



Correlation to the Common Core State Standards for Mathematics Grade 8

Math in Focus, Course 3
© 2013
Grade 8

COMMON CORE

#### Correlation of *Math* ¥ Focu to the Common Core State Standards

Overall, the CCSS are well aligned to Singapore's Mathematics Syllabus.

Policymakers can be assured that in adopting the CCSS, they will be setting learning expectations for students that are similar to those set by Singapore in terms of rigor, coherence and focus. – Achieve (achieve.org/CCSSandSingapore)

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Here are the parallel assumptions:

#### 1, Curriculum must be focused and coherent:

#### **Common Core State Standards:**

For over a decade, research studies of mathematics education in high performing countries have pointed to the conclusion that the mathematics curriculum in the United States must become substantially more focused and coherent in order to improve mathematics achievement in this country.

(Common Core State Standards for Mathematics, 3)

*Math* ¥ *Focu* is organized to teach fewer topics in each grade but to teach them thoroughly. When a concept appears in a subsequent grade level, it is always at a higher level. For instance, first grade does not address fractions, second grade covers what a fraction is, third grade covers equivalent fractions and fractions of a set, fourth grade deals with mixed fractions, and addition of simple fractions, while fifth grade teaches addition, subtraction, and multiplication of fractions as well as division of fractions by whole numbers. This is the coherence and focus that the standards call for.

#### 2. Teach to mastery

#### **Common Core State Standards:**

In grade 2, instructional time should focus on four critical areas: (1) extending understanding of base-ten notation; (2) building fluency with addition and subtraction; (3) using standard units of measure; and (4) describing and analyzing shapes. (Common Core State Standards for Mathematics, 17)

In Grade 3, instructional time should focus on four critical areas: (1) developing understanding of multiplication and division and strategies for multiplication and division within 100;(2) developing understanding of fractions, especially unit fractions...;(3) developing understanding of the structure of rectangular arrays and of area; and (4) describing and analyzing tw0-dimensional shapes

(Common Core State Standards for Mathematics, 21)

*Math* ¥ *Focu* has the identical structure. Rather than repeating topics, students master them in a grade level, and subsequent grades develop them to more advanced levels. Adding another digit is NOT an example. Moving from addition/subtraction in second grade to multiplication/division in third grade is such an example. Students continue to practice all the operations with whole numbers in every grade in the context of problem solving.

# 3. Focus on number, geometry and measurement in elementary grades

# **Common Core State Standards:**

Mathematics experiences in early childhood settings should concentrate on (1) number (which includes whole number, operations, and relations) and (2) geometry, spatial relations, and measurement, with more mathematics learning time devoted to number than to other topics.

(Common Core State Standards for Mathematics, 3)

*Math* ¥ *Focus* emphasizes number and operations in every grade K-5 just as recommended in the CCSS. The textbook is divided into two books roughly a semester each. Approximately 75% of Book A is devoted to number and operations and 60-70% of Book B to geometry and measurement where the number concepts are practiced. The key number topics are in the beginning of the school year so students have a whole year to master them.

#### 4. Organize content by big ideas such as place value

#### **Common Core State Standards:**

These Standards endeavor to follow such a design, not only by stressing conceptual understanding of key ideas, but also by continually returning to organizing principles such as place value or the properties of operations to structure those ideas. (Common Core State Standards for Mathematics, 4)

*Math* ¥ *Focus* is organized around place value and the properties of operations. The first chapter of each grade level from second to fifth begins with place value. In first grade, students learn the teen numbers and math facts through place value. In all the grades, operations are taught with place value materials so students understand how the standard algorithms work. Even the mental math that is taught uses understanding of place value to model how mental arithmetic can be understood and done.

#### 5. Curriculum must include both conceptual understanding and procedural fluency.

#### **Common Core State Standards:**

The Standards for Mathematical Content are a balanced combination of procedure and understanding (Common Core State Standards for Mathematics, 8)

*Math* ¥ *Focus* is built around the Singapore Ministry of Education's famous pentagon that emphasizes conceptual understanding, skill development, strategies for solving problems, attitudes towards math, and metacognition that enable students to become excellent problem solvers. The highly visual nature of the text and the consistent concrete to visual to abstract approach enables all students to both understand how procedures work and to fluently apply them to solve problems.

