FORMULAS AND FUNCTIONS IN EXCEL

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Formulas

Formulas allow you to perform arithmetic operations on numerical values. Combine strings, and compare the contents of one cell with another.

Structure:

* In Excel, formulas begin with an equal sign (=),

* followed by a numerical expression:

- Constants

- Operators

- Cell Addresses

= (B2 + C3 + 5)

Constants

1) Numerical Values entered as ordinary numbers:

* With or without a decimal point. (2 , 3.33, 0.0)

* Negative or Positive. (-6, 34.32)

* Scientific notation is also permitted (4E+8)

2) Strings (Labels)

* Text constant is entered by typing the desired text into the active cell.

Operators:

1) Arithmetic Operators:

Arithmetic Operator	Purpose	Example
+	Addition	A1+B1
-	Subtraction	A1-B1
*	Multiplication	A1*B1
/	Division	A1/B1
^	Exponentiation	A1^4
%	Percentage (Divide by 100)	A1%

Operators:

2) String Operators:

String Operator	Purpose	Example
&	Concatenate	A1&B1

Operators:

3) Comparison Operators:

Comparison Operators	Meaning	Example
>	Greater Than	C1>100
>=	Greater than or equal to	C1>=100
<	Less than	C1<100
<=	Less than or equal to	C1<=100
=	Equal	C1=C2
<>	Not Equal	C1<>C2

Operators:

Operators Precedence:

Operators Precedence	Operators
1	(%)
2	(^)
3	(* and /)
4	(+ and -)
5	(&)
6	(>, >=, <, <=, =, <>)

Cell Address

The intersection between the (Column Letter & Row Number)

B1: the cell lay in the intersection of column (B) and row (1)

It can be changed to the desired address

Example:

Find the value of the equation:

$$Z = \frac{(5X^2+3Y-7)}{(2X+1)}$$

X=10 , Y=12

Functions

A function consists of:

Function name + arguments

Arguments are enclosed by parentheses [()] and separated by commas [,]

Example: sum(C1,C2,C3)

Functions

*In some function, arguments can be separated by (:) which is called a *range*

Example: sum(C1:C100)

*Arguments can include a reference to another function.

Example: sum(A1, SQRT(A2/2), 2*B3+5, D7:D12)

Functions

Function	Purpose
ABS(X)	Absolute value of x
ACOS(X)	Cosine inverse
ASIN(X)	Sine inverse
ATAN(X)	Tangent invesre
AVERAGE(X1,X2,....)	Average of a list
COS(X)	Cosine of x
COSH(X)	Hyperbolic cosine
COUNT(X1,X2,....)	Number of values in a list or array
DEGREES(X)	Convert the angle to degree system
EXP(X)	Exponential of x (e^x)

Functions

Function	Purpose
INT(X)	Rounds X down to the near integer
LN(X)	Natural logarithm of X
LOG10(X)	Base-10 logarithm of X
MAX(X1,X2,....)	Find the maximum value of a list
MEDIAN(X1,X2,...)	Determine the median of values
MIN(X1,X2,....)	Find the minimum value of a list
PI()	Gives the value of pi = 3.14
RADIANS(X)	Converts the angle from degree to radian system
RAND()	Returns a random value between 0 and 1
ROUND(X,N)	Rounds X to N decimal places

Functions

Function	Purpose
SIGN(X)	Returns the sign of X
SIN(X)	Finds sine of X
SINH(X)	Finds hyperbolic sine of X
SQRT(X)	Returns the square root of X
STDEV(X1,X2,...)	Returns the standard deviation of values
SUM(X1,X2,....)	Returns the summation of values
TAN(X)	Returns the tangent of X
TRUNC(X)	Truncates X to N decimals
CONVERT(X)	Convert X from unit system to another one

Problems

Example 3-1

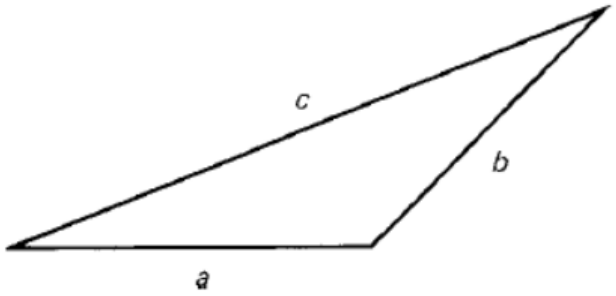
Compute the area enclosed by a triangle with sides equal to 50, 120, and 130 m.

