Name: _____ Period: _____ Date: _____

CCGPS Math 7th Grade Unit 1 Study Guide — Operations with Rational Numbers

Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.

**MCC7.NS.1** Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.
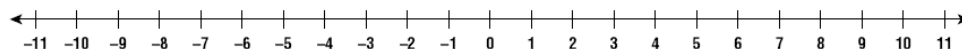
1. Which expression is represented by the model below?
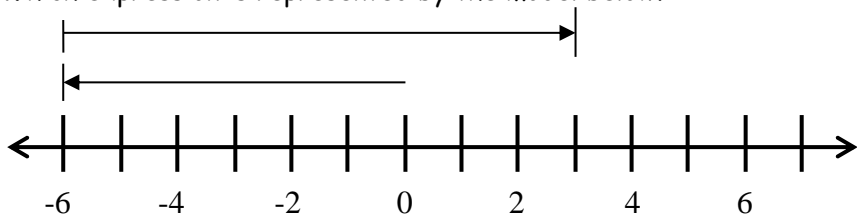
a) $3 + (-9) =$
b) $6 + (-9)$
c) $-6 + 3$
d) $-6 + (9) =$

2. Model the number sentence on the number line below. **4 – 6** = _____
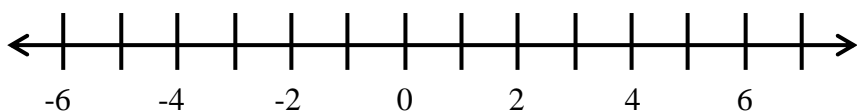
3. Use the number line to determine the difference.   -5 – 2 = _____

**MCC7.NS.1a** Describe situations in which opposite quantities combine to make 0.

4. Why is subtraction the same as adding the opposite of a number?
5. In which situation will adding the opposite of a number result in a sum of 0?

**MCC7.NS.1b** Understand p + q as the number located a distance |q| from p, in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.

To add two integers with the same sign: Add the absolute values of the numbers. The sum has the same sign as the addends.
To add integers with different signs: Find their absolute values. The sum is in the direction of the number with the larger absolute value. Subtract the smaller absolute value from the larger to find out how far the sum is in that direction.

6. In Washington, D.C. at 9 a.m., the temperature was -6°F. By 11 a.m., it had increased 10°F. What was the temperature at 11 a.m.?

7. The income from the Spanish Club's bake sale was $240. Expenses for the sale totaled $40. Use integer addition to find the total profit or loss from the bake sale.
   a) profit of $280   b) profit of $200   c) profit of $240   d) loss of $40

8. On a winter Monday in Baltimore, MD, temperature at 8 a.m. was –8°F. At 1 p.m. it was 27°F. By how many degrees did the temperature change from morning to the afternoon?

9. Maria had $395.25 in her checking account. She made deposits of $22.75 and $103.55. She also made a purchase of $165.72. What is the balance in Maria's account after the deposits and purchase?
   a) $687.72   b) $521.55   c) $649.76   d) $355.83

10. The price of a stock declined $2 yesterday. If the stock continues to change at the same rate each day, what will be the total change over 10 days?

11. Plot the integer 10 and its additive inverse on the number line below.

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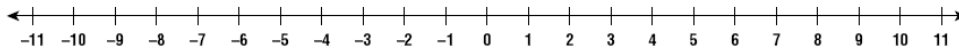
12. Illustrate the sum of -6 and its additive inverse on the number line below.

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 −11 −10 −9 −8 −7 −6 −5 −4 −3 −2 −1  0  1  2  3  4  5  6  7  8  9  10 11
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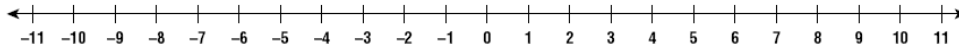
MCC7.NS.1c *Understand subtraction of rational numbers as adding the additive inverse, p − q = p + (−q). Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.*

13. The Spartans lost 6 yards on their first play and lost another 8 yards on their next play. What was their net result in yards after these two plays?
    a) -14 yards   b) -2 yards   c) 2 yards   d) 14 yards

