REVIEW FOR FINAL EXAM MA13900

1. a) Draw a **regular** octagonal pyramid.
b) How many vertices does it have?
c) How many faces does it have?
d) How many edges does it have?

2. a) Draw a hexagonal prism.
b) How many vertices does it have?
c) How many faces does it have?
d) How many edges does it have?

3. A pyramid has thirteen faces.
a) Draw the pyramid
b) How many edges does it have?
c) How many vertices does it have?

4. A prism has twenty-one edges.
a) Draw the prism
b) How many vertices does it have?
c) How many faces does it have?

5. Draw **two different** nets for a regular pentagonal pyramid. (Make sure the nets belong to congruent pyramids and that all measurements are consistent)

6. Draw **two different** nets for an oblique rectangular prism. (Make sure the nets belong to congruent prisms and that all measurements are consistent)

7. a) A polyhedron has 25 vertices and 69 edges, how many faces does it have?
b) Can a polyhedron have 71 faces and 73 edges? Justify your answer.

8. Name all the regular polyhedra. Along with its name you should mention how many faces does the polyhedron have and what shape do the faces have.

9. How many non-congruent polyhedra can be formed with:
a) Three unit cubes?
b) Four unit cubes?
[I suggest drawing in isometric dot paper for this exercise]

10. Draw a concave heptagon. What is the addition of its interior angles? What is the addition of its exterior angles?

11. Draw a convex nonagon (9-sides).
a) What is the addition of its interior angles?
b) If the nonagon were equiangular what would be the measurement of one of its interior angles?
c) How many diagonals does this nonagon have?

12. Draw a regular decagon.
a) What is the addition of its interior angles?
b) What is the measurement of one of its interior angles?
c) How many diagonals does this decagon have?
d) How many lines of symmetry does this regular decagon have?
e) How many rotational symmetries does this regular decagon have? Give the angles of rotation.

13. Consider a **regular** square pyramid.
a) How many planes of symmetry does this pyramid have?
b) How many axis of rotation does this pyramid have? Describe them.
c) How many rotational symmetries does this pyramid have?

14. Consider a **regular** tetrahedron.
a) How many planes of symmetry does this tetrahedron have?
b) How many axis of rotation does this tetrahedron have? Describe them.
c) How many rotational symmetries does this tetrahedron have?

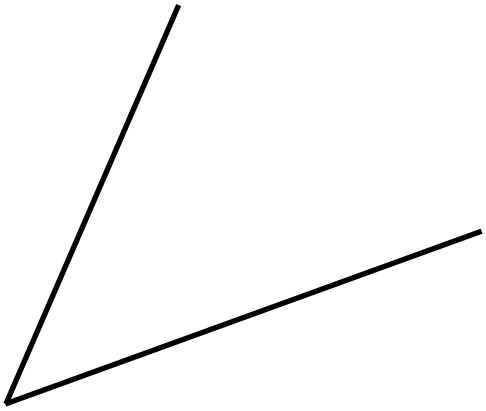
15. Consider a **right** prism whose base is a regular hexagon.
a) How many planes of symmetry does this tetrahedron have?
b) How many axis of rotation does this tetrahedron have? Describe them.
c) How many rotational symmetries does this right prism have?

16. Two spheres are given, the radius of the larger one is five times as large as the radius of the smaller one.
a) What is the volume of the larger one if the volume of the smaller one is $400m^3$?
b) What percentage of the surface area of the larger sphere is the surface area of the smaller one?
[Do NOT use the formulas for volume and surface area of the sphere. Realize that the problem can be solved without any formulas]