Solution

$$s = \frac{50 + 120 + 130}{2} = 150$$

Using Equation 3-2, we get

$$A = \sqrt{150(150 - 50)(150 - 120)(150 - 130)}$$
$$= \sqrt{150(100)(30)(20)}$$
$$= \sqrt{9{,}000{,}000} = 3000 \text{ m}^2$$



Area $= \sqrt{s(s-a)(s-b)(s-c)}$

where $s = (a + b + c)/2$

Problems

Student Exam Scores:

اسم الطالب	المرحلة الاولى	المرحلة الثانية	المرحلة الثالثة	المرحلة الرابعة	المعدل النهائي
اسعد	78.236	64.178	68.153	74.056	
امل	70.539	69.469	68.056	71.256	
جلال	66.314	55.155	50.162	64.165	
صبا	82.146	80.169	74.529	80.741	
عبد الرحمن	81.497	80.467	76.258	84.182	
عماد	65.147	60.741	60.561	70.258	
وسن	77.199	70.153	67.156	78.256	

Problems

Student Exam Scores: Design an Excel Worksheet to:

1) The final score for each student.

2) Round the final score to the nearest integer.

3) The highest and lowest final score.

4) Number of students.

5) Determine the number of students that have final grades more than 70.

Problems

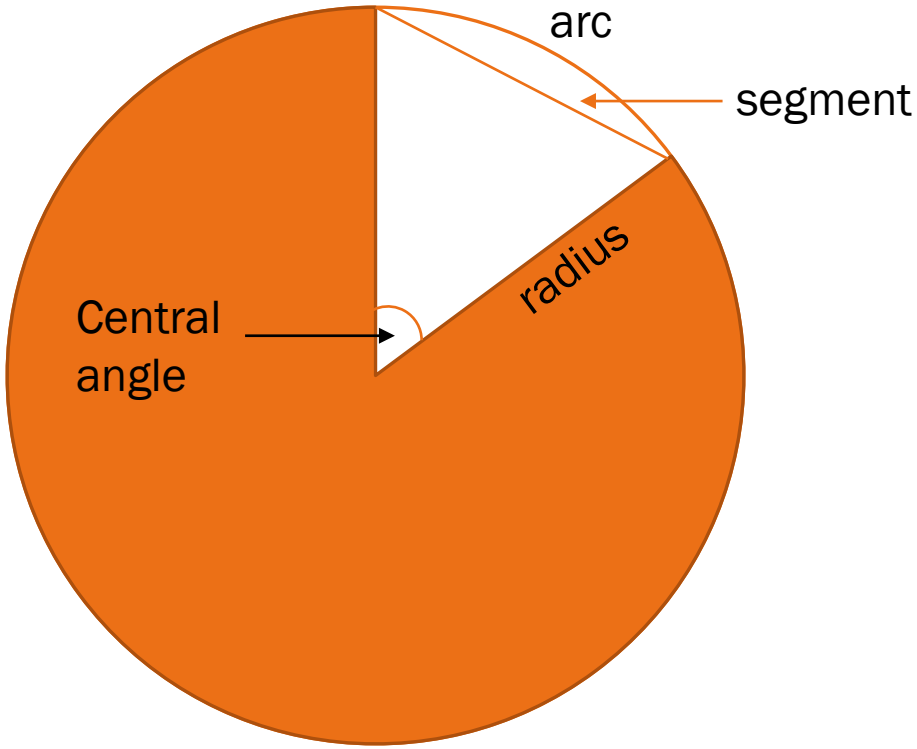
Determining the arc length and the sector area:

