AREA AND VOLUME

Pearson Edexcel - Wednesday 8 November 2017 - Paper 3 (Calculator) Higher Tier

1.

3		648	M2 [M1 A1	a complete method, eg 12.5 × 1000 ÷ 19.3 for using volume = mass/density, eg 12500 ÷ 19.3 (condone inconsistent units or incorrect conversions) may be implied by digits 647... or 648...] for answer in range 647 to 648

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2.

6		147	P1 P1 P1 A1 B1	starts process, eg uses x and $x + 7$ starts to work with at least 6 correct sides, may be on the diagram or in an expression (dep on previous P1) gives a correct expression for the perimeter, eg $x + x + 7 + x + 7 + x + 7 + x + x + 7 + x + 7 + x + 7$ or adds at least 6 correct sides and equates to 70 for width = 3.5 oe **and** length = 10.5 oe ft (dep P2) for correct area for their x

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3.

21		8600	P1 P1 P1 A1	for process to find the length of the rectangle, e.g. 24 × 4 (= 96) for process to find the perpendicular height of an equilateral triangle of side (24 × 2) cm, e.g. 48sin60 (= 41.5(69..)) or $\sqrt{48^2 - 24^2}$ (= $24\sqrt{3}$ oe) for complete process to find the width of rectangle, e.g. "41.5(69..)" + 24 + 24 (= 89.5(69..)) for answer in the range 8592 to 8602

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4.

7		complete chain of reasoning	C1 C1 C1	starts chain of reasoning eg finds area of large square and area of triangle or use of Pythagoras for $(x + y)^2 - 4\times (x\times y\div 2)$ oe or $\sqrt{x^2 + y^2} \times \sqrt{x^2 + y^2}$ complete chain of reasoning with correct algebra

Pearson Edexcel - Specimen Papers Set 1 - Paper 1 (Non-Calculator) Higher Tier

5.

4		48	P1 C1 P1 A1	begins to work with rectangle dimensions eg $l+w=7$ or $2\times l+w$ (=11) shows a result for a dimension eg using $l=4$ or $w=3$ begins process of finding total area eg 4 × "3" × "4" cao

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6.

5		explanation	M1 M1 M1 M1 C1	works with volume eg 240000 uses conversion 1 litre = 1000 cm^3 uses 8000 eg vol ÷ 8000 (=30) uses "30" eg "30" × 2.50 for explanation and 75 stated	begins working back eg 70÷2.50 (=28) uses conversion 1 litre = 1000 cm^3 uses 8000 eg "28"× 8000 (=224000) works with vol. eg 240000 for explanation with 240000 and 224000

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7.

18		75π	P1 P1 P1 A1	starts process by using $\frac{250}{3}\pi$ and $\frac{1}{2}\times\frac{4}{3}\pi r^3$ to find radius starts process using ½ curved surface area eg $(4\times\pi\times\text{"5"}^2)\div 2$ complete process shown eg $(4\times\pi\times\text{"5"}^2)\div 2+(\pi\times\text{"5"}^2)$ for 75π

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8.

12		430	P1 for appropriate use of Pythagoras P1 for setting up an equation equivalent to $x^2 = 15^2 - 5^2 - 7^2$ or better eg $\sqrt{151}$ P1 for finding the volume using their "$\sqrt{15^2 - 5^2 - 7^2}$" A1 430 to 430.1

Pearson Edexcel - Sample Paper 1 - (Non-Calculator) Higher Tier

9.

13		6.4	P1 P1 A1	Start to process eg. find scale factor (0.4) or $\frac{AE}{4}=\frac{4}{10}$ Complete process to find area

Pearson Edexcel - Sample Paper 1 - (Non-Calculator) Higher Tier

10.

18		Given result	M1 M1 A1	For length scale factor eg $\sqrt{\frac{4}{9}}$ **or** 120 : 405 $\left(\sqrt{\frac{4}{9}}\right)^3\times 405$ **or** $2^3 : 3^3$ (from 120 : 405) 120 from correct arithmetic **or** conclusion relating $2^3 : 3^3$ with $2^2 : 3^2$ with correct working

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11.

9		203	P1	translate into algebra for rectangle: $4x+4x+3x+4+3x+4$ $(=14x+8)$ or for trapezium: $5x+5x+x-3+7x-3$ $(=18x-6)$
			P1	equating: eg $18x-6=14x+8$ $(4x=14)$
			A1	solving for x: $x=14/4 = 3.5$ oe
			P1	process to find area: "3.5" × 3+4 (ft) or "3.5" × 4 ft
			A1	cao

Pearson Edexcel - Sample Paper 3 - (Calculator) Higher Tier

12.

16	$AC^2 = 20^2 + 20^2 = 800$ $AX^2 = 10^2 + 10^2 = 200$ $\sqrt{200} \times \tan 55 = VX \quad (= 20.19...)$ $VM^2 = \sqrt{"20.19"^2 + 10^2} \quad (= 22.54...)$ $4 \times \frac{1}{2} \times "22.54" \times 20 + 20^2$	1300		Let X be centre of base, M be midpoint of AB
			P1	process to find AC or AX
			P1	process to find VX or VA
			P1	process to find height of sloping face or angle of sloping face.
			P1	process to find surface area of one triangular face.
			A1	For 1300 – 1302

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13.

