





## Circles within a Rectangle - Calculator

**Calculate the maximum number of circles within a rectangle - can be used to calculate the numbers of pipes or wires in a conduit or similar.**

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The calculator below estimates the maximum number of circles that may fit within a rectangle. The calculator can be used to calculate

- the number of pipes - or wires - that fits within a conduit or similar applications

Input the rectangle inside dimensions - height and width and the circles outside diameters.

Default values are for *0.5 inch* circles inside a *10 inch x 10 inch* square. The calculator is generic and any kind of units can be used - as long as the same units are used for all values.

*w - rectangle width (in, mm, m)*

*h - rectangle height (in, mm, m)*

*d - circle diameter (in, mm, m)*

*s - space between circles - and between circles and rectangle walls (in, mm, m)*

- [Make a Shortcut to this Calculator on Your Home Screen?](#)

### Rectangular Pattern

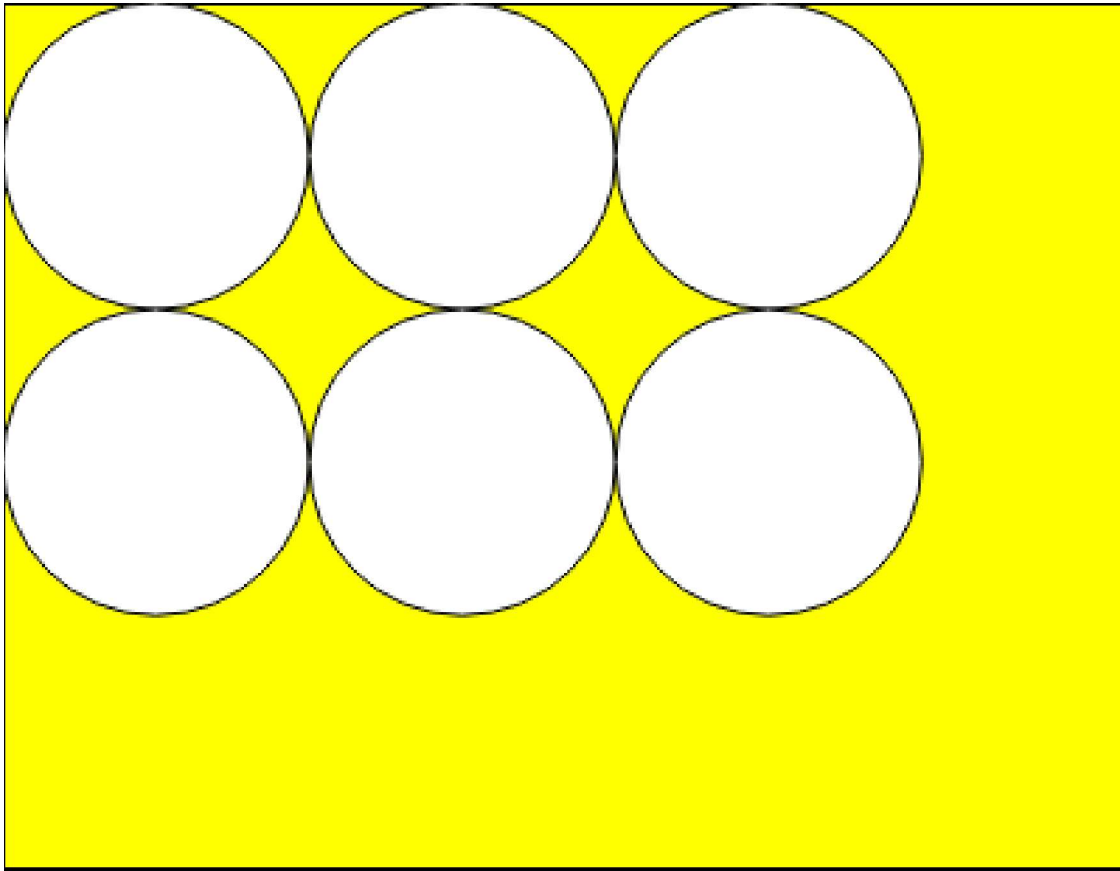
Maximum number of circles inside the **11 x 8.5** rectangle is: **6**

