

Midterm

Show all your work

Family name: _____
Given name: _____
Student number: _____
Score: ____/52

A simple calculator allowed.

Problem 1: Perform the following operations in the base indicated for each.

a. $643_7 + 134_7 =$

b. $200_8 - 13_8 =$

Score: /4

Problem 2: Suppose the work of a primary student, solving $417 - 88$ in written form in base 10 is shown below. Explain whether the student understands what she is doing, and supply reasons for your claim.

$417 - 88$ is the same as $419 - 90$
and that is the same as $429 - 100$
and that is equal to 329

Score: /2

Problem 3: Perform $417 - 88$ base 10 using an empty number line.

_____→

Score: /2

Problem 4: Even though multiplication of the set of real numbers is commutative, interpretations of fraction multiplication can be different. Make sketches to contrast the following:

a. $5 \times \frac{1}{2}$

b. $\frac{1}{2} \times 5$

Score: /4

Problem 5: After years of working with multiplication and division, children often form the erroneous generalization that “multiplication makes bigger” and “division makes smaller.” Provide examples in the form of story problems with solutions to show why each statement is wrong.

Score: /4

Problem 6: If $\frac{2}{3}$ of a number represented by x is 16, find triple the number.

Score: /2

Problem 7: Order these numbers in ascending order with explanation for students not using the calculator:

$$1.01, \quad \frac{101}{99}, \quad 110\%, \quad \frac{10}{9}, \quad \frac{11}{10}$$

Score: /3

Problem 8: A bus pass in Wonderland cost \$78 per month. Without a pass, each ride cost \$2.75. At least how many times do you have to ride the bus in a month to save money buying a pass?

Score: /3

Problem 9: Is 197 a prime number? Show all the primes you use to answer this question, in particular, explain which prime to stop testing.

Score: /3

Problem 10: Write 96 as a product of primes.

Score: /3

Problem 11: [BONUS] State and prove the divisibility rule for 3.

Score: /4

Problem 12: Explain two different methods for obtaining the greatest common factor of 48 and 72.

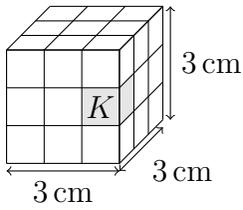
Score: /4

Problem 13: Given a number line and only the points for the indicated fractions, accurately locate and label the points for 0 and $1\frac{1}{4}$. If your markings do not make your reasoning clear, add an explanation.



Score: /3

Problem 14: The figure shown is made up of 27 identical cubes. If the cube marked K is removed, by what percentage does the total surface area of the figure increase or decrease?



Score: /3

Problem 15: A ball which bounces straight up and down, falls from a height of 16 m. Each time it bounces up to half the height from which it just fell. Find the total distance the ball has travelled when the top of its bounce is 1 m from the floor. Hint: It may help to draw the path of the bouncing ball.

Score: /4

Problem 16: Arin and Bob together have \$1.35. Arin has only nickels while Bob has only dimes. Arin has six more coins than Bob. How many coins do they possess between them?

Score: /4