*10			Has enough (with evidence)	5	M1 for splitting the shape (or showing recognition of the "absent" triangles) and using a method to find the area of one shape M1 for a complete method to find the total area, (= 9 m^2) M1 (dep on M1) for a method to find the number of packs required from their total area, eg. "9" ÷ 2 = 4.5 rounded up to 5 M1 for a method to find 75% of 24.80 or 75% of the cost of their total number of packs, eg. 24.80 × "5" × $\frac{75}{100}$ (= 93) or 24.80 × $\frac{75}{100}$ (= 18.6) C1 for a conclusion supported by fully correct answers, eg. showing 9 (m^2), 5 (packs) and 93 or 7 (from 100 – 93) OR M1 for method to find 75% of £24.80, eg. 24.80 × $\frac{75}{100}$ (= 18.6) M1 for method to find total number of packs Mary can buy, eg. 100 ÷ "18.60" = 5.3.... truncated to 5 or 10 (m^2) M1 for finding area of one relevant shape or showing how one pack (2 m^2) can fit in the diagram M1 (dep on previous M1) for complete method to show that 5 packs can cover the floor C1 for a conclusion supported by fully correct answers, showing the capacity (10) greater than total area (9)

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14.

23			22.5	3	M1 for $\frac{1}{2} \times 7 \times 5 \times \sin 40$ or $\frac{1}{2} \times 7 \times 5 \times \sin(180 - 40)$ M1 (dep M1) for doubling the area of the triangle A1 for 22.4 – 22.5 OR M1 for complete method to find height of parallelogram, eg 5 sin40° M1 (dep M1) for complete method to find the area of the parallelogram, eg 7 × 5sin40° A1 for 22.4 – 22.5

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15.

7			9	4	M1 for method to find area of one rectangle, eg 15 × 8 (=120) or 15 × 11 (=165) M1 (dep) for subtracting from/by given area, eg (138 – "120") (=18) or "165" – 138 (=27) M1 for final step from complete method shown, eg 15 − "18"÷ 3 or "27" ÷ 3 A1 cao **OR** M1 for a correct expression for the area of one rectangle, eg (8 + 3) × (15 − x) or 8 × x M1 (dep) for a correct equation eg (8 + 3) × (15 − x) + 8 × x = 138 M1 for correct method to isolate x, eg 3x = 27 A1 cao

Pearson Edexcel - Friday 13 June 2014 - Paper 2 (Calculator) Higher Tier

16.

25			302	3	M1 for $\frac{1}{2} \times \frac{4}{3} \times \pi \times 4^3$ oe (= 133.9 – 134.2) M1 for $\frac{1}{3} \times \pi \times 4^2 \times 10$ oe (= 167.4 – 167.7) A1 for 301 – 302 (or 96π or $\frac{288}{3}\pi$)

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17.

27			43.9	5	M1 for $\frac{11}{\sin 100}=\frac{9}{\sin D}$ oe M1 for $\sin D=\frac{9\sin 100}{11}$ (=0.80575…) or $D=53.68\ldots$ M1 for angle DCA= 180 − 100 − "D" (=26.317..) M1 for area of $ABCD = 2 \times ½ \times 11 \times 9 \times \sin$"26.317" A1 for 43.8 – 43.9 **OR** M1 for $\frac{11}{\sin 100}=\frac{9}{\sin D}$ oe M1 for $\sin D=\frac{9\sin 100}{11}$ (=0.80575…) or $D=53.68\ldots$ M1 for (height=) 9 × sin (180 − 100 − "D") or height = 3.990… M1 for area of $ABCD = (2 \times ½) \times 11 \times$ "height" A1 for 43.8 – 43.9 **OR** M1 for $11^2 = AD^2 + 9^2 - 2\times AD\times 9\times\cos 100$ M1 for $AD=\frac{18\cos 100+\sqrt{(18\cos 100)^2-4(1)(-40)}}{2(1)}$ M1 for $AD=\frac{18\cos 100+\sqrt{169.7(69795...)}}{2(1)}$ (= 4.95195(…)) M1 for area of $ABCD = 2\times\frac{1}{2}\times$ "4.95195" × 9 × sin100 A1 for 43.8 – 43.9

Pearson Edexcel - Wednesday 6 November 2013 - Paper 1 (Non-Calculator) Higher Tier

18.

3			120 cm^3	4	M1 for $\frac{1}{2}\times 3\times 4$ M1 (dep) for '$\frac{1}{2}\times 3\times 4$' × 20 A1 for 120 B1 (indep) for cm^3

Pearson Edexcel - Friday 14 June 2013 - Paper 2 (Calculator) Higher Tier

19.

1			40.5	3	M1 for 1.5×6 or 1.5 ×1.5 M1 for adding area of 5 or 6 faces provided at least 3 are the correct area A1 cao NB: anything that leads to a volume calculation 0 marks.

Pearson Edexcel - Thursday 28 February 2013 - Paper 1 (Non-Calculator) Higher Tier

20.

23			75π	3	M1 for $(4\times\pi\times 5^2)\div 2$ oe M1 for $\pi\times 5^2$ oe A1 for 75π accept 235.5 Condone the use of $\pi = 3.14\ldots$

Pearson Edexcel - Monday 4 March 2013 - Paper 2 (Calculator) Higher Tier

21.

