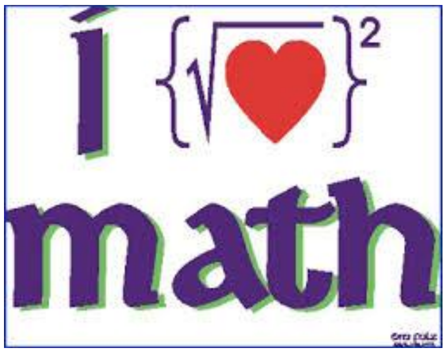
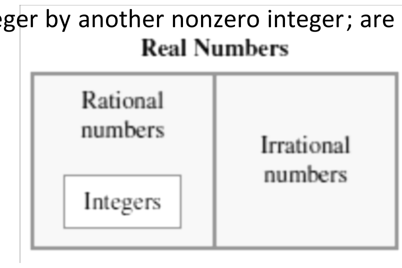


LET REVIEW MATERIALS IN MATH

- **Counting numbers/ Natural numbers** or **positive integers:** 1, 2, 3, and so on.
- **Integers:** positive integers, negative integers and **zero (** neither (+) nor (-)
  E.g. 5, -19, 0
- **Rational number:** any number that can be represented by the division of one integer by another nonzero integer; are used to specify parts of a quantity
  E.g. 5, -19, 5/8, -11/3
- **Irrational numbers:** cannot be written as the division of one integer by another.
  E.g. √2, л
- **Real Numbers:** *The integers, the rational numbers, and the irrational numbers, including all such numbers that are (+), (-), or zero.*
- **Imaginary number:** the square root of a negative number; not real numbers



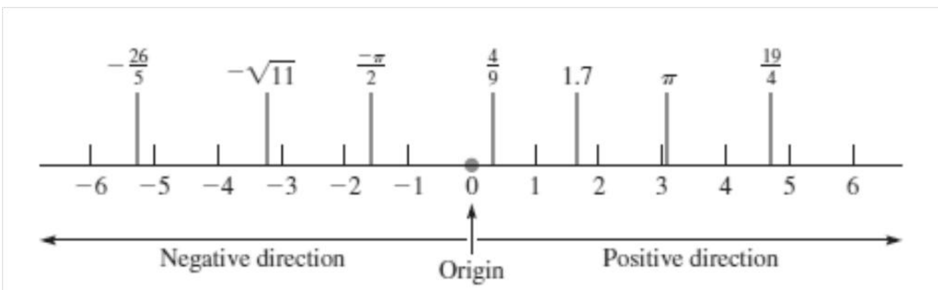
The numbers $\sqrt{-10}$ and $-\sqrt{-7}$ are imaginary numbers.
The number $\frac{-3}{7}$ is rational and real. The number $-\sqrt{7}$ is irrational and real.
The number $\frac{\pi}{6}$ is irrational and real. The number $\frac{\sqrt{-3}}{2}$ is imaginary.

- **Fraction -** *may contain any number or symbol representing a number in its numerator or in its denominator*; Indicates the division of the numerator by the denominator ; may be a number that is rational, irrational, or imaginary.

Examples: The numbers $\frac{2}{7}$ and $\frac{-3}{2}$ are fractions, and they are rational.

The numbers $\frac{\sqrt{2}}{9}$ and $\frac{6}{\pi}$ are fractions, but they are not rational numbers. It is not possible to express either as one integer divided by another integer.

The number $\frac{\sqrt{-5}}{6}$ is a fraction, and it is an imaginary number. ■



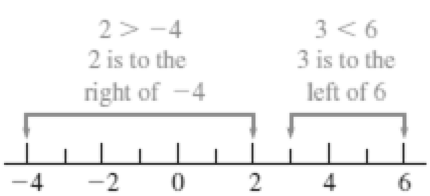
- **Absolute value-** the absolute value of a <u>positive number</u> is the *number itself*, and the absolute value of a <u>negative number</u> is the corresponding *positive number*.

E.g. The absolute value of 6 is 6, and the absolute value -7of is 7. We write these as | 6 | = 6 and | -7| = 7.

