

### Surface Area of 3D Shapes Mark Scheme

<b>1</b>	$\begin{aligned} \text{Area of top} &= \pi \times 3^2 = 9\pi \\ \text{Area of base} &= \pi \times 3^2 = 9\pi \\ 12 \times 6\pi &= 72\pi \end{aligned}$	[1] Correct curved surface area
	$\begin{aligned} \text{Surface Area} &= 72\pi + 9\pi + 9\pi \\ &= 90\pi \\ &= 282.74\text{cm}^2 \text{ (2 d. p.)} \end{aligned}$	[1] Correct answer
<b>2(a)</b>	$\begin{aligned} \text{Area of A} &= 78 \text{ cm}^2 \\ \text{Area of B} &= 52 \text{ cm}^2 \end{aligned}$	[1] Correct surface area
	$\text{Surface Area} = 78 + 52 = 130 \text{ cm}^2$	[1] Correct answer
<b>2(b)</b>	$(3 \times 2) \times 2 = 12$	[1] Result is the loss of two regions with area 12 shown
	$130 - 12 = 118 \text{ cm}^2$	[1] Correct answer
<b>3(a)</b>	$\begin{aligned} \text{Big cuboid} \\ (12 \times 3) \times 2 &= 72 \\ (9 \times 12) \times 2 &= 216 \\ (3 \times 9) \times 2 &= 54 \\ \text{total SA} &= 342 \text{ mm}^2 \end{aligned}$	[1] Correct surface area
	$\begin{aligned} \text{Small cuboid} \\ (3 \times e) \times 2 &= 6e \\ (1 \times e) \times 2 &= 2e \\ (3 \times 1) \times 2 &= 6 \\ \text{total SA} &= (6 + 8e) \text{ mm}^2 \end{aligned}$	[1] Correct expression for surface area
	$\text{Overlapping surface area} = (3 \times 1) \times 2 = 6$	[1] Overlapping surface area
	$\begin{aligned} \text{Total area SA of USB is } 342 + (8e + 6) - 6 &= \\ 342 + 8e \end{aligned}$	[1] Correct answer
<b>3(b)</b>	$\begin{aligned} 360 &= 342 + 8e \\ 8e &= 18 \\ e &= 2.25 \text{ mm} \end{aligned}$	[1] Correct answer
<b>4</b>	$\text{Area of base} = \pi \times 4^2 = 16\pi$	[1] Substitution into correct formula
	$\begin{aligned} \text{Area of curved surface} &= \pi Lr \\ &= \pi \times 4 \times 9 \\ &= 36\pi \end{aligned}$	[1] Area of curved surface
	$\begin{aligned} \text{Total surface area} &= 36\pi + 16\pi \\ &= 52\pi \\ &= 163.36 \text{ cm}^2 \end{aligned}$	[1] Correct answer
<b>5</b>	$\text{Surface Area} = 4 \times \pi \times 5^2 = 100\pi$	[1] Area of curved surface
	$\text{SA} = 314.16 \text{ cm}^2 \text{ (2 d. p.)}$	[1] Correct answer

Turn over ►

6	$\begin{aligned} \text{Area of triangles} &= 1/2 \times \text{base} \times \text{height} \\ &= 1/2 \times 6 \times 8 \\ &= 24 \\ 24 \times 2 &= 48 \\ \text{Area of base} &= 6 \times 11 = 66 \end{aligned}$	[1] Area of triangles and base calculated
	$\text{Slanted height} = \sqrt{73}$	[1] Use of Pythagoras to calculate slanted height
	$\begin{aligned} \text{Slanted side area} &= \sqrt{73} \times 11 = 11\sqrt{73} \\ 11\sqrt{73} \times 2 &= 22\sqrt{73} \end{aligned}$	[1] Area of slanted face
	$\begin{aligned} \text{Total Area} &= 48 + 66 + 22\sqrt{73} \\ &= 301.97 \text{ cm}^2 \end{aligned}$	[1] All areas added together for final answer
7(a)	$\begin{aligned} 2 \times \pi r^2 + \pi Dh \\ 2 \times \pi \times 5^2 + \pi \times 10 \times 4 \end{aligned}$	[1] Correct formula used
	$2 \times \pi \times 5^2 + \pi \times 10 \times 4 = 90\pi$	[1] Substitution of values with answer in terms of $\pi$
7(b)	$\begin{aligned} \text{Surface area of cylinder} - 2 \text{ cuboid faces.} \\ 90\pi - (2 \times 6 \times 1) = 270.7433 \end{aligned}$	[1] Correct surface area
	$\begin{aligned} 270.7433 + \\ 6 \times 4 \times 2 = 48 \\ 4 \times 1 \times 2 = 8 \\ 270.7433 + 48 + 8 = 326.7433 \\ 326.74 \text{ cm}^2 \text{ (2 d. p.)} \end{aligned}$	[1] Correct answer

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