GCSE (9-1)
Paper 3H (Calculator)

Practice set A

CM GCSE Practice Papers / Set A / Paper 3H (V1 FINAL)					
Question		**Working**	**Answer**	**Mark**	**Notes**
1			diagram	2	C1 : draws a solid shape that matches the front elevation C1 : fully correct solid shape with all the correct dimensions for the **overall** length, width and height. Note: accept dimensions that are break the rectangular prism and the triangular prism but these are not necessary
2	(a)		0.5024192862	1	B1 : cao
	(b/i)		0.50242	1	B1 FT : correct rounding ft their (a)
	(b/ii)		0.5	1	B1 FT : correct rounding ft their (a)
3		$x+2(-9)=10x$ $x-18=10x$ $9x=-18$ $x=-2$	$x=-2$	3	M1 : substitutes $y=-9$ into the equation (no need for any evaluation) M1 : for $\pm 9x=\pm 18$ A1 : obtains $x=-2$

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4		e.g. $€30 = £(30 \times 0.89) = £26.70$ $\$10 = £(10 \times 0.83 \times 0.89) = £7.39$ So Jessie has £34.09 < £35, so she does not have enough money to buy the dress	No + reason	3	P1 : attempts to convert **all** relevant prices into a common currency A1 : one correct and relevant conversion A1 : correctly calculates total amount of money Jessie has in a single currency and gives a statement, i.e. 'no, Jessie does not have enough money to buy the dress)', 'no, not enough money', etc. NB: Relevant conversions are: €30 = £26.70, €30 = $36.14, $10 = £7.39, $10 = €8.30, £35 = €39.33, £35 = $47.38
5	(a)		$\frac{1}{6}$	1	B1 : cao
	(b)	Area of sector = $\pi \times 4^2 = 50.265...$ So volume of prism = $'50.265...' \times 10 = 500.265...$	500 cm^3	3	M1 : area of the sector = 16π M1 : volume = 10 × 'their area of sector' A1 : correct volume

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6		90 – 45 = 45, 90 – 30 = 60 x = 180 – 45 – 60 = 75	x = 75 + reason	4	P1 : attempts to find a relevant angle P1 : forms and attempts to solve an equation involving x, i.e. x + 60 + 45 = 180 A1 : correct value of x C1 : gives at least one correct angle law to support their working somewhere in their working, i.e. 'angles in a triangle add to 180', 'the two non-right angles in a right angled triangle add to 90', 'angles on a straight line add to 180', etc. **Look for and credit working on the diagram**
7		1 unit of commission is $\frac{700}{7}$ = £100 $\Rightarrow$ Abdul receives £400 in commission So Shivani receives £200 in commission $\therefore$ total commission = 700 + 400 + 200 + 300 = £1600	£1600	4	P1 : for $\frac{700}{7}$ A1 : Abdul receives £400 in commission M1 : adds together their values for the commissions received by all the individuals OR does 100*(7+4+ their '2'+3) A1 : £1600 with supported workings

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<tr><th colspan="2">Question</th><th>Working</th><th>Answer</th><th>Mark</th><th>Notes</th></tr>
<tr><td rowspan="2">8</td><td>(a)</td><td></td><td>O</td><td>1</td><td>B1 : correct box unambiguously ticked. Ignore any ambiguous ticks and markings</td></tr>
<tr><td>(b)</td><td></td><td>O, B</td><td>1</td><td>B1 : correct boxes unambiguously ticked. Ignore any ambiguous ticks and markings</td></tr>
<tr><td rowspan="3">9</td><td rowspan="2">(a)</td><td rowspan="2"><table><tr><th>x</th><th>f</th><th>xf</th><th>x^2f</th></tr><tr><td>(2)</td><td>(4)</td><td>(8)</td><td>(16)</td></tr><tr><td>(7)</td><td>(12)</td><td>84</td><td>686</td></tr><tr><td>(11)</td><td>(6)</td><td>66</td><td>726</td></tr><tr><td>(14)</td><td>(8)</td><td>112</td><td>1568</td></tr></table></td><td rowspan="2">table</td><td rowspan="2">2</td><td>B1 : correct values added in xf column</td></tr>
<tr><td>B1 : correct values added in x^2f column</td></tr>
<tr><td>(b)</td><td>$4 + 12 + 6 + 8 = 30$
$\frac{8+84+66+112}{30} = 9$</td><td>9</td><td>3</td><td>B1 : total frequency = 30, seen or implied
M1 : correct expression for the mean
A1 : correct mean = 9</td></tr>
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	(c)	$\frac{16+686+726+1568}{30} = 99.86...$	{awrt} 100	3	M1 : finds total value for x^2f
					M1 : computes $\frac{\text{their } x^2 f}{\text{their } 30}$
					A1 : awrt 100, completely correct workings
	(d/i)		{awrt} 18.68	1	B1 : correct variance.
	(d/ii)		cm^2	1	B1 : correct units
10	(a)		12	1	B1 : cao
	(b)		0	1	B1 : cao
	(c)		89	1	B1 : cao
	(d)		89	1	B1 ft : correct answer or ft their (c)

