Geometry and transformations - Practice test 1

16 questions | 47 marks | 55 minutes

Angle reasoning, enlargement, constructions and geometric algorithms, building from short calculations to explanations.

Equivalent correct methods earn the corresponding marks.

1. A triangle has angles 62° and 48°. Find its third angle. [2 marks]

$180^\circ - 62^\circ - 48^\circ = 70^\circ$.

Answer: 70°

2. A quadrilateral has angles 78°, 95° and 110°. Find the fourth angle. [2 marks]

Its interior sum is 360°.

$360^\circ - 78^\circ - 95^\circ - 110^\circ = 77^\circ$.

Answer: 77°

3. Find one interior angle of a regular pentagon. [2 marks]

The sum is $(5-2)\times 180^\circ = 540^\circ$.

Regular means five equal angles, so $540^\circ \div 5 = 108^\circ$.

Answer: 108°

4. Parallel lines are crossed by a transversal. One angle is 133°. Find the acute co-interior angle paired with it. [2 marks]

Co-interior angles in parallel lines total 180°.

$180^\circ - 133^\circ = 47^\circ$.

Answer: 47°

5. Enlarge $P(2,\ -3)$ by factor 3 from the origin. [2 marks]

Multiply both coordinates by 3.

Answer: $P'(6,\ -9)$.

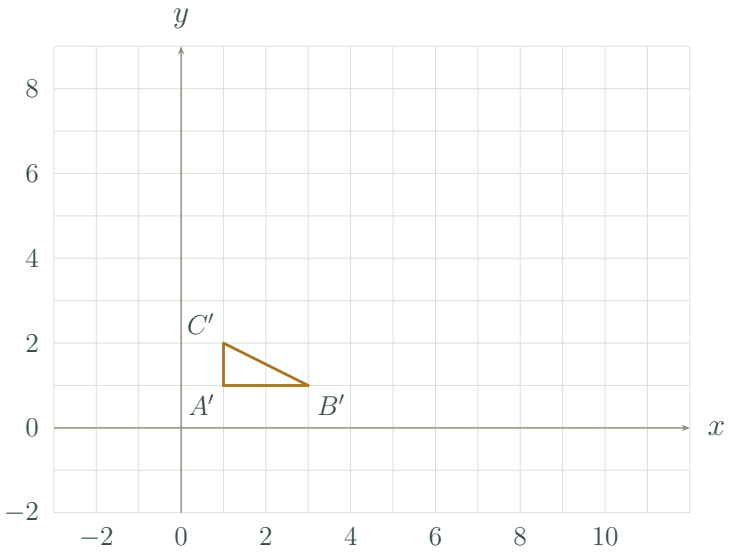
6. Enlarge $P(4, 3)$ by factor 2 from $C(1, 2)$. [3 marks]

$P - C = (3, 1)$.

Double to $(6, 2)$, then add $C = (1, 2)$ to obtain $(7, 4)$.

Answer: $P'(7, 4)$.

7. On the supplied grid, draw the image of $A(2, 2)$, $B(6, 2)$, $C(2, 4)$ under factor $\frac{1}{2}$ from the origin. [3 marks]



Halve both coordinates of each vertex.

Join matching image vertices in order.

Answer: $A'(1, 1)$, $B'(3, 1)$, $C'(1, 2)$.

8. A figure has perimeter 18 cm and area 20 cm². It is enlarged by positive factor 1.5. [4 marks]

(a) Find its new perimeter. [2 marks]

$18 \times 1.5 = 27$.

Answer: 27 cm

(b) Find its new area. [2 marks]

Area factor is $1.5^2 = 2.25$.

$20 \times 2.25 = 45$.