### 6. Mathematics is about reasoning

#### **Common Core State Standards:**

These Standards define what students should understand and be able to do <u>i</u>n their study of mathematics....One hallmark of mathematical understanding is the ability to justify, in a way appropriate to the student's mathematical maturity. (Common Core State Standards for Mathematics, 4)

*Math* ¥ *Focus* is famous for its model drawing to solve problems and to enable students to justify their solutions. In addition to journal questions and other explicit opportunities to explain their thinking, students are systematically taught to use visual diagrams to represent mathematical relationships in such a way as to accurately solve problems, but also to explain their thinking.

#### Works Cited:

1. "Common Core State Standards For Mathematics" *Common Core State Standards Initiative | Home*. 2 June 2010. Web. 26 July 2010. <a href="http://www.corestandards.org/assets/CCSSI\_Math%20Standards.pdf">http://www.corestandards.org/assets/CCSSI\_Math%20Standards.pdf</a>>.

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correlated to the

# Common Core State Standards for Mathematics Grade 8

Standard	Descriptor		Citations
	Standards for Mathematical Practice  Math in Focus ®, Course 3 aligns to the Common Core State Standards for Mathematical Practice throughout.		
SMP.1	Make sense of problems and persevere in solving them.	For example:	
	How Math in Focus Aligns:  As seen on the Singapore Mathematics Framework pentagon (see page T8), Problem Solving is at the heart of the Math in Focus Curriculum. Students use problem solving to build skills and persevere to solve routine and non-routine problems that include real-world and mathematical applications in number sense, algebra, functions, geometry, measurement, data analysis, and probability.		2F, 8, 10–11, 14, 18, 28, 41, 47, 50, 51, 54, 58D, 60, 73,77, 79, 86, 92D, 99–101, 109, 119, 120, 124, 128F, 138–139, 154, 156, 157, 161, 165, 168, 171–182, 192, 194, 190F, 202, 204, 205, 210–217, 235, 240D, 246–248, 260, 266, 278–279, 284  2D, 9, 13–15, 18–19, 29, 30, 31, 43, 48E, 55, 62, 69, 74, 76, 88–90, 92, 94, 99, 112D, 118, 128, 129, 131, 144, 149, 172B, 185, 189, 204–205, 209, 216B, 225, 226, 235, 240, 247, 257

Standard	Descriptor		Citations
SMP.2	Reason abstractly and quantitatively.	For example:	
	How Math in Focus Aligns:  In Math in Focus , concrete to pictorial to abstract progression helps students develop a deep mastery of concepts. Students analyze and solve non-routine problems, formulate conjectures through explorations, hands-on and technology activities, and observations, identify and explain mathematical situations and	SE/TE Course 3A:	2F, 13–23, 25, 28–32–34, 37–39, 40, 41–45,50–52, 58D, 67, 80, 92D, 93, 103, 108–115, 128F, 129-131, 132, 145, 147–151, 153, 165–169, 171–174, 178–179, 190F, 195, 198, 209, 214–216, 225–230, 234, 243–245, 273–274, 278–285
	relationships, and look for patterns in data and functions.	SE/TE Course 3B:	2D, 7–8, 10, 12–14, 48F, 55, 63, 77, 90, 98–99, 112D, 122, 130, 136, 146–147, 150–151, 153, 172D, 175, 177–179, 186–187, 192–195, 201–206, 207–208, 216D, 237–243, 246–248
SMP.3	Construct viable arguments and critique the reasoning of others.	For example:	
	How Math in Focus Aligns:  In Math in Focus Aligns:  In Math in Focus Aligns:  Journals and Think Maths. They demonstrate and explain mathematical steps using a variety of appropriate materials, models, properties, and skills. They share and	SE/TE Course 3A:	2B, 5, 12, 13, 24, 25, 26, 31, 32, 40,43, 47, 58A–58B, 60, 68, 81, 92A–92B, 96, 104, 109, 111, 118, 130-131, 147, 149, 154, 165, 171, 190A, 190C, 193, 195, 197, 210, 218, 225, 240A–240B, 252, 253, 260, 275, 284, 278–285
	critique mathematical ideas with others during class in 5-minute Warm-Up and Hands-On, Technology, and group activities, Guided Practice Exercises, Ticket Out the Door exercises, Projects, and other Differentiated Instruction activities.	SE/TE Course 3B:	2B, 7–8, 11, 16, 28, 34, 40, 44, 48B, 48C, 55, 58C, 59, 63, 70, 77, 83, 90, 92C, 96, 98–99, 103, 107, 111, 112B, 122, 128D-128E, 130, 137, 149, 150, 159, 172B, 186–187, 190D-190E, 194–195, 194–195, 210, 216B, 218, 240C, 242–243

