Equations and Inequalities Cumulative Review

1. Christie babysits throughout the week to earn extra money to save up for college. She charges $8 per hour on weekdays and $10 per hour on weekends. Let *x* represent the number of hours she worked on the weekdays and *y* represent the number of hours she worked on the weekend.
    a. Write an algebraic expression to represent the total amount of money she earned during the week.
    b. Use the Distributive Property to rewrite the expression by factoring out the greatest common factor.
2. Evaluate $\frac{x}{3} + 4x^3$ for $x = 6$.
3. Which numbers have 29 as their absolute value?
4. Joe, Tammy, Kevin, and Karen went out for lunch. Joe's meal cost $9, Tammy's cost $10, and Kevin and Karen's meals each cost $8. They decide to split the bill equally among them. Write an expression to represent the amount that each of them would pay and then solve the expression.
5. Last July in Antarctica, the average low temperature was -81°F. In the same month, the average high temperature was -76°F. What is the difference between the average low and high temperatures?
6. The Stationery Store sells birthday invitation cards in packs of 16 and matching envelopes in packs of 12. If you are planning a birthday party and do not want any leftover invitations or envelopes, what is the least number of guests you can invite so that you purchase the same number of each? How many packs of invitations will you need to purchase? How many packs of envelopes will you need to purchase?
7. Ms. Marjorie, the art teacher, had a gallon (128 ounces) of green paint. She used $\frac{5}{8}$ of the paint for her first two classes. She is using the remaining green paint for her last class. Each student needs $2\frac{2}{5}$ ounces of green paint for the project. How many students will she be able to give paint to?
8. Regular gas at the corner station costs $3.495 per gallon. You asked the attendant to fill up your car and it took 11.75 gallons. How much is your total? Round your answer to the nearest hundredths. You pay the attendant with a $100 bill. What is your change?
9. The area of the rectangular playground at school is 359.375 square feet. The width of the playground is 12.5 feet. What is the length of the playground?
10. On his last five science tests, Darren scored an 87, 94, 72, 90, and an 81. What score does he need on the next test in order to have a mean score of 85?
11. Evaluate $(3.8 - m) + 8.07 + m^2$ for $m = 1.4$.
12. In gym class, the students participated in a push-up challenge. The teacher recorded how many push-ups each student completed in one minute and created the chart below. Use the chart to answer the following questions.

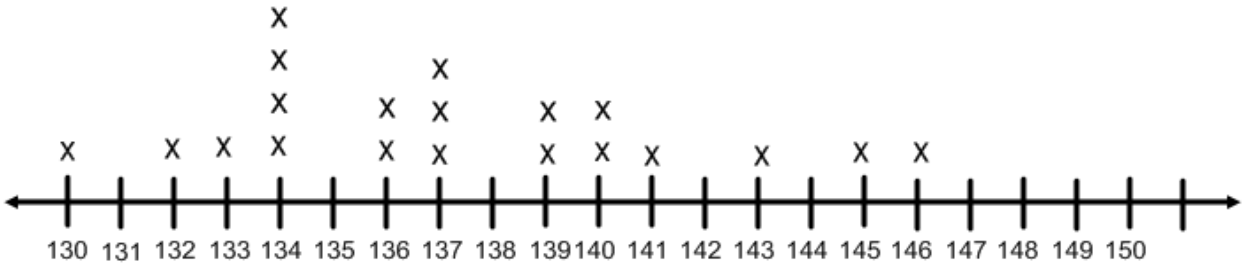
Push-Up Challenge

11	5	18	6	11	14	7	15	11	6
15	6	11	8	12	5	16	8	10	7

a. Find the minimum, lower quartile, median, upper quartile, and maximum.
b. Create a box-and-whisker plot using the data above.
c. What is the range of the data?
d. What is the interquartile range of the data?