15	(a)	$\frac{1}{2} \times (4 + 12) \times 10$	80	2	M1 for a fully correct method for area of *QRST* A1 cao
	(b)	**For example** $\frac{PT+10}{PT} = \frac{12}{4} = 3$ $PT + 10 = 3PT$ $2PT = 10$	5	3	M1 for a correct scale factor or ratio using two corresponding sides from two similar triangles or two sides within the same triangle (may be seen within an equation) eg. $\frac{12}{4}$oe **or** 4 : 12 oe **or** $\frac{PT}{4}$**or** $\frac{PS}{12}$**or** $\frac{12}{12-4}$ etc. M1 for a correct equation with *PT* or *PS* as the only variable **or** complete correct method using scale factor A1 cao

Pearson Edexcel - Monday 4 March 2013 - Paper 2 (Calculator) Higher Tier

22.

22		$\frac{1}{3} \times \pi \times 15^2 \times 40$ $-\frac{1}{3} \times \pi \times 7.5^2 \times 20$	8250	4	B1 for 15cm as diameter or 7.5 cm as radius of smaller cone (may be marked on diagram or used in a formula) M1 for a numerical expression for the volume of one cone eg. $\frac{1}{3} \times \pi \times 15^2 \times 40$ (=9424...) **or** $\frac{1}{3} \times \pi \times 7.5^2 \times 20$ (=1178...) M1 for $\frac{1}{3} \times \pi \times 15^2 \times 40$ oe $- \frac{1}{3} \times \times \pi \times 7.5^2 \times 20$ oe A1 for answer in the range 8240 – 8250 **OR** B1 for 2^3 M1 for a numerical expression for the volume of the large cone eg. $\frac{1}{3} \times \pi \times 15^2 \times 40$ (=9424...) M1 volume of frustrum $= \frac{7}{8} \times \frac{1}{3} \times \pi \times 15^2 \times 40$ oe A1 for answer in the range 8240 – 8250

Pearson Edexcel - Tuesday 6 November 2012 - Paper 1 (Non-Calculator) Higher Tier

23.

25	(a)		640	2	M1 for $80 \times \left(\frac{8}{4}\right)^3$ or $80 \div \left(\frac{4}{8}\right)^3$ A1 cao
	(b)		40	2	M1 for $160 \div \left(\frac{8}{4}\right)^2$ or $160 \times \left(\frac{4}{8}\right)^2$ or ft their scale factor from (a) A1 cao

Pearson Edexcel - Thursday 8 November 2012 - Paper 2 (Calculator) Higher Tier

24.

23	(a)	Let O be the centre of the base. $OB^2 + OC^2 = 10^2$; $OB^2 = 50$ $AO^2 = AB^2 - OB^2 = 50$ Vol $= \frac{1}{3} \times 10^2 \times \sqrt{50}$ **OR** Let M be the midpt of side BC and let O be the centre of the base. $AM^2 + MC^2 = 10^2$; $AM^2 = 75$ $AO^2 = AM^2 - MO^2 = 50$ Vol $= \frac{1}{3} \times 10^2 \times \sqrt{50}$	236	4	M1 correct method to start to find BD or BO using triangle OBC or triangle BCD (oe) Eg. $OB^2 + OC^2 = 10^2$ **or** $BO^2 = 50$ **or** $BO = \sqrt{50}$ (=7.07..) **or** $BO = \frac{\sqrt{200}}{2}$ **or** $10^2 + 10^2 = BD^2$ **or** $BD^2 = 200$ **or** $BD = \sqrt{200}$ (=14.1..) M1 (dep) correct method to find height of pyramid using triangle AOB Eg. $AO^2 = 10^2 - '\sqrt{50}'^2$ **or** $AO^2 = 50$ **or** $AO = \sqrt{50}$ (=7.07..) M1 (indep) $\frac{1}{3} \times 10^2 \times '\sqrt{50}'$ (but **not** $\frac{1}{3} \times 10^2 \times 10$) A1 235 – 236 **OR** M1 correct method to start to find height of a face using triangle AMC (oe) Eg. $AM^2 + 5^2 = 10^2$ **or** $AM^2 = 75$ **or** $AM = \sqrt{75}$ (=8.66...) M1 (dep) correct method to find height of pyramid using triangle AOM Eg. $AO^2 = '\sqrt{75}'^2 - 5^2$ **or** $AO^2 = 50$ **or** $AO = \sqrt{50}$ (=7.07..) M1 (indep) $\frac{1}{3} \times 10^2 \times '\sqrt{50}'$ (but **not** $\frac{1}{3} \times 10^2 \times 10$) A1 235 – 236

23 cont.	(a)				**OR** M1 for $\sin 45 = \frac{x}{10}$ **or** $\cos 45 = \frac{x}{10}$ M1 for $h = 10 \times \sin 45$ **or** $h = 10 \times \cos 45$ (=7.07..) M1 (indep) $\frac{1}{3} \times 10^2 \times '7.07...'$ (but **not** $\frac{1}{3} \times 10^2 \times 10$) A1 235 – 236

23	(b)	Angle $ABO = 45^{\circ}$ Angle $DAB = 180 - 45 - 45$ **OR** In ΔBAD, $\cos A = \frac{10^2 + 10^2 - '\sqrt{200}'^2}{2 \times 10 \times 10} = 0$ **OR** In ΔBOA, $\cos B = \frac{'\sqrt{50}'}{10}$ Angle $BAD = 180 - '45' - '45'$ **OR** $\sin A = \frac{'\sqrt{50}'}{10}$ $A = 45$ Angle $BAD = 2 \times '45'$	90	2	M1 Angle $DAB = 180 - 2 \times '45'$ A1 89.98 - 90 **OR** M1 $\cos BAD = \frac{10^2 + 10^2 - '\sqrt{200}'^2}{2 \times 10 \times 10}$ A1 89.98 - 90 **OR** M1 $\sin A = \frac{'\sqrt{50}'}{10}$ A1 89.98 - 90

Pearson Edexcel - Monday 11 June 2012 - Paper 1 (Non-Calculator) Higher Tier

25.

