Math 2 NCFE Review

NC.M2.N-RN.2 (1 question)

Rewrite expressions with radicals and rational exponents into equivalent expressions using the properties of exponents.

1. Simplify $\frac{\sqrt[5]{b^3}}{b^{\frac{4}{3}}}$

   A. $\frac{1}{b^{\frac{11}{15}}}$ B. $b^{\frac{29}{15}}$ C. $b^{\frac{1}{3}}$ D. $\frac{1}{b^{\frac{1}{3}}}$

2. Write $\sqrt[3]{27x^2y^6z^3}$ as an expression with rational exponents.

   A. $9x^{\frac{2}{3}}y^2z$ B. $3x^{\frac{3}{2}}y^{\frac{1}{2}}z$ C. $3x^{\frac{2}{3}}y^2z$ D. $9x^{\frac{3}{2}}y^{\frac{1}{2}}z$

3. Which expression is equivalent to $(8w^7x^{-5}y^3z^{-9})^{\frac{-2}{3}}$?

   A. $\frac{x^{\frac{10}{3}}z^6}{4w^{\frac{14}{3}}y^2}$ B. $\frac{4w^{\frac{14}{3}}y^2}{x^{\frac{10}{3}}z^6}$ C. $\frac{2w^{\frac{5}{3}}y^{\frac{1}{3}}}{x^{\frac{7}{3}}z^{\frac{11}{3}}}$ D. $\frac{x^{\frac{7}{3}}z^{\frac{11}{3}}}{2w^{\frac{5}{3}}y^{\frac{1}{3}}}$

4. Which expression is equivalent to $\left(\frac{16x^{\frac{1}{6}}y^{-2}}{x^{-\frac{1}{6}}y^6}\right)^{\frac{3}{2}}$

   A. $24x^{\frac{9}{2}}y^{\frac{9}{2}}$ B. $\frac{24x^{\frac{3}{4}}}{y^9}$ C. $\frac{64}{x^{\frac{1}{2}}y^8}$ D. $\frac{64x^{\frac{1}{2}}}{y^{12}}$

NC.M2.N-RN.3 (1 question)

Use the properties of rational and irrational numbers to explain why:

- the sum or product of two rational numbers is rational;
- the sum of a rational number and an irrational number is irrational;
- the product of a nonzero rational number and an irrational number is irrational.

5. The product of $\sqrt{6}$ and which value would be rational?

   A. π B. $\sqrt{2}$ C. 4 D. $\sqrt{6}$

6. The length of a rectangular prism is $4\sqrt{3}$ units. The height is $3\sqrt{6}$ units. If the volume is irrational, which could be the measure of the width of the rectangular prism?

   A. $2\sqrt{50}$ B. $4\sqrt{12}$ C. $5\sqrt{8}$ D. $7\sqrt{18}$

NC.M2.A-SSE.1a or 1b (1 question)

Interpret expressions that represent a quantity in terms of its context.

a. Identify and interpret parts of a quadratic, square root, inverse variation, or right triangle trigonometric expression, including terms, factors, coefficients, radicands, and exponents.

b. Interpret quadratic and square root expressions made of multiple parts as a combination of single entities to give meaning in terms of a context.

7. The expression $-4.9t^2 + 17t + 0.6$ describes the height of a basketball *t* seconds after it has been thrown vertically into the air. Determine the initial height of the basketball, the initial speed of the basketball, the maximum height of the ball, and the time it took for the ball to hit the ground.

   A. Initial height 0.6 m
   Initial speed 17 m/sec
   Max height 15.34 m
   Ground 3.5 sec

   B. Initial height 17 m
   Initial speed 4.9 m/s
   Max height 15.34 m
   Ground 3.5 sec

   C. Initial height 0.6 m
   Initial speed 17 m/sec
   Max height 1.7 m
   Ground 15.34 sec

   D. Initial height 0 m
   Initial speed 0.6 m/s
   Max height 15.34 m
   Ground 0 sec

8. If the volume of a rectangular prism is represented by $x(x + 3)(x + 2)$, which of the following could represent the area of the rectangular base?

   A. $x^2 + 6$ B. $x^2 + 5x + 6$ C. x^2 D. $x^2 + 3$

9. If *t* is an unknown constant, which binomial must be a factor of $7m^2 + 14m - tm - 2t$?

A. $7m + t$ B. $m - t$ C. $m + 2$ D. $m - 2$

NC.M2.A-SSE.3 (1 question)
Write an equivalent form of a quadratic expression by completing the square, where a is an integer of a quadratic expression, $ax^2 + bx + c$, to reveal the maximum or minimum value of the function the expression defines.

10. Write the expression in vertex form and identify the maximum/minimum. $3x^2 - 12x - 1$

A. $(x - 12)^2 - 1$ Min $(12, -1)$
B. $3(x - 12)^2 - 1$ Min $(-12, -1)$
C. $3(x - 2)^2 - 13$ Min $(2, -13)$
D. $3(x + 2)^2 - 13$ Max $(-2, -13)$

11. Which function is equivalent to $y = x^2 - 6x + 10$?

A. $y = (x + 3)^2 - 1$ B. $y = (x - 3)^2 + 1$ C. $y = (x + 6)^2 - 10$ D. $y = (x - 6)^2 + 10$

NC.M2.A-CED.1 (1 question)
Create equations and inequalities in one variable that represent quadratic, square root, inverse variation, and right triangle trigonometric relationships and use them to solve problems.