13. Translate the following phrases into algebraic expressions.
    a. triple the difference of 81 and the cube of *m*
    b. the sum of *x* and *y*, increased by the quotient of 9 and *n*
    c. the perimeter of a square if the length of a side is *w*
    d. six times the sum of *c* and *d*, decreased by twice the difference of 8 and *b*
    e. seven less than the product of twelve and *m*
    f. the quantity *x* less eleven divided by the sum of *y* and eighteen
14. Patrick surveyed his classmates about their age in months. He created the following line plot to show his data. Answer the questions below using the given data.

Age (in months)



    a. Find the mean, median, and mode(s) of the data.
    b. A new student joins the class. The student is 137 months old. Find the new mean, median, and mode(s).
15. Mark is 10 years old and his younger sister, Joanne, is 8 years old. Their aunt wants to take Mark, Joanne and her two children to the movies. Her oldest is 16 years old and her youngest is 14 years old. The movie theater in their town charges $9 for adults and $6 for children under 13 years old. Write an expression for the total cost of admission. Evaluate the total cost.
16. Timothy surveyed his classmates about how many minutes they spent on homework every day and created a frequency chart. Use the chart to create a histogram.

Time Spent on Homework (minutes)

Minutes	Tally	Frequency
0:00-4:59	I	1
5:00-9:59	III	3
10:00-14:59	II	2
15:00-19:59	~~IIII~~	5
20:00-24:59	~~IIII~~ II	7
25:00-29:59	III	3

17. Carolina collected the following data about how many hours her classmates sleep every night. Use the chart to find the mean absolute deviation.

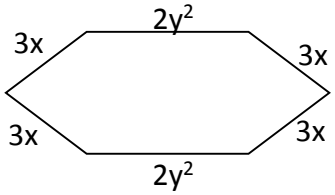
10	8	6	7	6	8	11	10	9	8
8	7	10	9	10	8	6	8	10	9

18. A skydiver jumps out of the plane when the plane flies to the jump altitude. Usually the jump altitude is around 4,000 meters. The skydiver deploys the parachute when he or she reaches an altitude of 760 meters. What is the distance between the point at which the skydiver jumps from the plane and the point at which the parachute is deployed?
19. Tina works at Burger-Rama 6 days a week. She earns $8 an hour as a full-time employee and must work 40 hours a week. For each hour she works overtime, she earns 1 ½ her normal wage. Write an expression for her total earnings if Tina works 45 hours. How much will she earn?
20. A dolphin is swimming at 250 feet below sea level. It descends 145 feet and then ascends 90 feet. Where is the dolphin located now?
21. You received $20 for your allowance this week. You went to the mall with your friend and spent $15 on a t-shirt with a picture of your favorite band. You and your friend decided to grab a bite to eat at the food court. Your meal cost $12 so you had to borrow money from your friend. Write an integer to represent the amount of money you owe your friend.
22. Plot the following rational numbers on a number line. Write the numbers in order from least to greatest using comparative symbols.

$$-1.75, 1\frac{2}{3}, -3.5, 2\frac{1}{4}, -3$$

23. In the game of Jeopardy you earn points for a correct response and lose points for an incorrect response. What would be the contestant's score after the following 4 responses: $300 correct, $200 incorrect, $200 correct, and $100 incorrect?
24. On a coordinate map, Alex's restaurant is located at (-2, 5). The bowling alley is located at (8, 5). What is the distance between Alex's restaurant and the bowling alley on the map?
25. At University Hospital, the parking garage is located under the building below ground level. You park your car on parking level 3 which is at an elevation of -27 feet. You visit your friend whose room is on the fourth floor which is at an elevation of 48 feet. What is the distance from parking level 3 to the fourth floor?
26. The temperature at noon was -53°C in Siberia. The temperature dropped 15° by midnight. What was the temperature at midnight?
27. A cube has a side length of 3 cm. Write an expression to represent the volume of the cube in exponential form. Evaluate the expression.
28. Mobile Phones charges $19 a month for cellular phone service. They also charge an initial set up fee of $25 for each contract. If *x* represents the number of months, write an algebraic expression to represent how much you will pay for 2 contracts.

