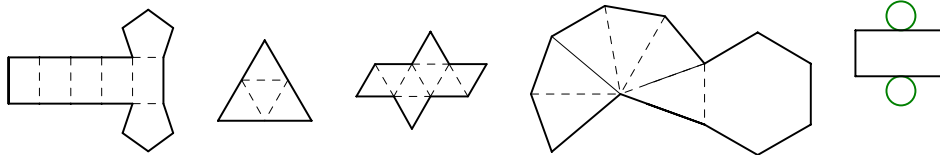


MATH 213 / E1, E2, E3 Final Review Questions, 2010

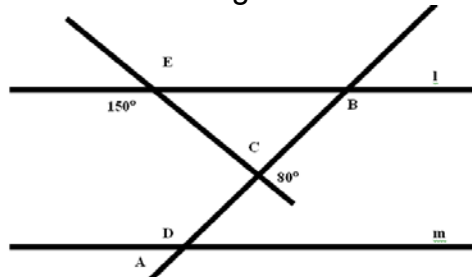
1. Sketch a **concave polygon** and explain why it is both **concave** and a **polygon**.
2. Sketch a **simple closed curve** and explain why it is both **simple** and **closed**.
3. Determine the measure of the **vertex, central and exterior angles** of a **regular heptagon, octagon and nonagon**.
4. Determine whether each figure is a regular polygon. If it is, explain why. If it is not, state which condition it does not satisfy.



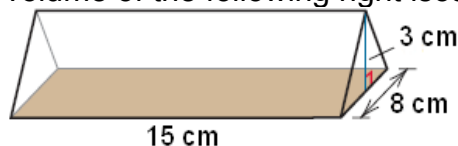
5. A prism has 69 edges. How many vertices and faces does it have?
6. A pyramid has 69 edges. How many vertices and faces does it have?
7. A prism has 24 faces. How many edges and vertices does it have?
8. A pyramid has 24 faces. How many edges and vertices does it have?
9. Which regular polygons tessellate? Explain and illustrate your answer with a sketch.
10. Sketch a pattern block figure with exactly four rotational symmetries and no lines of symmetry. List the angles of rotation.
11. Sketch a pattern block figure that is not a regular polygon, with exactly three lines of symmetry. Mark the lines and label them L1, L2 and L3
12. What are these nets for? Be exact:



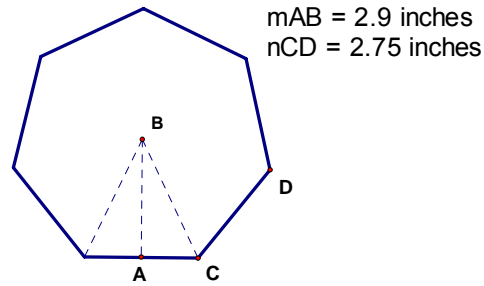
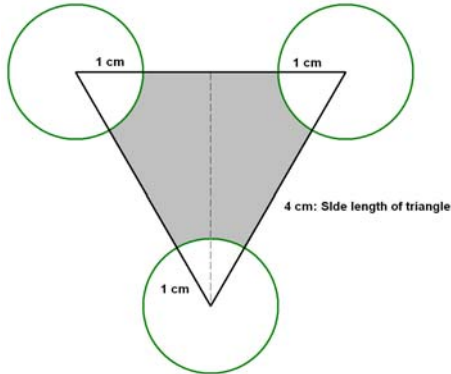
13. In the following figure, line l is parallel to line m . Given the angle measures indicated on the figure, find the measures of all of the angles. Use mathematics, not a protractor.





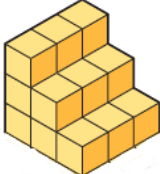
14. If you halve the length of each side of a rectangle, by what factor does the **PERIMETER** of the rectangle expand or contract? Explain briefly.
15. If you double the length of each side of a rectangular prism, by what factor does the **SURFACE AREA** of the prism expand or contract? Explain briefly.
16. If you double the radius of a sphere, by what factor does the **VOLUME** of the sphere expand or contract? Explain briefly.
17. How many **CUBIC FEET** of gravel are needed to cover a 2 yard x 3 yard area filled to 0.9 yard high?
18. If five tennis balls of diameter 6.5 cm. are packed into a cylindrical can that exactly holds the five balls (the can also has diameter 6.5 cm.); what is the volume of the **UNUSED SPACE** in the can?
19. Find the surface area and volume of the following right isosceles triangle prism,



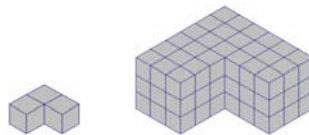
20. The following equilateral triangle has three circular regions surrounding it. What is the area of the shaded portion of the diagram?