12. A marathon is roughly 26.2 miles long. Which equation could be used to determine the time, *t*, it takes to run a marathon as a function of the average speed, *s* of the runner where *t* is in hours and *s* is in miles per hour?

A. $t = 26.2 - 26.2s$ B. $26.2 - \frac{s}{26.2}$ C. $t = 26.2s$ D. $t = \frac{26.2}{s}$

13. The function $h(x) = 0.04x^2 - 3.5x + 100$ defines the height (in feet) of a major support cable on a suspension bridge from the bridge surface where *x* is the horizontal distance (in feet) from the left end of the bridge. Where is the cable less than 40 feet above the bridge surface?

A. Approximately 23 feet to 64 feet
B. At 24 feet
C. Less than 23 feet and greater than 64 feet
D. The cable is never less than 40 feet above the bridge surface.

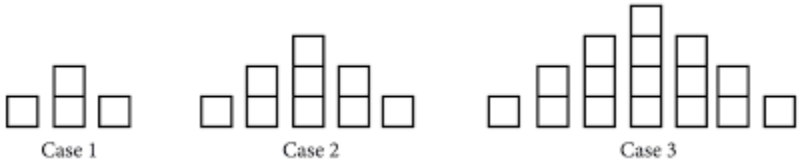
14. In kickboxing, it is found that the force, *f*, needed to break a board, varies inversely with the length, *L*, of the board. If it takes 5 lbs. of pressure to break a board 2 feet long, how many pounds of pressure will it take to break a board that is 6 feet long?

A. 10 lbs B. 60 lbs C. 0.6 lbs D. 1.67 lbs

NC.M2.A-CED.2 (1 question)
Create and graph equations in two variables to represent quadratic, square root and inverse variation relationships between quantities.

15. The number of boxes in a case, $f(x)$, is shown in the diagram. Which equation models the number of boxes in a case as a function of the number of cases?

A. $y = \sqrt{x}$
B. $y = x^2$
C. $y = \frac{1}{x}$
D. $y = x^3$



16. The equation $s = 2\sqrt{5x}$ can be used to estimate the speed, *s*, of a car in miles per hour, given the length in feet, *x*, of the tire marks it leaves on the ground. A car traveling 90 miles per hour came to a sudden stop. According to the equation, how long would the tire marks be for the car?

A. 355 feet B. 380 feet C. 405 feet D. 430 feet

17. The centripetal force F exerted on a passenger by a spinning amusement park ride is related to the number of seconds t the ride takes to complete one revolution by the equation $t = \sqrt{\frac{155\pi^2}{F}}$. Find the centripetal force exerted on a passenger when it takes 12 seconds for the ride to complete one revolution.

A. 10.6 B. 127.5 C. 11.3 D. 469.4

NC.M2.A-REI.4a and 4b (2 questions)

Solve for all solutions of quadratic equations in one variable.
a. Understand that the quadratic formula is the generalization of solving $ax^2 + bx + c$ by using the process of completing the square.
b. Explain when quadratic equations will have non-real solutions and express complex solutions as $a \pm bi$ for real numbers a and b.

18. Describe the nature of the roots of $2x^2 + 5 = 2x$.

A. 2 real B. 2 imaginary C. 1 real D. 2 rational

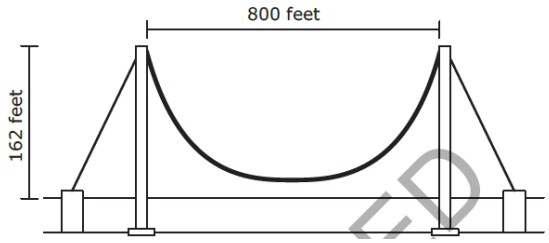
19. Ryan used the quadratic formula to solve an equation and his result was $x = \frac{8 \pm \sqrt{(-8)^2 - 4(1)(-2)}}{2(1)}$. Which quadratic equation in standard form was Ryan solving?

A. $-8x^2 - x - 2 = 0$ B. $x^2 + 8x - 2 = 0$ C. $x^2 - 8x - 2 = 0$ D. $x^2 + 8x + 2 = 0$

20. The equation $2x^2 - 5x = -12$ is rewritten in the form $2(x - p)^2 + q = 0$. What is the value of q?

A. $\frac{167}{16}$ B. $\frac{71}{8}$ C. $\frac{25}{8}$ D. $\frac{25}{16}$

21. The towers of a suspension bridge are 800 feet apart and rise 162 feet higher than the road. Suppose that the cable between the towers has the shape of a parabola and is 2 feet higher than the road at the point halfway between the towers.



What is the ***approximate*** height of the cable 120 feet from either tower?

A. 80 feet B. 74 feet C. 22 feet D. 16 feet

NC.M2.A-REI.7 (1 question)

Use tables, graphs, and algebraic methods to approximate or find exact solutions of systems of linear and quadratic equations and interpret the solutions in terms of a context.