Other examples are $\left|\frac{7}{5}\right| = \frac{7}{5}$, $|-\sqrt{2}| = \sqrt{2}$, $|0| = 0$, $-|\pi| = -\pi$, $|-5.29| = 5.29$, $-|-9| = -9$ since $|-9| = 9$. ■

$|-4.2| = ?$ **2.** $-\left|-\frac{3}{4}\right| = ?$

- **SIGNS OF INEQUALITY** : On the number line, if a first number is to the right of a second number, then the first number is said to be greater than (>) the second. If the number is to the left of the second, it is less than (<) the second



- **RECIPROCAL**

The reciprocal of 7 is $\frac{1}{7}$. The reciprocal of $\frac{2}{3}$ is

$$\frac{1}{\frac{2}{3}} = 1 \times \frac{3}{2} = \frac{3}{2}$$ invert denominator and multiply (from arithmetic)

NOTE: Every number, except zero, has a **reciprocal.** *The reciprocal of a number is 1 divided by the number*.

- **DENOMINATE NUMBERS**: N*umbers that represent a measurement and are written with units of measurement*

Examples:

To show that a certain HDTV set weighs 28 kilograms, we write the weight as **28 kg.**
To show that a giant redwood tree is 110 metres high, we write the height as **110 m.**
To show that the speed of a rocket is 1500 metres per second, we write the speed as **1500 m/s**.
To show that the area of a computer chip is 0.75 square centimetre, we write the area as **0.75 cm^2**.
To show that the volume of water in a glass tube is 25 cubic centimetres, we write the volume ***as*** **25 cm^3.**

- **LITERAL NUMBERS:** It is usually more convenient to state definitions and operations on numbers in a general form. To do this, we represent the numbers by letters, called **literal numbers.**
  Variables- literal numbers that may vary in a given problem
  Constants- literal numbers that are held fixed

ALGEBRA AND ARITHMETIC

Arithmetic: only numbers and their arithmetical operations (such as +, −, ×, ÷) occur
Algebra: also uses variables such as *x* and *y*, or *a* and *b* to replace numbers.
The major difference between algebra and arithmetic is the inclusion of variables.

Variable - a letter or symbol used in algebra to represent numbers;

- allows the making of generalizations in mathematics
- allows arithmetical equations (and inequalities) to be stated as laws (such as $a + b = b + a$ for all *a* and *b*), and thus is the first step to the systematic study of the properties of the real number system.
- allows reference to numbers which are not known
- may represent a certain value which is not yet known, but which may be found through the formulation and manipulation of equations.
- allows the exploration of mathematical relationships between quantities (e.g.: "if you sell *x* tickets, then your profit will be 3*x* − 10 dollars").

Expressions

- (In elementary algebra), may contain numbers, variables and arithmetical operations.
- conventionally written with 'higher-power' terms on the left
- Examples: $x + 3$ $y^2 + 2x - 3$

Properties of operations

Operation	Is Written	commutative	associative	identity element	inverse operation
Addition	$a + b$	$a + b = b + a$	$(a + b) + c = a + (b + c)$	0, which preserves numbers: $a + 0 = a$	Subtraction (-)
Multiplication	$a \times b$ or $a \cdot b$	$a \times b = b \times a$	$(a \times b) \times c = a \times (b \times c)$	1, which preserves numbers: $a \times 1 = a$	Division (/)
Exponentiation	a^b or a^b	Not commutative $a^b \neq b^a$	Not associative	1, which preserves numbers: $a^1 = a$	Logarithm (Log) and nth root $\sqrt[b]{a}$