Standard	Descriptor		Citations
SMP.4	Model with mathematics.	For example:	
	How Math in Focus Aligns:  In Math in Focus Aligns:  In Math in Focus and teachers represent mathematical ideas, model and record quantities using multiple representations, such as concrete materials, technology, visual models such as number lines, mapping diagrams, bar models, drawings, tables, and coordinate graphs, and symbols such as algebraic expressions, equations, inequalities, and formulas.	SE/TE Course 3A:	2D-2E, 3, 5–8, 21–23, 26, 28–30, 37–40, 42, 44–46, 49–52,60–65, 68–76, 81–84, 93, 96–101, 104–107, 109–115, 118–121, 129, 130–134, 136–139, 142–144, 147–151, 154–163, 165–169, 171–174, 191–195, 197–199, 200, 203, 210–214, 218–222, 240C 243–254, 259–264, 266–274
	equations, inequalities, and formulas.	SE/TE Course 3B:	2C, 3, 6–11, 12–15, 20–27, 31–36, 36–39, 48D–48E, 49, 50, 51–58, 61–69, 73–82, 86–95, 98–102, 112C, 113, 115, 116–122, 130–139, 144–153, 172C, 174–182, 186–195, 198–206, 217–218, 216C, 220–226, 229–232, 252–2553B:
SMP.5	Use appropriate tools strategically.	For example:	
	How Math in Focus & Aligns:  Math in Focus & helps students explore the different mathematical tools that are available to them, such as pencil and paper, estimation, geometry drawing tools, concrete and visual models such as number lines and grids, or technology to model developing skills and	SE/TE Course 3A:	3, 11, 12, 26, 40, 42, 47–52, 54, 60–65, 81–84, 93, 96–101, 104–107, 109–115, 118–121, 129, 130–134, 136–134, 147–151, 154–163, 165–169, 171–174, 191–195, 197–199, 200, 203, 207–208, 210–214, 218–222, 243–254, 259–264, 266–275
	interpret everyday situations that involve proportionality, functions, geometric transformations and formulas, variation, data distribution, and probability.	SE/TE Course 3B:	2C, 3, 5, 7–11, 12–15, 20–27, 31–39, 43, 48D–48E, 49, 50, 51–58, 61–69, 73–82, 86–95, 98–102, 112C, 113, 115, 116-122, 130–139, 144–153, 172C, 174–182, 186–195,198–206, 216C, 217–218, 220–226,229–232, 252–255

Standard	Descriptor		Citations
SMP.6	Attend to precision.	See, for example:	
	How Math in Focus Aligns:  In Math in Focus Aligns:  In Math in Focus Aligns, students check answers, define, highlight, review, and use mathematical vocabulary, define and interpret symbols, use appropriate forms of numbers and expressions, label bar and geometric models correctly, and compute with appropriate formulas and units in solving problems and explaining reasoning.	SE/TE Course 3A:	2, 3, 5–11, 26, 31, 39, 40–45, 55, 58, 60–65, 67, 80, 81–84, 87, 92, 95, 99–101, 103, 108, 112–115, 125, 128, 130–136, 145, 149, 154–158, 165–169, 171–174, 183, 190, 193–195, 207–209, 218–222, 224,234, 236–237, 240, 146–254, 258, 259–264, 273–274,278–285, 290
	una unus in solving problems and explaining reasoning.	SE/TE Course 3B:	2, 6–15, 19, 20–27, 31–33, 36–39, 42, 44, 49–50, 53, 55, 57, 63, 68–69, 72, 77, 80–82, 86–90, 97, 99, 103, 105, 107, 112, 115, 122–125, 130, 131, 137, 143, 150, 172, 159, 187, 191–195, 198–203, 210, 236, 239, 243, 247, 264
SMP.7	Look for and make use of structure.	For example: SE/TE Course 3A:	2A, 2D–2E, 2, 5, 14, 18, 28, 41, 47, 51, 52,
	How Math in Focus® Aligns:  The inherent pedagogy of Math in Focus® allows students to look for and make use of structure. Students recognize patterns and structure and make connections from one mathematical idea to another through, Best Practices, Big Ideas, Math Notes, Think Maths, and Cautions. Also occurs as skills and concepts are		55, 58A, 58C, 58, 60, 62, 64, 69, 73, 74, 75, 79, 82, 83, 87, 92A, 92C, 92, 96–98, 104, 109, 111, 114, 119, 120, 128A, 128D–128E 128, 130, 133, 138, 142, 154, 156, 161, 165, 172, 176, 177, 190A, 190D–190E 190, 194, 198, 202, 205, 210, 212, 218, 227, 236-237, 240A, 240C 252, 253, 260, 267, 270
	interconnected in prior knowledge activities, concept traces, and chapter concept maps.	SE/TE Course 3B:	2A, 2C, 2–5, 24, 44, 48A, 48D–48E, 48, 49–50, 51, 65, 73, 93, 107–108, 112A, 112C, 112–115, 119, 123–125, 131, 159, 172, 172A, 172C, 173, 187, 191, 193, 210, 216A, 216C 217–218, 222, 224, 231, 236, 239, 241, 245, 246, 247, 253, 254, 264

