\frac{5\sqrt{3}-10\sqrt{3}\sqrt{3}-2+4\sqrt{3}}{1-2\sqrt{3}+2\sqrt{3}-4\sqrt{3}\sqrt{3}}$	
		A1	for $\frac{32-9\sqrt{3}}{11}$ oe eg $\frac{-32+9\sqrt{3}}{-11}$	Accept $a = 32$, $b = 9$, $c = 11$

Paper: 1MA1/1H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
17	100	M1	for angle *BAC* = 40	
		M1	for angle *OAC* or angle *OCA* = 10 **or** angle *OAB* or angle *OBA*= 30	angle *AOB* = 120 gets M1M1
		M1	for angle *ACB* = (180 – 30 – 30) ÷ 2 (= 60) **or** angle *OCD* = 90 or angle *OCB* = 50	Award M3C0 for answer of 100 with no correct appropriate circle theorem
		C1	for angle *ACD* = 100 **and one** correct appropriate circle theorem from alternate segment theorem angle at the centre is twice the angle at the circumference the tangent to a circle is perpendicular to the radius	Underlined words need to be shown Reason needs to be linked to their method, which can be implied from correctly identified angles (stated or written on the diagram)
18 (a)	$\frac{4x+3}{5}$	M1	for first step to change the subject of $y=\frac{5x-3}{4}$ or $x=\frac{5y-3}{4}$ eg $4y=5x-3$ or $4x=5y-3$	Answer of $\frac{4y+3}{5}$ gets M1A0
		A1	oe	
(b)	100	M1	for h(5) = 1 – 2 × 5 (= – 9) **and** a clear intention to find g("– 9") **or** for $((1 – 2 \times 5) – 1)^2$ **or** for stating gh(x), eg $(1 – 2x – 1)^2$ oe	
		A1	cao	

Paper: 1MA1/1H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
19	0.204	P1	for a process to find a correct product, eg P(**A** plays **C** in the final) = 0.6 × 0.2 (= 0.12) or P(**A** plays **D** in the final) = 0.6 × 0.8 (= 0.48) or P(**A** wins against **B** and **C**) = 0.6 × 0.5 (= 0.3) or P(**A** wins against **B** and **D**) = 0.6 × 0.3 (= 0.18)	Could work with fractions Could be seen as part of a correct triple product
		P1	for a process to find the probability of **A** winning against **C or** winning against **D** in the final, eg P(**A** wins against **C** in the final) = "0.12" × 0.5 (= 0.06) or P(**A** wins against **D** in the final) = "0.48" × 0.3 (= 0.144) or P(**A** wins against **C** in the final) = "0.3" × 0.2 (= 0.06) or P(**A** wins against **D** in the final) = "0.18" × 0.8 (= 0.144)	
		P1	for a complete process, eg P(**A** wins the tournament) = "0.06" + "0.144"	
		A1	for 0.204 oe	

Paper: 1MA1/1H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
20	$y+\sqrt{3}x=4$	P1	for process to find the value of p, eg $\sqrt{4-1^2}$ $(=\sqrt{3})$	May occur later in the process
		P1	for a start of a process to find gradient of tangent, eg gradient of normal/radius = $\frac{1}{p}$ or $\frac{1}{"\sqrt{3}"}$ or $\frac{1}{[p]}$ **or** for gradient of tangent = $-p$ or $-"\sqrt{3}"$ or $-[p]$	Where $[p]$ is their stated value of p
		P1	(dep P1) for substituting ("$\sqrt{3}$", 1) into $y =$ "$-\sqrt{3}$"$x + c$ or for $y-1="-\sqrt{3}"(x-"\sqrt{3}")$ oe **or** for $1 = -p \times p + c$ **or** for substituting $([p], 1)$ into $y=-[p]x+c$ **or** for substituting ("$\sqrt{3}$", 1) into $y=-\frac{1}{[m]}x+c$	Where $[m]$ is clearly their gradient of the normal/radius
		A1	for $y+\sqrt{3}x=4$	A correct answer with no supportive working gets 0 marks