1	(a)	19	P1	for process to find area available at festival B, eg 700×2000 (=1 400 000)	
			P1	for process to find the area available per person at one festival, eg $80\,000 \div 425$ (= 188.23...) **or** [area] ÷ 6750 (= 207.40...)	Accept either number rounded eg 207 or 188
			P1	for process to find the area available per person at both festivals, eg $80\,000 \div 425$ (= 188.23...) **and** [area] ÷ 6750 (= 207.40...)	Accept either number rounded eg 207 or 188
			A1	for an answer in the range 18.7 to 19.5	
	(b)	explanation	C1	for a valid statement relating to scale factor for area, **Acceptable examples** There are 10000 (cm^2) in 1 (m^2) Because 1 m^2 is the same as $100 \times 100 = 10000$ cm^2 There are 2 side lengths that change from 1 m to 100 cm $300 \div 3$ is 100 should use 100^2 $300 \div 100 \div 100 = 0.03$ $3 \times 100 \times 100 = 30000$ Because it's area not length. Because it's in m^2 not just metres He hasn't taken the squared sign into account **Not acceptable examples** There are 1000 cm in 1 m Callum is correct because ..... $300 \div 3$ is 100 $3^2 = 9$ $300 \times 300 = 90000$ You have to square the number	

2	0.8	P1	for process to find the area, eg $187.5 = \frac{180}{A}$ **or** $180 \div 187.5$ (= 0.96) **or** $\frac{180}{1.2x} = 187.5$ **or** $1.2x = \frac{180}{187.5}$	Ignore units for P marks only
		P1	for complete process to find width, eg "0.96" ÷ 1.2 **or** 180 ÷ 225	
		A1	cao	

3	(a)	25.9	P1	for process to find volume of hemisphere, eg $\frac{1}{2} \times \frac{4}{3} \times \pi \times 3.5^3$ (=89.797...) $\left(\frac{343\pi}{12}\right)$ **or** for a correct expression for the volume of the cone, eg $\frac{1}{3} \times \pi \times 3.5^2 (y - 3.5)$ or $\frac{1}{3} \times \pi \times 3.5^2 \times h$	'$y - 3.5$' may be seen as a new variable, but cannot be just y Condone missing brackets Accept decimals rounded or truncated to 1dp
			P1	for setting up an equation linking all three aspects, eg $\frac{1}{2} \times \frac{4}{3} \times \pi \times 3.5^3 + \frac{1}{3} \times \pi \times 3.5^2 (y - 3.5) = 120\pi$ **or** "89.797..." + "12.828..."$(y - 3.5)$ = "376.99 ..." **or** "28.5833..." π + "4.0833..." $\pi(y - 3.5) = 120\pi$	120π - "89.797..." = 287.193... or $\frac{1097\pi}{12}$ π may be missing throughout Award of this mark implies award of the previous May be seen in multiple steps
			P1	for process to isolate y or $(y - 3.5)$ or h in their equation, eg $\frac{120\pi - \frac{1}{2} \times \frac{4}{3}\pi 3.5^3 + \frac{1}{3}\pi 3.5^3}{\frac{1}{3}\pi 3.5^2}$ **or** $\frac{"376.99..." - "89.797..." + "44.898..."}{"12.828..."}$ **or** $\frac{120\pi - "28.583..."\pi + "14.291..."\pi}{"4.083..."\pi}$ oe	
			A1	for answer in range 25.8 to 26.3 SCB3 for an answer in the range 22.3 to 22.8 or $\frac{1097}{49}$	If an answer is given in the range in working and then rounded incorrectly award full marks.

4	7500	M1	for method to find expected number of model B, eg $\frac{15}{80} \times 40000$ oe **or** $\frac{15}{"23+15+30+12"} \times 40000$ oe	
		A1	cao	

5	1250	P1	for process to use area of base in the formula, eg $\frac{10000}{2\times4}$	
		A1	cao	

