MATH 106
EXAM 1

Name Key

Answer all questions. Choose the best answer for multiple choice questions. Answer any questions that require explanations with complete sentences. Point values are indicated. Good luck!

$(18-2)(180) = 2280 \div 18 = 160^\circ$

1. (2 points) What is the measure of ONE interior angle of a regular 18-gon?
   a) 10° b) 2880° c) 180° d) 160° e) none of these

+1

2. (2 points) The sizes of three interior angles of a quadrilateral are 85°, 45°, and 60°. What is the size of the fourth angle of the quadrilateral?
   a) 20° b) 100° c) 170° d) 200°

$360 - 85 - 45 - 60$

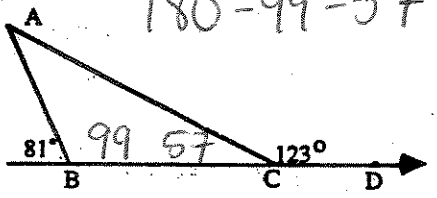
3. (2 points) An isosceles triangle has two angles, one with 40° and one with 100°. How large is the third angle?
   a) 40° b) 60° c) 100° d) 140° e) none of these

4. (2 points) What is the sum of the number of edges and the number of vertices for an octagonal pyramid?
   a) 25 b) 22 c) 9 d) 23 e) none of these

5. (2 points) The diagonals of a rectangle:
   a) meet at 90° angles
   b) bisect each other
   c) all of the above
   c) are congruent
   d) b & c

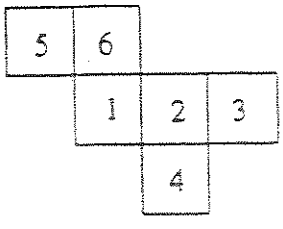
6. (2 points) Find the measure of angle A of the triangle:
   a) 156°
   b) 24°
   c) 57°
   d) 20°
   e) None of these

$180 - 99 - 57$



7. (2 points) What is the best name for a four-sided polygon with equal sides?
   a) square b) parallelogram c) rectangle d) rhombus e) kite

8. (2 points) Using the net for a cube pictured here, when folded up side 3 would be opposite which side?
   a) 1
   b) 2
   c) 4
   d) 5
   e) 6



9. (10 points) Decide if the following are true: always, sometimes, or never.

   a. A rhombus is A a parallelogram.

   b. An isosceles triangle is S a right triangle.

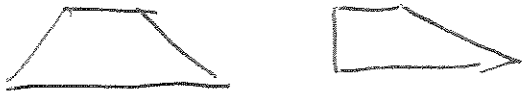
   c. An equilateral triangle is N an obtuse triangle.

   d. A square is A a quadrilateral.

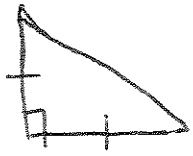
   e. A trapezoid is S a parallelogram

10. (9 points) Sketch the following if possible. If not possible, state why not.

   a. a trapezoid that is not a parallelogram



   b. a right triangle that is isosceles



   c. a rhombus that is not a kite

not possible, all rhombi have congruent adjacent sides

11. (3 points) How are the diagonals of every rectangle related?

   X. The diagonals are the same length.

   Y. The diagonals are perpendicular.

   Z. The diagonals bisect the angles of the rectangle.

(A.X only) B.Y only C. Z only D. X and Z only E. None of A-D

12. (4 points) A student states that a square cannot be a rhombus. What irrelevant characteristic(s) might she be assuming to be important? How would you help her to understand her error?

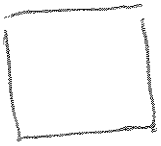
A rhombus is not required to have congruent angles, but they can have congruent angles (and thus be a square)

13. Consider the following definitions of a trapezoid: (4 points)

Definition A: A quadrilateral with at least one pair of opposite sides parallel.

Definition B: A quadrilateral with exactly one pair of opposite sides parallel.

Is it possible to draw a figure that is a trapezoid according to Definition A, but is **not** a trapezoid according to Definition B?

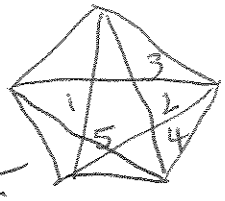


If yes, draw a figure that satisfies the conditions, and explain why your figure satisfies those conditions.
If no, explain why not.

A rectangle can be a trapezoid by definition A, but not by definition B.

14. (4 points) How many diagonals (total) does each of these polygons have?
a. a pentagon 5 b. a 103-gon 5250 (Show your work.)

(n-3)
2 at 2 = 4
(n-4)
1 at 1 = 1
5



2 at (n-3) = 2(100) = 200
1 at (n-4) = (99) = 99
1 at (n-5) = 98
1 at (n-6) = 97
+ ... + 2 at 2 + 1 at 1
= 200 + 5050
= 5250

15. (8 points) Determine which figure the following are describing:

a. I am a **polyhedron**
I have eight faces
All of my lateral faces are rectangles ← right prism
My two bases are regular polygons ← hexagon for 8-2
What am I?
right hexagonal prism

b. I am a **polygon**
I have four sides
I have two longer sides of equal length
I have two shorter sides of equal length
All of my angles are congruent
What am I?
rectangle

16. (12 points) Provide the following information.

a. An oblique hexagonal prism has 8 faces and 8 edges.