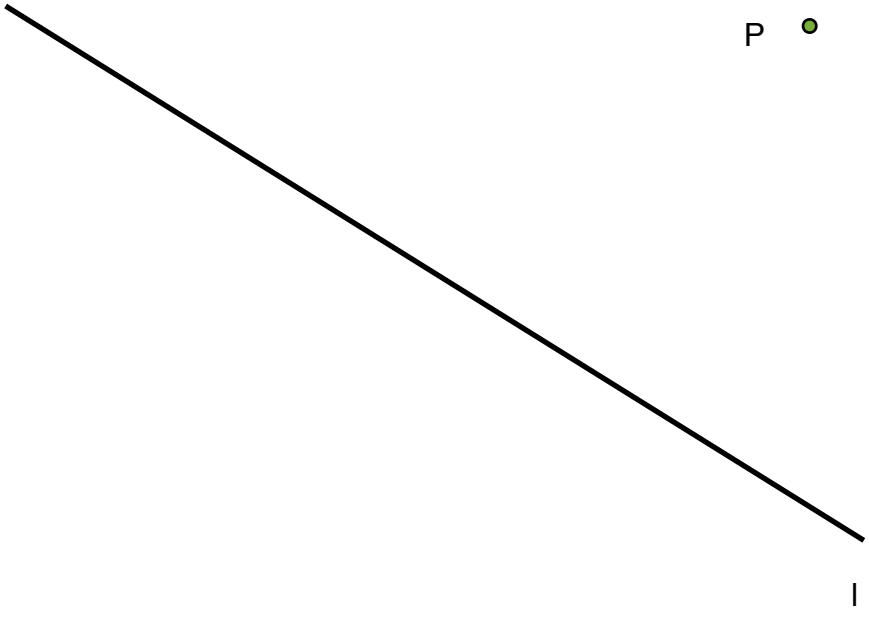
17. Fill in the blanks with either: <u>as large as</u> or <u>larger than</u>.
a)100 is 25% _____ 80
b) 15 is 300% _____ 5
c) 21 is 150% _____ 14
d) 646 is 190% _____ 340
e) 48 is 140% _____ 20

18. Fill in the blanks with the appropriate number:
a) _____ is 125% larger than 48
b) 24 is ____ as large as 36
c) 119 is 70% larger than _____
d) _____ is 250% as large as 62
e) 52 is 130% as large as _____

19. Using only straightedge and a compass bisect the angle given. Explain your steps briefly.



20. Using only a straightedge and a compass draw a line parallel to the given line l through point P. Explain your steps briefly.



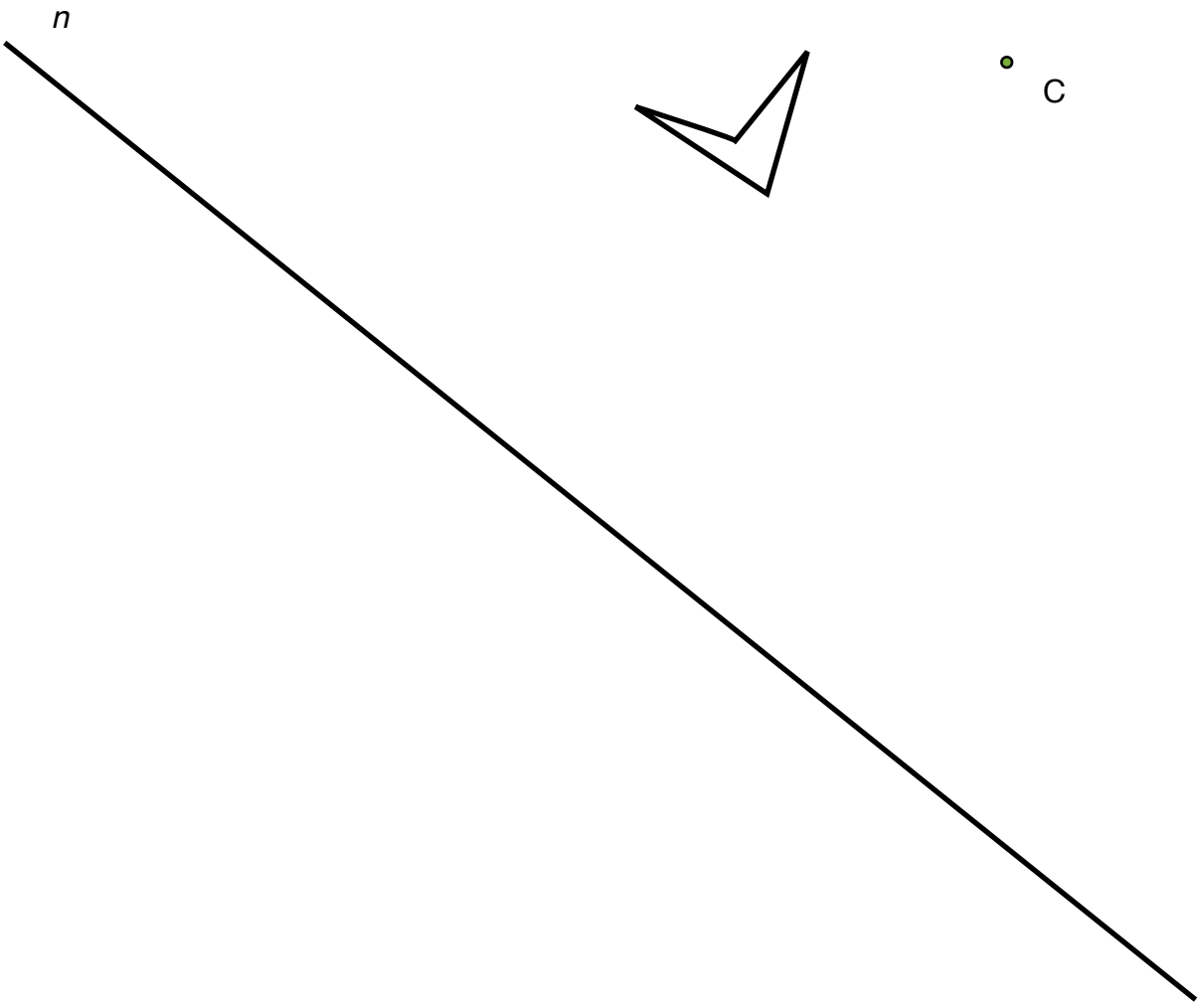
21. a) Which single rigid motions preserve orientation?
b) Which single rigid motions reverse orientation?

