Name & Surname: _____ Class: _____ Date: _____

TRAPEZIUM AREA EXPLORER

Turn two trapezia into one rule.

About 45 minutes Level ★★★☆☆

AREA OF A TRAPEZIUM

A trapezium is a quadrilateral with exactly one pair of **parallel sides**. The **perpendicular height** is measured at right angles between them.

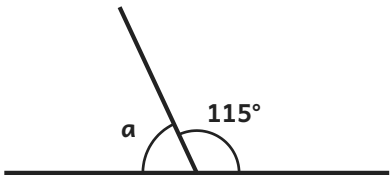
- Add the two parallel sides: $a + b$
- Halve the total, then multiply by height h: $A = \frac{1}{2} \times (a + b) \times h$
- Give area in square units, e.g. cm^2. Do not use the slant side for h.

TASK A

/4

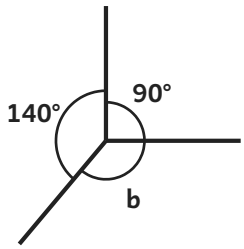
Find the missing angle in each diagram.

1



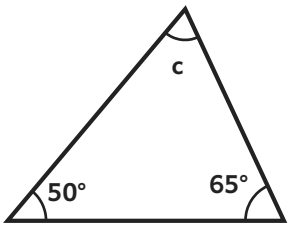
a = _____ °

2



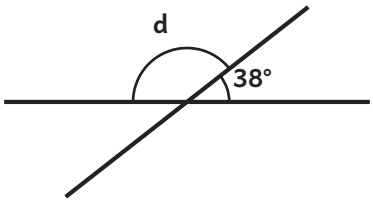
b = _____ °

3



c = _____ °

4



d = _____ °

The diagrams are drawn to size.

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FIRST AREA PRACTICE

Practise the formula with straightforward trapezia.

TASK B

/12

Work out each area. Write the formula before you calculate.

WARM UP

1. A trapezium has **parallel sides** 6 cm and 10 cm and **perpendicular height** 4 cm. Work out its **area**.

Answer: _____

2. A trapezium has **parallel sides** 8 cm and 12 cm and height 5 cm. Work out its **area**.

Answer: _____

3. Find the **area** of a trapezium with **parallel sides** 9 cm and 15 cm and height 6 cm.

Answer: _____

4. Find the **area** of a trapezium with **parallel sides** 5 cm and 9 cm and height 6 cm.

Answer: _____

PRACTISE

5. Find the **area** of a trapezium with **parallel sides** 4.5 cm and 7.5 cm and height 8 cm.

Answer: _____

6. A tile is a trapezium with **parallel sides** 7 mm and 9 mm and height 5 mm. Work out its **area**.

Answer: _____

7. A trapezium has **parallel sides** 12 m and 8 m and height 3 m. Work out its **area**.

Answer: _____

8. A student uses the slant side for h. **Explain** why this **mistake** gives too big an answer.

Answer: _____

PROBLEM SOLVING

9. A garden bed is a trapezium with **parallel sides** 10 m and 16 m and height 7 m. Work out its **area**.

Answer: _____

10. A floor tile is a trapezium with **parallel sides** 15 cm and 20 cm and height 10 cm. Work out its **area**.

Answer: _____

11. A trapezium has **area** 60 cm^2 and **parallel sides** 7 cm and 13 cm. Find its **perpendicular height**.

Answer: _____

12. Two congruent trapezia make a parallelogram with base 18 cm and height 4 cm. **Explain** how you know the **area** of one trapezium.

Answer: _____

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MISSING SIDES SOLVED

Find missing sides and solve trickier problems.

KEY WORDS

trapezium: quadrilateral with one pair of parallel sides

perpendicular height: distance between parallel sides at right angles

average: sum divided by how many there are

parallel: lines that stay the same distance apart

area: amount of flat space inside a shape

TASK C

/12

Solve these trickier problems. Beware the slant side.

WARM UP

1 A trapezium has **parallel sides** 10 cm and 20 cm and height 12 cm. The slant side is 13 cm. Work out its **area**.

Answer: _____

2 Find the **area** of a trapezium with **parallel sides** 6 mm and 9 mm and height 3 mm.

Answer: _____

3 Find the **area** of a trapezium with **parallel sides** 7 cm and 11 cm and height 4 cm.

Answer: _____

4 Find the **area** of a trapezium with **parallel sides** 9 cm and 5 cm and height 4 cm.

Answer: _____

PRACTISE

5 A trapezium has **area** 84 cm^2, height 7 cm and one **parallel side** 10 cm. Find the other side.

Answer: _____

6 A trapezium has **area** 42 cm^2, height 6 cm and one **parallel side** 5 cm. Find the other side.

Answer: _____

7 A trapezium has **area** 48 cm^2 and **parallel sides** 15 cm and 9 cm. Find its height.

Answer: _____

8 Student A works out $\frac{1}{2} \times (6 + 10 + 4)$. **Explain** the **mistake**.

Answer: _____

PROBLEM SOLVING

9 A compound shape is a rectangle 12 cm by 5 cm with a trapezium on top. The trapezium has **parallel sides** 12 cm and 8 cm and height 3 cm. Work out the total **area**.

Answer: _____

10 A path is a trapezium with **parallel sides** 8 m and 5 m and height 4 m. Work out its **area**.

Answer: _____

11 A trapezium lawn has **parallel sides** 6 m and 4 m and height 3 m. Grass seed costs £3.50 per square metre. Work out the total cost.

