



# Trigger Reference Guide

by XGASOFT



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## 1. Welcome to Trigger - Better Trigonometry for GameMaker Studio



Trigonometry is an important part of many facets of game development. However, built-in trigonometry functions are inefficient and awkwardly-named. Enter Trigger: a suite of efficient, easy-to-learn trigonometry functions from XGASOFT which you can use **for free**.

Trigger functions store the results of expensive calculations in memory so that they can be re-used until a new calculation is necessary. Since many uses of trigonometry will use the same angle to calculate X and Y coordinates, Trigger can easily cut performance costs of trigonometric functions *in half*. Furthermore, Trigger makes learning trigonometry programming easy by providing multiple functions to suit different styles. Each function is named and explained clearly.

Trigger is **fast for experts** and **easy for beginners**!

### In this reference guide, you'll learn...

- How to use each available function
- Individual script arguments and what they mean

To get started, choose a topic from the menu to the left above to learn more.

### 2. Buy Now(<https://xgasoft.itch.io/trigger>)

### 3. Download PDF(<https://xga.one/wp-content/uploads/trigger-reference-guide-17.pdf>)



## 4. Version History

### 1.0.0

- Initial release

## 5. Vngen Reference Guide

In simple terms, trigonometry is the study of triangles. In programming, it is often used to determine the 2D coordinates of points which have been rotated a certain distance away from another point. You may have a mental image of a line being drawn from point A to point B, creating an angle. While calculating this angle is the objective we're trying to achieve, how we get there is by imagining not just a line, but a *triangle* instead—two flat lines following the X and Y axis like normal, while the angle is the triangle's hypotenuse.

Trigonometry demonstrates that it is possible to determine the position, orientation, and length of a triangle's hypotenuse based on its other two sides. While the formulae required are logically quite simple, actually calculating them is not. For programs that heavily rely on trigonometry, having an efficient way to perform these calculations is important. And for newcomers who may not yet be used to working with trigonometry in programming, making them easy to understand is equally so.

Trigger fundamentally only has three functions: `point_rot_prefetch`, `point_rot_x`, and `point_rot_y`. However, by applying the same basic principles in different ways, users may find Trigger's other functions to be easier to use for their particular use-cases. In this reference guide, we'll examine each one in detail.

### 5.1. The "point\_rot\_prefetch" Function

#### Syntax:

```
point_rot_prefetch(deg);
```

Argument	Type	Description
deg	real	Angle to calculate sine and cosine, in degrees

#### Description:

Pre-calculates the sine and cosine of an angle in degrees, which can then be used by `point_rot_x` and `point_rot_y` (or other variants) without re-calculating. This is highly useful for improving performance when calculating multiple points based on the same rotation.

Note that setting an angle in `point_rot_x` and `point_rot_y` will override this script's calculations with a new sine and cosine. For the same reason, running this script is not necessary so long as the first instance of `point_rot_x` or `point_rot_y` is supplied with an angle instead. However, this script can still be quite useful for calculating an angle in a different event than the event in which `point_rot_x` or `point_rot_y` is run.

#### Example:

```
point_rot_prefetch(90);  
x = point_rot_x(5, 10);  
y = point_rot_y(5, 10);
```

## 5.2. The "point\_rot\_x" Function

### Syntax:

```
point_rot_x(x, y, [deg]);
```

Argument	Type	Description
x	real	Horizontal distance from the rotation center point
y	real	Vertical distance from the rotation center point
[deg]	real	<i>Optional:</i> Angle of rotation in degrees

### Description:

Returns the X component of a point the given distance away, rotated by the given angle in degrees. (Center point is assumed as 0.)

Supplying an angle is optional. As calculating the sine and cosine of angles is costly to performance, these values are stored in memory for use with further instances of trigonometry functions based on the same angle. If no angle is supplied, the previous angle's sine and cosine will be used instead. This is highly useful for improving performance when calculating multiple points based on the same rotation.

#### Example:

```
x = 128 + point_rot_x(64, 64, image_angle);  
y = 128 + point_rot_y(64, 64);
```

## 5.3. The "point\_rot\_y" Function

### Syntax:

```
point_rot_y(x, y, [deg]);
```

Argument	Type	Description
x	real	Horizontal distance from the rotation center point
y	real	Vertical distance from the rotation center point
[deg]	real	<i>Optional:</i> Angle of rotation in degrees

### Description:

Returns the Y component of a point the given distance away, rotated by the given angle in degrees. (Center point is assumed as 0.)

