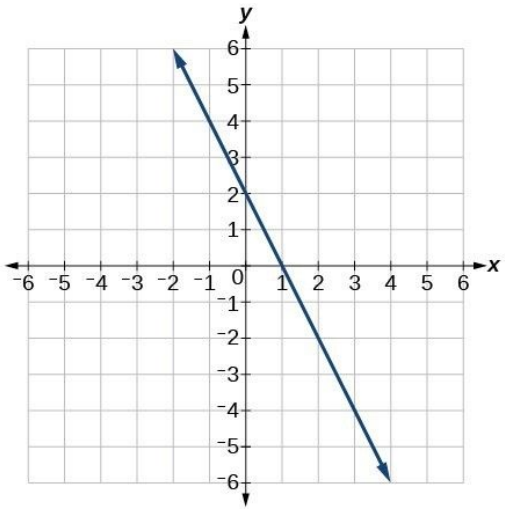
D228 Honors Math Placement Test Name: _____

Study Guide

1. **Compare numeric values**
   - Order the set from least to greatest: $4,\ \frac{1}{5},\ \left(\frac{4}{5}\right)^2,\ \sqrt{17},\ \frac{4}{3},\ 4.\overline{35}$
   - Which symbol would make the following a true sentence? $-\sqrt{10}$ ____ $-\sqrt{9}$
   - The values a,b, and c are positive. Which word describes the value of the expression $a(-b)(-c)$? (positive, negative, zero, cannot be determined)
2. **Translate verbal expressions**
   - 4 more than twice a number is 7 less than the sum of 6 and z
   - Half the product of x and y is 4 times the quotient of p and the square of r.
3. **Evaluate expressions**
   - Evaluate the expression $8x + 2x^4y - 3y$ when $x = -2$ and $y = -3$
4. **Identify, determine, and interpret unit rates**
   - A bird flies 30 miles in 6.5 hours. What is its hourly rate?
   - Kevin spends $19.50 on 15 protein bars while Jocelyn spends $20.50 on 16 bars. Who got the better deal?
5. **Solve equations (one-step, two-step, multi-step, variables on both sides, with fractions and decimals)**
   - $3x - 8 = 7x - 1$
   - $2(2.3x - 5.1) + 7.9 = 2.7x$
   - $\frac{1}{2}x - 3 = 2 - \frac{3}{4}x$
6. **Set up and solve word problem linear equations**
   - Amy purchased 4 sweaters online for $132, which includes a 10% sales tax. How much is each sweater (assuming all sweaters cost the same) before tax?
   - Joe has 4 less than 7 times as many shirts as Mark. Together, Joe and Mark have 140 shirts. How many shirts does Joe have? How many shirts does Mark have?
7. **Ratios and Proportions**
   a. Represent Ratios
   b. Solve Proportions
   c. Solve similar polygons
   d. Set up proportions from word problems and solve
      - How long will it take a plane to fly 363 miles at 132 miles per hour?
      - Given the following similar quadrilaterals, solve for x.

8. **Use function notation**
   - Given $f(x) = 3x^2 - 4x + 9$, what is $f(-2)$?
   - Which ordered pairs satisfy the function $g(x) = -7x + 2$?
9. **Solve and interpret one-variable inequalities**
   - Given the inequality $15 - 2.25x < 4.75$, what values make the inequality true?
   - Which values do not satisfy the inequality $\frac{2}{3}x - 15 \geq -\frac{1}{5}x + 2$?
10. **Set up and solve word problem one-variable inequalities**
   - Mr. Teacher bought a bag of 67 Snickers bars as rewards for his class performing well on a test. He gives the top student 5 Snickers bars and wants to spread the rest out evenly to the remaining 21 students. How many Snickers bars will each of the other students receive?
11. **Simplify expressions (distribute, combine like terms)**
   - Which of the following expressions is equivalent to $6x - 8(4x^2 + 9x - 3)$?
12. **Identify slope, x- and y-intercepts from an equation, graph, and table**
   - What are the x- and y-intercept of the line $y = \frac{3}{7}x + 6$?
   - What are the slope and y-intercept of the line $y + 3 = 5(x - 4)$?
   - What are the slope, x- and y-intercepts of the line from the graph below?