Given: * radius ,central angle

Calculate the following:

Circle’s area - Sector’s area - Segment’s area - Arc’s length

Chord’s length – Circumference - Diameter



Problems

Solution:

- Areas:

* Circle $= \pi R^2$

* Sector $= \frac{\Delta}{360} \times \pi R^2$

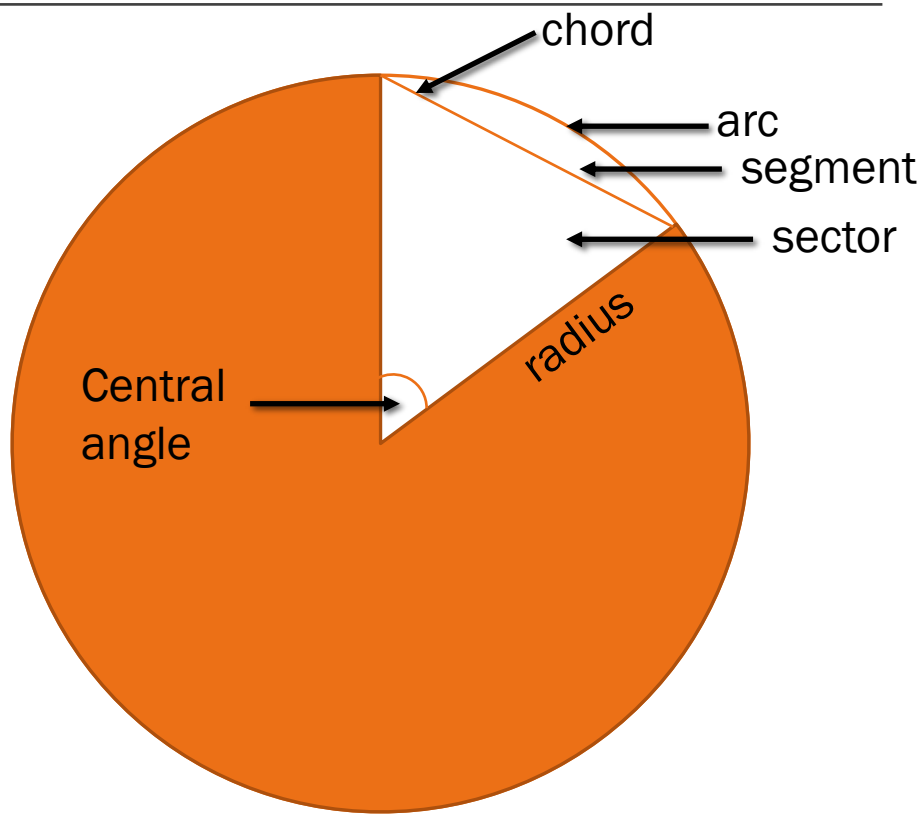
* Segment = $\frac{\Delta}{360}\pi R^2 - R^2 \frac{(\sin\Delta)}{2}$

- Arc's Length = $\Delta/180 * R$

- Chord length = $R*\sin(\Delta)$

- Circumference = $2\pi R$

- Diameter = 2R



Problems

RQD (Rock Quality Designation)

Example: In a 1500-mm rock core run, the following rock pieces were recovered from a borehole: 53 mm, 108 mm, 125 mm, 75 mm, 148 mm, 320 mm, 68 mm, 145 mm, 35 mm and 134 mm. Find the RQD and the core recovery ratio.

$$\text{CR } (\%) = \frac{\text{Length of rock core recovered}}{\text{Total length of the core run}} \times 100$$

$$\text{RQD } (\%) = \frac{\sum \text{Lengths of core pieces equal to or longer than 100 mm}}{\text{Total length of the core run}} \times 100$$