29. Anthony had $24 on him when he went to the mall with two friends. While at the mall, he bought his friends and himself each an ice cream cone. If *x* represents the cost of an ice cream cone, write an algebraic expression to represent how much money Anthony had left after buying the ice cream.
30. Sam bought 54 bottles of water and 36 bags of kettle corn. Let *x* represent the cost of each water bottle and *y* represent the cost of each bag of popcorn.
    a. Write an algebraic expression to represent the total cost of all the items.
    b. Use the Distributive Property to rewrite the expression by factoring out the greatest common factor.
31. Caleb has *y* amount of dollars in his checking account. He deposits *x* amount of dollars per week for 9 weeks. Write an algebraic expression to represent the amount of money Caleb has in his checking account.
32. Evaluate 4^2 and 2^4. Do you think the same relationship will happen to other numbers? Provide examples to support your answer.
33. Janice is putting carpet down in her hallway. She has a piece that is 4 feet by 6 feet. Unfortunately, the piece is too short and she needs to add another piece that is 4 feet by 3 feet to finish the hallway. Use the Distributive Property to write two different expressions to evaluate the total area of the carpet. Solve both expressions.
34. Consider the following sequence of numbers: 8 3 4 6 2
    a. Insert operation symbols and/or parentheses in the sequence (without changing the order of the numbers) so that the value is 17.
    b. Insert operation symbols and/or parentheses in the sequence (without changing the order of the numbers) so that the value is the largest possible number.
35. Thomas is planning his birthday party and plans to have 8 tables set up. Each table will have 12 bottles of water and 8 bowls of snacks. How many refreshments will be provided in all? Write the problem in two different ways. Solve the problem.
36. The students at Madison Middle School held a fundraiser. They sold chocolate bars for $1.50 each and $16.00 for a box of one dozen bars. They sold 165 individual chocolate bars and 52 boxes. Each individual bar cost $0.50 and each box cost $6.00. Write an expression and then solve to show the total profit the students earned.
37. Write an expression to represent the perimeter of the figure below. Simplify the expression by combining like terms.



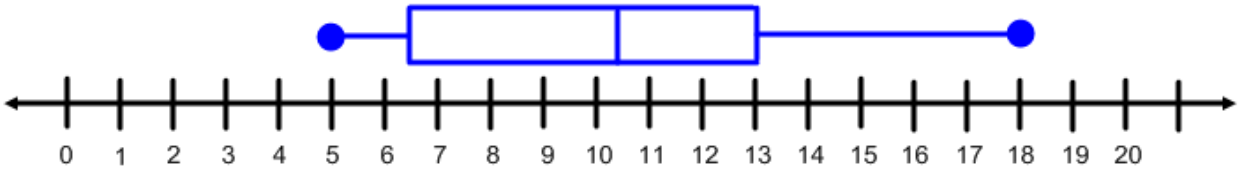
38. Joseph has *m* dollars. Timothy has three times the amount of money Joseph has. Karen has six times the amount of money Joseph has. Write an expression to represent the amount of money Joseph, Timothy and Karen have altogether. Simplify the expression by combining the like terms.

39. Evaluate $\frac{1}{3}w + 5w + w^2$ for $w = 12$.
40. Evaluate $3z + 2b - 6c$ for $a = 8.7, b = 1\frac{1}{2}, and\ c = 0.75$.