Area Rectangle (in<sup>2</sup>, mm<sup>2</sup>, m<sup>2</sup>): **93.5**

Area Circle (in<sup>2</sup>, mm<sup>2</sup>, m<sup>2</sup>): **7.07**

Area all Circles (in<sup>2</sup>, mm<sup>2</sup>, m<sup>2</sup>): **42.4**

Circles to Rectangle Area Ratio (%): **45.4**



### Rectangular Pattern - Circle Coordinates

Copy and paste the circle center coordinates to your application.  $x = 0$  and  $y = 0$  is top left corner of rectangle.

x y

1.5	1.5
4.5	1.5
7.5	1.5
1.5	4.5
4.5	4.5

Tip! - the values can be adapted and modified in excel or in a text editor for use in a CNC G-code generator or similar.

### Triangular Pattern

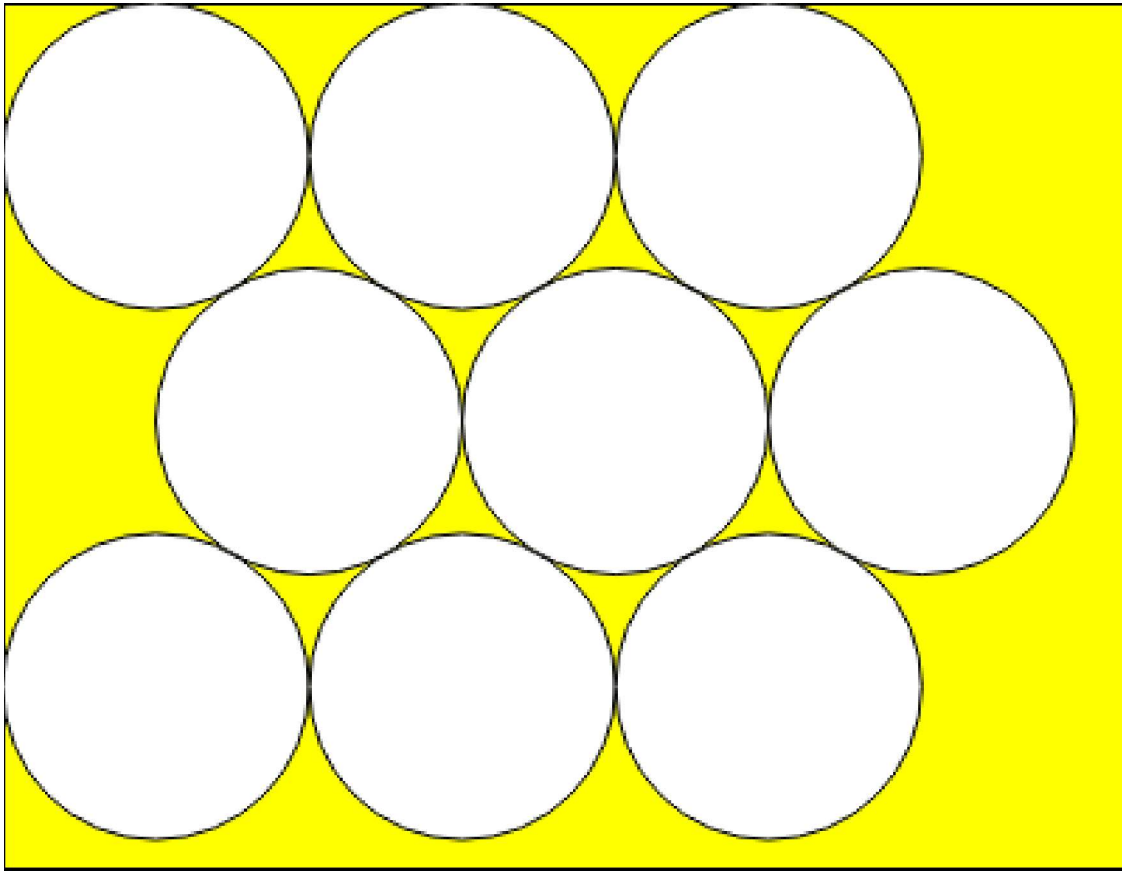
Maximum number of circles with the triangular pattern inside the **11 x 8.5** rectangle is: **9**