22. The student council is planning a dance for their high school. They did some research and found that the relationship between the ticket price and income that they will receive from the dance can be modeled by the function $f(x) = -100(x - 4)^2 + 1500$. They also calculated their expenses and found that their expenses can be modeled by the function $g(x) = 300 + 10x$. What ticket price(s) could the student council charge for the dance if they wanted to break-even (the expenses are equal to the income)?

A. 305.4 or 373.6 B. 0.54 or 7.36 C. 300 and 1500 D. 4 and 30

23. A system of equations is shown below. What is the smallest value of y in the solution set of the system?

$$y = x^2 + 2x + 8$$
$$y = -4x$$

A. -4 B. -2 C. 8 D. 16

NC.M2.A-REI.11 (1 question)

Extend the understanding that the x-coordinates of the points where the graphs of two square root and/or inverse variation equations $y=(x)$ and $y=g(x)$ intersect are the solutions of the equation $f(x)=g(x)$ and approximate solutions using graphing technology or successive approximations with a table of values.

24. Given the following equations, determine the x-value that results in an equal output for both functions.
$f(x) = \sqrt{3x-2}$
$f(x) = \sqrt{x+2}$ A. 2 B. -2 C. 4 D. 0

25. Solve $\frac{1}{x} = \sqrt{2x+3}$
A. 2 B. 0 C. -1 D. 0.5

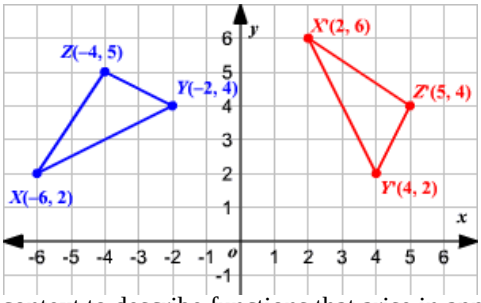
NC.M2.F-IF.2 (1 question)

Extend the use of function notation to express the image of a geometric figure in the plane resulting from a translation, rotation by multiples of 90 degrees about the origin, reflection across an axis, or dilation as a function of its pre-image.

26. Preimage $A(-3,4)$ was reflected over the x-axis and then reflected over the y-axis. Which transformation(s) will map the new image back onto preimage *A*?

A. Reflection over the line $y = x$
B. Translation right 6 and up 8
C. Rotation 180° about the origin
D. Dilation by a scale factor of 2

27. Determine the rule for the transformation to the right.

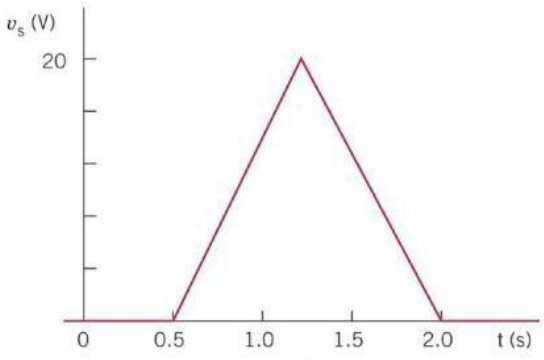


A. $f(x,y) = (y,-x)$
B. $f(x,y) = (-y,x)$
C. $f(x,y) = (-x,-y)$
D. $f(x,y) = (-x,y)$

NC.M2.F-IF.4 (1 question)

Interpret key features of graphs, tables, and verbal descriptions in context to describe functions that arise in applications relating two quantities, including: domain and range, rate of change, symmetries, and end behavior.

28. The graph is the voltage, *v*, in a given circuit as a function of the time (in seconds). What was the maximum voltage and how long did it take to complete the circuit?



A. Max voltage 1.25, Time to complete 20
B. Max voltage 20, Time to complete 2
C. Max voltage 20, Time to complete 1.25
D. Max voltage 20, Time to complete 1.5

29. Jason kicked a soccer ball that was lying on the ground.
It was in the air of 3 seconds before it hit the ground again.
While the soccer ball was in the air, it reached a height of approximately 30 feet. Assuming that the soccer ball's height (in feet) is a function of the time (in seconds), determine a reasonable domain and range.

A. Domain: $0 \le x \le 3$ Range $0 \le y \le 30$
B. Domain: $0 \le x \le 1.5$ Range $0 \le y \le 15$
C. Domain: $0 \le x \le 30$ Range $0 \le y \le 3$
D. Domain: $3 \le x \le 30$ Range $3 \le y \le 30$

30. The number of bacteria in a culture can be modeled by the function $N(t) = 28t^2 - 30t + 160$, where *t* is the temperature, in degrees Celsius, the culture is being kept. A scientist wants to have fewer than 200 bacteria in a culture in order to test a medicine effectively. What is the ***approximate*** domain of temperatures that will keep the number of bacteria under 200?

A. $-1.01℃ < t < 2.03℃$
B. $-0.86℃ < t < 1.93℃$
C. $-0.90℃ < t < 1.97℃$
D. $-0.77℃ < t < 1.85℃$

31. The function $f(x) = \frac{85}{x}$ models the volume of a gas in a balloon under *x* units of pressure at a constant temperature. Which ***best*** describes the domain of $f(x)$?

A. $0 < x \leq 85$ B. $0 \leq x \leq 85$ C. $x > 0$ D. $x \geq 0$

NC.M2.F-IF.7 (2 questions)

Analyze quadratic, square root, and inverse variation functions by generating different representations, by hand in simple cases and using technology for more complicated cases, to show key features, including: domain and range; intercepts; intervals where the function is increasing, decreasing, positive, or negative; rate of change; maximums and minimums; symmetries; and end behavior.