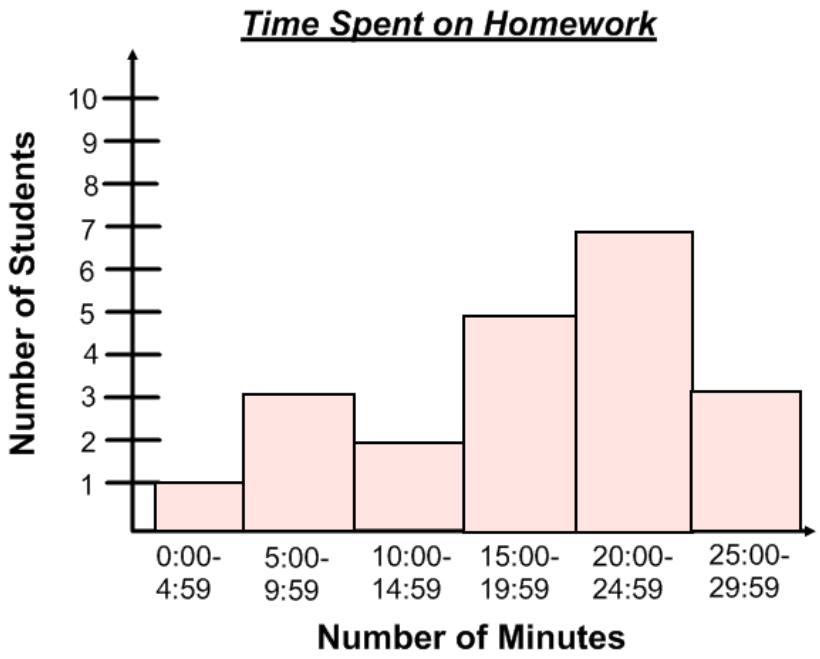
Answer Key

1.
    a. $8x + 10y$
    b. $2(4x + 5y)$
2. 866
3. 29; -29
4. $(9 + 10 + 2 \cdot 8) \div 4$; \$8.75
5. 5°
6. 48 guests, 3 packs of invitation cards, 4 packs of envelopes
7. 20 students
8. \$41.07; \$58.93
9. 28.75 feet
10. 86
11. 12.43
12.
    a. Minimum: 5; lower quartile: 6.5; median: 10.5; upper quartile: 13; maximum: 18
    b.

Push-Up Challenge



    c. 13
    d. 6.5
13.
    a. $3(81 - m^3)$
    b. $x + y + \frac{9}{n}$ or $x + y + (9 \div n)$
    c. $w + w + w + w$ or $4w$
    d. $6(c + d) - 2(8 - b)$
    e. $12m - 7$
    f. $\frac{x-11}{y+18}$ or $(x - 11) \div (y + 18)$
14.
    a. Mean: 137.35 months; Median: 137 months; Mode: 134 months
    b. Mean: $137.\overline{3}$ months; Median: 137 months; Mode: 134 and 137 months
15. $(3 \times 9) + (2 \times 6) = \$39$
16.



17. Mean absolute deviation: 1.24
18. 3,240 meters
19. $(40 \times 8) + (5 \times 12) = \$380$
20. 305 feet below sea level
21. -$7
22.

$-3.5 < -3 < -1.75 < 1\frac{2}{3} < 2\frac{1}{4}$

23. $200
24. 10 units
25. 75 feet
26. 68°C
27. 3^3; 27 cubic centimeters
28. $2 \cdot (25 + 19x)$
29. 24 – 3*x*
30.
    a. 54*x* + 36*y*
    b. 18(3*x* + 2*y*)
31. *y* + 9*x*
32. $4^2 = 16$; $2^4 = 16$; Answers may vary
33. 4(6) + 4(3); 4(6 + 3); 36 square feet
34.
    a. $8 + 3 \times 4 - 6 \div 2$

b. $8 \times 3 \times 4 \times 6 \times 2$

35. 8(12 + 8) 8 x 12 + 8 x 8 160
36. $(165 \times 1.50) + (52 \times 16) - (165 \times 0.50) - (52 \times 6) = 685$
37. $3x + 3x + 3x + 3x + 2y^2 + 2y^2 = 12x + 4y^2$
38. $m + 3m + 6m = 10\,m$
39. 208
40. 24.6