TeachME Professional Development

Reinforcing Math Skills in 7th-10th Grade

Numeracy Across The Curriculum

1. Students become numerate as they engage with numerical opportunities and experiences across various learning areas; for example, in history students develop numeracy capability as they learn to use scaled timelines as well as calendars and dates to recall information on topics of historical significance and:

A. Compare periods of history
B. Illustrate the passing of time
C. Identify cultural experiences and traditions
D. Categorize similar or related events into themes and eras

Whole School Approaches to Numeracy

2. In order to focus on problem solving and opportunities for students to apply mathematical skills purposefully across the curriculum, the recommended strategy for teaching and learning across all years of schooling is:

A. A formative approach
B. A integrated approach
C. An inquiry approach
D. An acquisition approach

---

3. Recommended steps in a problem-solving framework include clarifying the problem, choosing procedures and skills to solve the problem, applying what has been chosen, interpreting and checking the solution, and communicating all the steps.

A. True
B. False

---

4. The authors suggest that teachers of mathematics in years 7–10 need to work from the premise that all students can learn and will do so with appropriate teaching and support, including an emphasis on nurturing the students' established mindset.

A. True

B. False

Assessment

5. To ensure continuity of numeracy development, it is important to develop a consistent approach to assessment which includes each of the following EXCEPT:

A. Assessment should lead to more effective teaching with teams developing a plan of action and selecting focus areas for improvement
B. Progress is monitored and teaching is adjusted accordingly
C. Success criteria should be shared with students who increasingly take responsibility for addressing the criteria and assessing their own numeracy progress
D. Teachers benefit from sharing criterion-referenced numeracy assessment practices and planning for adjustments to teaching as a result of new understandings of course curriculum

---

Planning and Teaching for Numeracy

6. In years 7-10 effective planning and teaching emphasizes backward design and the importance of clear links between learning goals and assessment tasks.

A. True
B. False

---

7. To arrive at a sensible and plausible mathematical result, students need to bring to the task a deep knowledge of the math that will maximize their appropriate choices, an ease with strategies and methods that will augment their ability to choose and calculate correctly, and:

A. An ability to reason mathematically about whether their obtained solutions make sense in the given, understood, context
B. Practice with understanding what the problem is calling for, looking for patterns, and working backwards to problem-solve
C. Experience with self-instruction, self-questioning, and self-monitoring throughout the problem-solving practice
D. Critical knowledge about encoding, planning, solving, and responding processes

---

Numeracy Key Elements 7-10

8. The organizing elements for numeracy in 7-10 grade include estimating and

calculating with whole numbers, recognizing and using patterns and relationships, using fractions, decimals, percentages, ratios and rates, using spatial reasoning and measurement, and:

A. Understanding concepts and procedures
B. Promoting strategic competence
C. Interpreting statistical information
D. Developing concrete and abstract reasoning

Estimating and Calculating with Whole Numbers

9. Estimation in calculation relies on deep understandings about numbers and how they work as well as in-depth comprehension of mathematical operations, and the best way to teach these skills is through practice with algorithms.

A. True
B. False

Putting it Into Practice

10. The greatest challenge for many students in solving word problems is that they don’t understand the language/words used, so they need routines where they learn to understand the words in mathematical terms so that they can represent the situations described using symbols that facilitate calculation.

A. True
B. False

Calculating

11. As the magnitude of numbers students are working with increases, students will find that most calculations are best done using mental strategies to estimate, followed by:

A. Students discussing and sharing strategies
B. Some form of digital technology to compute
C. Written calculations to check estimations
D. Using the mental strategies to solve related problems

Solving Problems and Checking Calculations

12. When students see a math problem that is represented by a situation described in a written context requiring mathematical computation, the biggest difficulty they face in starting the problem-solving process is:

A. Sequencing the steps to be taken when there is more than one
B. Writing a number sentence to represent the calculation required
C. Understanding and using the numbers in the appropriate context
D. The inability to translate the problem into a real-world scenario

---

Money

13. Sample activities requiring money calculations can be developed to address both the “estimate and calculate” strand of the numeracy continuum and the:

A. “Develop and understand place value” strand
B. “Verbal and written counting sequence” strand
C. “Pattern and number structure” strand
D. “Understand and use numbers in context” strand

Recognizing and Using Patterns and Relationships

14. Mathematics is the science of patterns and patterns are used to help us organize and make sense of the world in which we live, so students need to be able to generalize about these patterns rather than having to study each separate pattern.

A. True
B. False

---

15. Patterns and relationships in years 3–6 focus on patterns represented with numbers, and in particular, on identifying and representing trends within them, while in In Years 7–10, patterns and relationships are represented using:

A. Algebraic rules
B. Input and output relationships
C. Problems within mathematics and from the real world
D. Functions in modeling real-time observations

---

16. A deep algebraic understanding is required for students to know how a rule might be determined, how it works, and how it can be used to generate different solutions depending on numbers substituted into them.

A. True
B. False

Planning

17. In order to build on learning in grades 7-10, teachers must have some understanding of what their students already know and understand, and what they can do.

A. True
B. False

---

18. Which of the following is NOT one of the understandings that students in grades 7-10 need to learn and develop in the “recognizing and using patterns and relationships” area?

A. What variables are, how to form and simplify algebraic expressions, and how to write and use algebraic expressions to find solutions of equations
B. How to substitute values into rules/formulae to determine unknown quantities and verify solutions
C. How to develop conceptual understanding, fluency, and ability to apply advanced functions
D. How to identify variation, represent it visually, and interpret visual representations

---

19. Although order of operations and the concepts of indices/exponents would likely have been taught in earlier grades, teachers in later grades will need to ensure these have been learned before attempting to simplify algebraic expressions.