32. Compare $f(x) = 2x^2$ and $g(x) = \sqrt{2x}$ for the domain $x \geq 0$

A. $f(x)$ is decreasing at an increasing rate and $g(x)$ is increasing at a decreasing rate
B. $f(x)$ is decreasing at an increasing rate and $g(x)$ is increasing at an increasing rate
C. $f(x)$ is increasing at a decreasing rate and $g(x)$ is decreasing at an increasing
D. $f(x)$ is increasing at an increasing rate and $g(x)$ is increasing at a decreasing rate

33. What is the end behavior for $y = -3(x-1)^2 + 4$?

A. $x \to \infty, y \to \infty$
$x \to -\infty, y \to \infty$

B. $x \to \infty, y \to -\infty$
$x \to -\infty, y \to \infty$

C. $x \to \infty, y \to \infty$
$x \to -\infty, y \to -\infty$

D. $x \to \infty, y \to -\infty$
$x \to -\infty, y \to -\infty$

NC.M2.F-IF.9 (1 question)

Compare key features of two functions (linear, quadratic, square root, or inverse variation functions) each with a different representation (symbolically, graphically, numerically in tables, or by verbal descriptions).

34. Function $f(x)$ is shown in the table and function $g(x)$ is shown as an equation. What is the difference between the maximum value of $g(x)$ and $f(x)$?

A. 5
B. 1
C. -1
D. -41

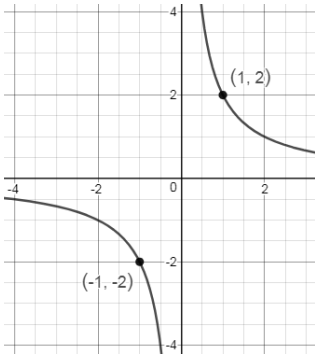
x	$f(x)$
-2	-47
-1	-26
0	-11
1	-2
2	1
3	-2

$g(x) = -2\sqrt{x+3} + 6$

35. Compare the constant of proportionality for each of the following inverse variation models and list them in order from least to greatest.

$y = \frac{9}{x}$

x	y
2	20
4	10
5	8
8	5
16	2.5



A. 1, 9, 40
B. 2, 9, 40
C. 0.5, 9, 10
D. 2, 9, 10

NC.M2.F-BF.1 (1 question)

Write a function that describes a relationship between two quantities by building quadratic functions with real solution(s) and inverse variation functions given a graph, a description of a relationship, or ordered pairs (include reading these from a table).

36. Farmer Brown built a rectangular pen for his chickens using 12 meters of fence.
    - He used part of one side of his barn as one length of the rectangular pen.
    - He maximized the area using the 12 meters of fence.

    Farmer Johnson built a rectangular pen for her chickens using 16 meters of fence.
    - She used part of one side of her barn as one length of the rectangular pen.
    - The length of her pen was 2 meters more than the length of Farmer Brown's pen.
    - The width of her pen was 1 meter more than the width of Farmer Brown's pen.

    How much larger is Farmer Johnson's rectangular pen than Farmer Brown's?

    A. 24 square meters B. 18 square meters C. 16 square meters D. 14 square meters

37. Write an equation to represent the following relationship: y varies inversely with x and when $x = 3$ then $y = 5$.

    A. $y = 15x$ B. $xy = 15$ C. $y = 3x^2 + 5$ D. $y = \frac{x}{15}$

NC.M2.F-BF.3 (1 question)

Understand the effects of the graphical and tabular representations of a linear, quadratic, square root, and inverse variation function *f* with $k \cdot f(x)$, $f(x)+k$, $f(x+k)$ for specific values of k (both positive and negative).

38. The graph of $f(x) = 2x^2 - 3x + 5$ will be translated 8 units down, producing the graph of $q(x)$. Which equation represents the new function, $q(x)$?

    A. $q(x) = 2x^2 - 3x - 3$
    B. $q(x) = 2x^2 - 3x + 13$
    C. $q(x) = 2x^2 - 11x + 5$
    D. $q(x) = 2x^2 + 5x + 5$

39. The graph of $f(x) = x^2$ will be translated 5 units up and 2 units to the right. Which function describes the graph produced by the translation?
    A. $g(x) = x^2 - 4x + 9$
    B. $g(x) = x^2 + 4x - 1$
    C. $g(x) = x^2 - 10x + 27$
    D. $g(x) = x^2 + 10x + 23$

40. Which function is even?
    A. $f(x) = (x + 2)(x - 2)$
    B. $f(x) = x(x + 2)$
    C. $f(x) = (x + 1)(x - 2)$
    D. $f(x) = (x - 1)(x - 1)$

Helpful Information

Even function – Symmetric about y-axis

Odd function – Symmetric about origin

NC.M2.G-CO.3 (1 question)

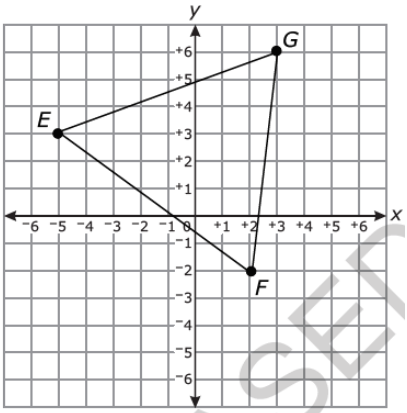
Given a triangle, quadrilateral, or regular polygon, describe any reflection or rotation symmetry i.e., actions that carry the figure onto itself. Identify center and angle(s) of rotation symmetry. Identify line(s) of reflection symmetry. Represent transformations in the plane.