Properties of Numbers

PROPERTY	EXPLANATION		EXAMPLE
COMMUTATIVE	The word "commutative" comes from "commute" or "move around"	For addition: $a + b = b + a$ For multiplication: $ab = ba$	2 + 3 = 3 + 2 2×3 = 3×2
ASSOCIATIVE	The word "associative" comes from "associate" or "group"; the rule that refers to grouping.	For addition: $a + (b + c) = (a + b) + c$ For multiplication: $a(bc) = (ab)c$	2 + (3 + 4) = (2 + 3) + 4 2(3×4) = (2×3)4
DISTRIBUTIVE	"multiplication *distributes* over addition; Either takes something through parentheses or else factors something out.	$a(b + c) = ab + ac$	2(3 + 4) = 2×3 + 2×4 $2(x + y) = 2x + 2y$
IDENTITY	For addition: the sum of a number and 0	$a + 0 = a$	

	is the number itself. For multiplication: The product of a number and 0 is the number itself.	*a * 1= a*	
INVERSE	Additive inverse: the number that you add to a certain number that makes it equal to 0. Multiplicative inverse: the number that you multiply with the number, equals 1.	additive inverse of a=-a multiplicative inverse of a= 1/a	$-6 + 6 = 0$. $(-6)(^{-1}/_{6}) = 1$.

Properties of equality

The relation of equality (=) is...

- reflexive: $b = b$;
- symmetric: if $a = b$ then $b = a$;
- transitive: if $a = b$ and $b = c$ then $a = c$.
-

The relation of equality (=) has the property...

- that if $a = b$ and $c = d$ then $a + c = b + d$ and $ac = bd$;
- that if $a = b$ then $a + c = b + c$;
- that if two symbols are equal, then one can be substituted for the other.

Simplify: $23 + 5x + 7y - x - y - 27$. Justify your steps.

$23 + 5x + 7y - x - y - 27$	**original (given) statement**
$23 - 27 + 5x - x + 7y - y$	**Commutative Property**
$(23 - 27) + (5x - x) + (7y - y)$	**Associative Property**
$(-4) + (5x - x) + (7y - y)$	**simplification ($23 - 27 = -4$)**
$(-4) + x(5 - 1) + y(7 - 1)$	**Distributive Property**
$-4 + x(4) + y(6)$	**simplification**
$-4 + 4x + 6y$	**Commutative Property**

- **Simplify $3(x + 2) - 4x$. Justify your steps.**

$3(x + 2) - 4x$	**original (given) statement**
$3x + 3×2 - 4x$	**Distributive Property**
$3x + 6 - 4x$	**simplification ($3×2 = 6$)**
$3x - 4x + 6$	**Commutative Property**
$(3x - 4x) + 6$	**Associative Property**
$x(3 - 4) + 6$	**Distributive Property**
$x(-1) + 6$	**simplification ($3 - 4 = -1$)**
$-x + 6$	**Commutative Property**

- **OPERATIONS ON POSITIVE AND NEGATIVE INTEGERS**

Addition of two numbers of the <u>same sign</u>: *Add their absolute values and assign the sum their common sign.*

(a) $2 + 6 = 8$ — the sum of two positive numbers is positive

(b) $-2 + (-6) = -(2 + 6) = -8$ — the sum of two negative numbers is negative

Addition of two numbers of <u>different signs</u> *Subtract the number of smaller absolute value from the number of larger absolute value and assign to the result the sign of the number of larger absolute value.*

(a) $2 + (-6) = -(6 - 2) = -4$ — the negative 6 has the larger absolute value

(b) $-6 + 2 = -(6 - 2) = -4$

(c) $6 + (-2) = 6 - 2 = 4$ — the positive 6 has the larger absolute value

(d) $-2 + 6 = 6 - 2 = 4$

the subtraction of absolute values

Subtraction of one number from another *Change the sign of the number being subtracted and change the subtraction to addition. Perform the addition.*

(a) $2 - 6 = 2 + (-6) = -(6 - 2) = -4$

Note that after changing the subtraction to addition, and changing the sign of 6 to make it -6, we have precisely the same illustration as Example 2(a).

(b) $-2 - 6 = -2 + (-6) = -(2 + 6) = -8$

Note that after changing the subtraction to addition, and changing the sign of 6 to make it -6, we have precisely the same illustration as Example 1(b).