A. True
B. False

How to Identify Variation, Represent it Visually and Interpret Visual Representations

20. Variation in a relationship describes the extent to which the relationship deviates from its normal state or:

A. How it is dispersed
B. Its expected trend
C. Whether its continuous or intermittent
D. Its patterns or functions

---

21. Activities that help support the understanding of variation include having students generate data point tables and graphs while investigating relationships, having students consider any habits they might have that involve amounts of time taken each day, and using graphs to show qualitative relationships.

A. True
B. False

Monitoring and Assessment

22. Each of the following is an accurate statement about assessing the understanding of pattern and relationships EXCEPT:

A. Assessment must go well beyond the skills needed for algebra
B. Students should be able to make conjectures about patterns and predict what will happen to a pattern as it trends upwards or downwards
C. Understanding of these concepts needs to include a firm grasp of core skills and concepts related to patterns and relationships
D. Monitoring involves keeping and reviewing data points over time, looking for bumps in variation, and reasoning about why these might be occurring

---

23. Patterns and relationships are used across the curriculum, and a specific example used in social studies is when students learn about patterns in different text types and the ways in which documents are put together following various patterns and formulae.

A. True
B. False

Using Fractions, Decimals, Percentages, Ratios and Rates

24. It is critical that the idea of equal quantities or parts is explicitly taught to students during early fraction lessons, as this understanding is critical for comparing fractional amounts and for the understanding of:

A. Proportional reasoning
B. Conversion and order

C. The connections between fractions, decimals and percentages
D. Problems involving ratios

Links to the Curriculum

25. Proportional reasoning is a complex process that brings together all the mathematics ways of working, is embedded in a range of different mathematics strands and topics, and:

A. Identifies proportional and non-proportional situations
B. Encourages thinking multiplicatively
C. Enhances flexibility
D. Requires facility with a variety of different number representations

---

Putting it Into Practice

26. Teachers should spend time encouraging students to estimate fractions by modeling the thinking and process involved and by having them share their reasoning in a similar way with each other.

A. True
B. False

Rates, Ratios and Proportions

27. A ratio is a comparison between two or more quantities while a rate compares:

A. The size of a number to that of another number
B. Two quantities of different measures
C. The parts of two quantities
D. The part of a quantity to all of another quantity

---

28. When working with ratios and proportions, learning the method without necessarily fully understanding why it works is detrimental to students, and it must be discouraged.

A. True
B. False

---

29. The four main types of proportional relationships are direct proportion, inverse

proportion, in-part proportion, and:

A. Complex proportion
B. Linear proportion
C. Power proportion
D. Constant proportion

---

30. In-part proportions are those that involve more than two variables, one of which is related in a positively proportional way and the other is related in an inverse way.

A. True
B. False

---

31. Many science topics require knowledge and understanding about ratio and proportion, including density, molarity, speed and acceleration, and:

A. Matter and energy
B. Motion
C. Force
D. Friction

Using Spatial Reasoning

32. While “shapes” refer to 2 dimensional drawings and figures such as triangles and squares, 3 dimensional items such as balls, pyramids, or cones are known as:

A. Objects
B. Structures
C. Forms
D. Models

---

33. Interpreting maps and diagrams encompasses where things are rather than what things are, and students need to learn and use the language of direction, position and location in order to do this.

A. True
B. False

Geometric Reasoning

34. Students are able to reason about shapes when they have a broad range of geometric language and understandings of different items, the language to describe them and their positions, and the ability to:

A. Use critical thinking and logical arguments
B. Analyze assumptions and relationships
C. Evaluate their intrinsic properties
D. Describe what happens/results when they move

Interpreting Statistical Information

35. In order to be able to interpret data displays, students must be able to first collect, organize and display the data.

A. True
B. False

Putting it Into Practice

36. For middle school students, it is important to use data that students can relate to such as that which they collect themselves, and teachers can gradually extend this to working with data from secondary sources until students become data literate.

A. True
B. False

Interpreting Chance Events

37. Which of the following is NOT an accurate statement about chance?

A. Chance isn’t about probability; rather, probability is about chance
B. Chance is concerned with measuring likelihood or expectation
C. Most people are satisfied to have a general sense about likelihood, which is demonstrated in the language when used when talking about chance
D. Students develop misconceptions about chance which may be carried into adulthood

---

Monitoring and Assessment

38. Students should be exposed to scenarios involving chance so that they can have the opportunities to consider risks and interpret them in terms of the implications for making judgments about risks, such as in financial planning, addictive behaviors and their own health.

A. True
B. False

Using Measurement

39. Measuring requires deep understandings about what needs to be measured, units of measurements, estimating using an understanding of attributes and units, and measuring using:

A. Nominal and ordinal levels
B. Interval techniques
C. Direct and indirect measuring methods
D. Differential measurement

Putting it Into Practice

40. Once students have decided what to measure, they need to think about the purpose or why they want to measure it, as this helps decide:

A. The level of accuracy or precision that is needed
B. Which measurement scale to use
C. The reliability and validity of their measurement tools
D. How to report measurements

Estimating Measures

41. Estimation depends on purpose and audience, and these two criteria help students decide whether they are confident that their estimate is good enough in the circumstances or if they should calculate with greater precision.

A. True
B. False

---

42. Direct measuring is used to determine exact continuous quantities of attributes such as length, area, and volume.

A. True
B. False
