

PRACTICE WORKSHEET + FULL ANSWER KEY

Geometry and trigonometry

Secondary mathematics. Work through the sections in order, or choose the one that matches this week's topic.

QUESTIONS	SECTIONS	ANSWER KEY	WORKING SPACE
52	5	At the back	Ruled

Name _____ Class _____ Date _____

Before you start

Sketch and label the shape before using a formula. Distinguish lengths, areas and volumes by their units. Trigonometric ratios connect sides to a specified angle in a right triangle.

WORKED EXAMPLE

A right triangle has legs 6 cm and 8 cm. Find its hypotenuse.

- 1 Use $c^2 = 6^2 + 8^2$.
- 2 $c^2 = 36 + 64 = 100$.
- 3 $c = 10$ cm; the hypotenuse is the longest side.

Use this method as your model. Set out your own working the same way.

Common mistakes to avoid

- Mixing perimeter and area
- Identifying opposite and adjacent sides without choosing the angle

There are 52 questions across 5 sections. Write in the ruled space, then mark your work against the answer key at the back. Topics covered: Angles, Area and volume, Right triangles.

SECTION A Angles and polygons

Sketch and label the diagram before using any angle fact.

- 1 Two angles in a triangle are 55 and 65 degrees. Find the third.

- 2 Find the angle supplementary to 118 degrees.

- 3 Find the angle complementary to 37 degrees.

- 4 Angles on a straight line are $3x$ and $2x$. Find x .

5 Find the sum of the interior angles of a hexagon.

6 Find one interior angle of a regular pentagon.

7 Find one exterior angle of a regular octagon.

8 Two parallel lines are cut by a transversal and one angle is 74 degrees. Find its co-interior angle.

9 State what vertically opposite angles have in common.

10 The angles of a quadrilateral are 90, 85, 115 and x . Find x .

11 Explain why the exterior angles of any polygon add to 360 degrees.

SECTION B Perimeter, area and volume

Distinguish lengths, areas and volumes by their units before you start.

12 Find the area of a triangle with base 10 cm and height 7 cm.

13 Find the area of a parallelogram with base 12 cm and height 5 cm.

14 Find the area of a trapezium with parallel sides 6 cm and 10 cm and height 4 cm.

15 Find the circumference of a circle with radius 4 cm, in terms of π .

16 Find the area of a circle with radius 4 cm, in terms of π .

17 A cuboid measures 3 cm by 4 cm by 5 cm. Find its volume.

18 Find the surface area of that cuboid.

19 Find the volume of a cylinder with radius 3 cm and height 10 cm, in terms of π .

20 A square has perimeter 36 cm. Find its area.

21 A rectangle has area 48 cm² and width 6 cm. Find its perimeter.

22 Explain the difference between perimeter and area, including their units.

SECTION C Pythagoras and right triangles

The hypotenuse is opposite the right angle and is always the longest side.

- 23 A right triangle has legs 6 cm and 8 cm. Find its hypotenuse.

- 24 A right triangle has legs 5 cm and 12 cm. Find its hypotenuse.

- 25 A right triangle has hypotenuse 25 cm and one leg 7 cm. Find the other leg.

- 26 Is a triangle with sides 9, 12 and 15 right-angled? Show why.

- 27 A ladder 5 m long reaches 4 m up a wall. Find the distance of its foot from the wall.

- 28 Find the diagonal of a 6 cm by 8 cm rectangle.

- 29 Find the exact diagonal of a square of side 5 cm.

- 30 A right triangle has legs 2 cm and 3 cm. Give the hypotenuse in surd form.

- 31 In a right triangle, opposite = 3 and hypotenuse = 5 for angle A. Find $\sin A$.

- 32 For that same triangle, find $\cos A$ and $\tan A$.

SECTION D Trigonometry

Label opposite, adjacent and hypotenuse relative to the angle you are using.

- 33 State the exact value of $\sin(30 \text{ degrees})$.

- 34 State the exact value of $\cos(30 \text{ degrees})$.

- 35 State the exact value of $\tan(60 \text{ degrees})$.

- 36 A right triangle has hypotenuse 10 cm and an angle of 30 degrees. Find the opposite side.

- 37 A right triangle has adjacent side 8 cm and angle 45 degrees. Find the opposite side.

