

1. (2+2+2+2+2+2=12 points) For the following problems, no work is necessary - just give the answer.

(a) Give the definition of a circle.

(b) Give the definition of a trapezoid.

(c) Draw a figure with rotational symmetry of order 6.

(d) Determine whether the following “if... then” statement is true. Then write the converse and determine whether the converse is true.

If a figure is a parallelogram, then it is a rhombus.

(e) Describe the three steps in the teaching sequence for measurements.

(f) What is the measure of an interior angle in a regular 6-gon?

2. (3+3+3=9 points) For the following problems, mark true or false. No work is necessary.

All pentagons are convex.

True False

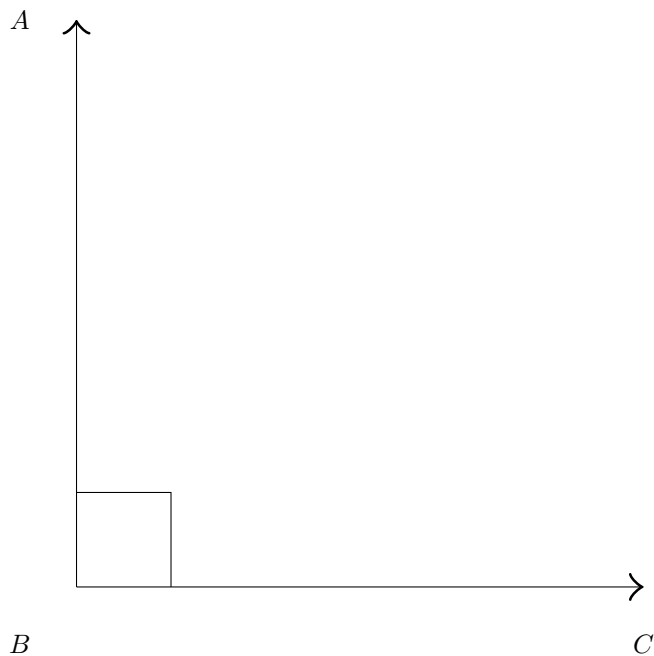
Supplementary angles add to 90° .

True False

A triangle can have two obtuse angles.

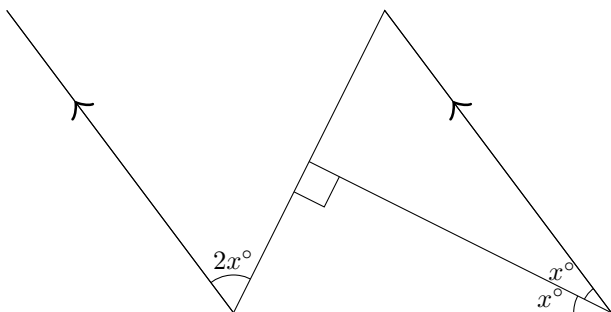
True False

3. (10 points) You are given the following 90° angle $\angle ABC$. Use a compass and straightedge to construct a 45° angle. Clearly identify your steps.

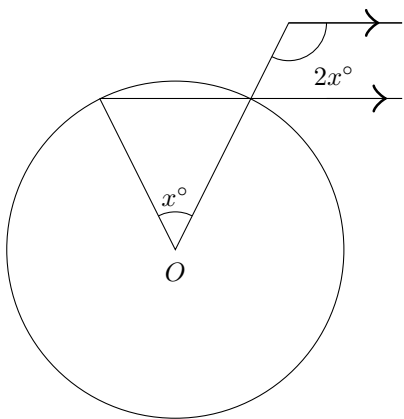


4. (6 points) Draw a clock face to represent the time at 1:20. Then find the angle between the clock hands at this time.
5. (6 points) A bucket holds 3 L 250 mL of water; 1 L 800 mL is removed from the bucket. How much water remains in the bucket?
6. (6 points) Two triangles both have internal angles 30° , 70° and 80° . They also each have one side with length 1 cm. Are the triangles necessarily congruent? If yes, prove this; if no, use a sketch to provide a counterexample.

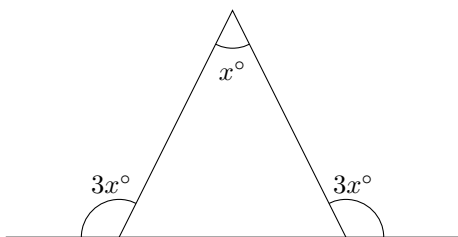
7. (12 points) Write an equation for x and solve it. Justify each step using geometric facts.



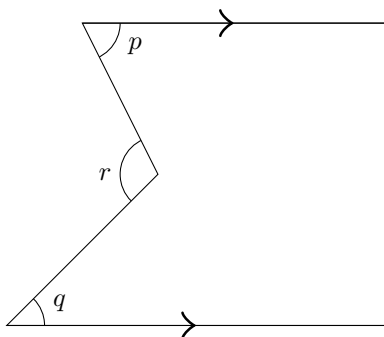
8. (12 points) Write an equation for x and solve it. Justify each step using geometric facts. You are given that O is the center of the circle.



9. (12 points) Write an equation for x and solve it. Justify each step using geometric facts.



10. (15 points) Give a careful **proof** of the following statement. Make sure to clearly identify any additional constructions you use, as well as to reference all geometric facts used.



Prove $p + q = r$.

Hint: Start by extending one of the diagonal lines to form a transversal of the pair of parallel lines.