   - What are the slope, x- and y-intercepts of the line from the table below?

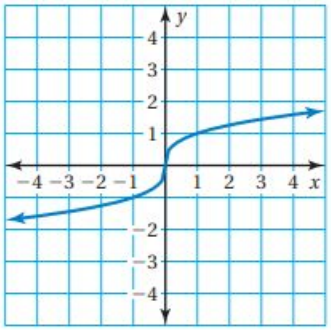
x	y
-5	4
-3	2
-1	0
0	-1
2	-3
4	-5

13. Determine if a table, equation, or scatter plot represents a linear relationship

- Does the table represent a linear function?

Color	Red	Yellow	Green	Blue	Violet
Wavelength, x	660	595	530	465	400
Frequency, y	454	504	566	645	749

- Does the graph represent a linear function?



- Which of the following equations are linear?

$5y = 2x$ $\quad$ $y = \frac{2}{5}x$ $\quad$ $10y = 4x$ $\quad$ $5xy = 2$

14. Find mean, median, mode

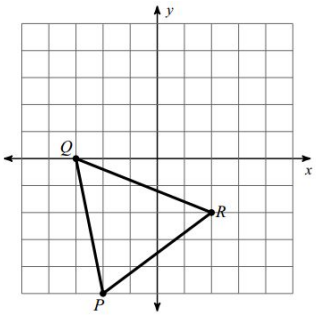
- Find the mean, median and mode of the data set: 13, 18, 13, 14, 13, 16, 14, 21, 13
- Carly earned daily tips of \$24, \$37, \$26, \$29, and \$35. How much does she need to earn the next time she works to average \$30 per day?

15. Determine the distance between two points

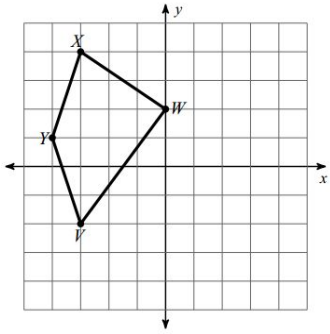
- Point A is located at (-4,9) and Point B is located at (-1, -2). What is the horizontal distance between A and B? What is the vertical distance? What is the distance?

16. Identify transformations (Reflection, rotation, translation)

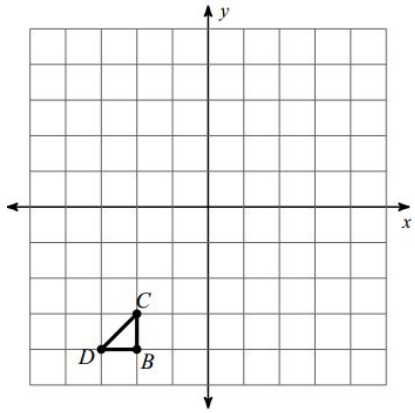
- Graph a rotation of 180° about the origin



- Graph a reflection of the following image across the x-axis and y-axis



- Graph a translation: (x,y) → (x - 1, y + 4)



17. Radicals

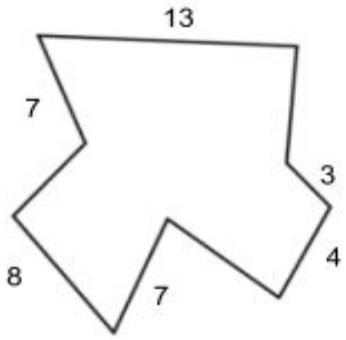
a. Simplify
b. Add/Subtract
c. Multiply
d. Divide
    - Simplify $\sqrt{50}$
    - Simplify $4\sqrt{120}$
    - Simplify $\sqrt{60x^5}$
    - Simplify $3\sqrt{5} - 8\sqrt{5}$
    - Simplify $\sqrt{24} + 7\sqrt{6}$
    - Simplify $\sqrt{10} \cdot \sqrt{15}$
    - Simplify $\frac{\sqrt{25}}{\sqrt{5}}$

18. Apply the Pythagorean theorem

- Given a right triangle with legs of length 12 and 15, what is the hypotenuse?
- If the hypotenuse of a right triangle is 20 and on the of the sides is 10, what is the length of the remaining side?

