

Here is a comprehensive exercise for Year 8 students in Queensland, covering the "Measurement and Geometry" content strand, complete with a key for the answers.

Year 8 Mathematics: Measurement and Geometry Exercise

A. Area and Perimeter

1. A rectangular garden is 15 m long and 8 m wide. Calculate its **perimeter**.
 2. Find the **area** of a triangle with a base of 10 cm and a perpendicular height of 4 cm.
 3. A composite shape is made up of a 6 cm $\times$ 4 cm rectangle and a square with side lengths of 3 cm attached to the shorter side. Calculate the total **area** of the composite shape.
 4. A parallelogram has a base of 9 m and a perpendicular height of 5 m. What is its **area**?
 5. A square has an area of 81 cm². What is its **perimeter**?
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B. Circles

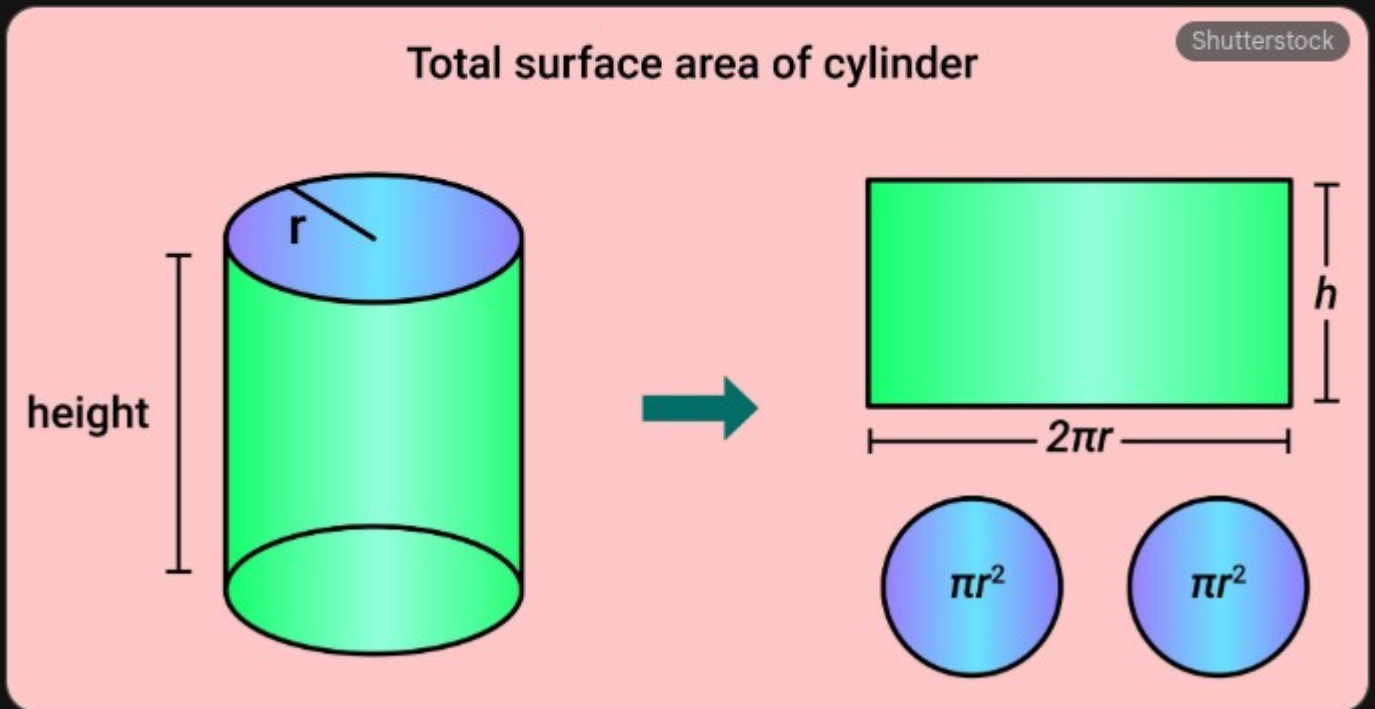
(Use $\pi \approx 3.14$ or the π button on your calculator. Round to one decimal place where necessary.)

1. A circular pool has a diameter of 6 m. Calculate the **circumference** of the pool.
 2. Find the **area** of a circle with a radius of 5 cm.
 3. The circumference of a bicycle wheel is 157 cm. What is the **radius** of the wheel?
 4. A circular tablecloth has a radius of 0.8 m. What is the area of fabric required?
 5. Calculate the **perimeter** of a semicircle (half circle) with a diameter of 10 m.
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C. Volume

1. Calculate the **volume** of a rectangular prism with a length of 5 cm, width of 4 cm, and height of 10 cm.
2. A triangular prism has a base area of 12 m^2 and a length (height) of 7 m. What is its **volume**?
3. A cylindrical water tank has a radius of 2 m and a height of 5 m. Calculate its **volume** to the nearest cubic meter. (Use $\pi \approx 3.14$).