6	20	B1	stating bound, eg 10.65 **or** 10.55 **or** 31 min 48.5sec **or** 31 min 47.5sec **or** 1908.5sec **or** 1907.5sec	
		P1	(dep on B1) for a correct bound for time in hours, eg 0.5301(38…) **or** 0.5298(61…) **Or** a correct process to find one bound for speed in km per minute eg [UB of S] = [UB of D]÷[LB of T] or [LB of S] = [LB of D]÷[UB of T] **or** a correct process to find one bound for speed in km per second eg [UB of S] = [UB of D]÷[LB of T] or [LB of S] = [LB of D]÷[UB of T]	Bound rounded or truncated to 4 dp Where 10.6 < [UB of D] ≤ 10.65 **and** 31 min 47.5 sec ≤ [LB of T] < 31 min 48 sec **Or** 10.55 ≤ [LB of D] < 10.6 **and** 31 min 48 sec < [UB of T] ≤ 31 min 48.5 sec Where 10.6 < [UB of D] ≤ 10.65 **and** 1907.5 sec ≤ [LB of T] < 1908 sec **Or** 10.55 ≤ [LB of D] < 10.6 **and** 1908 sec < [UB of T] ≤ 1908.5 sec
		P1	(dep on P1) for correct process to find one bound for speed in km per hour, eg [UB of S] = [UB of D]÷ 0.5298(61…) **or** [LB of S] = [LB of D]÷ 0.5301(38…) **OR** Correct process to convert a bound for speed in km per minute to km per hour eg [UB of S] = [UB of D]÷[LB of T] × 60 **or** [LB of S] = [LB of D]÷[UB of T] × 60 **OR** Correct process to convert a bound for speed in km per second to km per hour eg [UB of S] = [UB of D]÷[LB of T] × 60 × 60 **or** [LB of S] = [LB of D]÷[UB of T] × 60 × 60	Time used in hours Where 10.6 < [UB of D] ≤ 10.65 **and** 31 min 47.5 sec ≤ [LB of T] < 31 min 48 sec **Or** 10.55 ≤ [LB of D] < 10.6 **and** 31 min 48 sec < [UB of T] ≤ 31 min 48.5 sec Where 10.6 < [UB of D] ≤ 10.65 **and** 1907.5 sec ≤ [LB of T] < 1908 sec **Or** 10.55 ≤ [LB of D] < 10.6 **and** 1908 sec < [UB of T] ≤ 1908.5 sec
		A1	for both correct bounds from correct working, 20.099… **and** 19.900…	Figures rounded or truncated to 3 sf or better
		C1	for 20 correct to 2 significant figures as both bounds agree.	

7	Yes (supported)	P1	for a process to find the volume of 1 tank eg $\pi \times 40^2 \times 160$ (= 804247.7… or 804.2...or 256000π)	Values can be truncated or rounded
		P1	for complete process to find the volume of 4 tanks, [volume of tank] × 4 eg $\pi \times 40^2 \times 160 \times 4$ (= 3216990.8… or 3216.9... or 1024000π) **or** for process to find volume of fertiliser available per tank eg 32 × 1000 ÷ 4 (= 8000)	For this mark, [volume of tank] must come from a calculation involving π, r^2, h
		P1	for a process to find the volume of fertiliser needed for 1 tank eg [volume of tank] ÷ 101 (= 7962.8...) or 4 tanks (= 31851.3…) **OR** for a process to find volume of mixture that 32 litres of fertiliser will make eg 32000 × 101 (= 3232000) or 32 × 101 (= 3232)	For this mark, [volume of tank] must come from a calculation involving π, r^2, h or be stated as their volume.
		C1	for Yes supported by correct figures shown eg a comparable figure in the range 31.8 to 31.9 (litres) **or** in the range 31800 to 31900 with 32000 (cm^3) **or** in the range 3216 to 3217 with 3232 (litres) **or** in the range 3216000 to 3217000 with 3232000 (cm^3) **or** in the range 7958 to 7963 with 8000 (cm^3)	There are other possible pairs of values which can be used in the comparison

8	14.1	P1	for a process to find the volume of the top eg 92.8 ÷ 2.9 (= 32)	Values can be truncated or rounded
		P1	for finding total mass of P eg 92.8 + 972.8 (= 1065.6)	
		P1	for finding total volume of P eg $\frac{"1065.6"}{4.7}$ (= 226.7234)	
		P1	(dep P2) for $\frac{"32"}{[\text{total volume}]}\times100$	For this mark, [total volume] does not have to come from a correct process but is the value that the student believes is the total volume of the pyramid.
		A1	for answer in the range 14.1 to 14.2	