Answer: _____

12 A parallelogram is made from two identical trapezia. **Explain** why the parallelogram **area** is double.

Answer: _____

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SPOT CORRECT METHODS

Sort methods and calculate areas from diagrams.

TASK D

Example done for you

/5

Sort each statement into correct method or common mistake.

● **correct method**: colour it blue or draw ● ▲ **common mistake**: colour it orange or draw ▲

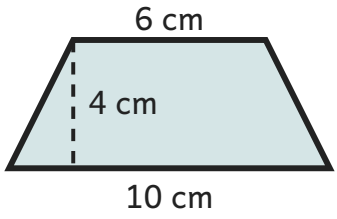
Add the **parallel sides** ●	Multiply by the **perpendicular height**	Halve to find the **average**	Use the **slant side** as height
Forget to **halve**	Add all four sides for **area**		

TASK E

/4

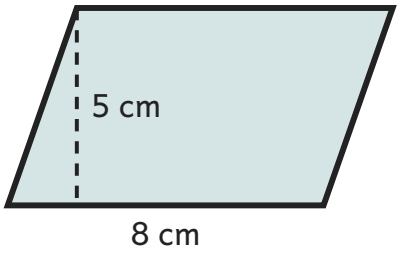
Calculate the area of each shape from its diagram.

1



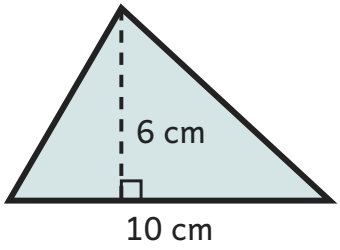
Area: _____ **cm²**

2



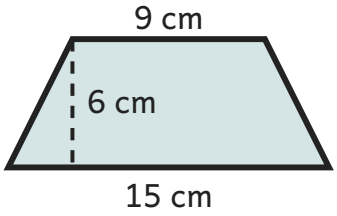
Area: _____ **cm²**

3



Area: _____ **cm²**

4



Area: _____ **cm²**

DID YOU KNOW?

Two identical trapezia always join to make a **parallelogram**. That is why the formula halves.

CHALLENGE TIME!

Can you spot three **trapezium** shapes in the classroom? Tell a partner.

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WORKED METHODS COMPARED

Follow examples then finish written calculations.

TASK F

/2

Study each example, then try its partner the same way.

WORKED EXAMPLE

Work out the area of a trapezium with parallel sides 8 cm and 12 cm and height 5 cm.

1. Add: 8 + 12 = 20
2. Halve: 20 ÷ 2 = 10
3. Multiply by height: 10 × 5 = 50 cm^2

Answer: 50 cm^2

YOUR TURN

Work out the area of a trapezium with parallel sides 6 cm and 14 cm and height 5 cm.

Answer: _____

WORKED EXAMPLE

A trapezium has area 84 cm^2, height 7 cm and one parallel side 10 cm. Find the other.

1. $84 = \frac{1}{2} \times (10 + b) \times 7$
2. $84 \div 7 = 12$, so $12 = \frac{1}{2} \times (10 + b)$
3. $24 = 10 + b$, so $b = 14$ cm

Answer: 14 cm

YOUR TURN

A trapezium has area 60 cm^2, height 6 cm and one parallel side 7 cm. Find the other.

Answer: _____

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TRAPEZIUM AREA EXPLORER

TASK G

/4

Complete these written calculations. They practise area steps.

1

		9
+	1	5

2

		2	4
×			6

3

2)	1	4	4

4

		8	4
−	1	2	

HOW DID I DO?

Circle a face for each line.

I can spot parallel sides and perpendicular height. ☹ 😐 ☺

I can use $A = \frac{1}{2} \times (a + b) \times h$. ☹ 😐 ☺

I can find a missing side from the area. ☹ 😐 ☺

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Answer sheet: Trapezium Area Explorer

Task A

a = 65° (angles on a straight line add up to 180°)
b = 130° (angles around a point add up to 360°)
c = 65° (angles in a triangle add up to 180°)
d = 142° (angles on a straight line add up to 180°)

Task B

1. 32 cm^2
2. 50 cm^2
3. 72 cm^2
4. 42 cm^2
5. 48 cm^2
6. 40 mm^2
7. 30 m^2
8. The slant side is longer than the perpendicular distance and is not at right angles, so it must not be used for h.
9. 91 m^2
10. 175 cm^2
11. 6 cm
12. The parallelogram area is 72 cm^2, so one trapezium is half of that, 36 cm^2.

Task C

1. 180 cm^2
2. 22.5 mm^2
3. 36 cm^2
4. 28 cm^2
5. 14 cm
6. 9 cm
7. 4 cm
8. Only the two parallel sides are added; the height 4 must multiply afterwards, not be added.
9. 90 cm^2
10. 26 m^2
11. £52.50
12. The parallelogram contains two copies of the same trapezium, so its area is two times one trapezium.

Task D

correct method (blue ●): Add the parallel sides, Multiply by the perpendicular height, Halve to find the average
common mistake (orange ▲): Use the slant side as height, Forget to halve, Add all four sides for area

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Task E

1. area = 32 cm^2
2. area = 40 cm^2
3. area = 30 cm^2
4. area = 72 cm^2

Task F

1. 50 cm^2
2. 13 cm

Task G

1. 9 + 15 = 24
2. 24 × 6 = 144
3. 144 ÷ 2 = 72
4. 84 − 12 = 72

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