25		Vol cylinder $= \pi \times (2x)^2 \times 9x$ $= 36\pi x^3$ $36\pi x^3 = \frac{4}{3}\pi r^3$ $r^3 = 27x^3$	$3x$	3	M1 for sub. into $\pi r^2 h$ eg. $\pi \times (2x)^2 \times 9x$ oe M1 for $\pi \times (2x)^2 \times 9x = \frac{4}{3}\pi r^3$ oe A1 oe eg. $\sqrt[3]{\frac{36x^3}{\frac{4}{3}}}$ NB : For both method marks condone missing brackets around the $2x$

Pearson Edexcel - Monday 5 March 2012 - Paper 4 (Calculator) Higher Tier

26.

13		½ (6 + 12) × 8	72	2	M1 for ½ × (6 + 12) × 8 or complete method to find the area eg 8 × 6 + ½ × 8 × "12 – 6" or 12 × 8 – ½ × 8 × "12 – 6" or 48 + 24 or 96 - 24 A1 cao

Pearson Edexcel - Monday 14 November 2011 - Paper 4 (Calculator) Higher Tier

27.

24		$3 \times \pi \times 8^2$	603	3	M1 for $\frac{1}{2} \times 4 \times \pi \times 8^2$ oe (=402(.12…)) M1 (dep) for '402' + $\pi \times 8^2$ or 192π A1 for 603 – 603.23

Pearson Edexcel - Friday 10 June 2011 - Paper 4 (Calculator) Higher Tier

28.

9		$\frac{1}{2}(8\times 15)\times 2 + (17\times 10) + (15\times 10) + (8\times 10)$ $= 60 + 60 + 170 + 150 + 80$	520 cm^2	4	M1 a correct expression for area of one face M1 for five area expressions added (at least three correct) A1 cao NB: if volume calculated then no marks B1 (indep) for cm^2

Pearson Edexcel - Friday 10 June 2011 - Paper 4 (Calculator) Higher Tier

29.

20			$c^2(b+d)$ $\pi a^2 b$ $\frac{2a^3 d}{c}$	3	B3 for all 3 correct, no extras (B2 for 2 or 3 correct and 1 incorrect) (B1 for 1 correct and at most 2 incorrect)

Pearson Edexcel - Tuesday 9 November 2010 - Paper 3 (Non-Calculator) Higher Tier

30.

19	(a)	15 ÷ 10 8 × 1.5	12	2	M1 for 15 ÷ 10 or 1.5 or $\frac{3}{2}$ or $\frac{2}{3}$ A1 cao
	(b)	½ × (8 +"a") × 5	50	2	NB : ft from (a) provided '*DC*' > 8 M1 for $\frac{(8+"a")\times 5}{2}$ A1 ft **or** M1 for (8× 5) + ½("*DC*" − 8) × 5 A1 ft **or** M1 for ½ × "*DC*" × 15 − ½ × 8 × 10 A1 ft **or** M1 for ½ × 8 × 10 × "1.5²" − ½ × 8 × 10 A1 ft

Pearson Edexcel - Monday 7 June 2010 - Paper 3 (Non-Calculator) Higher Tier

31.

20	(a)		$a^2(c+b)$ $4abc$	2	B1 for a^2 $(c + b)$ B1 for $4abc$ [−1 for each additional incorrect answer, up to a minimum of 0]
	(b)	8 × 100 × 100 × 100	8 000 000 or 8 x 10^6 or 8 million	2	M1 for sight of 10^6 oe or $100\times100\times100$ or $200\times200\times200$ A1 for 8 000 000 or 8 x 10^6

OCR GSCE – Tuesday 3 November 2020 – Paper 4 (Calculator) Higher Tier

32.

6			482	**4**	**M1** for 6×8×15 or 720 **M1** for $\sqrt[3]{their 720}$ or 8.96… **M1** for [6 ×] $(\sqrt[3]{their 720})^2$	**M3** implied by 80.3[3...] or 481.99... **M2** implied by 8.96.. i.e [6 ×] (*their* 8.96…)^2

OCR GSCE – Thursday 5 November 2020 – Paper 5 (Non-Calculator) Higher Tier

33.

20			144 with correct working	**7**	**B2** for [AD =] 10, [AB =] 24, [DC =] 12 and [BC =] 10 or **M1** for 56 ÷ (5 + 12 + 6 + 5) **oe** AND **M2** for $h^2 + 6^2 = 10^2$ or ref to 3, 4, 5 or 6, 8, 10 triangle or **B1FT** for deducing perpendicular from D to AB is 6 cm from A (or B) **A1** for height = 8 AND **M1** for $\frac{8}{2}(12+24)$ or better If 0 scored **SC2** for answer 144 with no working or **SC1** for height = 8 with no working	"Correct working" requires evidence of at least B2 AND M2 AND M1 Could be written on diagram For M2 FT *their* BC and ½ (AB – DC) used condone $h^2 + 3^2 = 5^2$ (using ratio values) FT ½ (*their* AB – *their* DC) FT *their* AB, CD and *h* provided *h* is not *their* AD or 5

OCR GSCE – Tuesday 11 June 2019 – Paper 6 (Calculator) Higher Tier

34.

