

Hello! I'd be happy to prepare the "Measurement and Geometry" exercise for your Year 7 grandchild. These problems focus on the formal geometric reasoning, angle properties, and formulas that are introduced at the start of high school mathematics in Queensland.

Year 7 Measurement and Geometry Practice

1. Geometric Reasoning (5 Problems)

1. A triangle has angles measuring 45° , 45° , and 90° . Classify this triangle by its **sides** and by its **angles**.
2. A quadrilateral has two pairs of parallel sides. Name two different quadrilaterals that fit this description.
3. If a quadrilateral is divided into two triangles by a diagonal line, what is the **sum of its interior angles**?
4. In a scalene triangle, all three side lengths are _____.
5. A regular quadrilateral has four equal sides and four equal angles. What is its special name?

2. Angle Relationships (5 Problems)

1. Two angles, a and 55° , are **complementary**. What is the size of angle a ?
2. A straight line has an angle of 180° . If two angles on the line are 110° and x , what is the value of x ?
3. In the diagram of two parallel lines cut by a transversal, the angle in the top-left position is 65° . What is the size of the angle in the bottom-left position (**corresponding angle**)?
4. The three interior angles of a triangle are y , $2y$, and $3y$. Write an equation to find the value of y .
5. If two lines intersect, and one angle is 40° , what is the size of the angle **vertically opposite** to it?

3. Area and Volume Formulas (5 Problems)

1. Calculate the **area** of a triangle with a base of 10 cm and a height of 8 cm. (Formula: $A = \frac{1}{2}bh$)
2. A rectangular prism has a length of 5 m, a width of 2 m, and a height of 3 m. Calculate its **volume** in cubic metres (m^3). (Formula: $V = l \times w \times h$)
3. A **parallelogram** has a base of 6 cm and a perpendicular height of 4 cm. What is its area?
4. The area of a rectangle is 42 cm^2 . If its width is 6 cm, what is its length?
5. A triangular prism has a triangular face (base) with an area of 15 cm^2 . If the length (height of the prism) is 12 cm, what is the volume of the prism?

4. Circles (5 Problems)

1. If the radius (r) of a circle is 7 cm, what is its **diameter** (d)?
2. The diameter of a circular swimming pool is 10 m. What is the distance from the centre of the pool to the edge?

- The **circumference** (C) is the distance around the circle. Which of these formulas uses the diameter:
(A) $C = 2\pi r$ or (B) $C = \pi d$?
- If the radius of Circle A is 3 times the radius of Circle B, how does the diameter of Circle A relate to the diameter of Circle B?
- In your own words, briefly explain the meaning of the mathematical constant **pi** (π).

5. Location and Transformation (5 Problems)

- What are the **coordinates** of the origin point on the Cartesian plane?
- A point is located at $(-2, 5)$. If this point is reflected across the **y-axis**, what are the new coordinates?
- Describe the transformation that moves a shape 4 units to the right and 2 units up.
- If you **rotate** a shape 90° clockwise about the origin, is it a rigid transformation? (Does the size and shape stay the same?).
- Plot the point $P(3, -4)$ on a Cartesian plane. In which **quadrant** (I, II, III, or IV) is this point located?

Answers

1. Geometric Reasoning

- Isosceles, Right-angled** (Isosceles because two angles are equal, meaning two sides are equal; Right-angled because one angle is 90°).
- Parallelogram** and **Rhombus** (or Square, or Rectangle).
- 360° (Since a quadrilateral can be split into two triangles, and $2 \times 180^\circ = 360^\circ$).
- Different
- A **Square**

2. Angle Relationships

- $a = 35^\circ$ ($90^\circ - 55^\circ = 35^\circ$)
- $x = 70^\circ$ ($180^\circ - 110^\circ = 70^\circ$)
- 65° (Corresponding angles are equal when lines are parallel).
- $y + 2y + 3y = 180^\circ$ (The sum of angles in a triangle is 180°).
- 40° (Vertically opposite angles are equal).

3. Area and Volume Formulas

- 40 cm^2 ($A = \frac{1}{2} \times 10 \times 8 = 40$)
- 30 m^3 ($V = 5 \times 2 \times 3 = 30$)
- 24 cm^2 ($A = b \times h = 6 \times 4 = 24$)
- 7 cm ($42 \div 6 = 7$)
- 180 cm^3 ($V = \text{Area of Base} \times \text{Length} = 15 \times 12 = 180$)

4. Circles

1. 14 cm ($d = 2r$; $2 \times 7 = 14$)
2. 5 m (The distance is the radius, $r = d \div 2$; $10 \div 2 = 5$)
3. (B) $C = \pi d$
4. The diameter of Circle A is **3 times** the diameter of Circle B.
5. Pi (π) is the ratio of a circle's **circumference** to its **diameter**. (It is the constant number you get when you divide the distance around any circle by the distance across it).

5. Location and Transformation

1. (0, 0)
2. (2, 5) (Reflecting across the y-axis changes the sign of the x-coordinate).
3. **Translation** (or a slide)
4. **Yes** (Rotation is a rigid transformation; it preserves the size and shape).
5. **Quadrant IV** (Points with a positive x-coordinate and a negative y-coordinate are in Quadrant IV).