

# Y10 Foundation ANSWERS

## – Area and volume of shapes involving circles

Q1.

Question	Answer	Mark	Mark scheme	Additional guidance
(a)	Diameter drawn	B1	diameter drawn	Accept hand drawn, intention through centre and from edge to edge. Ruler not required but intention clear.
(b)	Segment shaded	B1	segment drawn unambiguously	Line must go edge to edge (condone extending outside the circle). Freehand acceptable. Can also draw a diameter here (as semi-circle).

Q2.

PAPER: IMA0_2F				
Question	Working	Answer	Mark	Notes
		440	2	M1 for $140 \times \pi$ or 439 A1 for 439.6 – 440

Q3.

Question	Working	Answer	Mark	Notes
*		Conclusion (supported)	4	M1 for $\pi \times 120^2$ (= 45 216 – 45 249) M1 for " $\pi \times 120^2$ " $\div$ 1800 A1 for 25.1 – 25.2 C1 ft (dep on M2) for appropriate conclusion from their figures OR M1 for $\pi \times 120^2$ (= 45 216 – 45 249) M1 for $20 \times 1800$ A1 for 36 000 and 45 216 – 45 249 C1 ft (dep on M2) for appropriate conclusion from their figures OR M1 for $\pi \times 120^2$ (= 45 216 – 45 249) M1 for " $\pi \times 120^2$ " $\div$ 20 A1 for 2260 – 2263 C1 ft (dep on M2) for appropriate conclusion from their figures OR M1 for $1800 \times 20$ M1 for $36000 \div \pi$ (=11 457 – 11465) A1 for 107(0...) C1 ft (dep on M2) for appropriate conclusion from their figures

Q4.

	Working	Answer	Mark	Notes
		6.87	4	M1 for $\pi \times 4 \times 4$ or $\pi \times 4^2$ or $\pi \times 16$ or $\pi r^2 = 50.26\dots$ M1 for ' $\pi r^2 \div 2$ ' M1 for $8 \times 4 - \pi r^2 \div 2$ A1 for 6.86 – 6.88

Q5.

PAPER: IMA0_2F				
Question	Working	Answer	Mark	Notes
*		No + reason	4	M1 for intention to find the circumference eg $140 \times \pi (=439.82\dots)$ A1 for circumference = 439 – 440  M1 (dep on previous M1) for a complete method shown that could arrive at two figures that are comparable, eg " $C \div 60 \times 12 (=87.96\dots)$ , $90 \div 12 \times 60 (=450)$ , $90 \times 60 \div C (=12.27)$ , " $C \div 90 \times 12 (=58.64\dots)$ "  C1 (dep on both M marks) for No and explanation that shows a correct comparison eg only 84 people could sit around the tables or that 13 tables are needed or that 480 cm is needed.

Q6.

Question	Working	Answer	Mark	Notes
*	$(17-2.8) \times 9.5 = 134.9$ $\pi \times (3.8 \div 2)^2 = 11.34\dots$ $134.9 - 2 \times 11.34 = 112.21$ $112.21 \div 25 = 4.488$	5	5	M1 for $(17-2.8) \times 9.5 (=134.9)$ or $17 \times 9.5 - 2.8 \times 9.5 (=161.5 - 26.6 = 134.9)$ M1 for $\pi \times (3.8 \div 2)^2 (=11.33 - 11.35)$ M1(dep on M1) for ' $134.9 - 2 \times 11.34$ ' A1 for 112 - 113 C1(dep on at least M1) for 'He needs 5 boxes' ft from candidate's calculation rounded up to the next integer.

Q7.