14			1250 nfww	**5**	**M4** for $[6x^2 =]\ 2 \times 625$ or **B4** for final answer 1244 to 1250.05 OR **M1** for $3x^2$ oe or 625 and **M1** for $3x^2 = 625$ oe and **A1** for $[x =] \sqrt{\frac{625}{3}}$ or $\frac{25\sqrt{3}}{3}$ oe or 14.4 to 14.434 soi (14.4 to 14.434 seen implies **M1M1A1**) and **M1** for $6 \times$ *their* x^2 If **0** scored, **SC1** for starting from $x^2 = 25$ **and** final answer 150 or starting from $2x^2 = 25$ **and** final answer 75	Special cases: Starting from $3x^2 = 25$ oe soi **M1M0** for $3x^2 = 25$ **A1** for $[x =] \sqrt{\frac{25}{3}}$ or $\frac{5\sqrt{3}}{3}$ oe or 2.88 to 2.89 soi (2.88 to 2.89 seen implies **M1M0A1**) **M1** for $6 \times$ *their* x^2 soi by 50 Starting from $2x^2 = 625$ oe soi **M1M0** for $2x^2 = 625$ **A1** for $[x =] \sqrt{\frac{625}{2}}$ or $\frac{25\sqrt{2}}{2}$ or 17.6 to 17.7 soi (17.6 to 17.7 seen implies **M1M0A1**) **M1** for $6 \times$ *their* x^2 (1875 as final answer implies **M1M0A1M1A0**) Starting from $x^2 = 625$ oe soi **M1M0** for $x^2 = 625$ **A0** (equation has been simplified and it is a more substantial error) **M1** for $6 \times$ *their* x^2 (3750 as final answer implies **M1M0A0M1A0**)

OCR GSCE – Tuesday 11 June 2019 – Paper 6 (Calculator) Higher Tier

35.

18			8.74[…] nfww	**4**	**M3** for $[r =] \sqrt[3]{\frac{2100}{\pi}}$ or **M2** for $\pi r^3 = 2100$ oe **M1** for $\frac{1}{3}\pi r^2(3r)$ oe Alternative method using h **M3** for $[h =] \sqrt[3]{\frac{56700}{\pi}}$ soi by 26.2[3…] or **M2** for $\pi h^3 = 56700$ oe **M1** for $\frac{1}{3}\pi\left(\frac{h}{3}\right)^2 h$ oe	Accept answer of 8.7 after **M3** May be done in stages eg **M3** for $\sqrt[3]{668.(\ldots)}$ eg. **M2** for $3\pi r^3 = 6300$ or $\frac{1}{3}\pi r^2(3r) = 2100$ etc eg. **M1** for πr^3 eg. **M1** for $\frac{1}{27}\pi h^3$

OCR GSCE – Wednesday 8 November 2017 – Paper 6 (Calculator) Higher Tier

36.

15			85π or 267[.0…]	**3**	**M2** for $\pi \times 5 \times 12 + \pi \times 5^2$ oe OR **B1** for 60π or 25π or 188[.4…] or 188.5 or 78[.5…] or $\pi \times 5^2$	

OCR GSCE – Sample Papers – Paper 4 (Calculator) Higher Tier

37.

2	**(a)**		4900π	**2** 1 AO1.2 1 AO1.3a	**M1** for $\pi \times 70^2$ may be implied by 15393.8…	
	(b)		3.5	**2** 2 AO1.3a	**M1** for $\frac{17150\pi}{\textit{their}\ '4900\pi'}$	**FT** from **(a)**, provided **(a)** is a multiple of π

OCR GSCE – Sample Papers – Paper 4 (Calculator) Higher Tier

38.

13			11 or better	**4** 2 AO1.3b 1 AO3.1b 1 AO3.2	**M1** for $r = \sqrt[3]{\frac{3v}{4\pi}}$ **soi** **A1** for r (Earth) = 6365 km or r (Jupiter) = 69890 km **M1** for $\frac{\textit{their}\ '69890'}{\textit{their}\ '6365'}$	Alternate method: M1 for $\frac{1.43\times10^{15}}{1.08\times10^{12}}$ A1 for 1324[.074…] M1 for $\sqrt[3]{1324}$

OCR GSCE – Sample Papers – Paper 5 (Non - Calculator) Higher Tier

39.

7			8 cm 10 cm	**3** 1 AO1.3a 1 AO3.1b 1 AO3.2	**M1** for listing square numbers and finding differences **M1** for square rooting *their* pair of square numbers	

OCR GSCE – Sample Papers – Paper 6 (Calculator) Higher Tier

40.

16	**(a)**	**(i)**	70.71[0678…]	**3** 1 AO1.1 2 AO3.1a	**M2** for $8 \times \frac{1}{2} \times 5 \times 5 \times \sin 45$ or **M1** for $\frac{1}{2} \times 5 \times 5 \times \sin 45$	
		(ii)	85 – 85.4	**5** 2 AO1.3b 3 AO3.1b	**M4** for $(2 \times 5 \cos 22.5)^2$ or $(2 \times 5 \sin 67.5)^2$ or **M3** for $2 \times 5 \cos 22.5$ or $2 \times 5 \sin 67.5$ or **M2** for $5 \cos 22.5$ or $5 \sin 67.5$ or **M1** for $\cos 22.5 = \frac{x}{5}$ or $\sin 67.5 = \frac{x}{5}$	9.238… 4.619…
	(b)		64 : 1 or 1 : $\frac{1}{64}$	**2** 2 AO3.2	**M1** for making the link to, and using, enlargement eg $(\frac{1}{8})^2$ or 8^2 **soi**	

AQA GSCE – Thursday 4 June 2020 – Paper 2 (Calculator) Higher Tier

41.