22. Determine if the final image has the same orientation as the original, or not, after applying the compositions:

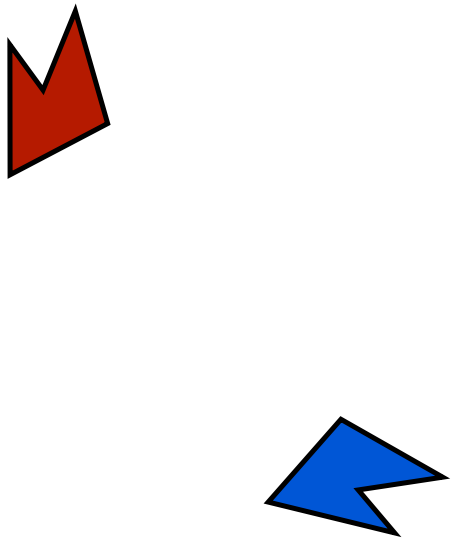
a)(Rotation 100° clockwise around center C)o(Rotation 50° clockwise around center D)
b)(Reflection on line *m*)o(Translation with vector ***w***)
c)(Translation with vector ***v***)o(Rotation 85° counterclockwise around center C)
d)(Glide-reflection with vector ***v*** and line *m*)o(Reflection on line *n*)
e)(Rotation 25° counterclockwise around center D)o(Translation with vector ***v***)o (Reflection on line *m)*
f) (Reflection on line *n*)o(Translation with vector ***w***)o(Glide reflection with vector ***v*** and line *m*)

23. Apply the following composition to quadrilateral BIRD.

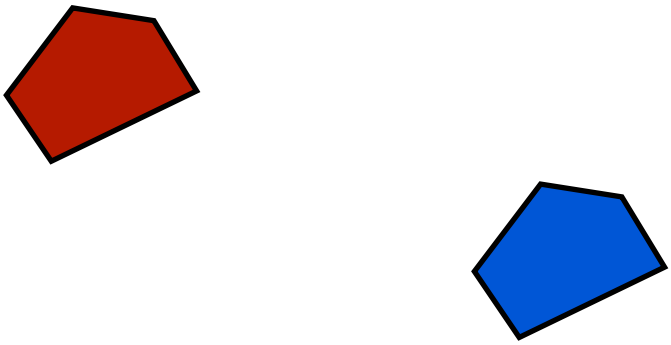
(Reflection on line *n*)o(Rotation 60° counterclockwise around center C)



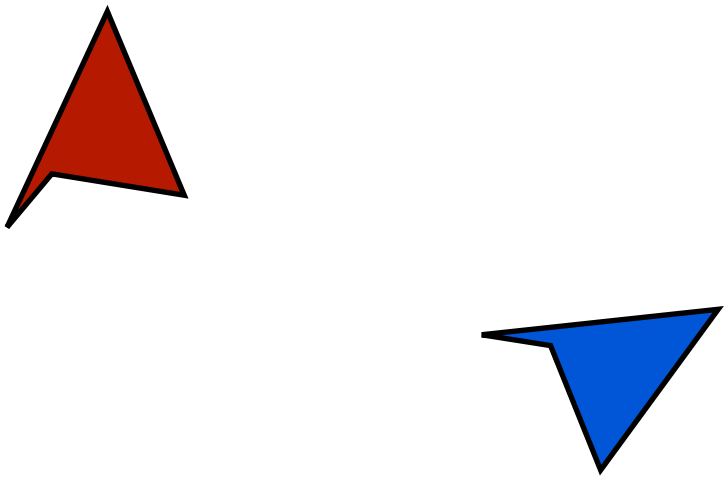
24.The original image is in Blue, the image after applying a reflection is Red. Find the reflection line.