41. Which rotation will carry a regular hexagon onto itself?
    A. a 30° counterclockwise rotation
    B. a 90° counterclockwise rotation
    C. a 120° counterclockwise rotation
    D. a 270° counterclockwise rotation

NC.M2.G-CO.5 (1 question)

Given a geometric figure and a rigid motion, find the image of the figure. Given a geometric figure and its image, specify a rigid motion or sequence of rigid motions that will transform the pre-image to its image.

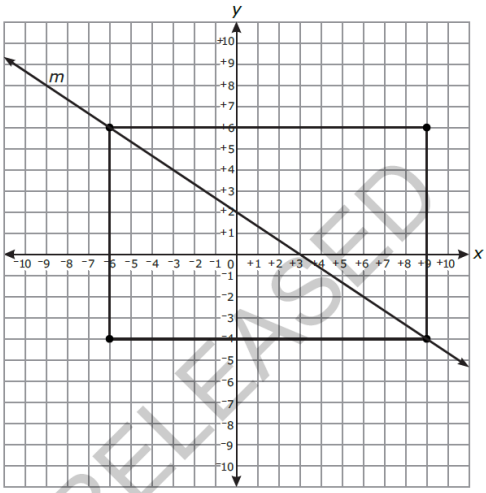
42. Triangle EGF is graphed.



Triangle EGF will be rotated 90° counterclockwise around the origin and will then be reflected across the y-axis, producing an image triangle. Which additional transformation will map the image triangle back onto the original triangle?

A. Rotation 270° counterclockwise around the origin
B. Rotation 180° counterclockwise around the origin
C. Reflection across the line $y = -x$
D. Reflection across the line $y = x$

43. Which transformation will carry the rectangle shown to the right onto itself?



A. a reflection over line *m*
B. a reflection over the line $y = 1$
C. a rotation 90° counterclockwise about the origin
D. a rotation 270° counterclockwise about the origin

NC.M2.G-CO.8 (1 question)

Justify the ASA, SAS, and SSS criteria for triangle congruence. Use criteria for triangle congruence (ASA, SAS, SSS, HL) to determine whether two triangles are congruent.

44. Which statements could be used to prove that ΔABC and $\Delta A'B'C'$ are congruent?

A. $\overline{AB} \cong \overline{A'B'}, \quad \overline{BC} \cong \overline{B'C'}, \quad and \angle A \cong \angle A'$

B. $\overline{AB} \cong \overline{A'B'}, \quad \angle A \cong \angle A', \quad and \angle C \cong \angle C'$

C. $\angle A \cong \angle A', \quad \angle B \cong \angle B', \quad and \angle C \cong \angle C'$

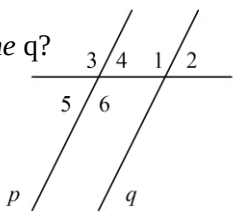
D. $\angle A \cong \angle A', \quad \overline{AC} \cong \overline{A'C'}, \quad and \overline{BC} \cong \overline{B'C'}$

NC.M2.G-CO.9 (1 question)

Prove theorems about lines and angles and use them to prove relationships in geometric figures including:

- ☐ Vertical angles are congruent.
- ☐ When a transversal crosses parallel lines, alternate interior angles are congruent.
- ☐ When a transversal crosses parallel lines, corresponding angles are congruent.
- ☐ Points are on a perpendicular bisector of a line segment if and only if they are equidistant from the endpoints of the segment.
- ☐ Use congruent triangles to justify why the bisector of an angle is equidistant from the sides of the angle.

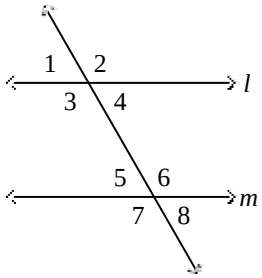
45. $m\angle 1 = 6x$ and $m\angle 3 = 120$. What is the value of *x* if *line p* is parallel to *line* q? The diagram is not drawn to scale.



A. 114 B. 126
C. 120 D. 20

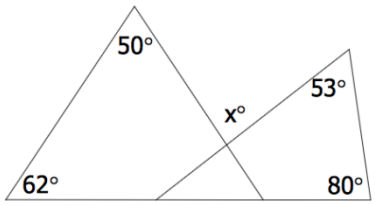
46. Find the value of the variable if $m \parallel l$, $m\angle 1 = 2x + 44$ and $m\angle 5 = 5x + 38$. The diagram is not drawn to scale.