Answer: 45 cm²

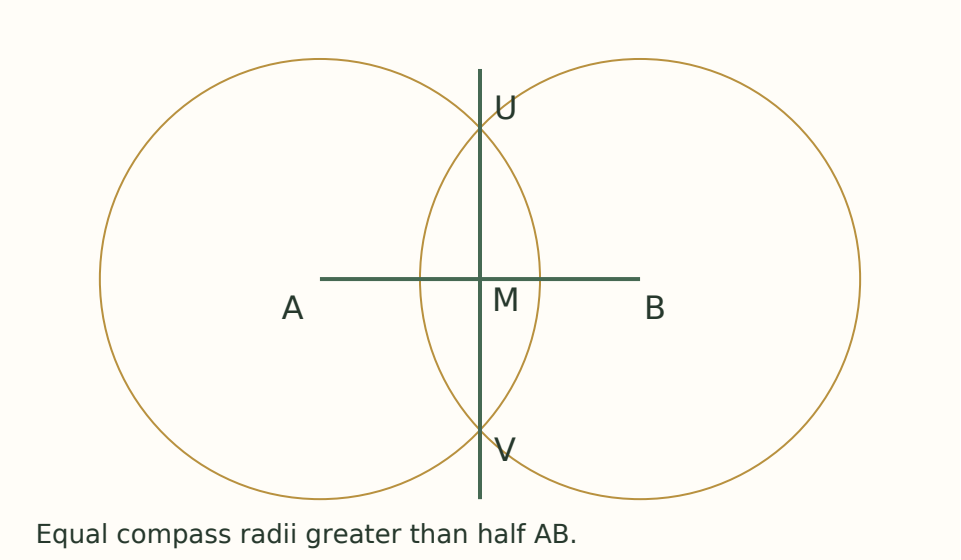
9. Name a property preserved by enlargement and one that is not generally preserved. Explain. [3 marks]

Enlargement gives a similar shape.

Lengths are multiplied by k, which need not equal 1.

Answer: Angles are preserved; side lengths are not generally preserved.

10. Draw $AB = 8$ cm and construct its perpendicular bisector. State the compass condition. [4 marks]



Equal compass radii greater than half AB.

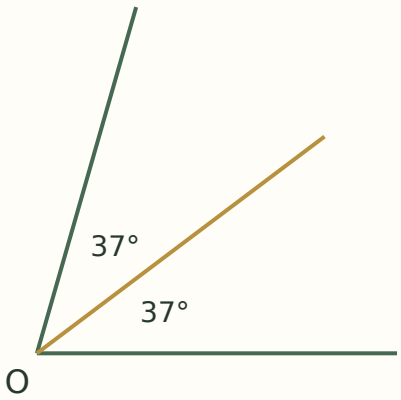
Draw equal-radius arcs from the endpoints above and below AB.

Join the two crossings.

The crossings are equally distant from A and B.

Answer: It passes through the 4 cm midpoint at 90°; use equal radii greater than 4 cm.

11. Construct the bisector of a 74° angle and state the sizes of the new angles. [3 marks]



Equal angles, each 37°. Sketch not to scale.

Mark the two arms using an arc from the vertex.

Use equal-radius arcs from those arm marks and join the internal crossing to the vertex.

$74^\circ \div 2 = 37^\circ$.

Answer: 37° and 37°.

12. Translate $P(3, 4)$ by $(1, -2)$, then enlarge by factor 2 from the origin. Find the image. [3 marks]

Translation gives $(4, 2)$.

Enlargement gives $(8, 4)$.

Answer: $(8, 4)$

13. A sorting procedure calls every quadrilateral with four equal sides a square. Give a counterexample and a sufficient extra condition. [3 marks]

Equal sides alone do not determine the angles.

Four equal sides plus a right angle establish a square.

Answer: A non-square rhombus; require a right angle as well.

14. A bisector procedure chooses radius 4 cm for a 10 cm segment. Explain the failure and repair it. [3 marks]

Two radii total 8 cm, less than the 10 cm separation.

More than half the segment length is required.

Answer: The arcs do not meet. Use the same radius greater than 5 cm at both ends.

15. An isosceles triangle has equal base angles of 62°. Find the vertex angle and give a reason. [3 marks]

Triangle angles total 180°.

$180^\circ - 62^\circ - 62^\circ = 56^\circ$.

Answer: 56°

16. A rectangular courtyard is 8 m by 5 m. A similar plan enlarges all lengths by factor 1.25. [5 marks]

(a) Find the new dimensions. [2 marks]

$8 \times 1.25 = 10$ and $5 \times 1.25 = 6.25$.

Answer: 10 m by 6.25 m

(b) Find the new area and its percentage increase. [3 marks]

Original area $= 40\ \text{m}^2$; new area $= 10 \times 6.25 = 62.5\ \text{m}^2$.

Increase $= 22.5\ \text{m}^2$; $22.5 \div 40 \times 100 = 56.25\%$.

Answer: 62.5 m²; 56.25% increase