



Name: _____ Period: _____

Grade _____

PROBLEM DETECTIVE

Operations of Rational Numbers

DIRECTIONS For each question, determine the type of problem that can be used to solve the problem, write an expression, show your work, and **CIRCLE YOUR FINAL ANSWER**.

Question	Type of Problem	Work
You are on a roller coaster that begin $\frac{1}{5}$ mile above ground. The roller coaster descends $\frac{1}{2}$ mile. What is the roller coaster new location after descending?	Addition Subtraction Multiplication Division Absolute Value	$\frac{1}{5} - \frac{1}{2}$ $\frac{2}{10} - \frac{5}{10} = -\frac{3}{10}$ mi.
A submarine submerged at a depth of 40.21 feet dives 57.35 more feet down. What is the new depth of the submarine?	Addition Subtraction Multiplication Division Absolute Value	$-40.21 + -57.35$ -97.56 ft $\begin{array}{r} 57.35 \\ + 40.21 \\ \hline 97.56 \end{array}$
The lowest point in Egypt is Quattara Depression at $\frac{4}{5}$ miles below sea level. The highest point in the country is Mount Catherine at $\frac{6}{8}$ miles above sea level. Determine the difference between the lowest point and highest point in Egypt.	Addition Subtraction Multiplication Division Absolute Value	$1\frac{4}{5} - \frac{6}{8}$ $\frac{-32}{40} + \frac{-30}{40} = \frac{-62}{40}$ $\frac{22}{40} \div 2 = \frac{11}{20}$ mi.

$$\begin{array}{r} 40 \overline{) 62} \\ -40 \\ \hline 22 \end{array}$$

Question	Type of Problem	Work
Determine the distance in altitude between New Orleans, Louisiana (8.2 feet below sea level) and Rapid City, South Dakota (32.9 feet above sea level).	Addition Subtraction Multiplication Division Absolute Value	$ -8.2 - 32.9 $ $ -8.2 + -32.9 = 41.1$ feet
A computer stock lost $\frac{1}{2}$ point every 6 hours. Find the total points the stock fell.	Addition Subtraction Multiplication Division Absolute Value	$\frac{1}{2} \cdot \frac{6}{1} = \frac{6}{2}$ 3 points
A Delta airplane at $10\frac{1}{2}$ miles. If the plane drops $2\frac{1}{4}$ miles in altitude, what is the new altitude?	Addition Subtraction Multiplication Division Absolute Value	$10\frac{1}{2} - 2\frac{1}{4}$ $8\frac{2}{4} - \frac{1}{4} = 8\frac{1}{4}$ mi
Cody decreased the speed of his car by 3.5 miles per second over a period of 60 seconds. Find the average change in speed each after 60 sec.	Addition Subtraction Multiplication Division Absolute Value	-3.5×60 -210 mi. $\begin{array}{r} 60 \\ \times 3.5 \\ \hline 300 \\ 1800 \\ \hline 2100 \end{array}$

Target Practice - Use a separate sheet of paper

Multiply. Write in simplest form.

- | | | | | |
|---------------------------------------|---------------------------------------|------------------------------------------|------------------------------------------|------------------------------------------------------|
| 12. $\frac{1}{12} \cdot \frac{4}{7}$ | 13. $\frac{3}{16} \cdot \frac{1}{9}$ | 14. $\frac{5}{8} \cdot \frac{4}{5}$ | 15. $\frac{9}{10} \cdot \frac{2}{3}$ | <p>WORK SHOULD BE LOCATED ON PAGE 45 of your INB</p> |
| 16. $-\frac{9}{10} \cdot \frac{2}{3}$ | 17. $(-\frac{12}{25}) \frac{15}{32}$ | 18. $(-\frac{3}{5})(-\frac{1}{3})$ | 19. $(-\frac{4}{7})(-\frac{1}{20})$ | |
| 20. $3\frac{1}{3} \cdot \frac{1}{4}$ | 21. $4\frac{1}{4} \cdot 3\frac{1}{3}$ | 22. $-3\frac{3}{8} \cdot (-\frac{2}{3})$ | 23. $-\frac{5}{6} \cdot (-1\frac{4}{5})$ | |

28. **BAKING** A recipe calls for $\frac{3}{4}$ cup of sugar per batch of cookies. If Gabe wants to make 6 batches of cookies, how many cups of sugar does he need?

$6 \times \frac{3}{4}$

29. **POPULATION** Population density measures how many people live within a certain area. In a certain city, there are about 150,000 people per square mile. How many people live in an area of $2\frac{1}{4}$ square miles?

ALGEBRA Evaluate each expression if $r = \frac{1}{4}$, $s = \frac{2}{5}$, $t = \frac{8}{9}$, and $v = -\frac{2}{3}$.

30. rs 31. rt 32. stv 33. rtv

WORK SHOULD BE LOCATED ON PAGE 45 of your INB

30) $\frac{1}{4} \cdot \frac{2}{5}$

Write the multiplicative inverse of each number.