4. A storage box is 1 m long, 50 cm wide, and 20 cm high. Calculate its **volume** in **cubic meters** (m^3).
5. What is the **capacity** (volume) of a cube with side lengths of 8 mm?

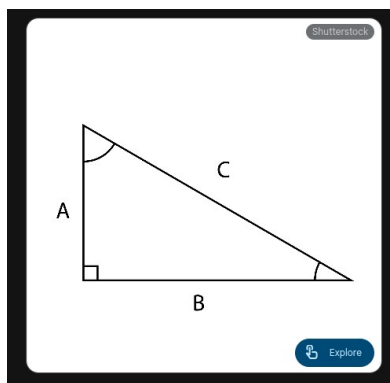
D. Time

1. A plane leaves Sydney at 08:30 (AEST, UTC+10) and arrives in Perth at 10:00 (AWST, UTC+8). What is the **actual flight duration**?
2. Convert 2.5 hours into minutes and seconds.
3. A soccer match runs from 19:30 until 21:15. What is the **duration** of the match in hours and minutes?
4. If it is 03:00 on Monday in Brisbane (AEST, UTC+10), what time and day is it in London (GMT, UTC+0)?
5. A recipe calls for 45 minutes of cooking time. If you put the food in the oven at 17:35, what time will it be finished?

E. Pythagoras' Theorem

1. A right-angled triangle has two shorter sides (legs) measuring 6 cm and 8 cm. Calculate the length of the **hypotenuse (c)**.
2. A 13 m ladder leans against a wall. The base of the ladder is 5 m away from the wall. How high up the wall does the ladder reach?
3. The hypotenuse of a right-angled triangle is $\sqrt{50}$. One of the other sides is 5 cm. Find the length of the third side.

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4. A sailing boat travels 12 km North and then 9 km East. What is the shortest distance from its starting point to its final position?
5. A TV screen is 40 inches wide and 30 inches high. Calculate the length of the **diagonal** of the screen.

F. Coordinate Geometry

1. State the coordinates of a point that is **3** units right and **2** units up from the origin **(0, 0)**.
 2. In which **quadrant** does the point $(-4, 1)$ lie?
 3. What are the coordinates of the **x**-intercept for the line passing through $(2, 4)$ and $(6, 4)$?
 4. If a point $(x, 7)$ is plotted **5** units vertically above the x -axis, what is the value of x ?
 5. Reflect the point $(-1, 5)$ across the **y-axis**. What are the new coordinates?
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G. Properties of Shapes

1. Identify the quadrilateral that has **four equal sides** but only **opposite angles are equal** (not necessarily 90°).
 2. What is the sum of the **interior angles** of any quadrilateral?
 3. If one interior angle of a parallelogram is 110° , what is the measure of the adjacent interior angle?
 4. A polygon has 5 sides. What is the sum of its interior angles?
 5. A quadrilateral has vertices at $A(1, 2)$, $B(4, 2)$, $C(4, 5)$, and $D(1, 5)$. What type of quadrilateral is this?
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H. Congruence and Similarity

1. Two triangles, $\triangle ABC$ and $\triangle XYZ$, are congruent. If side $AB = 5$ cm, what is the length of side XY ?
2. Name the four common **tests (conditions)** used to prove that two triangles are congruent.
3. If two squares have side lengths of 4 cm and 8 cm respectively, are they **congruent**, **similar**, or both?
4. Triangle PQR is similar to triangle STU . If side $PQ = 6$ cm and $ST = 12$ cm, what is the scale factor of the enlargement from $\triangle PQR$ to $\triangle STU$?
5. Two rectangles are similar. The first has a length of 10 cm and a width of 4 cm. If the second rectangle has a length of 15 cm, what is its **width**?

