

MATH 1136 FINAL REVIEW

BASIC GEOMETRIC CONCEPTS AND REASONING

- lines, planes
- angles
- the parallel postulate
- polygons (mainly triangles and quadrilaterals)
- circles, spheres
- angle sum by walking/turning and parallel postulate
- compass/straightedge constructions
- reasoning about properties of polygons: simple proofs, Venn diagrams

Suggestions from the *Practice Exercises (Orange)*

10.2.3, 10.2.4, 10.2.6, 10.2.8, 10.4.3, 10.5.5, 10.5.7, 10.5.8, 10.5.9

ALGEBRAIC EXPRESSIONS

- algebraic expressions from pictures and vice versa
- expressions and equations to describe relationships among quantities
- solving equations
- strip diagrams as a bridge between written descriptions and algebraic expressions

Suggestions from the *Practice Exercises (Orange)*

9.1.5, 9.1.6, 9.2.2, 9.2.5, 9.3.1, 9.3.3, 9.3.4, 9.4.4, 9.5.1, 9.5.2, 9.5.3

FUNCTIONS

- key (defining) property of functions
- using reasoning with remainders to understand repeating sequences
- arithmetic and geometric sequences
- shape of graph and qualitative behavior of function
- proportional relationships as linear functions
- arithmetic sequences as linear functions
- equations for linear functions

Suggestions from the *Practice Exercises (Orange)*

9.6.1, 9.6.2, 9.6.3, 9.6.5, 9.7.4, 9.7.6, 9.8.2, 9.8.3, 9.8.4

MEASUREMENT TOPICS

- Fundamentals of measurement
 - meaning of measurement
 - measurable v.s. non-measurable attributes
 - units
- Length, area, volume
 - similarities and differences between the three
- Error and precision in measurement
- Dimensional analysis

AREA TOPICS (PART I)

- Area of rectangles
 - meaning of area
 - length x width
- Moving and additivity principles
- Areas of triangles

Suggestions from the *Practice Exercises (Orange)*

11.1.7, 11.1.8, 11.4.3, 11.4.4, 11.4.5
12.1.1, 12.1.2, 12.2.1, 12.2.2, 12.2.3, 12.3.1, 12.3.2, 12.3.3

AREA TOPICS (PART II)

- Areas of triangles, parallelograms
- Cavalieri's principle
- square constant and circle constant
- Circle area, estimates of pi and tau
- Areas of irregular shapes
- The Pythagorean theorem

Suggestions from the *Practice Exercises (Orange)*

12.5.1, 12.5.2,
12.6.1, 12.6.2, 12.6.3, 12.6.4, 12.6.5,
12.7.2, 12.8.2, 12.8.3,
12.9.1, 12.9.2, 12.9.5, 12.9.6, 12.9.7, 12.9.8, 12.9.9

Date: 2017-04-19.

VOLUME TOPICS

- Meaning of volume; volumes of prisms.
- Faces, Edges, Vertices of basic 3D shapes.
- Meaning of surface area.
- Patterns for cones and pyramids. Relationships between measurements of the pattern and measurements of the 3D shape.
- Cross sections of 3D shapes.
- Cavalieri's principle. If two shapes have the same cross-section area at every height, then they have the same volume. Explain how the shearing version of Cavalieri's principle (presented in the text) is a special case of this.
- Volume of cone/pyramid is $\frac{1}{3}$ the volume of the cylinder/prism with the same base and height. This leads to the volume formula for circular cones and rectangular pyramids.
- Volume of a sphere is $\frac{4}{3}\pi r^3$. The $\frac{4}{3}$ comes from comparison with a cylinder and two cones.

Suggestions from the *Practice Exercises (Orange)*

13.1.1, 13.1.2

13.2.2, 13.2.3, 13.2.4, 13.2.7, 13.2.8

13.3.2, 13.3.3, 13.3.4, 13.3.8

13.4.2, 13.4.3

TRANSFORMATIONS, CONGRUENCE, AND SIMILARITY TOPICS

- Transformations in the plane
 - Four main types of isometry: rotation, reflection, translation, glide reflection (a.k.a. “trans-flection”).
 - Important non-isometries: shearing, scaling.
- Symmetry, congruence
 - Types of symmetry
 - Triangle congruence
 - Other congruence and geometric properties of compass/straightedge constructions
- Similarity (scaling)
 - Relating similarity problems to ratio problems
 - Concept of similarity and slope of a line
 - Triangle similarity
- Scaling area and volume
 - Linear, area, and volume scale factors
 - Variety of applications

Suggestions from the *Practice Exercises (Orange)*

14.1.1, 14.1.2, 14.1.3

14.2.1, 14.2.2, 14.2.3, 14.2.4,

14.3.1, 14.3.2, 14.3.3,

14.4.1, 14.4.2,

14.5.3, 14.5.4, 14.5.5,

14.6.2, 14.6.3

PROBABILITY

- Key principles of probability
- Theoretical v.s. empirical probabilities
- Counting techniques
 - counting combinations
 - counting choices
- Probabilities and fraction arithmetic
- Probabilities of multistage/compound events

Suggestions from the *Practice Exercises (Orange)*

16.1.1, 16.1.2, 16.2.2, 16.2.4, 16.2.5,

16.3.1, 16.3.2, 16.3.3, 16.3.4, 16.4.1, 16.4.2, 16.4.3