9(a)	**Alternative method 1**		
	$200 - 2 \times 5 \times 5$ or $200 - 50$ or 150 or $4 \times 5 \times y$ or $20y$	M1	oe eg $5y + 5y + 5y + 5y$ implied by 37.5 or answer 937.5
	$4 \times 5 \times y = 200 - 2 \times 5 \times 5$ or $4 \times 5 \times y = 200 - 50$ or $4 \times 5 \times y = 150$ or $150 \div 4 \div 5$ or $150 \div 20$ or 7.5	M1dep	oe eg $20y = 150$
	187.5	A1	oe
	Alternative method 2		
	$200 - 2 \times 5 \times 5$ or $200 - 50$ or 150	M1	oe implied by 37.5 or answer 937.5
	$150 \div 4 \times 5$ or 37.5×5	M1dep	oe
	187.5	A1	oe
	Additional Guidance		
	Embedded 7.5 eg $4 \times 5 \times 7.5 = 150$		M1M1

9(b)	It is smaller than the answer to part (a)	B1	
	Additional Guidance		

AQA GSCE – Thursday 8 June 2020 – Paper 3 (Calculator) Higher Tier

42.

17	$2(12-x)$ or $24-2x$ or $12(x+2)$ or $12x+24$ or $12x+2x$ or $14x$ or $2x+x^2+x(12-x)$ or $2x+x^2+12x-x^2$	M1	oe correct area of small rectangle or large rectangle or unshaded section may be seen on diagram
	$\frac{12(x+2)}{4}=2(12-x)$ or $12x+2x=6(12-x)$	M1dep	oe equation eg $3(x+2)=2(12-x)$ $3x+6=24-2x$ $12(x+2)=8(12-x)$ $12x+24=96-8x$
	$3x+2x=24-6$ or $14x+6x=72$	M1dep	oe equation with brackets expanded and terms collected eg $5x=18$ $12x+8x=96-24$ $20x=72$
	$\frac{18}{5}$ or $3\frac{3}{5}$ or 3.6	A1	oe
	Additional Guidance		
	$3x+6$		M1
	Trial and improvement with $x=3.6$ chosen		M1M1M1A1
	Trial and improvement without $x=3.6$ chosen		M0M0M0A0

AQA GSCE – Thursday 6 June 2019 – Paper 2 (Calculator) Higher Tier

43.

	Alternative method 1		
	8^2 or 64 and 17^2 or 289	M1	
	$\sqrt{17^2-8^2}$ or $\sqrt{225}$ or 15	M1dep	oe implies M2 may be seen on diagram
	8 × 3 × their 15 or 24 × their 15	M1dep	dep on M2 oe eg (8 + 16) × their 15 or 0.5 × 8 × their 15 × 6
	360	A1	SC2 [448.8, 456]
	Alternative method 2		
	$\cos C = \frac{8}{17}$ or C = [61.9, 62]	M1	may be seen on diagram
7	17 × sin their [61.9, 62] or [14.9, 15.1]	M1dep	may be seen on diagram oe eg 8 × tan their [61.9, 62]
	8 × 3 × their [14.9, 15.1] or 24 × their [14.9, 15.1] or [357.6, 362.4]	M1dep	dep on M2 oe eg (8 + 16) × their [14.9, 15.1] or 0.5 × 8 × their [14.9, 15.1] × 6
	360	A1	SC2 [448.8, 456]
	Alternative method 3		
	$\sin A = \frac{8}{17}$ or A = [28, 28.1]	M1	may be seen on diagram
	17 × cos their [28, 28.1] or [14.9, 15.1]	M1dep	may be seen on diagram oe eg 8 ÷ tan their [28, 28.1]
	8 × 3 × their [14.9, 15.1] or 24 × their [14.9, 15.1] or [357.6, 362.4]	M1dep	dep on M2 oe eg (8 + 16) × their [14.9, 15.1] or 0.5 × 8 × their [14.9, 15.1] × 6
	360	A1	SC2 [448.8, 456]

Alternative method and Additional Guidance continued on the next page

7 cont	**Alternative method 4**		
	$\cos C = \frac{8}{17}$ or C = [61.9, 62]	M1	may be seen on diagram
	$\frac{1}{2} \times 8 \times 17 \times \sin$ their [61.9, 62] or [59.9, 60.1]	M1dep	oe
	6 × their [59.9, 60.1] or [357.6, 362.4]	M1dep	oe
	360	A1	SC2 [448.8, 456]
	Additional Guidance		
	15 without a contradictory value for *AB* scores the first two marks on Alt method 1, even if not subsequently used		M1M1
	$\sqrt{17^2 + 8^2}$		M1M0
	3rd M1 is for the total area and may be calculated in various ways eg using a trapezium + a triangle		
	3rd M1 is for the total area so further work will lose the mark eg 360 seen followed by 360 – 60, answer 300		M1M1M0A0
	May use sine rule or cosine rule but must reach *AB* = ... to award the second M1 in Alt 2 or 3		

AQA GSCE – Thursday 6 June 2019 – Paper 2 (Calculator) Higher Tier

44.