A. 1 B. 2 C. 3 D. -2



47. Solve for x.

A. 68°
B. 65°
C. 47°
D. 115°



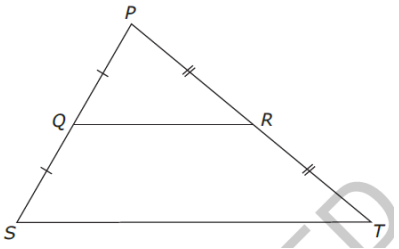
NC.M2.G-CO.10 (1 question)

Prove theorems about triangles and use them to prove relationships in geometric figures including:

- ☐ The sum of the measures of the interior angles of a triangle is 180º.
- ☐ An exterior angle of a triangle is equal to the sum of its remote interior angles.
- ☐ The base angles of an isosceles triangle are congruent.
- ☐ The segment joining the midpoints of two sides of a triangle is parallel to the third side and half the length.

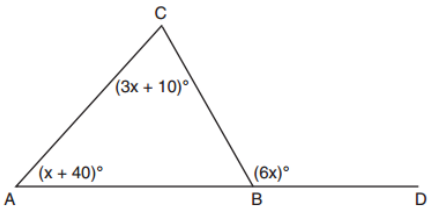
48. Which statement must be true about the triangle?

A. $PQ + QS = PR + RT$
B. $\Delta PQR \cong \Delta PST$
C. $ST = 2 \cdot QR$
D. $\angle S \cong \angle T$



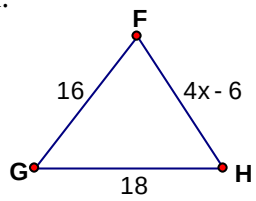
49. Find the value of x.

A. 30°
B. 25°
C. 13°
D. 15°



50. If $\angle F \cong \angle G$, solve for *x*.

A. 3
B. 5.5
C. 6
D. 16



NC.M2.G-SRT.2a and 2b (1 question)

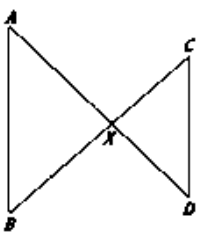
Understand similarity in terms of transformations.

a. Determine whether two figures are similar by specifying a sequence of transformations that will transform one figure into the other.

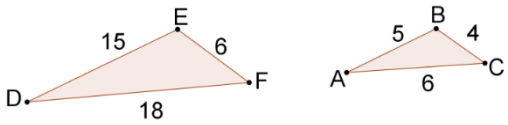
b. Use the properties of dilations to show that two triangles are similar when all corresponding pairs of sides are proportional and all corresponding pairs of angles are congruent.

51. In the diagram, $\overline{CD} \parallel \overline{AB}$. Are the triangles similar? If so, identify the similarity statement and justification.

A. The triangles are not similar.
B. $\Delta ABX \sim \Delta CDX$ by AA~
C. $\Delta ABX \sim \Delta DCX$ by AA~
D. $\Delta ABX \sim \Delta DCX$ by SAS~



52. Determine if $\Delta DEF \sim \Delta ABC$ and if so, justify the similarity statement.



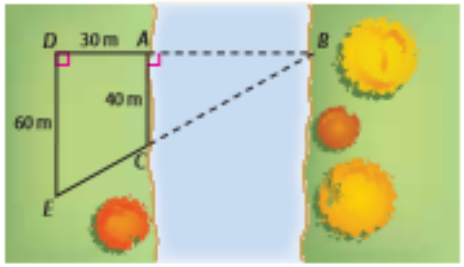
A. Yes, the triangles are similar. Triangle DEF is a dilation of triangle ABC by a scale factor of 3.
B. Yes, the triangles are similar. Triangle DEF is a dilation of triangle ABC by a scale factor of $\frac{1}{3}$
C. No, the triangles are not similar. The sides of triangle DEF are not proportional to the sides of triangle ABC.
D. No the triangles are not similar. There must be at least one set of corresponding congruent angles for the triangles to be similar.

NC.M2.G-SRT.4 (2 questions)

Use similarity to solve problems and to prove theorems about triangles. Use theorems about triangles to prove relationships in geometric figures.

- A line parallel to one side of a triangle divides the other two sides proportionally and its converse.
- The Pythagorean Theorem

53. Calculate the distance across the river, AB.

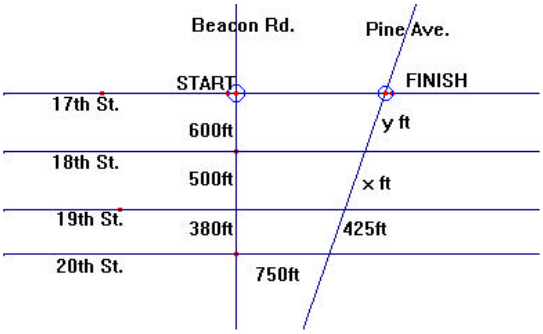


A. 40 m
B. 30 m
C. 60 m
D. 90 m

54. The parade committed has come up with the Beacon County Homecoming parade route for next year.

- They want to start at the intersection of 17th Street and Beacon Road.
- The parade will proceed south on Beacon Road, turning left onto 20th Street.
- Then the parade will turn left onto Pine Avenue and finish back at 17th Street.

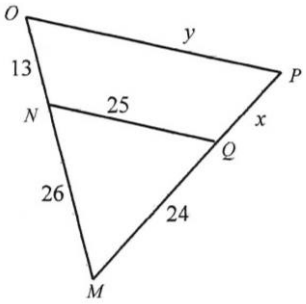
What is the ***approximate*** distance traveled on the parade route?



