Year 9 Circles, Area and Volume – Mixed Practice

ANSWER KEY HappyKids.fit

Answers and worked solutions · 30 questions

A. Mixed practice (mixed order)

1. 1808.64 cm^3

$V = \pi r^2 h$; cross-section $3.14 \times 8^2 = 200.96$ cm^2

Volume: $200.96 \times 9 = 1808.64$ cm^3

2. 5π m

$C = 2\pi r = \pi d$

$= \pi \times 5 = 5\pi$ m

3. 49π cm^2

$r = 14 \div 2 = 7$ cm

$A = \pi r^2 = \pi \times 7^2 = 49\pi$ cm^2

4. 4 planes of symmetry

A plane of symmetry cuts the solid into two halves that are mirror images

triangular prism whose ends are equilateral triangles: 4

5. 200.96 m^2

$r = 16 \div 2 = 8$ m

$A = \pi r^2 = 3.14 \times 64 = 200.96$ m^2

6. 7500 grams

1 kilogram = 1000 grams

$7.5 \times 1000 = 7500$ grams

7. area 226.08 cm^2; perimeter 61.68 cm

r = 12 cm; area = $\frac{1}{2} \times 3.14 \times 12^2 = 226.08$ cm^2

Curved edge = $\frac{1}{2} \times 3.14 \times 24 = 37.68$ cm

Perimeter = 37.68 + 24 (the diameter) = 61.68 cm

8. 99π m^3

$V = \pi r^2 h$

$= \pi \times 3^2 \times 11$

$= 99\pi$ m^3

9. 24π m

$C = 2\pi r = \pi d$

$= 2 \times \pi \times 12 = 24\pi$ m

10. 100π mm^2

$2\pi r = 20\pi$, so r = 10 mm

$A = \pi r^2 = \pi \times 10^2$

$= 100\pi$ mm^2

11. 400 cm^2

Base: $10 \times 10 = 100$ cm^2
Four triangles: $4 \times ½ \times 10 \times 15 = 300$ cm^2
Total: 400 cm^2

12. 102 m^2

Rectangle $12 \times 6 = 72$ m^2; triangle $½ \times 12 \times 5 = 30$ m^2
Total: 102 m^2

13. 4 cm

Volume = area of cross-section × length
Length = $96 \div 24 = 4$ cm

14. 251.2 cm^2

Unrolled, the label is a rectangle: $2\pi r$ by h
Length $2 \times 3.14 \times 5 = 31.4$ cm
Area $31.4 \times 8 = 251.2$ cm^2

15. 1 m^2 = 100 cm × 100 cm = 10 000 cm^2, so 6 m^2 = 60 000 cm^2.

Error: an area needs the length factor twice
1 $m^2 = 100 \times 100 = 10\,000$ cm^2
$6 \times 10\,000 = 60\,000$ cm^2

16. 200.96 cm^2

$A = \pi r^2$
$= 3.14 \times 8^2 = 3.14 \times 64 = 200.96$ cm^2

17. 77.86 cm^2

Square $9 \times 9 = 81$ cm^2; quarter circle $¼ \times 3.14 \times 2^2 = 3.14$ cm^2
Left: $81 - 3.14 = 77.86$ cm^2

18. infinitely many planes of symmetry

A plane of symmetry cuts the solid into two halves that are mirror images
cylinder: infinitely many

19. 16π mm^2

$2\pi r = 8\pi$, so $r = 4$ mm
$A = \pi r^2 = \pi \times 4^2$
$= 16\pi$ mm^2

20. 14π m

$C = 2\pi r = \pi d$
$= \pi \times 14 = 14\pi$ m

21. Yes. A cube has 9 planes; that cuboid has only 3.

Test an example
A cube has 9 planes; that cuboid has only 3.
Decide

22. 301.44 litres

$V = 3.14 \times 40^2 \times 60 = 301\,440\ cm^3$

$301\,440 \div 1000 = 301.44$ litres

23. volume 681.7 cm^3 (estimate 540 cm^3)

Estimate: $3 \times 6^2 \times 5 = 540\ cm^3$

$3.14 \times 6.4^2 \times 5.3 = 681.65632 = 681.7\ cm^3$ (1 d.p.)

24. 96 cm^2

Edge = $\sqrt[3]{64} = 4$ cm

One face: $4 \times 4 = 16\ cm^2$

Six faces: $6 \times 16 = 96\ cm^2$

25. area 100.48 cm^2; perimeter 41.12 cm

$r = 8$ cm; area = $\frac{1}{2} \times 3.14 \times 8^2 = 100.48\ cm^2$

Curved edge = $\frac{1}{2} \times 3.14 \times 16 = 25.12$ cm

Perimeter = 25.12 + 16 (the diameter) = 41.12 cm

26. 875 buckets

3.5 kL = 3500 litres

$3500 \div 4 = 875$ buckets

27. 12 cm

$V = \pi r^2 h$

$48\pi = \pi \times 4 \times h$

$h = 48 \div 4 = 12$ cm

28. 25 000 kilolitres

1 megalitre = 1000 kilolitres

$25 \times 1000 = 25\,000$ kilolitres

29. 1360 cm^3

Cross-section: $\frac{1}{2} \times (8 + 12) \times 8 = 80\ cm^2$

Volume: $80 \times 17 = 1360\ cm^3$

30. The formula uses the radius: r = 9 cm, so A = 3.14 × 81 = 254.34 cm^2.

Error: the diameter was used instead of the radius

$r = 18 \div 2 = 9$

$A = 3.14 \times 9^2 = 254.34\ cm^2$