

SHAPES

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- 1 An Angle Generated by Rotating a Half-Line about its End Point in a Counter-Clockwise Direction.**
- 2 One Complete Revolution is an Angle of 360 Degrees.**
- 3 One Half of a Revolution is 180 Degrees, called a Straight Angle.**
- 4 One Fourth of a Revolution is 90 Degrees, called a Right Angle, and is Marked with a Small Square.**
- 5 Two Lines that Form a Right Angle are Perpendicular.**
- 6 B is the Vertex of Angle ABC.**
- 7 An Acute Angle is an Angle Less Than 90 Degrees.**
- 8 An Obtuse Angle is an Angle Between 90 and 180 Degrees.**
- 9 Supplementary Angles are Two Angles whose Sum is 180 Degrees.**

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10 Complementary Angles are Two Angles whose Sum is 90 Degrees.

11 A Circle is the Set of All Points at the Same Distance from a Fixed Point Called the Center.

12 The Radius is a Line Drawn from the Center to any Point on the Circle.

13 A Chord is a Line whose Endpoints are on the Circle.

14 The Diameter is a Chord that Passes throughout the Center of the Circle.

15 The Secant is a Line that Intersects the Circle at Two Points.

16 The Tangent is a Line that Touches the Circle at One Point.

17 A Central Angle is an Angle Formed by Two Radii, with its Vertex at the Center of the Circle.

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18 An Inscribed Angle is an Angle Formed by Two Chords, with its Vertex on the Circle.

19 The Distance Around the Circle is called its Circumference C.

20 By Breaking the Circle at a Point A and Bending its Circumference into a Straight Line, We can see that its Circumference C is Slightly More Than 3 Times as Long as its Diameter D.

21 The Ratio of the Circumference to the Diameter is called “pie”, the Greek Letter π .

22 The Perimeter Or Circumference of the Circle is : $C = \pi D$ OR $C = \pi 2r$.

23 The Area of the Circle is : $A = \pi r^2$ OR $A = \frac{\pi D^2}{4}$

24 Pi Equals : $\pi = \frac{22}{7} = 3\frac{1}{7} = 3.14$

25 $D = 2r$

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- 26 The Parallelogram is a Quadrilateral whose Opposite Sides are Both Parallel and Equal.**
- 27 Opposite Angles of a Parallelogram are Equal.**
- 28 The Perimeter of the Parallelogram is : $P = 2a + 2b$**
- 29 The Area of a Parallelogram is : $A = BH$**
- 30 The Height H or Altitude of a Parallelogram is the Distance between Two Opposite Sides.**
- 31 The Perpendicular can be Drawn at any Point.**
- 32 The Side to which they are Drawn is called their Base B.**
- 33 Any Closed Four Sided Plane Figure is called a Quadrilateral.**
- 34 The Rectangle is a Parallelogram with Four Right Angles.**
- 35 The Perimeter of the Rectangle is : $P = 2L + 2W$**

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36 The Area of a Rectangle is : $A = LW$

37 The Length is the Longer Side called L.

38 The Width is the Shorter Side called W.

39 The Square is a Rectangle with Four Equal Sides and Right Angles.

40 The Perimeter of the Square is : $P = 4S$

41 The Area of the Square is : $A = SS$ OR $A = S^2$

42 The Diagonal of a Square is : $D = S\sqrt{2}$ OR $D = S(2^{\frac{1}{2}})$

43 The Length of Each Side of the Square is S. and $2^{\frac{1}{2}}$

OR Square Root of Two is Equal to $\sqrt{2}$ Or $2^{\frac{1}{2}} = 1.414$

44 The Perimeter of a Trapezoid is : $P = a + b + c + B$

45 B is the Longest Side and b is the Shortest Side.

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46 The Height is h and the Other Sides are a and c .

47 The Area of the Trapezoid is : $A = \frac{(B + b)h}{2}$

48 The Rhombus is a Parallelogram with Four Equal Sides.

49 Two of its Angles are Equal and Obtuse.

50 Two of its Angles are Equal and Acute.

51 The Perimeter of the Triangle is : $P = a + b + c$

52 The Area of the Triangle is : $A = \frac{Bh}{2}$

53 The Sides of the Triangle are a , b , and c .

54 An Uppercase B is used for the Base of the Triangle.

55 The Height of the Triangle is the Length of a Line Drawn from the Vertex of an Angle Perpendicular to the Opposite Side.

56 The Side to which the Height is Drawn is called the Base.

57 Since the Height can be Drawn from any of the Three Angles in a Triangle to the Opposite Side, there are Three Height-Base Pairs in any Triangle.

58 Sometimes We have to Extend a Side or Base in order to Draw the Height to it.

59 When a Side is Extended in order to Draw a Height to it, the Original Side and Not the Extended Side is the Base of that Height.

60 The Sum of the Measures of the Three Angles is 180 Degrees.

$$\alpha + \beta + \gamma = 180 \text{ Degrees}$$

61 By Subtracting the Sum of Two Known Angles from 180, We find the Size of the Unknown Angle.

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62 α , β and γ are Angles that Open Up to Sides a , b and c , Respectively.