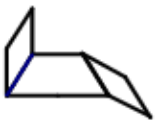
21. What is the area of the regular heptagon pictured above? Show your work. Include units.
 22. The length of each edge of each cube in the following sequence of figures is 1 cm. Determine the surface area for Figures 1, 2, 3 and Figure n, include units. Determine the volume for Figures 1, 2, 3 and Figure n, include units.

Figure 1	Figure 2	Figure 3
		

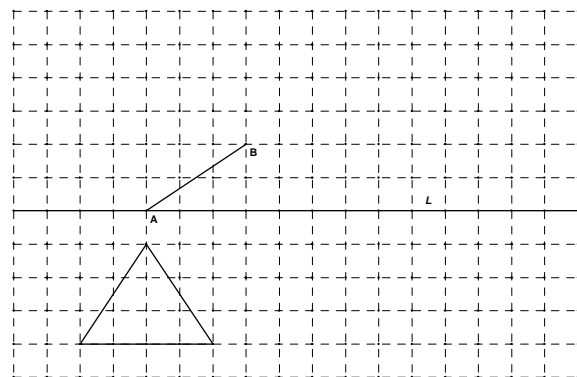
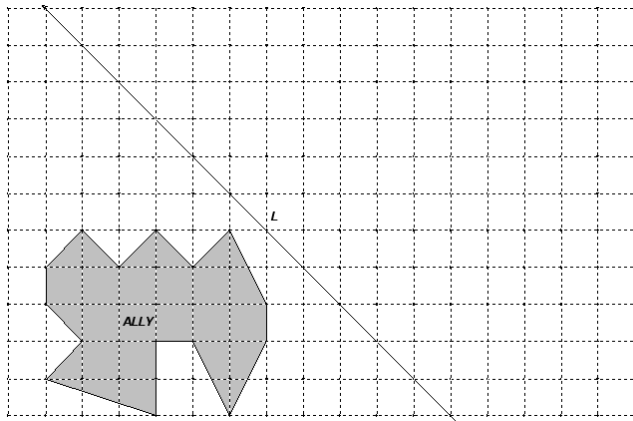
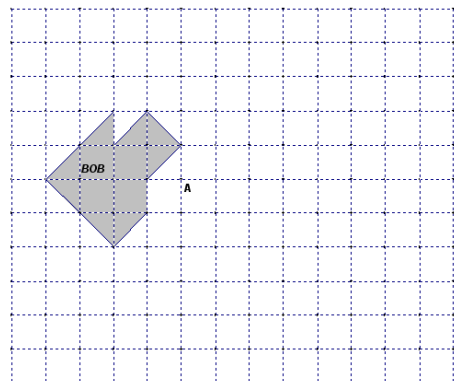
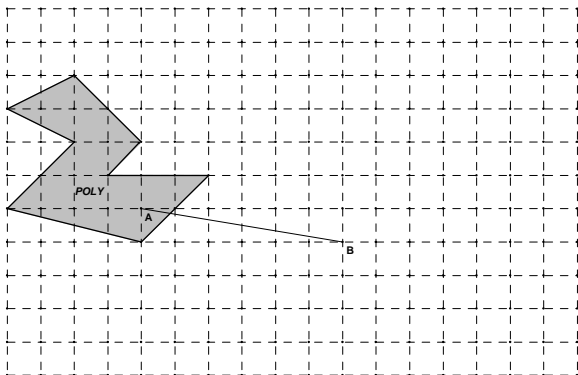
23. Lisa is buying special hardwood flooring from Germany and the cost (in US dollars) is \$1500 per bundle. Each bundle will cover 12 square meters. If Lisa wants to put the flooring in a room that is 18 feet by 20 feet, how much will the flooring cost? Note: Lisa can only buy whole bundles (e.g. she can't buy 1/2 of a bundle, etc). Show all work and conversions. Note 1 yard \approx .915 meters.
 24. The following two figures are similar. Each dimension of the larger figure is TRIPLE the corresponding dimension of the smaller figure. If this tripling of dimensions is continued, how many cubes will there be in the **FOURTH (nth)** figure? If the dimensions of the first figure are doubled rather than tripled, how many cubes would there be in the **SECOND (nth)** figure?