- 38 Find angle A when $\sin A = 0.5$, for A between 0 and 90 degrees.

- 39 A ramp rises 1.5 m over 6 m horizontally. Find the angle of elevation, to 1 decimal place.

- 40 State which ratio to use when you know the opposite side and the hypotenuse.

- 41 A tree casts a 12 m shadow when the sun is at 40 degrees. Find its height, to the nearest metre.

- 42 Explain why sides must be labelled relative to a chosen angle.

SECTION E Similarity, transformations and reasoning

A scale factor for length is not the scale factor for area or volume.

- 43 Similar triangles have a length scale factor of 3. State the area scale factor.

- 44 Two similar solids have a length scale factor of 2. State the volume scale factor.

- 45 A 6 cm by 4 cm photo is enlarged by scale factor 2.5. Find the new dimensions.

- 46 In similar triangles, a 4 cm side corresponds to 10 cm. Find the side corresponding to 6 cm.

- 47 Describe the transformation from (2, 3) to (2, -3).

- 48 Describe the transformation from (2, 3) to (5, 3).

- 49 State the image of (4, 1) after a rotation of 180 degrees about the origin.

- 50 State one property preserved by a rotation.

- 51 Explain the difference between congruent and similar shapes.

- 52 A map scale is 1:25,000. What ground distance does 6 cm represent?

Answer key

Work each section before you check it. These are model answers: an equivalent method, or a different well-supported interpretation, can be just as correct.

SECTION A - ANGLES AND POLYGONS

1. 60 degrees.
2. 62 degrees.
3. 53 degrees.
4. $x = 36$ degrees.
5. 720 degrees.
6. 108 degrees.
7. 45 degrees.
8. 106 degrees.
9. They are equal.
10. 70 degrees.
11. Walking once around the shape turns you through one complete rotation.

SECTION B - PERIMETER, AREA AND VOLUME

12. 35 square cm.
13. 60 square cm.
14. 32 square cm.
15. 8π cm.
16. 16π cm².
17. 60 cubic cm.
18. 94 square cm.
19. 90π cm³.
20. 81 square cm.
21. 28 cm.
22. Perimeter is the distance around a shape, in centimetres; area is the space inside, in square centimetres.

SECTION C - PYTHAGORAS AND RIGHT TRIANGLES

23. 10 cm.
24. 13 cm.
25. 24 cm.
26. Yes; $9^2 + 12^2 = 81 + 144 = 225 = 15^2$.
27. 3 m.
28. 10 cm.
29. $5\sqrt{2}$ cm.
30. $\sqrt{13}$ cm.
31. $3/5$.
32. $\cos A = 4/5$ and $\tan A = 3/4$.

SECTION D - TRIGONOMETRY

33. $1/2$.
34. $\sqrt{3}/2$.

35. $\sqrt{3}$.
36. 5 cm.
37. 8 cm.
38. 30 degrees.
39. About 14.0 degrees.
40. Sine, because $\sin = \text{opposite} / \text{hypotenuse}$.
41. About 10 m.
42. Opposite and adjacent swap places depending on which angle is used, so the ratio would be wrong.

SECTION E - SIMILARITY, TRANSFORMATIONS AND REASONING

43. 9.
44. 8.
45. 15 cm by 10 cm.
46. 15 cm.
47. A reflection in the x-axis.
48. A translation 3 units to the right.
49. $(-4, -1)$.
50. Lengths and angles; the image is congruent to the object.
51. Congruent shapes are identical in size and shape; similar shapes have the same shape with proportional sides.
52. 150,000 cm, which is 1.5 km.

Review and next steps

Mark your work against the answer key, record your score for each section, then answer the three questions below. Bring this page to your next lesson so your tutor can start from what actually blocked you.

Which question did you find hardest, and what exactly stopped you?

Rewrite the corrected working for that question here.

Which section do you want to practise again before your next lesson?

Score record

SECTION	QUESTIONS	NUMBER CORRECT	PRACTISE AGAIN?
A. Angles and polygons	11		
B. Perimeter, area and volume	11		
C. Pythagoras and right triangles	10		
D. Trigonometry	10		
E. Similarity, transformations and reasoning	10		
Total	52		

Keep going with one-to-one support.

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