(c) $-a - (-a) = -a + a = 0$

This shows that subtracting a number from itself results in zero, even if the number is negative. Therefore, *subtracting a negative number is equivalent to adding a positive number of the same absolute value.*

Multiplication and division of two numbers *The product (or quotient) of two numbers of the same sign is positive. The product (or quotient) of two numbers of different signs is negative.*

(a)	$3(12) = 3 \times 12 = 36$	$\frac{12}{3} = 4$	result is positive if both numbers are positive
(b)	$-3(-12) = 3 \times 12 = 36$	$\frac{-12}{-3} = 4$	result is positive if both numbers are negative
(c)	$3(-12) = -(3 \times 12) = -36$	$\frac{-12}{3} = -\frac{12}{3} = -4$	result is negative if one number is positive and the other is negative
(d)	$-3(12) = -(3 \times 12) = -36$	$\frac{12}{-3} = -\frac{12}{3} = -4$	

❖ **ORDER OF OPERATIONS**

Often, how we are to combine numbers is clear by grouping the numbers using symbols such as **parentheses ( ),** the **bar,**—, between the numerator and denominator of a fraction, and **vertical lines | |** for absolute value. Otherwise, for an expression in which there are several operations, we use the following order of operations.

1. *Operations within specific groupings are done first.*
2. *Perform multiplications and divisions (from left to right).*
3. *Then perform additions and subtractions (from left to right).*

Note that $20 \div (2 + 3) = \frac{20}{2+3}$, whereas $20 \div 2 + 3 = \frac{20}{2} + 3$.

(PMDAS)

EXAMPLES:

1. 16 - 2 x 3=
2. | 3 – 5 | - | -3 – 6 |=
3. 12- 6 ÷ 2 =
4. 16 ÷ (2 x 4)

$$a + (-b) = a - b$$
$$a - (-b) = a + b$$

NOTE: When evaluating expressions, it is generally more convenient to change the operations and numbers so that the result is found by the addition and subtraction of positive numbers.

❖ **EVALUATING NUMERICAL EXPRESSIONS**

(a) $7 + (-3) - 6 = 7 - 3 - 6 = 4 - 6 = -2$ using Eq. (

(b) $\frac{18}{-6} + 5 - (-2)(3) = -3 + 5 - (-6) = 2 + 6 = 8$ using Eq. (

(c) $\frac{|3 - 15|}{-2} - \frac{8}{4 - 6} = \frac{12}{-2} - \frac{8}{-2} = -6 - (-4) = -6 + 4 = -2$

(d) $\frac{-12}{2 - 8} + \frac{5 - 1}{2(-1)} = \frac{-12}{-6} + \frac{4}{-2} = 2 + (-2) = 2 - 2 = 0$

❖ **OPERATIONS WITH ZERO**

If a is a real number, the operations of addition, subtraction, multiplication, and division with zero are as follows:

$$a + 0 = a$$
$$a - 0 = a \qquad 0 - a = -a$$
$$a \times 0 = 0$$
$$0 \div a = \frac{0}{a} = 0 \qquad (\text{if } a \neq 0)$$

($\neq$ means "is not equal to")

(a) $5 + 0 = 5$ (b) $-6 - 0 = -6$ (c) $0 - 4 = -4$

(d) $\frac{0}{6} = 0$ (e) $\frac{0}{-3} = 0$ (f) $\frac{5 \times 0}{7} = \frac{0}{7} = 0$

Note that there is no result defined for division by zero. To understand the reason for this, consider the results for $\frac{6}{2}$ and $\frac{6}{0}$.

$$\frac{6}{2} = 3 \quad \text{since} \quad 2 \times 3 = 6$$

If $\frac{6}{0} = b$, then $0 \times b = 6$. This cannot be true because $0 \times b = 0$ for any value of b.

NOTE *division by zero is undefined*

(The special case of $\frac{0}{0}$ is termed *indeterminate*. If $\frac{0}{0} = b$, then $0 = 0 \times b$, which is true for any value of b. Therefore, no specific value of b can be determined.)

$\frac{2}{5} \div 0$ is undefined $\quad \frac{8}{0}$ is undefined $\quad \frac{7 \times 0}{0 \times 6}$ is indeterminate

Note: Never divide by zero. Division by zero is the only undefined basic operation. All the other operations with zero may be performed as for any other number.