19	$\tan 64 = \frac{h}{4}$ or $\tan 26 = \frac{4}{h}$ or $\frac{h}{\sin 64} = \frac{4}{\sin 26}$	M1	oe eg $\tan 64 = \frac{h}{15-11}$ or $\tan (90 - 64) = \frac{15-11}{h}$ or $h^2 + 4^2 = \left(\frac{4}{\cos 64}\right)^2$ any letter
	4 tan 64 or $\frac{4}{\tan 26}$ or $\frac{4}{\sin 26} \times \sin 64$ or 8.2…	M1dep	oe eg $\sqrt{\left(\frac{4}{\cos 64}\right)^2 - 4^2}$ implies M2 may be seen on diagram
	$\frac{1}{2} \times (15 + 11) \times$ their 8.2… or $\frac{1}{2} \times 4 \times$ their 8.2.. + 11 × their 8.2..	M1dep	oe eg 15 × their 8.2… – $\frac{1}{2} \times 4 \times$ their 8.2… dep on M2
	[106.6, 106.62]	A1	accept 107 with working seen
	Additional Guidance		
	3rd M1 is for a total area and may be calculated as a trapezium or a rectangle + a triangle or a rectangle – a triangle or a triangle + a triangle		
	8.2… seen scores M2 even if not subsequently used		
	Further work after 106.6 eg 106.6 + 16.4		M1M1M0A0

AQA GSCE – Thursday 6 June 2019 – Paper 2 (Calculator) Higher Tier

45.

	$\pi r \times 2r$ or $\pi r \times 3r$ or $2\pi r^2$ or $3\pi r^2$ or $5\pi r^2$	M1	oe implied by a correct equation for first A1
	$2\pi r^2 + 3\pi r^2 = 57.8\pi$ or $5\pi r^2 = 57.8\pi$ or $2\pi r^2 = 57.8\pi \div 5 \times 2$ or $3\pi r^2 = 57.8\pi \div 5 \times 3$ or $\sqrt{11.56}$	A1	oe eg $\pi r \times 2r + \pi r \times 3r = 57.8\pi$ or $5r^2 = 57.8$ or $r^2 = 11.56$ or $2r^2 = 23.12$ or $3r^2 = 34.68$
	3.4 or $\frac{17}{5}$ or $3\frac{2}{5}$	A1	

	Additional Guidance	
21	11.56 not in a square root or a correct equation	M0
	Adding the area of a circle (or 2 circles) can score a maximum of M1A0A0 eg $3\pi r^2 + \pi r^2 = 57.8\pi$ Adding further incorrect terms scores M0	M1A0A0
	T & I scores M1A1A1 if answer 3.4, otherwise scores 0	
	Allow $\pi r^2 5$ for $5\pi r^2$ etc throughout	
	Answer ± 3.4	M1A1A0
	$5\pi r^2 \times \pi r^2$ or $3\pi r^2 \times \pi rl$ etc	M0
	Allow π to be replaced by [3.14, 3.142]	
	Answer 3 is incorrect unless 3.4 seen in working lines	

AQA GSCE – Tuesday 11 June 2019 – Paper 3 (Calculator) Higher Tier

46.

24	$\sin 24 = \frac{h}{20}$	M1	oe $\cos 66 = \frac{h}{20}$ $\frac{20}{\sin 90} = \frac{h}{\sin 24}$
	20 × sin 24 or 8.1…	M1dep	20 × cos 66 $\frac{20}{\sin 90} \times \sin 24$
	[1215, 1221]	A1	with no incorrect working seen
	Additional Guidance		
	150 × 20 × sin 24		M1M1

AQA GSCE – Tuesday 6 November 2018 – Paper 1 (Non - Calculator) Higher Tier

47.

2	200π	B1	

AQA GSCE – Monday 12 November 2018 – Paper 3 (Calculator) Higher Tier

48.

24	$\frac{4}{3}\pi(2x)^3$ or $\frac{1}{3}\pi(3x)^2h$	M1	oe
	$\frac{4}{3}\pi(2x)^3 = \frac{1}{3}\pi(3x)^2h$ or $\frac{4}{3}\pi 8x^3 = \frac{1}{3}\pi 9x^2h$	M1dep	oe Sets up equation
	$32x = 9h$ or $x = \frac{9}{32}h$ or $h = \frac{32}{9}x$ or $\frac{32}{3}r = 9h$ or $r = \frac{27}{32}h$ or $h = \frac{32}{27}r$ or $27h = 32r$ or $\frac{27}{32}h : h$ or $3x : \frac{32}{9}x$ or $\frac{27}{32} : 1$ or $3 : \frac{32}{9}$ or 0.84... : 1 or 3 : 3.55...	M1dep	oe linear equation or ratio
	27 : 32	A1	
	Additional Guidance		
	32 : 27		M1M1M1A0
	Note $\frac{4}{3}\pi(2)^3$ = [33.49, 33.52] $\frac{1}{3}\pi(3)^2h$ = [9.42h, 9.43h]		

AQA GSCE – Thursday 7 June 2018 – Paper 2 (Calculator) Higher Tier

49.

20	$0.25\pi^2(30 - 20)^2(30 + 20)$ or $0.25\pi^2 \times 10^2 \times 50$	M1	oe allow use of π as [3.14, 3.142]
	[12 320, 12 340.21]	A1	may be implied
	12 300 or 1.23×10^4 with no value outside [12 320, 12 340.21] seen	A1	
	Additional Guidance		
	$0.25\pi^2(30 - 20)^2(30 + 20)$ 12 300		M1 A1(implied)A1
	12 300 with no incorrect working		M1A1A1
	12 300.0 is not to 3 significant figures		
	M1 gained followed by answer 12 300.0		M1A0A0
	Do not allow misreads eg $0.25\pi^2(30 + 20)^2(30 + 20)$		M0A0A0
	Brackets expanded correctly and values substituted		M1

AQA GSCE – Thursday 7 June 2018 – Paper 2 (Calculator) Higher Tier

50.