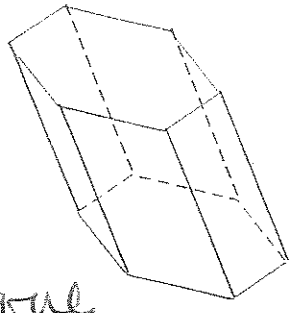
b. A rectangular pyramid has 5 faces, 8 edges, and 5 vertices.

c. A polyhedron with 18 edges and 10 vertices has 10 faces.

$18 = F + 10 - 2$

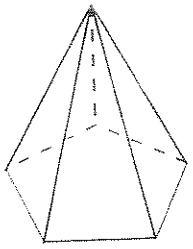
17. (12 points) Give the best name for the shape represented by . . .

a.



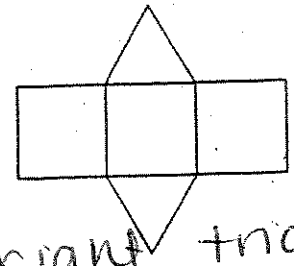
oblique hexagonal prism

b.



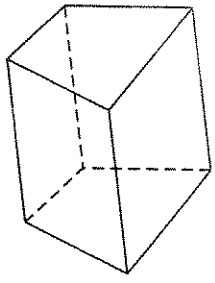
regular pentagonal pyramid

c. (a net)



right triangular prism

d.



right trapezoidal prism

18. (3 points) Which of these is true about every right rectangular prism (rectangular solid)?

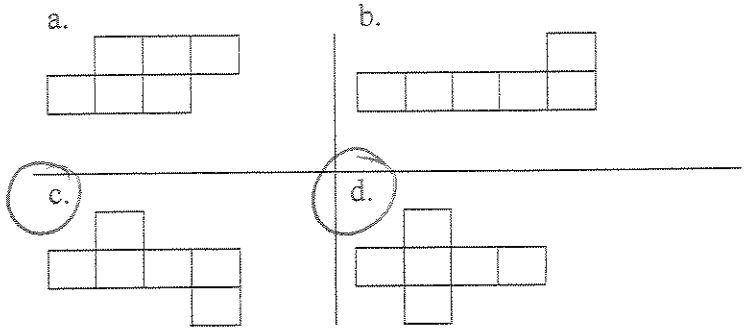
X. All the edges have the same length.

Y. All the angles on each face have the same size.

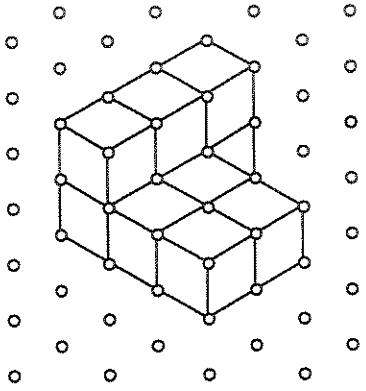
Z. Each edge is perpendicular to the edges it meets.

A. X only B. Y only C. Z only (D. Y and Z only) E. none of A-D

20. (4 points) Which of the following nets will fold up to be a cube. Circle all that apply.



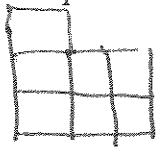
21. (6 points) Sketch the listed views for the 3-dimensional drawing shown below:



(left) Front:

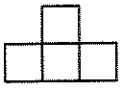
Right:

Top:



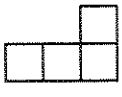
22. (6 points) On the isometric grid paper, sketch a 3D shape with the following views. Interpret "front" to be "front left," and "right" to be "front right."

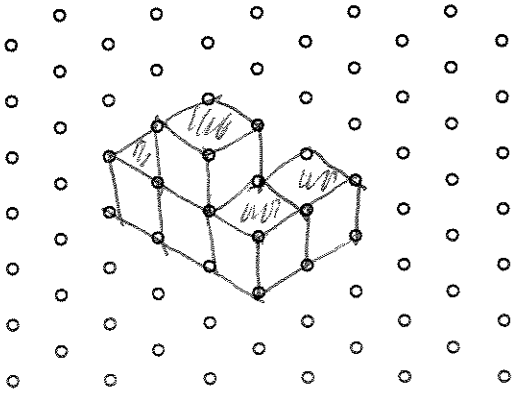
front



right

top





23. (4 points) Decide whether each of the following is always true, sometimes true, or never true.

a. A cube is a polyhedron: A

b. A right rectangular prism is a cube: S

c. A pyramid is a regular polyhedron: S

d. A cube is a hexahedron: A

24. (4 points) Must every edge of a regular polyhedron be the same length? Must every angle have the same measure? Explain using complete sentences.

yes all edges must be the same length because they belong to congruent regular polygons. All angles must be congruent for the same reason.