❖ **RATIO AND PROPORTION**

Ratio: *The quotient is a/b is also called the* **ratio a** ***of to b.***
Proportion: An equation stating that *two ratios are equal;*

If the ratio of to 8 equals the ratio of 3 to 4, we have the proportion: $\frac{x}{8} = \frac{3}{4}$

Since a proportion is an equation, if one of the numbers is unknown, we can solve for its value as with any equation. Usually, this is done by noting the denominators and multiplying each side by a number that will clear the fractions.

We can solve this equation by multiplying both sides by 8. This gives

$$8\left(\frac{x}{8}\right) = 8\left(\frac{3}{4}\right), \quad \text{or} \quad x = 6$$

Substituting $x = 6$ into the original proportion gives the proportion $\frac{6}{8} = \frac{3}{4}$. Since these ratios are equal, the solution checks.

WORD PROBLEMS

Age

•

1. Father is aged three times more than his son Ronit. After 8 years, he would be two and a half times of Ronit's age. After further 8 years, how many times would he be of Ronit's age?

A. 2 times **B.** $2\frac{1}{2}$ times

C. $2\frac{3}{4}$ times **D.** 3 times

Let Ronit's present age be x years. Then, father's present age =(x + 3x) years = 4x years.

∴ $(4x + 8) = 5(x + 8)$

2

$\Rightarrow$ $8x + 16 = 5x + 40$
$\Rightarrow$ $3x = 24$
$\Rightarrow$ $x = 8$.

Hence, required ratio = $\frac{(4x + 16)}{(x + 16)} = \frac{48}{24} = 2$.

2. A father said to his son, "I was as old as you are now when you were born". If the father's age is 38 years now, the son's age five years back was:

A. 14 years
B. 19 years
C. 33 years
D. 38 years

Answer: Option **A**
Let the son's present age be x years. Then, $(38 - x) = x$
$\Rightarrow$ $2x = 38$.
$\Rightarrow$ $x = 19$.
$\therefore$ Son's age 5 years back (19 - 5) = 14 years.

3. The sum of the present ages of a father and his son is 60 years. Six years ago, father's age was five times the age of the son. After 6 years, son's age will be:

A. 12 years
B. 14 years
C. 18 years
D. 20 years

Answer: Option **D**
Let the present ages of son and father be x and $(60 - x)$ years respectively.
Then, $(60 - x) - 6 = 5(x - 6)$
$\Rightarrow$ $54 - x = 5x - 30$
$\Rightarrow$ $6x = 84$
$\Rightarrow$ $x = 14$.
$\Rightarrow$ $\therefore$ Son's age after 6 years = $(x + 6)$ = 20 years..

Work

A can do a work in 15 days and B in 20 days. If they work on it together for 4 days, then the fraction of the work that is left is :

A. $\frac{1}{4}$
B. $\frac{1}{10}$
C. $\frac{7}{15}$
D. $\frac{8}{15}$

Answer:*Option* ***D***

A's 1 day's work = $\frac{1}{15}$;

B's 1 day's work = $\frac{1}{20}$;

(A + B)'s 1 day's work = $\left(\frac{1}{15} + \frac{1}{20}\right) = \frac{7}{60}$.

(A + B)'s 4 day's work = $\left(\frac{7}{60} \times 4\right) = \frac{7}{15}$.

Therefore, Remaining work = $\left(1 - \frac{7}{15}\right) = \frac{8}{15}$.

NUMBERS

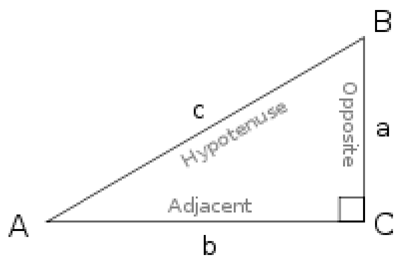
Three times the first of three consecutive odd integers is 3 more than twice the third. The third integer is:

A. 9
B. 11
C. 13
D. 15

Answer: Option **D**
Explanation:
Let the three integers be x, $x + 2$ and $x + 4$.
Then, $3x = 2(x + 4) + 3 \Leftrightarrow x = 11$.
$\therefore$ Third integer = $x + 4 = 15$.