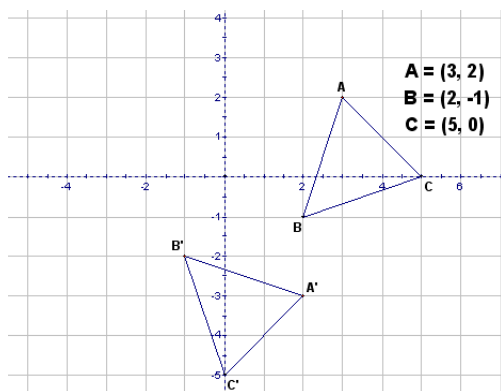
25. Julia and James just bought their first house. They are so excited they had a scale model of their new house made. The scale factor relating their model to the actual house is 75. If the length of one side of the actual house is 50 feet, how many **inches** long is the corresponding side of the model house? If the volume of the model of the house is 0.10 feet³, what is the volume of the actual house?
 26. The following figure is made using two tan parallelograms and one red trapezoid from the pattern blocks. Sketch an enlargement of the figure by a scale factor of 2. Use only tan parallelograms and red trapezoids in your enlargement. If instead you were to sketch an enlargement by a scale factor of 3 (or 4 or 5), how many tan parallelograms and how many red trapezoids would be in your figure?



27. Sketch the translated image of POLY for the mapping that maps A to B.
28. Sketch the rotated image of BOB for a 90° counterclockwise rotation about point A:
29. Sketch the reflected image of ALLY over the line L
30. Use the motion; point A to point B and line L to sketch a glide reflection of the triangle/



31. In the diagram below triangle A'B'C' is the image of triangle ABC under a rotation through 90° clockwise centered at the origin.



What are the coordinates of A', B' and C'?

Generalize the rule for this rotation, i.e., create a rule that would move any point the same way.

(x, y) is moved to the point (_____, _____)

TRUE OR FALSE QUESTIONS

32. Every equilateral triangle is isosceles.
33. A rhombus is a regular polygon.
34. Every hexagon is a regular polygon.
35. The acute angles of a right triangle are complementary.
36. The acute angles of a right triangle are supplementary.

37. If two angles are supplementary, one must be either right or obtuse.
38. Every prism has a square base.
39. A quadrilateral may have all acute angles.
40. A quadrilateral may have both a right angle and an obtuse angle.
41. A semi-regular tessellation can be made using only regular hexagons and squares.
42. Every prism has rectangular lateral faces.
43. Some scalene triangles are right triangles.
44. Every pyramid has isosceles triangles sides.
45. All quadrilaterals have at least two lines of symmetry.
46. The top of a cone is called a vertex or apex.
47. Any two regular polygons that tessellate by themselves can be used together to create a semi-regular tessellation.
48. If a polygon is concave, then it must have a reflex angle.
49. All regular polygons are convex.
50. 4 quarts = 128 ounces
51. If the area of a circle doubles, so does the radius.
52. If the surface area of two cylinders is the same, then the cylinders have the same volume.
53. A cube of with side length 10cm would fit inside of a circle with diameter 10cm.
54. 25° C is warmer than 50° F.
55. The volume of a right pyramid is 3 times the volume of a right prism with the same base and height.
56. The diagonals of a kite intersect at right angles.
57. All right triangles are similar.
58. Triangle 1 has side lengths 2 cm, 3 cm and 5 cm. Triangle 2 has side lengths 2 cm, 3 cm and 5 cm. Triangle 1 and Triangle 2 must be similar.
59. If a rectangular prism is scaled by a factor of 3, the surface area increases by a factor of 6.
60. Triangle 1 has angles 40° , 40° and 100° and Triangle 2 has angles 40° , 100° and 40° . Triangle 1 and Triangle 2 must be congruent.

(NOT TRUE/FALSE!)

61. Match the triangles into CONGRUENT or (only) SIMILAR pairs. In each case, solve for unknown values in the triangles (only as needed) and use triangle properties to show why the matched triangle pair is CONGRUENT or SIMILAR. Explain as needed. Show your work. Triangles are not to scale.