	$\sqrt[3]{64}$ and $\sqrt[3]{343}$ or 4 and 7 or $\sqrt[3]{[5.3, 5.4]}$ or [1.74, 1.754411] or $\sqrt[3]{[0.18, 0.19]}$ or [0.56, 0.575]	M1	oe eg 4 : 7 or 7 : 4 or $\sqrt[3]{\frac{343}{64}}$ or $\frac{7}{4}$ or $\sqrt[3]{\frac{64}{343}}$ or $\frac{4}{7}$
	their 4^2 and their 7^2 or 16 and 49 or their $[1.74, 1.754411]^2$ or [3.02, 3.08] or their $[0.56, 0.575]^2$ or [0.31, 0.331]	M1dep	oe eg 16 : 49 or 49 : 16 or $\left(\text{their } \frac{7}{4}\right)^2$ or $\frac{49}{16}$ or $\left(\text{their } \frac{4}{7}\right)^2$ or $\frac{16}{49}$
23	539	A1	

Additional Guidance

4^3 and 7^3	M1
$64^{\frac{2}{3}}$ and $343^{\frac{2}{3}}$	M1M1
$\left(\frac{343}{64}\right)^{\frac{2}{3}}$ or $\left(\frac{64}{343}\right)^{\frac{2}{3}}$	M1M1
Answer 539 with evidence of rounding to 539 scores A0 eg1 176 × 3.06 = 538.56 Answer 539 eg2 176 × 3.06 = 539 (may have kept all digits on calculator)	 M1M1A0 M1M1A1
$\left(\sqrt{176} \times \frac{7}{4}\right)^2$	M1M1
176 ÷ 16 = 11 and 11 × 49	M1M1
4 and 7 (and/or 4^2 and 7^2) but uses different method not involving 4 and 7	M1M0A0

AQA GSCE – Tuesday 12 June 2018 – Paper 3 (Calculator) Higher Tier

51.

13	The diagonals are lines of symmetry ✓ The diagonals bisect each other ✓ The diagonals are perpendicular ✓ The diagonals are equal in length	B1	
	Additional Guidance		

AQA GSCE – Thursday 2 November 2017 – Paper 1 (Non - Calculator) Higher Tier

52.

17	Ticks No and gives correct reason or ticks No and gives numerical counter-example for any solid	B1	eg1 (volume of) A is 8 times bigger eg2 (volume) sf = 2^3 eg3 if A and B are cubes and l = 3, volume of A = 27 volume of B = 216 216 is not 27 × 2
	Additional Guidance		
	Condone $8l^3$	B1	
	No, as the height/width is (also) doubled/different	B1	
	No, as the length/volume is cubed	B0	
	No, volume is l^3	B0	
	No, as the height could be different	B0	
	No, it would be 3 times as big	B0	
	Doubling the length doesn't double the volume	B0	

AQA GSCE – Wednesday 25 May 2017 – Paper 1 (Non - Calculator) Higher Tier

53.

28	**Alternative method 1**		
	$\frac{1}{3}$ (×) π (×) 5^2 (×) 15 or 125π or [392.5, 392.8]	M1	oe
	$\frac{r}{5} = \frac{15-9}{15}$ or $r = 2$	M1	oe r is radius of small cone
	$\frac{1}{3}$ × π × their 2^2 × $(15-9)$ or 8π or [25.12, 25.14]	M1dep	dep on 2nd M1
	117π	A1	Accept $\pi 117$ or $\frac{351\pi}{3}$
	Alternative method 2		
	$\frac{1}{3}$ (×) π (×) 5^2 (×) 15 or 125π or [392.5, 392.8]	M1	oe
	volume sf = $\left(\frac{15-9}{15}\right)^3$ or $\frac{8}{125}$ or $\left(\frac{15}{15-9}\right)^3$ or $\frac{125}{8}$	M1	oe
	their 125π × their $\frac{8}{125}$ or their 125π ÷ their $\frac{125}{8}$ or 8π or [25.12, 25.14]	M1dep	dep on 2nd M1 Accept $1 - \frac{8}{125}$ or $\frac{117}{125}$
	117π	A1	Accept $\pi 117$ or $\frac{351\pi}{3}$
	Additional Guidance		
	Allow [3.14, 3.142] for π for M marks only		
	Answer of 367.(...)		M1M1M1A0

AQA GSCE – Sample Paper 2 (Calculator) Higher Tier

54.

23	$\frac{1}{2} \times \frac{4}{3} \times \pi \times 6^3$ or 144π	M1	oe eg [452, 452.45]
	$\frac{2}{5} \times$ their $144\pi = \frac{1}{3} \times \pi \times x^2 \times 12$ or $57.6\pi = 4\pi x^2$	M1	oe eg [180.8, 181] = [12.5, 12.6] x^2 Must equate two volumes in terms of π
	$3 \times \frac{2}{5} \times$ their $144\pi \div 12\pi$ or 14.4	M1dep	oe eg their [180.8, 181] ÷ their [12.5, 12.6] dep on 2nd M1 Correct working to isolate x^2
	[3.79, 3.8]	A1	