Standard	Descriptor		Citations
SMP.8	Look for and express regularity in repeated reasoning.	For example:	
	How Math in Focus®, students are given consistent tools for solving problems, such as bar models, algebraic variables, tables, coordinate grids, standard algorithms with rational numbers, numerical and geometric properties, possibility diagrams, and formulas so they see the similarities in how different problems are solved and understand efficient means for solving.	SE/TE Course 3A:	2D-2E, 2F, 3–4, 13–23, 25, 28–32–34, 37–39, 40, 41–45, 50–52, 58C, 58D, 60–65, 68–78, 81–84, 92C, 92D, 93, 96–98, 103, 108–115, 128D-128E, 128F, 129–131, 132, 142–145, 147–151, 154–163, 165–169, 171–174, 178–179, 190D-190E, 190F, 195, 198, 209, 214–216, 225–230, 234, 240C, 243–245, 246–250, 273–274, 278–285
		SE/TE Course 3B:	2C, 2D, 5, 6–15, 20–27, 31–33, 36–39, 48D–48E, 48F, 50, 55, 63, 77, 88–90, 98–102, 112C, 112D, 122–125, 130, 132–139, 146–147, 150–153, 172C, 172D, 175, 177–179, 186–187, 192–195, 201–206, 207–208, 216C, 216D, 217, 224–226, 229–232, 237–248, 253, 257–258

Standard	Descriptor		Citations		
Standards for Ma	Standards for Mathematical Content				
CC.8.NS	The Number System				
Know that there a	re numbers that are not rational, and approximate then	by rational numbers	s		
CC.8.NS.1	Understand informally that every number has a decimal expansion; the rational numbers are those with decimal expansions that terminate in 0s or eventually repeat.  Know that other numbers are called irrational	SE/TE: Course 3A:	3,95,98		
CC.8.NS.2	Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., $\pi^2$ )	SE/TE: Course 3A: SE/TE: Course B:	3, 47–52 5, 31–33, 36–39, 43		
CC.8.EE	Expressions and Equations	1			
Work with radica	ls and integer exponents				
CC.8.EE.1	Know and apply the properties of integer exponents to generate equivalent numerical expressions	SE/TE: Course 3A:	2D-2F, 5-11, 13-23, 25-30, 32-38, 40-45, 47-52		
CC.8.EE.2	Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$ , where $p$ is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational	SE/TE: Course 3A: SE/TE: Course 3B:			

Standard	Descriptor		Citations
CC.8.EE.3	Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other	SE/TE: Course 3A:	58C-58D, 59, 60-65, 81-84
CC.8.EE.4	Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology	SE/TE: Course 3A:	58C-58D, 68-78, 81-84
<b>Understand the co</b>	onnections between proportional relationships, lines, and	linear equations	
CC.8.EE.5	Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways	SE/TE: Course 3A:	93, 109–115, 118–121, 129, 133–134, 165– 169, 171–180, 191
00.0.22.0	proposition in an annual major	SE/TE: Course 3B:	50, 113–114
	Use similar triangles to explain why the slope <i>m</i> is the same between any two distinct points on a non-vertical	SE/TE: Course 3A:	130–144, 147–151, 154–163, 165–169
CC.8.EE.6	line in the coordinate plane; derive the equation $y = mx$ for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at $b$ .	SE/TE: Course 3B:	190–195

