Mathematics Standards for High School

Mathematics | High School—Number and Quantity

Numbers and Number Systems. D . A , : 1, 2, 3… , 0 . A , . . D . 8, . , .

:

E . F , $(5^{1/3})^3$ $5^{(1/3)3} = 5^1 = 5$ $5^{1/3}$ 5.

C

Number and Quantity Overview

The Real Number System

- **Extend the properties of exponents to rational exponents**
- **Use properties of rational and irrational numbers.**

Quantities

- **Reason quantitatively and use units to solve problems**

The Complex Number System

- **Perform arithmetic operations with complex numbers**
- **Represent complex numbers and their operations on the complex plane**
- **Use complex numbers in polynomial identities and equations**

Vector and Matrix Quantities

- **Represent and model with vector quantities.**
- **Perform operations on vectors.**
- **Perform operations on matrices and use matrices in applications.**

Mathematical Practices

1. [illegible]
2. [illegible]
3. C [illegible]
4. [illegible]
5. [illegible]
6. A [illegible]
7. [illegible]
8. [illegible]

The Real Number System N-RN

Extend the properties of exponents to rational exponents.

1. E . For example, we define $5^{1/3}$ to be the cube root of 5 because we want $(5^{1/3})^3 = 5^{(1/3)3}$ to hold, so $(5^{1/3})^3$ must equal 5.
2. .

Use properties of rational and irrational numbers.

3. E ; ; .

Quantities N-Q

Reason quantitatively and use units to solve problems.

1. - ; ; .
2. D .
3. C .

The Complex Number System N-CN

Perform arithmetic operations with complex numbers.

1. i $i^2 = 1$, $a + bi$ a b .
2. $i^2 = 1$, , .
3. (+) F ; .

Represent complex numbers and their operations on the complex plane.

4. (+) ( ), .
5. (+) , , ; . For example, (1 + 3)

Seeing Structure in Expressions

- Interpret the structure of expressions
- Write expressions in equivalent forms to solve problems

Arithmetic with Polynomials and Rational Expressions

- Perform arithmetic operations on polynomials
- Understand the relationship between zeros and factors of polynomials
- Use polynomial identities to solve problems
- Rewrite rational expressions

Creating Equations

- Create [illegible]

Seeing Structure in Expressions A-SSE

Interpret the structure of expressions

1. .
   a. , , ,
      .
   b.
      . *For example, interpret P(1+r)ⁿ as the product of P and a factor not depending on P.*
2. =+0̸3̸4& 5 2

Rewrite rational expressions

6. ; $a(x)/b(x)$
$q(x)$ $r(x)/b(x)$, a [illegible]

6. (. .,), .

7. . *For example, find the points of intersection between the line* $y = 3x$ $x^2 + y^2 = 3$.

8. (+) .

9. (+) F (3 3).

Represent and solve equations and inequalities graphically

10. , ( ).

11. E x- $y = f(x)$ $y = g(x)$ $f(x) = g(x)$; , . ., , , . $f(x)$ / $g(x)$, , , , .

12. - ( ), - .

Mathematics | High School—Functions

F [illegible]

Interpreting Functions

•

Interpreting Functions F-IF

Understand the concept of a function and use function notation

1. ( ) ( ) . f x , $f(x)$ f x. f $y = f(x)$.
2. , , .
3. , , . *For example, the Fibonacci sequence is defined recursively by $f(0) = f(1) = 1$, $f(n+1) = f(n) + f(n-1)$ for $n \geq 1$.*

Interpret functions that arise in applications in terms of the context

4. F 0353 . 0 74 71 0571 10 71 0 3 bT(tbcm0huu(oph5JJsB1t.5Mtn

9. C (, , ,). *For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.*

Building Functions F-BF

Build a function that models a relationship between two quantities

1\. .

a. D , , .

b. C . *For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.*

c. (+) C . *For example, if T(y) is the temperature in the atmosphere as a function of height, and h(t) is the height of a weather balloon as a function of time, then T(h(t)) is the temperature at the location of the weather balloon as a function of time.*

2\. , , , .