Question	Working	Answer	Mark	Notes
*		No (supported)	5	<p>M1 for <math>\pi \times 9 \div 2</math> (<math>=14.137\dots</math>) or <math>\pi \times 5 \div 2</math> (<math>=7.85\dots</math>)  or for <math>\pi \times 9</math> (<math>=28.27\dots</math>) or <math>\pi \times 5</math> (<math>=15.7\dots</math>)  M1 for complete method to work out perimeter:  <math>2 + 2 + (\pi \times 9 \div 2) + (\pi \times 5 \div 2)</math> (<math>=25.99\dots</math>)  M1 (dep M1) for method to find number of rolls required for their perimeter,  eg "their total perimeter" <math>\div 2.4</math> eg <math>25.99 \div 2.4</math> (<math>=10.8</math>),  "<math>47.98 \dots \div 2.4</math> (<math>=19.9</math>) or "<math>43.98 \dots \div 2.4</math> (<math>=18.3</math>)  M1 for method to work out cost eg <math>3 \times 10 + 2 \times 3.99</math> (<math>=37.98</math>),  or <math>11 \times 3.99</math> (<math>=43.89</math>); <math>20 \rightarrow 67.98</math>, <math>19 \rightarrow 63.99</math>  or for method to find how many rolls can be bought for £35 (<math>=10</math>)  C1 for a conclusion supported by fully correct answers eg 37.98  (for comparing with 35) or 10 and 10.8</p> <p>OR</p> <p>M1 for <math>\pi \times 9 \div 2</math> (<math>=14.137\dots</math>) or <math>\pi \times 5 \div 2</math> (<math>=7.85\dots</math>)  or for <math>\pi \times 9</math> (<math>=28.27\dots</math>) or <math>\pi \times 5</math> (<math>=15.7\dots</math>)  M1 for complete method to work out perimeter  eg <math>2 + 2 + (\pi \times 9 \div 2) + (\pi \times 5 \div 2)</math> (<math>=25.99\dots</math>)  M1 for a method to find how many rolls can be bought for £35  (<math>=10</math>)  M1 for a method to work out the coverage of 10 rolls  e.g. <math>10 \times 2.4</math> (<math>=24</math>)  C1 for a conclusion supported by fully correct answers  eg 25.9(<math>\dots</math>) and 24</p>

Q8.

PAPER: IMA0 2H				
Question	Working	Answer	Mark	Notes
		14.4	3	<p>M1 for <math>\pi \times 6.5^2 \times 11.5</math> (<math>=1526.42\dots</math>)  M1 (dep) for <math>\frac{1526.42\dots}{\pi \times 5.8^2}</math>  A1 for 14.4 - 14.5</p> <p>OR</p> <p>M1 for <math>\frac{5.8}{6.5}</math> or <math>\frac{6.5}{5.8}</math> or 0.89(23...) or 1.12(06896...)  M1 for <math>11.5 \div \left(\frac{5.8}{6.5}\right)^2</math> or <math>11.5 \div \left(\frac{6.5}{5.8}\right)^2</math>  A1 for 14.4 - 14.5</p>

Q9.

Paper: 5MB3F_01				
Question	Working	Answer	Mark	Notes
		77 – 77.2	4	<p>M1 for <math>\pi \times 40^2 \times 90</math> (<math>=452389\dots</math>)  M1 for "452389" – 65000 (<math>=387389\dots</math>)  M1 (dep on at least M1) for "387389..."  <math>\div (\pi \times 40^2)</math>  A1 for answer in the range 77 to 77.2  OR  M1 for <math>\pi \times 40^2</math> (<math>=5026\dots</math>)  M1 for 65000 <math>\div</math> "5026..." (<math>=12.93\dots</math>)  M1 (dep on at least M1) for 90 – "12.93"  A1 for answer in the range 77 to 77.2</p>

Q10.

	Working	Answer	Mark	Notes
		12.7	3	M1 for $3.142 \times 5 \times 5$ oe or $3.142 \times 5 \times 5 \times 'h'$ (=78.5 – 78.55) M1 for $1000 \div (3.142 \times 5 \times 5)$ A1 for 12.7 – 12.8 NB: multiples of $\pi$ acceptable for M marks

Q11.

Question	Answer	Mark	Mark scheme	Additional guidance
	155	M1	for a complete method to find the volume of the hemisphere, eg $\frac{1}{2} \times \frac{4}{3} \times \pi \times 4.2^3$ oe	If an answer in the range is seen in working and then incorrectly rounded award full marks
		A1	answer in range 155 to 155.2	

Q12.

Question	Answer	Mark	Mark scheme	Additional guidance
	48	M1	for method to use a volume formula with correct substitution for the cone, sphere or hemisphere eg $\frac{1}{3} \times \pi \times 3^2 \times 10$ or $\frac{4}{3} \times \pi \times 3^3$ or $\frac{2}{3} \times \pi \times 3^3$ oe	May work without $\pi$ or with an approximation of $\pi$ ; must use the correct radius of 3 (and 10) in substitution
		M1	for complete method to find total volume eg $\frac{1}{3} \times \pi \times 3^2 \times 10 + \frac{2}{3} \times \pi \times 3^3$	
		M1	(dep first M1) for correct partial simplification, eg $30\pi$ or $18\pi$	Must be cone or hemisphere
		A1	cao  SC B2 for answer of 264 or $264\pi$	Accept $48\pi$