- | | | |
|--------------------|--------------------|--------------------|
| 13. $-\frac{7}{9}$ | 14. $-\frac{5}{8}$ | 15. 15 |
| 16. 18 | 17. $3\frac{2}{5}$ | 18. $4\frac{1}{8}$ |

Divide. Write in simplest form.

- | | | | | |
|--------------------------------------|----------------------------------------|----------------------------------------|------------------------------------------|------------------------------------------------------|
| 19. $\frac{2}{5} \div \frac{3}{4}$ | 20. $\frac{3}{8} \div \frac{2}{3}$ | 21. $\frac{2}{3} \div \frac{5}{6}$ | 22. $\frac{2}{5} \div \frac{1}{10}$ | <p>WORK SHOULD BE LOCATED ON PAGE 46 of your INB</p> |
| 23. $-\frac{4}{5} \div \frac{3}{4}$ | 24. $\frac{3}{10} \div (-\frac{2}{3})$ | 25. $-\frac{5}{9} \div (-\frac{2}{3})$ | 26. $-\frac{7}{12} \div (-\frac{5}{6})$ | |
| 27. $\frac{2}{5} \div 4$ | 28. $\frac{9}{16} \div 3$ | 29. $\frac{4}{5} \div 6$ | 30. $\frac{6}{7} \div 4$ | |
| 31. $3\frac{3}{4} \div 2\frac{1}{2}$ | 32. $7\frac{1}{2} \div 2\frac{1}{10}$ | 33. $-12\frac{1}{4} \div 4\frac{2}{3}$ | 34. $10\frac{1}{5} \div (-\frac{3}{15})$ | |

16. **PAINTING** It took 3 people $2\frac{1}{2}$ hours to paint a large room. How long would it take 5 people to paint a similar room?

BONUS!

39. **BAKING** Emily is baking chocolate cupcakes. Each batch of 20 cupcakes requires $\frac{2}{3}$ cup of cocoa. If Emily has $3\frac{1}{4}$ cups of cocoa, how many full batches of cupcakes will she be able to make and how much cocoa will she have left over?

***COLUMNS SHOULD BE SET UP IN YOUR INB ON PAGES 47 and 48
(fold each page in half to make 4 columns in total)

Column 1: #'s 1-5 > On pg. 47

Column 3: #'s 11 - 15 > On pg. 48

Column 2: #'s 6-10

Column 4: #'s 16 - 18

Order of Operations: Use "PEMDAS" to help simplify each expression.

1. $8 + 7 \cdot 9$
 $8 + 63 = 71$

11. $12 + 4^2$
 $12 + 16 = 28$

2. $35 - (17 - 2) \div 5$
 $35 - 15 \div 5$
 $35 - 3 = 32$

12. $24 - 9 \cdot 2 + 6 \div 3$

ON YOUR OWN

3. $\frac{90 - 22}{28 - 11} = \frac{68}{17} = 4$

13. $\frac{45}{9} + 3$
 $5 + 3 = 8$

4. $12(2 + 7) - 24 \div 12$
 $12(9) - 2$
 $108 - 2 = 106$

14. $4(9 - 3) \div (8 - 2)$

ON YOUR OWN

5. $26 - [(25 - 11) - 2^3]$
ON YOUR OWN

15. $(8^2 - 2^5) \div (24 \div 6) + 3^2$
 $(64 - 32) \div 4 + 9$
 $32 \div 4 + 9$
 $8 + 9 = 17$

6. $\frac{12(30 - 12)}{3^2}$

16. $\frac{5(16 - 5) - 1}{4^2 - 7} = \frac{54}{9} = 6$

ON YOUR OWN

$$\begin{array}{l} 5(16-5)-1 \\ \downarrow \\ 5(11)-1 \\ \downarrow \\ 55-1 \\ \downarrow \\ 54 \end{array} \quad \begin{array}{l} 4^2-7 \\ \downarrow \\ 16-7 \\ \downarrow \\ 9 \end{array}$$

**with fraction styled problems separate as two problems. Evaluate the numerator and then the denominator. Then use the fraction bar to divide the two solutions.

Substitute and evaluate: $x = 8$, $y = 6$, $m = 3$, $p = \frac{1}{2}$, $n = \frac{3}{4}$

7. $4x - 2m$

$$\begin{array}{l} 4(8) - 2(3) \\ \downarrow \quad \downarrow \\ 16 - 6 = 10 \end{array}$$

8. $\frac{xy}{m} \div m$

$$\frac{(3/4)(8)(6)}{3}$$

$$\frac{(3/4)(48)}{3}$$

$$36 / 3 = 12$$

9. $2my + x$

ON YOUR OWN

10. $6p + 8n$

$$6(1/2) + 8(3/4)$$

$$3 + 6$$

$$9$$

$$\frac{8}{1} \cdot \frac{3}{4} = \frac{6}{1}$$

17. $5y + 8p$

ON YOUR OWN

18. $2(3x + 6) \div (10m)$

ON YOUR OWN

19. $(x + y) \div p$

$$(8 + 6) / (1/2)$$

$$14 \times 2 = 28$$

20. $my - 2x$

ON YOUR OWN