Standard	Descriptor		Citations
Analyze and solve	Analyze and solve linear equations and pairs of simultaneous linear equations		
CC.8.EE.7	Solve linear equations in one variable	SE/TE: Course 3A:	94, 96–101
CC.8.EE.7a	Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$ , $a = a$ , or $a = b$ results (where $a$ and $b$ are different numbers).	SE/TE: Course 3A:	104–107
CC.8.EE.7b	Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms	SE/TE: Course 3A:	94, 96–101
CC.8.EE.8	Analyze and solve pairs of simultaneous linear equations	SE/TE: Course 3A:	190D–190F, 193–195
CC.8.EE.8a	Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously	SE/TE: Course 3A:	190E–190F, 218–222
CC.8.EE.8b	Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection	SE/TE: Course 3A:	190E-190F, 197-208
CC.8.EE.8c	Solve real-world and mathematical problems leading to two linear equations in two variables	SE/TE: Course 3A:	210–214

Standard	Descriptor		Citations
CC.8.F	Functions		
Define, evaluate, a	nd compare functions		
CC.8.F.1	Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.	SE/TE: Course 3A:	240C-240D, 243-254, 259-264
CC.8.F.2	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).	SE/TE: Course 3A:	278–285
CC.8.F.3	Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear	SE/TE: Course 3A: SE/TE: Course 3B:	
Use functions to m	odel relationships between quantities		
CC.8.F.4	Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two $(x, y)$ values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.	SE/TE: Course 3A: SE/TE: Course 3B:	240C-240D, 259-264, 266-269, 272-275 190-195
CC.8.F .5	Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally	SE/TE: Course 3A: SE/TE: Course 3B:	259–264, 266–269, 272–275 190–195

Standard	Descriptor		Citations
CC.8.G	Geometry		
<b>Understand congr</b>	uence and similarity using physical models, transparenc	ies, or geometry soft	ware
CC.8.G.1	Verify experimentally the properties of rotations, reflections, and translations:	SE/TE: Course 3B:	48D-48F, 51-58, 61-69, 73-79
CC.8.G.1a	Lines are taken to lines, and line segments to line segments of the same length	SE/TE: Course 3B:	54–58, 64–68, 76–77
CC.8.G.1b	Angles are taken to angles of the same measure	SE/TE: Course 3B:	54–58, 64–68, 77–79
CC.8.G.1c	Parallel lines are taken to parallel lines	SE/TE: Course 3B:	55–58, 64–68, 77–79
CC.8.G.2	Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them	SE/TE: Course 3B:	112C-112D, 116-125, 144-145, 150-152
CC.8.G.3	Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates	SE/TE: Course 3B:	48D-48F, 55-58, 64-68, 77-79, 88-95, 98- 102, 144-153
CC.8.G.4	Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them	SE/TE: Course 3B:	112C-112D, 129-139, 146-147, 153
CC.8.G.5	Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles	SE/TE: Course 3B:	115, 137–139

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Standard	Descriptor	Citations
Understand and a	pply the Pythagorean Theorem	
CC.8.G.6	Explain a proof of the Pythagorean Theorem and its converse	SE/TE: Course 3B: 2C–2D, 6–15
CC.8.G.7	Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions	SE/TE: Course 3B: 6–10, 13–15, 31–33, 36–39
CC.8.G.8	Apply the Pythagorean Theorem to find the distance between two points in a coordinate system	SE/TE: Course 3B: 20–27
Solve real-world a	nd mathematical problems involving volume of cylinder	s, cones, and spheres
CC.8.G.9	Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems	SE/TE: Course 3B: 2C, 5, 31–33, 36–39

Standard	Descriptor	Citations
CC.8.SP	Statistics and Probability	
Investigate patter	ens of association in bivariate data	
CC.8.SP.1	Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association	SE/TE: Course 3B: 172C-172D, 174-182
CC.8.SP.2	Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line	SE/TE: Course 3A: 165–169, 259–264, 273–274  SE/TE: Course 3B: 172C–172D, 186–195
CC.8.SP.3	Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept	SE/TE: Course 3A: 171–180, 259–264, 273–274 SE/TE: Course 3B: 186–195
CC.8.SP.4	Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables	SE/TE: Course 3B: 172C-172D, 173, 198-206