Trigonometry-a

- ⟹ branch of mathematics that studies triangles and the relationships between their sides and the angles between these sides.
- ⟹ defines the trigonometric functions, which describe those relationships and have applicability to cyclical phenomena, such as waves.

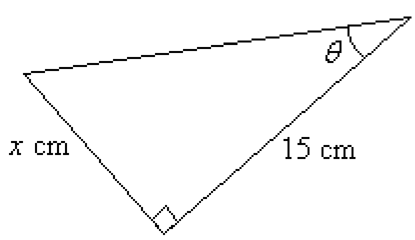


In this right triangle: sin A = a/c; cos A = b/c;tan A = a/b

Trigonometric function	Definition	$\sin A = \frac{\textrm{opposite}}{\textrm{hypotenuse}} = \frac{a}{c}.$
		$\cos A = \frac{\textrm{adjacent}}{\textrm{hypotenuse}} = \frac{b}{c}.$
Sine function (sin)	the ratio of the side opposite the angle to the hypotenuse.	$\tan A = \frac{\textrm{opposite}}{\textrm{adjacent}} = \frac{a}{b} = \frac{\sin A}{\cos A}.$
Cosine function (cos),	the ratio of the adjacent leg to the hypotenuse.	$\csc A = \frac{1}{\sin A} = \frac{c}{a},$
Tangent function (tan	of the opposite leg to the adjacent leg.	$\sec A = \frac{1}{\cos A} = \frac{c}{b},$
Cosecant		$\cot A = \frac{1}{\tan A} = \frac{\cos A}{\sin A} = \frac{b}{a}.$
Secant		
Cotangent		

Hypotenuse- the side opposite to the 90 degree angle in a right triangle; it is the longest side of the triangle, and one of the two sides adjacent to angle *A*.
adjacent leg- the other side that is adjacent to angle *A*.
opposite side- ithe side that is opposite to angle *A*.
The reciprocals of these functions are named the **cosecant** (csc or cosec), **secant** (sec), and **cotangent** (cot), respectively:

Calculate the length of the side *x*, given that tan ϑ = 0.4



Solution:

$$\tan\theta = \frac{\text{opposite side}}{\text{adjacent side}}$$

$$0.4 = \frac{x}{15}$$

$$x = 0.4 \times 15$$

$$= 6 \text{ cm}$$

ANALYTIC GEOMETRY

In analytic geometry, the plane is given a coordinate system, by which every point has a pair of real number coordinates.
The most common coordinate system to use is theC artesian coordinate system, where each point has an *x*-coordinate representing its horizontal position, and a *y*-coordinate representing its vertical position. These are typically written as an ordered pair (*x*, *y*). This system can also be used for three-dimensional geometry, where every point in Euclidean space is represented by anordered triple of coordinates (*x*, *y*, *z*)

the slope m of the line: $m = \frac{y_2 - y_1}{x_2 - x_1}.$

1. Find the slope of the line that passes through the points (-1 , 0) and (3 , 8).
   Solution: m = (y2 - y1) / (x2 - x1) = (8 - 0) / (3 - -1) = 2

What is the slope of the line -7y + 8x = 9
Solution:
Rewrite the equation in slope intercept form.
-7y = -8x + 9
y = (8/7) x - 9/7
The slope of the given line is 8/7.

DEGREES AND RADIANS
The concept of angle is one of the most important concepts in geometry. The concepts of equality, sums, and differences of angles are important and used throughout geometry, but the subject of trigonometry is based on the measurement of angles.