Area Rectangle (in<sup>2</sup>, mm<sup>2</sup>, m<sup>2</sup>): **93.5**

Area Circle (in<sup>2</sup>, mm<sup>2</sup>, m<sup>2</sup>): **7.07**

Area Circles (in<sup>2</sup>, mm<sup>2</sup>, m<sup>2</sup>): **63.6**

Circles to Rectangle Area Ratio (%): **68**



### Triangular Pattern - Circle Coordinates

Copy and paste the circle center coordinates to your application. x = 0 and y = 0 is top left corner of rectangle.

x y

1.5	1.5	▲
4.5	1.5	■
7.5	1.5	▼
3		
4.098076211353316		

**Be aware!** - The algorithm is quite simple - switching rectangle width and height may influence the number calculated. Switching the input values above changes the layout and gives

Maximum number of circles with the triangular pattern inside a **8.5 x 11** rectangle is: **8**

**Note!** - with some combinations of rectangular shapes and circle sizes - one or two more circles - or even more - may be added with a modified layout of the circles. In the default triangular example above - two more circles can be added in between if the left and right bottom circles are moved to the left and right border. The algorithm used for the calculation is quite simple and may underestimate the number of circles in some cases.

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- [Mathematics](#) - Mathematical rules and laws - numbers, areas, volumes, exponents, trigonometric functions and more.
- [Electrical](#) - Electrical units, amps and electrical wiring, wire gauge and AWG, electrical formulas and motors.

## Related Documents

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- [Area of Intersecting Circles](#) - Calculate area of intersecting circles
- [Area Survey App](#) - Online app that can be used to make an exact plot of a surveyed area - like a room, a property or any 2D shape.
- [Area Units Converter](#) - Convert between units of area.
- [Circles - Circumferences and Areas](#) - Circumferences and areas of circles with diameters in inches.

- **Circles Outside a Circle** - Calculate the numbers of circles on the outside of an inner circle - like the geometry of rollers on a shaft.
- **Discrete Data Sets and their Mean, Median and Mode Values** - Calculate the arithmetic mean, median and modal values from discrete data sets.
- **Elementary Curves** - Ellipse, circle, hyperbola, parabola, parallel, intersecting and coincident lines.
- **Elementary Surfaces** - Ellipsoid, sphere, hyperboloid, cone and more.
- **Equal Areas - Circles vs. Squares** - Radius and side lengths of equal areas, circles and squares.
- **Smaller Circles within a Larger Circle - Calculator** - Calculate the number of small circles that fits into an outer larger circle - ex. how many pipes or wires fits in a larger pipe or conduit.
- **Smaller Rectangles within a Larger Rectangle** - The maximum number of smaller rectangles - or squares - within a larger rectangle (or square).
- **Solving Equations of the First Degree with One Unknown** - Equations with one unknown.
- **Solving First Degree Equations with Two Unknowns** - Online calculator and solving procedure for two equations with two unknowns.
- **Solving Quadratic Equation with One Unknown** - How to solve a quadratic equation.
- **Squaring with Diagonal Measurements** - A rectangle is square if the lengths of both diagonals are equal.

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### Unit Converter

Temperature

0.0

☒ °C

☐ °F

Convert!

Length

1.0

☒ m

☐ km

☐ in

☐ ft

- ☐ *yards*  
☐ *miles*  
☐ *naut miles*

Convert!

Area

1.0

- ☒  $m^2$   
☐  $km^2$   
☐  $in^2$   
☐  $ft^2$   
☐  $miles^2$   
☐ *acres*

Convert!

Volume

1.0

- ☒  $m^3$   
☐ *liters*  
☐  $in^3$   
☐  $ft^3$   
☐ *us gal*

Convert!

Weight

1.0

- ☒  $kg_f$   
☐  $N$   
☐  $lb_f$

Convert!

Velocity

1.0

- ☒  $m/s$   
☐  $km/h$   
☐  $ft/min$



- ☐ *ft/s*  
☐ *mph*  
☐ *knots*

Convert!

### Pressure

1.0

- ☒ *Pa (N/m<sup>2</sup>)*  
☐ *bar*  
☐ *mm H<sub>2</sub>O*  
☐ *kg/cm<sup>2</sup>*  
☐ *psi*  
☐ *inches H<sub>2</sub>O*

Convert!

### Flow

1.0

- ☒ *m<sup>3</sup>/s*  
☐ *m<sup>3</sup>/h*  
☐ *US gpm*  
☐ *cfm*

Convert!

## Scientific Online Calculator



3 30

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