A.3755 feet C. 2655 feet

B. 3135 feet D. 3885 feet

55. Find the values of x and y given that ΔOPM ~ ΔNQM.



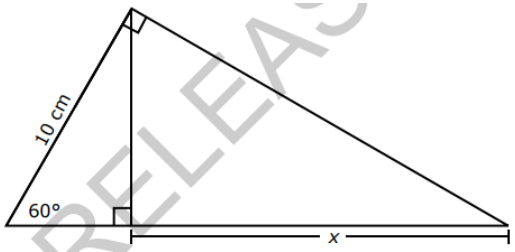
A. $x = 37.5, y = 12$ B. $x = 12, y = 37.5$

C. $x = 12, y = 12.5$ D. $x = 24, y = 37.5$

NC.M2.G-SRT.8 (1 question)

Use trigonometric ratios and the Pythagorean Theorem to solve problems involving right triangles in terms of a context.

56. What is the value of x in the triangle?



A. $\frac{5\sqrt{3}}{2}$ cm B. $5\sqrt{3}$ cm C. 10 cm D. 15 cm

57. From the top of a tower, the angle of depression to a stake on the ground is 72°. The top of the tower is 80 feet above the ground. What is the distance from the top of the tower to the stake?

A. 84.12 feet B. 25.99 feet C. 258.89 feet D. 76.08 feet

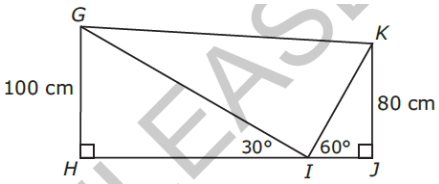
58. Suppose a tree casts a shadow of length 60 feet. If the distance from the top of the tree to the end of the shadow is 80 feet, what is the angle of elevation from the shadow to the top of the tree?

A. 10.42° B. 48.59° C. 53.13° D. 41.41°

NC.M2.G-SRT.12 (1 question)

Develop properties of special right triangles (45-45-90 and 30-60-90) and use them to solve problems.

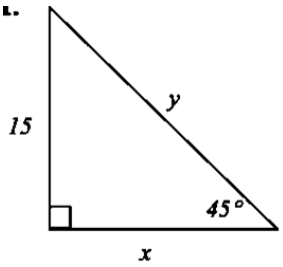
59. What is the ***approximate*** length of $\overline{HJ}$ in the diagram?



A. 292 cm B. 265 cm C. 219 cm D. 196 cm

60. Solve for y.

A. $y = 15$
B. $y = 15\sqrt{2}$
C. $y = 15\sqrt{3}$
D. $y = 30$



NC.M2.S-IC.2 (1 question)

Use simulation to determine whether the experimental probability generated by sample data is consistent with the theoretical probability based on known information about the population.

61. Multiple groups of students flip coins. One group flips a coin 5 times, one group flips a coin 20 times, and one group flips a coin 100 times. Which group's results will most likely approach the theoretical probability?

A. 5 times B. 20 times C. 100 times D. They are all equal to the theoretical probability.

62. If we flip a coin 30 times, we get 18 tails. How many more tails did we get in the simulation than expected?

A. 18 B. 30 C. 12 D. 3

NC.M2.S-CP.1 (1 question)

Describe events as subsets of the outcomes in a sample space using characteristics of the outcomes or as unions, intersections and complements of other events.

63. Twenty-one students at a school have an allergy to peanuts, shellfish, or both.
    - Fourteen students at the school are allergic to peanuts.
    - Twelve students at the school are allergic to shellfish.

    How many of the students are allergic to both peanuts and shellfish?

A. 12 B. 7 C. 5 D. 2

The students are curious as to which teachers prefer coffee or tea. They decide to track whether the teacher is a male or a female and whether they prefer coffee or tea. They find that of the 200 teachers at Humie Olive Rd High, 96 preferred tea. They also find that of the 120 male teachers, 81 liked coffee. Use the information to answer the following. (Use for 64 &65)

64. How many teachers are male or prefer coffee?

A. 81 B. 177 C. 143 D. 224

65. How many teachers are female and prefer tea?

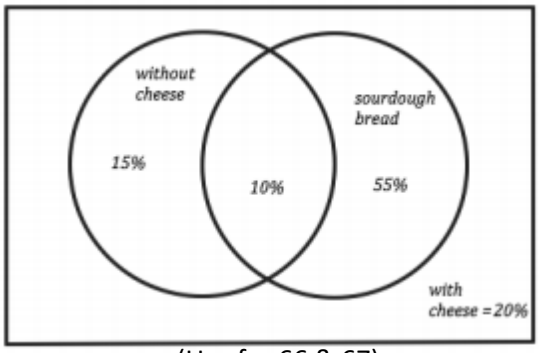
A. 176 B. 57 C. 23 D. 96

NC.M2.S-CP.4 (1 question)

Represent data on two categorical variables by constructing a two-way frequency table of data. Interpret the two-way table as a sample space to calculate conditional, joint and marginal probabilities. Use the table to decide if events are independent.

