

## GCSE Maths: Exact answers with $\pi$ (Higher): answers

GCSE Maths - Standard Form, Indices and Surds - Higher - Lesson 6.6

**Answers.** Final answers to the worksheet questions. Full step-by-step solutions for every question are free at [websink.site/gcse/maths/ch06-standard-form-indices-surds/higher/exact-answers-with/](https://websink.site/gcse/maths/ch06-standard-form-indices-surds/higher/exact-answers-with/)

### Exercise 6N Exact answers with $\pi$ Non-calculator

**1** Work out the area of each circle. Give your answers in terms of  $\pi$ .

(a) radius 3 cm

**Answer:**  $9\pi \text{ cm}^2$

(b) radius 5 cm

**Answer:**  $25\pi \text{ cm}^2$

(c) radius 6 cm

**Answer:**  $36\pi \text{ cm}^2$

(d) radius 10 cm

**Answer:**  $100\pi \text{ cm}^2$

**2** Work out the circumference of each circle. Give your answers in terms of  $\pi$ .

(a) diameter 8 cm

**Answer:**  $8\pi \text{ cm}$

(b) diameter 10 cm

**Answer:**  $10\pi \text{ cm}$

(c) diameter 14 cm

**Answer:**  $14\pi \text{ cm}$

(d) diameter 20 cm

**Answer:**  $20\pi \text{ cm}$

**3** Work out each. Leave  $\pi$  in your answers.

(a)  $3\pi + 5\pi$

**Answer:**  $8\pi$

(b)  $9\pi - 4\pi$

**Answer:**  $5\pi$

(c)  $12\pi - \pi$

**Answer:**  $11\pi$

(d)  $7\pi + 2\pi$

**Answer:**  $9\pi$

**4** Work out each. Leave  $\pi$  in your answers.

(a)  $4\pi \times 3$

**Answer:**  $12\pi$

(b)  $\frac{3}{4}\pi \times 8$

**Answer:**  $6\pi$

(c)  $5\pi \times 6$

**Answer:**  $30\pi$

(d)  $6\pi \div 2$

**Answer:**  $3\pi$

(e)  $10\pi \div 4$

**Answer:**  $\frac{5}{2}\pi$

**5** Use a calculator to write each exact answer as a decimal.

(a)  $36\pi \text{ cm}^2$  (to 1 decimal place)

**Answer:**  $113.1 \text{ cm}^2$

(b)  $10\pi \text{ cm}$  (to 1 decimal place)

**Answer:**  $31.4 \text{ cm}$

(c)  $25\pi \text{ m}^2$  (to 2 decimal places)

**Answer:**  $78.54 \text{ m}^2$

**6** Work out the area of each shape. Leave  $\pi$  in your answers.

(a) a quarter circle of radius 8 cm

**Answer:**  $16\pi \text{ cm}^2$

(b) a quarter circle of radius 10 cm

**Answer:**  $25\pi \text{ cm}^2$

(c) a semicircle of radius 6 cm

**Answer:**  $18\pi \text{ cm}^2$

(d) a semicircle of radius 4 cm

**Answer:**  $8\pi \text{ cm}^2$

**7** Work out the perimeter of each shape. Leave  $\pi$  in your answers.

(a) a semicircle of radius 5 cm

**Answer:**  $(5\pi + 10) \text{ cm}$

(b) a semicircle of diameter 12 cm

**Answer:**  $(6\pi + 12) \text{ cm}$

- (c) a quarter circle of radius 8 cm

**Answer:**  $(4\pi + 16)$  cm

- 8 Work out the exact area of each shape. It is a rectangle with a semicircle on one end (the diameter of the semicircle is the width of the rectangle).

- (a) rectangle 8 cm by 5 cm

**Answer:**  $(40 + 8\pi)$  cm<sup>2</sup>

- (b) rectangle 12 cm by 7 cm

**Answer:**  $(84 + 18\pi)$  cm<sup>2</sup>

- 9 A cylindrical can has radius 3 cm and height 10 cm. Work out its volume in terms of  $\pi$ .

**Answer:**  $90\pi$  cm<sup>3</sup>

- 10 Find the radius of each circle.

- (a) area  $49\pi$  cm<sup>2</sup>

**Answer:** 7 cm

- (b) area  $100\pi$  cm<sup>2</sup>

**Answer:** 10 cm

- (c) circumference  $14\pi$  cm

**Answer:** 7 cm

- (d) circumference  $30\pi$  cm

**Answer:** 15 cm

- 11 A circular running track has an outer radius of 10 m and an inner radius of 6 m. Work out the exact area of the track.

**Answer:**  $64\pi$  m<sup>2</sup>

- 12 Is the fraction  $22/7$  equal to  $\pi$ ? Explain your answer.

**Answer:** No.  $22/7 = 3.142857...$  but  $\pi = 3.141592....$   $\pi$  cannot be written exactly as a fraction, so  $22/7$  is only an approximation.

- 13 Sam says the area of a circle with radius 6 cm is  $12\pi$  cm<sup>2</sup>. Explain his mistake and give the correct exact area.

**Answer:** He doubled 6 instead of squaring it. The correct area is  $36\pi$  cm<sup>2</sup>.

- 14 Show that the area of a semicircle with diameter 10 cm is  $12.5\pi$  cm<sup>2</sup>.

**Answer:**  $25\pi/2 = 12.5\pi$  cm<sup>2</sup>

- 15 Circle A has radius 2 cm and circle B has radius 6 cm. Show that the area of B is 9 times the area of A.

**Answer:** A:  $4\pi$ . B:  $36\pi$ .  $36\pi \div 4\pi = 9$ .

- 16 Work out the exact area of each circle.

(a) radius  $\sqrt{7}$  cm

**Answer:**  $7\pi \text{ cm}^2$

(b) radius  $2\sqrt{3}$  cm

**Answer:**  $12\pi \text{ cm}^2$

(c) radius  $3\sqrt{2}$  cm

**Answer:**  $18\pi \text{ cm}^2$

(d) radius  $\sqrt{5}$  cm

**Answer:**  $5\pi \text{ cm}^2$

**17** The area of a circle is  $20\pi \text{ cm}^2$ . Find its radius as a simplified surd. Then work out its exact circumference.

(a) radius

**Answer:**  $2\sqrt{5}$  cm

(b) circumference

**Answer:**  $4\pi\sqrt{5}$  cm