Conversion between radians and degree

A chart to convert between degrees and radians
As stated, one radian is equal to 180/π degrees. Thus, to convert from radians to degrees, multiply by 180/π.

$$\text{angle in degrees} = \text{angle in radians} \cdot \frac{180^\circ}{\pi}$$

For example:

$$1 \text{ rad} = 1 \cdot \frac{180^\circ}{\pi} \approx 57.2958^\circ$$

$$2.5 \text{ rad} = 2.5 \cdot \frac{180^\circ}{\pi} \approx 143.2394^\circ$$

$$\frac{\pi}{3} \text{ rad} = \frac{\pi}{3} \cdot \frac{180^\circ}{\pi} = 60^\circ$$

Conversely, to convert from degrees to radians, multiply by π/180.

$$\text{angle in radians} = \text{angle in degrees} \cdot \frac{\pi}{180^\circ}$$

For example:

$$1^\circ = 1 \cdot \frac{\pi}{180^\circ} \approx 0.0175 \text{ rad}$$

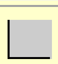
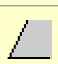
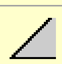
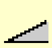
$$23^\circ = 23 \cdot \frac{\pi}{180^\circ} \approx 0.4014 \text{ rad}$$

Radians can be converted to turns by dividing the number of radians by 2π.

Radian to degree conversion derivation

We know that the length of circumference of a circle is given by $2\pi r$, where r is the radius of the circle.
So, we can very well say that the following equivalent relation is true:
$360^\circ \iff 2\pi r$ [Since a 360° sweep is need to draw a full circle]
By definition of radian, we can formulate that a full circle represents:

$$\frac{2\pi r}{r} \text{ rad}$$
$$= 2\pi \text{ rad}$$

Angle	Degrees	Radians
	90°	π/2
	60°	π/3
	45°	π/4
	30°	π/6

Combining both the above relations we can say:

$$2\pi \text{ rad} = 360^\circ$$
$$\Rightarrow 1 \text{ rad} = \frac{360^\circ}{2\pi}$$
$$\Rightarrow 1 \text{ rad} = \frac{180^\circ}{\pi}$$

Probability is ordinarily used to describe an attitude of mind towards some proposition of whose truth we are not certain. The proposition of interest is usually of the form "Will a specific event occur?" The attitude of mind is of the form "How certain are we that the event will occur?"
Examples:
Tickets numbered 1 to 20 are mixed up and then a ticket is drawn at random. What is the probability that the ticket drawn has a number which is a multiple of 3 or 5?

A. $\frac{1}{2}$ **B.** $\frac{2}{5}$

C. 8 **D.** 9

15	20

Answer: Option **D**

Here, S = {1, 2, 3, 4, ..., 19, 20}.

Let E = event of getting a multiple of 3 or 5 = {3, 6 , 9, 12, 15, 18, 5, 10, 20}.

$\therefore$ $P(E) = \frac{n(E)}{n(S)} = \frac{9}{20}$.

A bag contains 2 red, 3 green and 2 blue balls. Two balls are drawn at random. What is the probability that none of the balls drawn is blue?

A.	$\frac{10}{21}$	**B.**	$\frac{11}{21}$
C.	$\frac{2}{7}$	**D.**	$\frac{5}{7}$

Answer: Option **A**

Total number of balls = (2 + 3 + 2) = 7.

Let S be the sample space.

Then, $n(S)$ = Number of ways of drawing 2 balls out of 7

$= {}^7C_2$ \`

$= \frac{(7 \times 6)}{(2 \times 1)}$

= 21.

Let E = Event of drawing 2 balls, none of which is blue.

$\therefore$ $n(E)$ = Number of ways of drawing 2 balls out of (2 + 3) balls.

$= {}^5C_2$

$= \frac{(5 \times 4)}{(2 \times 1)}$

= 10.

$\therefore$ $P(E) = \frac{n(E)}{n(S)} = \frac{10}{21}$.

What is the probability of getting a sum 9 from two throws of a dice?

A.	$\frac{1}{6}$	**B.**	$\frac{1}{8}$
C.	$\frac{1}{9}$	**D.**	$\frac{1}{12}$

Answer: Option **C**

Explanation:

In two throws of a die, $n(S) = (6 \times 6) = 36$.

Let E = event of getting a sum ={(3, 6), (4, 5), (5, 4), (6, 3)}.

$\therefore$ $P(E) = \frac{n(E)}{n(S)} = \frac{4}{36} = \frac{1}{9}$.

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