✓ Answers

A. Area and Perimeter

1. 46 m (Working: $2 \times (15 + 8) = 46$)
2. 20 cm^2 (Working: $\frac{1}{2} \times 10 \times 4 = 20$)
3. 33 cm^2 (Working: Area of rectangle = $6 \times 4 = 24$. Area of square = $3 \times 3 = 9$. Total Area = $24 + 9 = 33$)
4. 45 m^2 (Working: Area = base $\times$ height = $9 \times 5 = 45$)
5. 36 cm (Working: Side length = $\sqrt{81} = 9$ cm. Perimeter = $4 \times 9 = 36$)

B. Circles

1. 18.8 m (Working: $C = \pi d \approx 3.14 \times 6 = 18.84$)
2. 78.5 cm^2 (Working: $A = \pi r^2 \approx 3.14 \times 5^2 = 78.5$)
3. 25 cm (Working: $C = \pi d \rightarrow d = \frac{157}{3.14} = 50$ cm. Radius = $\frac{50}{2} = 25$ cm)
4. 2.0 m^2 (Working: $A = \pi r^2 \approx 3.14 \times 0.8^2 = 2.0096$)
5. 25.7 m (Working: Curved distance = $\frac{1}{2}\pi d \approx \frac{1}{2} \times 3.14 \times 10 = 15.7$ m. Total Perimeter = $15.7 + 10 = 25.7$ m)

C. Volume

1. 200 cm^3 (Working: $V = 5 \times 4 \times 10 = 200$)
2. 84 m^3 (Working: $V = \text{Base Area} \times \text{Length} = 12 \times 7 = 84$)
3. 63 m^3 (Working: $V = \pi r^2 h \approx 3.14 \times 2^2 \times 5 = 62.8$)
4. 0.1 m^3 (Working: Convert all units to meters: $1 \text{ m} \times 0.5 \text{ m} \times 0.2 \text{ m} = 0.1 \text{ m}^3$)
5. 512 mm^3 (Working: $V = 8^3 = 512$)

D. Time

1. 1 hour and 30 minutes (Working: Sydney is 2 hours ahead of Perth. Departure time in Perth time is $08 : 30 - 2 \text{ hours} = 06 : 30$. Flight duration is $10 : 00 - 06 : 30 = 3 \text{ hours and } 30 \text{ minutes.}$)
2. 150 minutes and 9,000 seconds (Working: $2.5 \times 60 = 150$. $150 \times 60 = 9,000$)
3. 1 hour and 45 minutes
4. 05:00 on Sunday (Working: Brisbane is UTC+10, London is UTC+0. London is 10 hours behind Brisbane. $03 : 00 \text{ Mon} - 10 \text{ hours} = 17 : 00 \text{ Sun}$)
5. 18:20 (Working: $17 : 35 + 45 \text{ mins} = 17 : 80 = 18 : 20$)

E. Pythagoras' Theorem

1. 10 cm (Working: $c^2 = 6^2 + 8^2 = 36 + 64 = 100 \rightarrow c = 10$)
2. 12 m (Working: $a^2 = c^2 - b^2 = 13^2 - 5^2 = 169 - 25 = 144 \rightarrow a = 12$)
3. 5 cm (Working: $a^2 = (\sqrt{50})^2 - 5^2 = 50 - 25 = 25 \rightarrow a = 5$)
4. 15 km (Working: $c^2 = 12^2 + 9^2 = 144 + 81 = 225 \rightarrow c = 15$)
5. 50 inches (Working: $c^2 = 40^2 + 30^2 = 1600 + 900 = 2500 \rightarrow c = 50$)

F. Coordinate Geometry

1. $(3, 2)$
2. Quadrant II
3. No x -intercept (The line is horizontal, $y = 4$, and never crosses the x -axis.)
4. x can be **any number** (The statement $y = 7$ only affects the vertical position, not the horizontal position x . The point is $(x, 7)$.)
5. $(1, 5)$

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G. Properties of Shapes

1. Rhombus
2. 360°
3. 70° (Working: Consecutive angles in a parallelogram are supplementary, meaning they add to 180° . $180^\circ - 110^\circ = 70^\circ$)
4. 540° (Working: Sum $\$ = (n-2) \times 180^\circ = (5-2) \times 180^\circ = 3 \times 180^\circ = 540^\circ$)
5. Rectangle (The sides are vertical and horizontal, and adjacent sides are perpendicular, creating four 90° angles.)

H. Congruence and Similarity

1. 5 cm (Corresponding sides of congruent shapes are equal.)
2. **SSS** (Side-Side-Side), **SAS** (Side-Angle-Side), **ASA** (Angle-Side-Angle), and **RHS** (Right-angle-Hypotenuse-Side).
3. **Similar** (All squares are similar, but they are not congruent unless their side lengths are equal.)
4. 2 (Working: $\frac{12}{6} = 2$)
5. 6 cm (Working: Scale factor $\$ = \frac{15}{10} = 1.5$. New width $\$ = 4 \times 1.5 = 6 \text{ cm}$.)