Supplying an angle is optional. As calculating the sine and cosine of angles is costly to performance, these values are stored in memory for use with further instances of trigonometry functions based on the same angle. If no angle is supplied, the previous angle's sine and cosine will be used instead. This is highly useful for improving performance when calculating multiple points based on the same rotation.

#### Example:



```
x = 128 + point_rot_x(64, 64, image_angle);  
y = 128 + point_rot_y(64, 64);
```

## 5.4. The "dist\_rot\_x" Function

### Syntax:

```
dist_rot_x(dist, [deg]);
```

Argument	Type	Description
dist	real	Horizontal distance from the rotation center point
[deg]	real	<i>Optional:</i> Angle of rotation in degrees

### Description:

Returns the X component of a point the given distance away, rotated by the given angle in degrees. (Center point is assumed as 0.)

Supplying an angle is optional. As calculating the sine and cosine of angles is costly to performance, these values are stored in memory for use with further instances of trigonometry functions based on the same angle. If no angle is supplied, the previous angle's sine and cosine will be used instead. This is highly useful for improving performance when calculating multiple points based on the same rotation.

#### Example:

```
x = 128 + dist_rot_x(64, image_angle);  
y = 128 + dist_rot_y(64);
```

## 5.5. The "dist\_rot\_y" Function

### Syntax:

```
dist_rot_y(dist, [deg]);
```

Argument	Type	Description
dist	real	Vertical distance from the rotation center point
[deg]	real	<i>Optional:</i> Angle of rotation in degrees

### Description:

Returns the Y component of a point the given distance away, rotated by the given angle in degrees. (Center point is assumed as 0.)

Supplying an angle is optional. As calculating the sine and cosine of angles is costly to performance, these values are stored in memory for use with further instances of trigonometry functions based on the same angle. If no angle is supplied, the previous angle's sine and cosine will be used instead. This is highly useful for improving performance when calculating multiple points based on the same rotation.

#### Example:



```
x = 128 + dist_rot_x(64, image_angle);  
y = 128 + dist_rot_y(64);
```

## 5.6. The "vec\_rot\_x" Function

### Syntax:

```
vec_rot_x(x1, y1, x2, y2, [deg]);
```

Argument	Type	Description
x1	real	Horizontal center point
y1	real	Vertical center point
x2	real	Horizontal distance from the rotation center point
y2	real	Vertical distance from the rotation center point
[deg]	real	<i>Optional:</i> Angle of rotation in degrees

### Description:

Returns the X component of a point the given distance away from the given center point, rotated by the given angle in degrees (or in other words, the X component of the tip of a rotated line).

Supplying an angle is optional. As calculating the sine and cosine of angles is costly to performance, these values are stored in memory for use with further instances of trigonometry functions based on the same angle. If no angle is supplied, the previous angle's sine and cosine will be used instead. This is highly useful for improving performance when calculating multiple points based on the same rotation.

### Example:

```
x = vec_rot_x(128, 128, 64, 64, image_angle);  
y = vec_rot_y(128, 128, 64, 64);
```

## 5.7. The "vec\_rot\_y" Function

### Syntax:

```
vec_rot_y(x1, y1, x2, y2, [deg]);
```

Argument	Type	Description
x1	real	Horizontal center point
y1	real	Vertical center point
x2	real	Horizontal distance from the rotation center point
y2	real	Vertical distance from the rotation center point
[deg]	real	<i>Optional:</i> Angle of rotation in degrees

### Description:

Returns the Y component of a point the given distance away from the given center point, rotated by the given angle in degrees (or in other words, the Y component of the tip of a rotated line).



Supplying an angle is optional. As calculating the sine and cosine of angles is costly to performance, these values are stored in memory for use with further instances of trigonometry functions based on the same angle. If no angle is supplied, the previous angle's sine and cosine will be used instead. This is highly useful for improving performance when calculating multiple points based on the same rotation.

**Example:**

```
x = vec_rot_x(128, 128, 64, 64, image_angle);  
y = vec_rot_y(128, 128, 64, 64);
```

## 6. Patreon Credits

This product is made possible by the generous support of XGASOFT patrons on [Patreon](#). Every contribution counts, no matter how big or small. To all fans and patrons around the globe, thanks for being a part of XGASOFT's story!

