Oxford Revise | Edexcel GCSE Maths Higher | Answers

Chapter 19 Area and perimeter (including circles)

Question	Answer	Extra information	Marks
19.1	$5 + 12 + 13 = 30$ $90 \div 30 = 3$, so one part of the ratio $= 3$ cm The side lengths are thus: $5 \times 3 = 15$ cm $12 \times 3 = 36$ cm $13 \times 3 = 39$ cm The two perpendicular sides must be the two shorter sides of 15 cm and 36 cm So, the area = $\frac{1}{2} \times 15 \times 36 = 270\,\text{cm}^2$	Finding one part of the ratio $= 3$ cm Finding the lengths of the sides Finding the area	1 1 1
19.2	Area $= \pi r^2$ $\pi r^2 = 25\pi$ $r^2 = 25$ $r = 5$ Circumference = $2\pi r = 2\pi \times 5 = 10\pi$ cm	$r = 5$ Correct answer	1 1
19.3	Area $= \frac{\pi r^2}{2} = \frac{\pi \times 4.5^2}{2} = 31.8\,\text{cm}^2$ Perimeter $= \frac{1}{2}\pi \times 9 + 9 = 23.1\,\text{cm}$	Area correct to 1 dp Perimeter correct to 1 dp	1 1

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Question	Answer	Extra information	Marks
19.4 (a)	$60°$	$360 \div 6$	1
19.4 (b)	Area $= \frac{1}{6} \times \pi \times 18^2 = 54\pi$ cm^2	Finding the area of the circle Dividing by 6	1 1
19.5	Diameter of largest semicircle $= 19.3 + 4.9 = 24.2$ m Perimeter $= \frac{19.3\pi}{2} + \frac{4.9\pi}{2} + \frac{24.2\pi}{2} = 76.0$ cm	Finding the circumference of one semicircle Correct formula for total perimeter Correct answer	1 1 1
19.6	Area of semicircle $= \frac{\pi r^2}{2} = \frac{\pi \times 5.5^2}{2} = 47.516...$ cm^2 Height of trapezium $= 10 - 5.5 = 4.5$ cm Area of trapezium $= \frac{1}{2} \times (11 + 7) \times 4.5 = 40.5$ cm Area of compound shape $= 88.0$ cm^2	Finding the area of the semicircle Finding the trapezium height Finding the trapezium area Correct answer	1 1 1 1
19.7	Triangle area $= \frac{1}{2} \times 12.8 \times 17.9$ Trapezium area $= \frac{1}{2}(x + 9.4) \times 12.8$ Equate the areas and solve for x. $\frac{1}{2} \times 12.8 \times 17.9 = \frac{1}{2}(x + 9.4) \times 12.8$ $17.9 = x + 9.4$ $x = 8.5$ cm	Finding the area formula of the triangle Finding the area formula for the trapezium Equating and solving	1 1 1

Question	Answer	Extra information	Marks
19.8	Shaded area = (2 × area of quarter circle) – area of the square: $2\times\frac{1}{4}\pi\times10^2-10^2$ $=100\left(\frac{\pi}{2}-1\right)\text{ cm}^2$	Attempt to find the area of a quarter circle Add areas of quarter circles and subtract the area of the square Correct answer	1 1 1
19.9 (a)	Area = $\frac{50}{360}\times\pi r^2=98.2\,\text{cm}^2$	$\pi\times15^2\times\frac{50}{360}$ Correct answer, to 1 dp Correct units	1 1 1
19.9 (b)	Arc length = $2\pi r\times\frac{50}{360}=2\pi\times15\times\frac{5}{36}=13.1\,\text{cm}$ Perimeter = $13.1+15+15=43.1$ cm	Find arc length Find perimeter Correct units	1 1 1
19.10	Perimeter = $2r+$ major arc length 90 = $2\times12+\frac{360-\theta}{360}\times\pi\times24$ Rearrange and solve for θ to give $\theta=44.873...$ To the nearest degree, $\theta=45°$	Find major arc length Use total perimeter to set up equation $360-$ angle Correct equation Correct answer	1 1 1 1 1

Question	Answer	Extra information	Marks
19.11	Let angle *BOA* = θ $\pi \times 17^2 \times \frac{\theta}{360} = 60$ $\theta = 23.790...$ Perimeter = $2\pi \times 17 \times \frac{23.790...}{360} + 2 \times 17$ $= 41.058...$ $= 41.1$ cm, to 3 sf	Attempt to use area of sector formula Solve for θ Use perimeter formula with value of θ Correct answer	1 1 1 1
19.12	Width of rectangle = radius of each circle = 5 cm Area of rectangle = $5 \times 10 = 50$ cm^2 Total area of quarter circles = $2 \times \frac{\pi(5)^2}{4} = \frac{25\pi}{2}$ Area of shaded region = $50 - \frac{25\pi}{2}$ So, $\frac{\text{Area of shaded region}}{\text{Area of rectangle}} = \frac{50 - \frac{25\pi}{2}}{50}$ $= 1 - \frac{25\pi}{100}$ $= 1 - \frac{\pi}{4}$ $= \frac{4 - \pi}{4}$	5 cm identified as width of rectangle / radius of circle Area of quarter circles and rectangle found Correct fraction (unsimplified) Fully correct	1 1 1 1

Question	Answer	Extra information	Marks
19.13	Area of triangle OAB = 25, so $\frac{1}{2}\times OA\times 5=25$ Therefore, $OA=10$, and the coordinates of A are $(10, 0)$ Gradient of $l_1=\frac{-5}{10}=-\frac{1}{2}$ Gradient of $l_2=\frac{-1}{-\frac{1}{2}}=2$, since the lines are perpendicular. $\frac{16-7}{7-a}=2$ $\Rightarrow 9=14-2a$ $2a=2$ $a=2.5$	$\frac{1}{2}\times OA\times 5$ Gradient for l_1 Gradient for l_2 Final correct answer	1 1 1 1
19.14 (a)	$168=2^3\times 3\times 7$		3
19.14 (b)	$168\times 441=\left(2^3\times 3\times 7\right)\times\left(3^2\times 7^2\right)$ $=2^3\times 3^3\times 7^3$ $=\left(2\times 3\times 7\right)^3$ $=42^3$ Thus, $n=42$	Use part a to set up 168×441 as a multiplication of the combined prime factors Correct answer	1 1