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11		$A^2 = \frac{k}{\sqrt[3]{B}}$ $2^2 = \frac{k}{\sqrt[3]{27}} \Rightarrow k = 4 \times 3 = 12$ $\therefore 4^2 = \frac{12}{\sqrt[3]{B}} \Rightarrow \sqrt[3]{B} = \frac{3}{4} \Rightarrow B = \frac{27}{64}$	$\frac{27}{64}$	4	M1 : forms correct expression for A in terms of B and substitutes (2, 27) into the expression A1 : correct value of k dM1 : substitutes **their** k into **their** expression along with $A = 4$ and attempts to find B A1 : correct value of B
12	(a)		geometric	1	B1 : cao
	(b)		$0 < r < 1$	1	B1 : unambiguous tick in the correct box. Ignore ambiguous ticks and markings
	(c)	$2000 = 5400r^4$ $\Rightarrow r = \sqrt[4]{\frac{2000}{5400}} = 0.7801...$ So after 5 years, his car is worth $5400(0.7801...)^5 = £1560.23$ So, yes, Edgar has made profit from selling his car (as £1560 > £1500)	Yes + reason	5	P1 : forms the equation $2000 = 5400r^4$ A1 : correct value of r P1 : substitutes 5 into the formula for P with their r A1 : price of the car after 5 years is {awrt} £1560 C1 : fully correct solution and gives a conclusive statement, i.e. 'yes, Edgar has made profit by selling his car'

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13		$f(x+1)-f(x)=\dfrac{x+1}{2(x+1)+1}-\dfrac{x}{2x+1}$ $=\dfrac{(x+1)(2x+1)-x(2x+3)}{(2x+3)(2x+1)}$ $=\dfrac{2x^2+3x+1-2x^2-3x}{(2x+3)(2x+1)}$ $=\dfrac{1}{(2x+3)(2x+1)}$	$\dfrac{1}{(2x+1)(2x+3)}$	5	M1 : correct expression for $f(x+1)$ seen anywhere M1 : writes down $f(x+1)-f(x)$ using their $f(x+1)$ and attempts to combine the fractions using a common denominator A1 : forms a correct expression for $f(x+1)-f(x)$ as a single unsimplified fraction M1 : expands the brackets on the numerator and collects like terms A1 : correct expression obtained from completely correct workings. Condone brackets on denominator expanded (correctly). Ignore any subsequent working once the correct form given in the question has been reached

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14	(a)		c^2	1	B1 : cao
	(b)	Outer square has area = $(a+b)^2$ Area of $T = \frac{1}{2}ab$ Area of the 4 triangles is thus $2ab$ So area of shaded region/square $ABCD$ = $(a+b)^2 - 2ab = a^2 + 2ab + b^2 - 2ab$ $= a^2 + b^2$ *	proof	4	M1 : area of the outer square = $(a + b)^2$. May be implied M1 : area of the triangles is $2ab$. May be implied M1 : considers their 'area of outer square – their area of the **4** triangles'. Must be an algebraic expression in terms of a and b A1 : complete and convincing proof with no errors seen
	(c)		expln.	1	C1 : any correct explanation about what has been shown, i.e. 'Pythagoras' Theorem (has been proven)', '$a^2 + b^2 = c^2$', 'sum of the squares of the shorter sides of a right-angled triangle is the square of the longer side', etc.

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15		Method 1: $\frac{10}{n}\times\frac{9}{n-1}=p$ $\Rightarrow 90=pn(n-1)$ $\Rightarrow pn^2-pn-90=0$ $\Rightarrow n^2-n-\frac{90}{p}=0$ So $\frac{90}{p}=210\Rightarrow p=\frac{3}{7}$ Method 2: $n^2-n-210=0$ $\Rightarrow (n-15)(n+14)=0$ $\Rightarrow n=15$ $p=\frac{10}{15}\times\frac{9}{14}=\frac{3}{7}$	$p=\frac{3}{7}$	3	P1 : for $\frac{10}{n}\times\frac{9}{n-1}=p$ (oe) **OR** attempts to solve the quadratic equation, obtaining n = 15 (ignore other solutions if given) M1 : compares coefficients **OR** for $p=\frac{10}{'15'}\times\frac{9}{'15'-1}$ using their n A1 : correct value of p

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16	(a/i)		(3,30)	1	B1 : cao
	(a/ii)		(7,10)	1	B1 : cao
	(a/iii)		$\left(\frac{1}{2},10\right)$	1	B1 : cao
	(b)		False False True	3	B1, B1, B1 : one mark for each correct. Answers should be clear and unambiguous. Ignore any unambiguous markings or ticks
17	(a)	$19^2 = 25^2 + 35^2 - 2(25)(35)\cos p$ $\Rightarrow 2(25)(35)\cos p = 25^2 + 35^2 - 19^2$ $\Rightarrow \cos p = \frac{25^2 + 35^2 - 19^2}{2(25)(35)} = 0.85085...$ $\Rightarrow p = \cos^{-1}(0.85085...) = 31.695...$	p = 32 (awrt)	4	M1 : uses the cosine rule with all values substituted in correctly A1 : cos$p$ = 0.85085… or equivalent, including unsimplified forms dM1 : uses inverse cosine on their cos$p$ to find p A1 : correct value of p. Awrt 32

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	(b)	Area = $\frac{1}{2}(25)(35)\sin(31.695...)$ $= 229.861...\ \text{cm}^2$	230 (awrt)	2	M1 : $\frac{1}{2}(25)(35)\sin(\text{their } p)$ A1 : correct area of the triangle
18		Height of cone = 4 cm So volume of cone = $\frac{1}{3}\pi(3)^2(4) = 12\pi$ $\Rightarrow$ volume of cylinder = $= \frac{3}{2} \times 12\pi = 18\pi$ Volume of sphere = $\frac{4}{3}\pi(2)^3 = \frac{32}{3}\pi$ So volume of shaded region is $18\pi - \frac{32}{3}\pi = \frac{22}{3}\pi$	$\frac{22}{3}\pi$	5	B1 : correct height of the cone, seen or implied B1ft: correct volume of the cone, ft their height. If they use 5 as the height, it is B0 B0 M1 : correctly uses the ratio on their volume for the cone to find the volume of the cylinder M1 : correct volume for the sphere A1 : correct exact volume of the shaded region. Isw