66. Determine if sourdough (event A) is independent from without cheese (event B)
    A. Independent; $P(A) + P(B) = P(A \cup B)$
    B. Dependent; $P(A) \cdot P(B) \neq P(A \cap B)$
    C. Independent; $P(A) \cdot P(B) = P(A \cap B)$
    D. Dependent; $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

67. Using the Venn diagram, determine $P(soudough|without\ cheese)$.
    A. 0.4 B. 0.18 C. 0.2 D. 0.15



(Use for 66 & 67)

An employee of Baskin Robbins observed the customers orders. The employee noted if the customer was male or female and if ice cream or cake was ordered. (Use for 68 and 69)

- 85 customers ordered ice cream
- Of the 60 females, 10 ordered ice cream
- 20 males ordered cake

68. What is the probability that a randomly selected customer ordered ice cream given the customer was male?

    A. $\frac{15}{19}$ B. $\frac{15}{31}$ C. $\frac{21}{31}$ D. $\frac{15}{17}$

69. What is the probability that a randomly selected customer was male or ordered ice cream?

    A. $\frac{15}{19}$ B. $\frac{15}{31}$ C. $\frac{21}{31}$ D. $\frac{15}{17}$

NC.M2.S-CP.5 (1 question)

Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations.

70. For a carnival game, a jar contains 20 blue marbles and 80 red marbles.
    - Children take turns randomly selecting a marble from the jar.
    - If a blue marble is chosen, the child wins a prize.
    - After each turn, the marble is replaced.
    - Casey has drawn six red marbles in a row.

    Which statement is true?

    A. If Casey selects another red marble, then 2 of her next 3 picks will be blue marbles because 2 blue marbles are selected for every 8 red marbles selected.
    B. The probability that Casey selects a blue marble on the next turn is higher than it was on her last turn because she has chosen so many red marbles in a row.
    C. The probability that Casey selects a blue marble on her next turn is the same as it was on the last turn because selections are independent of each other.
    D. If Casey draws 4 more times, she will select 2 blue marbles because the probability that a blue marble will be selected is 2 out of every 10 turns.

71. Juanita flipped a fair coin 10 times and got the following results: T, H, T, T, H, H, H, H, H, H. Her math partner Harold asserts that the next flip is going to result in tails. Is Harold's assertion correct?
    A. Yes, since the probability of tails is $\frac{1}{2}$, the next flip must be a tail since there have been $\frac{7}{10}$ heads.
    B. Yes, the likelihood that another head would occur is very small since there have been 6 heads in a row.
    C. Harold has a 50% chance of being correct since the next flip is independent of the previous flips and a fair coin has a theoretical probability of 50%.
    D. No, since there have been so many heads, it is likely this pattern will continue.

NC.M2.S-CP.6 (1 question)

Find the conditional probability of *A* given *B* as the fraction of *B*'s outcomes that also belong to *A*, and interpret the answer in context.

72. Suppose that Jamal can choose to get home from work by taxi or bus.
    - When he chooses to get home by taxi, he arrives home after 7 p.m. 8 percent of the time.
    - When he chooses to get home by bus, he arrives home after 7 p.m. 15 percent of the time.
    - Because the bus is cheaper, he uses the bus 60 percent of the time.

    What is the ***approximate*** probability that Jamal chose to get home from work by bus, given that he arrived home after 7 p.m?

    A. 0.09 B. 0.14 C. 0.60 D. 0.74

73. A teacher gave her class two quizzes. 30% of the class passed both quizzes and 60% of the class passed the first quiz. What percent of those who passed the first quiz also passed the second quiz?

    A. 50% B. 30% C. 40% D. 10%

NC.M2.S-CP.8 (1 question)

Apply the general Multiplication Rule P (A and B) = P(A)P(B|A) = P(B)P(A|B), and interpret the answer in context. Include the case where A and B are independent: P (A and B) = P(A) P(B).

74. Events *M* and *N* have probabilities such that $P(M) = 0.4$, $P(N) = 0.28$, $P(M \cup N) = 0.56$, and $P(M \cap N) = 0.12$. Are event *M* and event *N* independent?

    A. No, because $P(M) - P(N) = P(M \cap N)$
    B. No, because $P(M) \cdot P(N) \neq P(M \cap N)$
    C. Yes, because $P(M) + P(N) = P(M \cup N)$
    D. Yes, because $P(M) \cdot P(N) \neq P(M \cup N)$

75. You have a box with 3 blue marbles, 2 red marbles, and 4 yellow marbles. You are going to pull out one marble, record its color, put it back in the box and draw another marble. What is the probability of pulling out a red marble followed by a blue marble? What is the probability of pulling out a red marble followed by a blue marble?

    A. $\frac{5}{18}$ B. $\frac{5}{9}$ C. $\frac{2}{27}$ D. $\frac{1}{12}$

76. You have a box with 3 blue marbles, 2 red marbles, and 4 yellow marbles. You are going to pull out one marble, record its color, leave it out, and draw another marble. What is the probability of pulling out a red marble followed by a blue marble? What is the probability of pulling out a red marble followed by a blue marble?

    A. $\frac{5}{18}$ B. $\frac{5}{9}$ C. $\frac{2}{27}$ D. $\frac{1}{12}$

NC Final Exam 2018-19	Number of Operational Items	Number of Field Test Items	Total Number of Items
NC Math 2	33 multiple-choice	4 multiple-choice	37

120 minutes to complete the exam.