Build new functions from existing functions

3\. $f(x)$ $f(x) + k$, $k\,f(x)$, $f(kx)$, $f(x + k)$ k ( ); k . E . *Include recognizing even and odd functions from their graphs and algebraic expressions for them.*

4\. F .

a. ( ) = . *For example, $f(x) = 2x^3$ or $f(x) = (x+1)/(x-1)$ for $x \neq 1$.*

b. (+) .

c. (+) , .

d. (+) - .

5\. (+) .

Linear, Quadratic, and Exponential Models F-LE

Construct and compare linear, quadratic, and exponential models and solve problems

1\. D .

a. , .

b. .

c. .

2. C [illegible]

3. [illegible]

4. F [illegible]

Geometry Overview

Congruence

- **Experiment with transformations in the plane**
- **Understand congruence in terms of rigid motions**
- **Prove geometric theorems**
- **Make geometric constructions**

Similarity, Right Triangles, and Trigonometry

- **Understand similarity in terms of similarity transformations**
- **Prove theorems involving similarity**
- **Define trigonometric ratios and solve problems involving right triangles**
- **Apply trigonometry to general triangles**

Circles

- **Understand and apply theorems about circles**
- **Find arc lengths and areas of sectors of circles**

Expressing Geometric Properties with Equations

- **Translate between the geometric description and the equation for a conic section**
- **Use coordinates to prove simple geometric theorems algebraically**

Geometric Measurement and Dimension

- **Explain volume formulas and use them to solve problems**
- **Visualize relationships between two-dimensional and three-dimensional objects**

Modeling with Geometry

- **Apply geometric concepts in modeling situations**

Mathematical Practices

1. [illegible].
2. [illegible].
3. C [illegible].
4. [illegible].
5. [illegible].
6. A [illegible].
7. [illegible].
8. [illegible].

Congruence G-CO

Experiment with transformations in the plane

1.

2. C

3.

Find arc lengths and areas of sectors of circles

5. D , , ; .

Expressing Geometric Properties with Equations	G-GPE

Translate between the geometric description and the equation for a conic section

1. D ; .
2. D .
3. (+) D , .

Use coordinates to prove simple geometric theorems algebraically

4. *. For example, prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle; prove or disprove that the point (1, 3) lies on the circle centered at the origin and containing the point (0, 2).*
5. (. .,).
6. F .
7.

Mathematics | High School—Statistics and Probability

Interpreting Categorical and Quantitative Data

- **Summarize, represent, and interpret data on a single count or measurement variable**
- **Summarize, represent, and interpret data on two categorical and quantitative variables**
- **Interpret linear models**

Interpreting Categorical and Quantitative Data — S-ID

Summarize, represent, and interpret data on a single count or measurement variable

1. [illegible]
2. [illegible]
3. [illegible]
4. [illegible]

Summarize, represent, and interpret data on two categorical and quantitative variables [illegible]

4. ; .

5. ; .

6. E .

Conditional Probability and the Rules of Probability S-CP

Understand independence and conditional probability and use them to interpret data

1. D ( ) ( ) , , , (, , ,).

2. *A* *B* *A* *B* , .

3. *A* *B* *P*(*A* *B*)/*P*(*B*), *A* *B* *A* *B* *A*, *B* *A* *B*.

4. C - . - . *For example, collect data from a random sample of students in your school on their favorite subject among math, science, and English. Estimate the probability that a randomly selected student from your school will favor science given that the student is in tenth grade. Do the same for other subjects and compare the results.*

5. . *For example, compare the chance of having lung cancer if you are a smoker with the chance of being a smoker if you have lung cancer.*

3. (+) D ; *. For example, find the theoretical probability distribution for the number of correct answers obtained by guessing on all five questions of a multiple-choice test where each question has four choices, and find the expected grade under various grading schemes.*

4. (+) D ; *. For example, find a current data distribution on the number of TV sets per household in the United States, and calculate the expected number of sets per household. How many TV sets would you expect to find in 100 randomly selected households?*

Use probability to evaluate outcomes of decisions

5. (+) 1 1 1 367 45 695 3 2 7 746 3 ; 45 6 3 2 76 7 74 7 5 72 74