25. The original image is in Blue, the image after applying a translation is Red. Determine the translation vector.



26. The original image is in Blue, the image after applying a rotation is Red. Find the center of rotation, the angle of rotation and the direction of rotation.



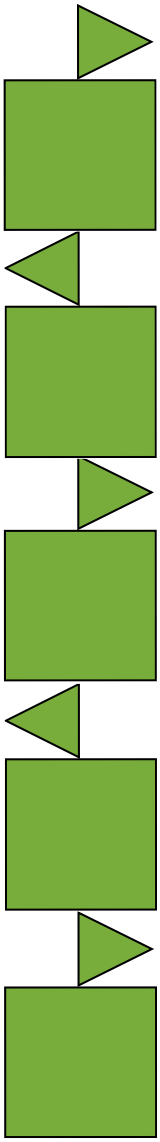
27. Describe all the symmetries the figure below has. Be as explicit and clear as possible. (The figure continues indefinitely following the same pattern)

Rotational Symmetries:

Reflection Symmetries:

Translation Symmetries:

Glide-Reflection Symmetries:



28. Determine which unit is larger in each case.

a) 3 qij = 1 kiki
b) 0.5 rof = 0.83 wak
c) 9 yal = 0.75 vay
d) 45 gur = 74 tep

29. Decides if x is greater than y, y is greater than x or if they are the same.

a) x km = y cm
b) x in = y yard
c) x mg = y g
d) x tbsp =y cups

30. Use the following data to carry out the conversions asked below:

3 fab = 5 pir 8 pir = 5 tup 4 tup = 1 arg

a) 15 pir = ____ fab
b) 6 tup = ____ pir or _____ arg
c) 10 fab = _____ tup
d) 2 arg = ____ pir

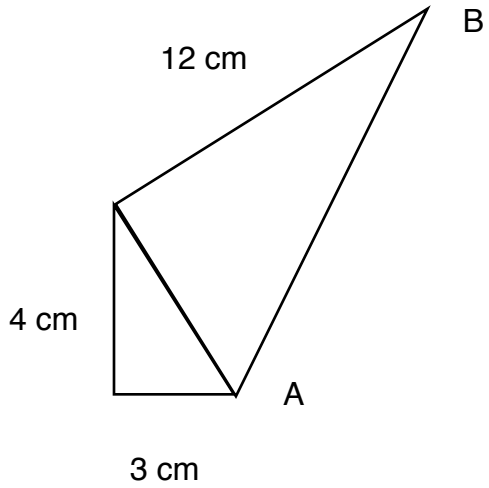
31. Carry out the following conversions:
a) 23 km = ____ m
b) 250 cm^2 = _____ m^2
c) 243 ft^3 = _____ yd^3
d) 23 ft^2 = _____ in^2

32. Tom measured the width of a rectangle with a ruler that allowed him to round answers to the nearest half inch. He measured 20.5 in.
Sara measured the length of the same rectangle with a ruler that allowed her to round answers to the nearest inch. She measured 50 in.

a) What is the smallest possible width of the rectangle? What is the smallest possible length of the rectangle?
b) What is the smallest possible perimeter of the rectangle?
c) What is the longest possible width of the rectangle? What is the longest possible length of the rectangle?
d) What is the maximum possible area of the rectangle?

33. A sphere fits snuggly inside a cylinder. The volume of the sphere is 4000 dm^3:
a) What is the volume of a cone with the same height and the same base as the cylinder?
b) Who has the biggest surface area: the cylinder or the sphere?

34. a) What is the length of AB? All angles that seem right are, in fact, right.



b) What is the area of the figure above?

35. The hypotenuse of a right triangle is 16 cm long and one of the legs is 6 cm long.
a) Find the length of the other leg.
b) Determine the area of the triangle.

36. 5 people can paint 3 rooms in 6 hours. How many rooms can 15 people paint in half a day?