19. Determine the perimeter and area of polygons

- If the perimeter of the object below is 65, give possible lengths for the remaining sides

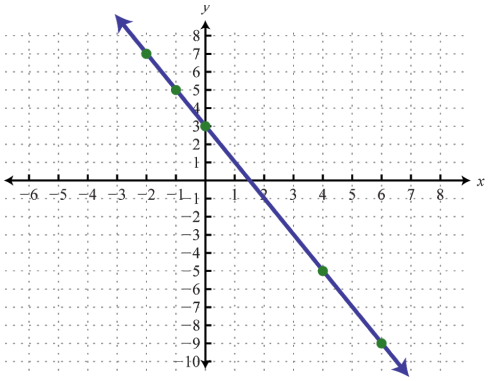


- The area of a rectangle is 95 in^2. If its base is 19 inches, what is the height?
- Find the area of a circle with radius 10 mm.

20. Determine slope given two points, a graph, or a table

- Determine the slope between (-3,6) and (5, -12)

- Determine the slope of the graph



- Determine the slope from the table

x	y
1	7
3	11
5	15
20	45

21. Write equations in slope-intercept and point-slope form given:

a. A slope and a point
b. A slope and a y-intercept
c. Two points
   - Write an equation in point-slope form for a line containing the point (5, -4) with a slope of 6.
   - Write an equation in slope-intercept form for a line with a slope of $-\frac{3}{5}$ and y-intercept (0, -2).
   - Write an equation in slope-intercept form for a line containing the points (-1, 6) and (2,-3).

22. Apply exponent rules

a. Product
b. Quotient
c. Power
d. Negative
e. Zero
   - Simplify $-4x^{-3}y^{3} \cdot \ -2xy^{-3}$
   - Simplify $\frac{2m^{3}n^{-3}}{6n}$
   - Simplify $4y^{2} \cdot (2yx^{2})^{0}$

23. Perform polynomial operations (addition, subtraction, multiplication)

- Determine the sum of the polynomials $(5x^{3}+2x-4)+(6x^{3}-2x-5)$
- Determine the difference of the polynomials $(8x^{3}-x-6)-(5x^{2}+2x-8)$
- Determine the product of the binomials $(3x-1)(2x+4)$
- Determine the product of the binomials $(x+7)^{2}$

24. Factor polynomials (GCF, binomials, trinomials)

- Factor $20x^5 - 8x^3$
- Factor $x^2 - 49$
- Factor $x^2 + 3x - 10$
- Factor $3x^2 + 4x - 7$

25. Systems of equations

a. Substitution
b. Elimination
c. Graphing
d. Setting up equations in word problems
    - Determine the value of x and y that will satisfy the system of equations:
        - $8x + 2y = -2$
          $y = -5x + 1$
        - $3x + 2y = -9$
          $5y - 10x = -5$
        - $3x - 7y = -26$
          $-x + \frac{5}{2}y = 10$
    - Dominic has 38 coins that are all quarters and dimes. He has a total of $5. Model this situation by writing a system of equations.

26. Cartesian coordinate plane

a. Quadrants
b. Plotting points
c. Determining scale of axes
    - The point (7,-3) falls in which quadrant?
    - You are measuring average temperature readings in St. Paul, MN each month. What is an appropriate scale for the y-axis?
    - The grid for your scatter plot has an x-axis that goes from 20 to 60 and a y-axis that goes from -20 to 10. Give an example of a data point that CAN be plotted on the graph and an example of a data point that CANNOT be plotted on the graph.