63 Two Triangles are Similar if their Corresponding Angles are Equal and their Corresponding Sides are Proportional.

64 The Equilateral Triangle has Three(3) Equal Sides and Three(3) Equal Angles.

65 The Measure of each Angle is 60 Degrees.

66 The Isosceles Triangle has Two(2) Equal Sides and Two(2) Equal Angles.

67 The Right Triangle Contains the 90 Degree Angle called the Right Angle.

68 The Perimeter of the Right Triangle is : $P = a + b + c$

69 The Hypotenuse is the Longest Side and is Opposite to the Right Angle.

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70 The Square of the Hypotenuse is the Sum of the Square of the other Sides : $c^2 = a^2 + b^2$

71 The Area of the Right Triangle is : $A = \frac{ab}{2}$

72 The Hypotenuse is c and their other sides are a and b, a;so called Legs.

73 An Ellipse is a Plane Figure Obtained when a Plane Intersects a Cone Obliquely.

74 The Sum of the Distances of any Point on its Perimeter from either of Two Points or Foci within it is Constant.

75 A type of Conic that has an Eccentricity e, between 0 and 1

76 It is a Closed Symmetrical Curve like an Elongated Circle ; the Higher the Eccentricity, the Greater the Elongation.

77 Any Chord through the Center is a Diameter.

78 The Ellipse has Two(2) Diameters that are Axes of Symmetry : the Longest Diameter is the Major Axis and the Shortest the Minor Axis.

79 A Line Segment from the Center to the Ellipse along the Major Axis is a Semi-Major Axis ; one along the Minor Axis is a Semi-Minor Axis.

80 Each of the Two(2) Points at which the Major Axis meets the Ellipse is a Vertex of the Ellipse.

81 The Area of an Ellipse is : $A = \pi ab$

Where a is the Length of the Semi-Major Axis and b the Length of the Semi-Minor Axis.

82 The Ellipse has Two(2) Foci on the Major Axis and Two Directrices Perpendicular to the Major Axis.

83 Each Focus is a Distance, ae from the Center, where e is the Eccentricity. Each Directrix is a Distance $\frac{a}{e}$ from the Center.

84 The Equation of an Ellipse in Cartesian Coordinates

is : $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

85 The Eccentricity of an Ellipse is given by : $e = c/2a$, where c is the Distance between the Foci.

Also, it is given by : $e^2 = 1 - b^2 / a^2$.

Q) Is this True that : "The Eccentricity of an Ellipse is given by : $e = c/2a$, where c is the Distance between the Foci." ?

A) Google Ai Response :

◆ AI Overview

Close, but not quite!

The correct formula is actually $e = c/a$.

Here is the breakdown of why:

- c is the distance from the **center** to a focus.
- a is the distance from the **center** to a vertex (the semi-major axis).

It sounds like you might be mixing up the total distances with the semi-distances. If we look at the "full" lengths:

- The distance **between the two foci** is $2c$.
- The length of the **major axis** is $2a$.

So, if you take the ratio of the full lengths, the 2s just cancel out anyway:

$$\frac{\text{distance between foci}}{\text{length of major axis}} = \frac{2c}{2a} = \frac{c}{a}$$

In short: Just lose the "2" in your denominator and you're golden!

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Close, but not quite!

The correct formula is actually $e = c/a$. [1, 2] ...



NO.

The formula $e = \frac{c}{2a}$ is **incorrect**.

The correct formula is:

$$e = \frac{c}{a}$$

Why it is not $2a$:

- c is the distance from the **center** to a focus.
- a is the distance from the **center** to a vertex.
- If you use the **full** distance between foci ($2c$) and the **full** length of the major axis ($2a$), the 2s cancel out: $\frac{2c}{2a} = \frac{c}{a}$.

Would you like to see how to calculate c if you only have the lengths of the **major** and **minor** axes?

86 Either of the Two(2) Chords through a Focus of the Ellipse and Perpendicular to the Major Axis is a Latus Rectum.

87 The Length of the Latus Rectum is $2b^2 / a$.

88 A Circle with its Center at the Center of the Ellipse and Passing through the Vertex (with radius a) is an Eccentric Circle of the Ellipse.

90 The Circle with Radius b is also an Eccentric Circle.

91 The Larger one with Radius a is called the Auxiliary Circle of the Ellipse.

92 If the Ellipse has its Center at the Origin and its Major Axis along the x-Axis, the Eccentric Angle @, is defined as follows:

93 At a particular Point on the Ellipse the Ordinate is Extended to meet the Auxiliary Circle at P' ; @ is then the Positive Angle between the x-Axis and Radius OP' .

94 The Parametric Equations of the Ellipse are :

$$X = a \cos @ \quad \text{and} \quad Y = b \sin @ .$$

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95 The Ellipse has Two(2) well known Properties Connected with its Foci F_1 and F_2 .

96 For any Point P on the Ellipse, the Sum of the Distances PF_1 and PF_2 is Constant, Equal to $2a$.

97 This is made use of in Drawing Ellipses by Looping a String around Two Pins at the Foci.

98 The Focal Property of the Ellipse is that if at any Point P the Tangent APB is Drawn, then the Lines from the Foci to the Point make Equal Angles with the Tangent, so $\text{Angle } APF_1 = \text{Angle } BPF_2$.

99 This is also called the Reflection Property, since a Reflector Shaped like an Ellipse would Focus Light from a Source at one Focus onto the other Focus, the Optical Property, or would similarly Focus Sound, the Acoustical Property.

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“Keplers’ Law” states that :

Each Planet moves in a Path that is an Ellipse with the Sun at One Focus.

The Line joining a Planet to the Sun Sweeps out Equal Areas in Equal Times during Orbital Motion.

The Squares of the Periods of Revolution of any two(2) Planets are Proportional to the Cubes of the Major Axes of their Elliptical Orbits.