14. Which expression has a value of –3?
    a) -7 – 4   b) -4 – (-7)   c) -7 – (-4)   d) -4 – 7

15. Find the difference. $-1\dfrac{2}{3} - \left(-2\dfrac{1}{2}\right) =$

16. Morris borrowed $6 from his mother. So far, he has repaid $4. If debt is represented as a negative number, which number sentence shows the amount of Jack's remaining debt?
    a) -6 + 4 = -2   b) -6 – 4 = -10   c) -6 + (-4) = -10   d) 6 – 4 = 2

17. What is the distance between **–11 and 6** on a number line?

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 −11 −10 −9 −8 −7 −6 −5 −4 −3 −2 −1  0  1  2  3  4  5  6  7  8  9  10 11
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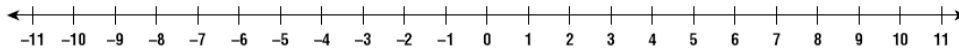
18. ADD: $-1\dfrac{3}{5} + \left(-3\dfrac{1}{2}\right) =$

19. Evaluate: -12.5 – (-2.4) =

MCC7.NS.1d *Apply properties of operations as strategies to add and subtract rational numbers.*

20. At the Apple Orchard workers were asked to put 100 apples in barrels. The following five were filled incorrectly. If the supervisor wrote +5 above a barrel, it meant that the barrel was 5 apples over; -5 meant that a barrel was 5 apples less than 100.

   -2   **+6**   **+3**   **-6**   **-3**

   How many <u>total</u> apples are in the five barrels?
    a) -480 apples   b) 498 apples   c) 500 apples   d) 520 apples

21. What is the quotient? $16 \div 4$

    a) -4   b) 4   c) -12   d) 12

22. Divide.

    $-385 \div 77 =$ _____

23. Nemo is swimming at sea-level (zero), he suddenly sees a shark and quickly dives **down** at a rate of 6 meters per second. How far is Nemo after 10 seconds?

    a) 60 meters   b) -60 meters   c) 4 meters   d) -16 meters

24. Solve. $-\dfrac{2}{5} \cdot -\dfrac{4}{9} =$

25. Solve. $\dfrac{-36}{-12}$

MCC7.NS.2a _Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as (–1)(–1)=1 and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts._

26. If p represents a negative number, is $-p$ a positive or negative number?

27. If $b = -5$, what is $b \cdot b \cdot b$?

28. The temperature fell 36°F in 9 hours. If the temperature fell at the same rate every hour, which represents the change in temperature each hour?

    a) -324°F   b) -27°F   c) -4°F   d) 45°F

29. A shoreline is changing -3 centimeters each year due to beach erosion. What is the change in the shoreline over 6 years?

    a) -18 cm   b) -9 cm   c) -3 cm   d) -2 cm

30. How can using the properties of operations help you multiply and divide rational numbers?

31. Convert to a decimal: $\dfrac{3}{14}$

32. Which shows the fraction $\dfrac{7}{12}$ as a decimal?

    a) 7.12   b) 0.712   c) 0.583   d) 0.58

33. When the following fractions are converted to decimals, which results in a repeating decimal?

   a) $\dfrac{3}{9}$ b) $\dfrac{5}{8}$ c) $\dfrac{4}{20}$ d) $\dfrac{4}{6}$

34. Which of the following is equivalent to $\dfrac{13}{36}$?

   a) 0.361 b) $0.36\overline{1}$ c) $0.\overline{361}$ d) $0.3\overline{61}$

MCC7.NS.3 *Solve real-world and mathematical problems involving the four operations with rational numbers.*
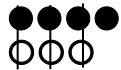
35. Your cell phone bill is automatically deducting $32 from your bank account every month. How much will the deductions total for the year?

36. It took a submarine 20 seconds to drop to 100 feet below sea level from the surface. What was the rate of the descent?

37. Suppose the temperature is -6°. Using a digital thermometer, what will be the temperature if it rises 31.7° degrees?

Adding Integers Extra Practice:

KEY: O = positive

        ● = negative

Problem	Model	Pattern/Rule	Solution
Example: -4 + 3	●●●● OOO		-1
38) 7 + (-8)			
39) -4 + (-14)	THINK: If the signs are the same, is there a zero pair?		
40) 0 + (-2)			
41) -9 + 9			

Subtracting Integers Extra Practice:
(to subtract an integer, add its opposite)

Problem	K Keep	I Inverse	O Opposite	Pattern/Rule	Solution
42) 3 – 9					
43) -8 – 8					
44) -5 – (-7)					
45) -2 – 10					