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### **Patreon "Supporters"**

Tarquinn J Goodwin

## 7. End-User License Agreement for XGASOFT Digital Assets and Services ("EULA")

**LAST UPDATED: 08/19/2017**





## 1. ABOUT THIS DOCUMENT

This document (the “Agreement”) contains the necessary legal information applying to end users’ use of digital assets produced by XGASOFT, including access to software products as well as services.

We know that’s a mouthful and reading EULAs isn’t very exciting, but this is important. Please take your time to review and ensure you understand the terms of this document before proceeding to use XGASOFT products in your own work.

If you have any questions or concerns about the terms outlined in this document, please feel free to contact us at [contact@xgasoft.com](mailto:contact@xgasoft.com) or by visiting our Contact & Support page.

## 2. ACCEPTANCE

**2.1** This Agreement is legally binding, and in order to download and use or otherwise participate in XGASOFT software and services, you must agree to the terms outlined in this document. If you do not agree, do not download, use, or otherwise participate in XGASOFT software and services.

**2.2** In order to accept this Agreement, you must be at least eighteen (18) years of age or whatever age is of legal majority in your country. If this legal age requirement is not met, you must obtain your parent’s or legal guardian’s approval and acceptance of this Agreement in your stead. Obtaining this approval is your responsibility, and XGASOFT accepts no liability for failure to do so.

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**3.2** This Agreement does not create any exclusive relationship between XGASOFT and the Customer, nor any legal partnership, joint venture, or employer/employee relationship.

**3.3** XGASOFT Property is provided on an “as is” basis.

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**donor to XGASOFT through Patreon.**

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**4.3** The preceding limitation shall not be applied retroactively, so that any existing, complete, and publicly available commercial and non-commercial properties using XGASOFT Property will not be considered in violation of this agreement.

**4.4** This Agreement does not create any exclusive relationship between XGASOFT and the Customer, nor any legal partnership, joint venture, or employer/employee relationship.

**4.5** XGASOFT Property is provided on an "as is" basis.

## **5. LICENSE FEE**

**5.1** Fees are determined for each product and service on a case-by-case basis, and XGASOFT reserves the right to change fees on XGASOFT Property with or without prior notice.

**5.2** XGASOFT may rely on authorized third-party institutions to process and collect license fees of the amount agreed upon with the third-party, in addition to any applicable foreign and domestic taxes.

**5.3** By engaging in doing business with authorized third-party institutions, the Customer must agree to any separate End-User License Agreements ("EULAs") required by the third-party. Furthermore, the Customer acknowledges and agrees that XGASOFT is not responsible for the practices, behaviors, or agreements of any third-party.

## **6. MODIFICATIONS**

**6.1** XGASOFT grants the Customer license to modify, or alter the functionality of, XGASOFT Property as source code and assets exclusively for the Customer's own use, solely for the creation of, or integration with electronic applications and other interactive media, including both commercial and non-commercial purposes strictly in accordance with the terms of this Agreement.

**6.2** Modifying XGASOFT Property in accordance with the terms of this Agreement will not affect or terminate the Customer's license to use the Property, however XGASOFT cannot guarantee the quality and functionality of modified versions of the Property, nor its compatibility with other XGASOFT Property.

**6.3** By modifying the Property, the Customer acknowledges this and agrees to not hold responsible XGASOFT for any loss or damage incurred by the modified Property.

**6.4** Furthermore, the Customer acknowledges and agrees that addition of modifications to the original Property in no way represents a change of ownership of the Property, and that XGASOFT shall retain ownership of all intellectual property rights associated to the Property, modified and unmodified.

**6.5** XGASOFT makes no guarantee to offer technical support to the Customer for modified versions of XGASOFT



Property.

## 7. RESTRICTIONS

As part of this licensing agreement, Customer agrees not to, and will not permit others to:

- license, sell, rent, lease, assign, distribute, transmit, host, outsource, disclose or otherwise commercially exploit XGASOFT Property in its original form as source code and assets or make the Property available to any third party in its original form, excluding collaborators on an individual product incorporating XGASOFT Property.
- in any way redistribute as source code and assets modified forms of XGASOFT Property, which are permitted exclusively for the Customer's own use, excluding collaborators on an individual product incorporating XGASOFT Property.
- reverse engineer XGASOFT Property for the purpose of creating commercial electronic assets and services which may be in competition with XGASOFT.
- disable, circumvent, or otherwise interfere with security or content usage functionality (such as, but not limited to, digital rights management) in or related to XGASOFT Property.
- remove, alter, or otherwise attempt to obscure XGASOFT copyrights, trademarks, or other proprietary notices in or related to XGASOFT Property.

## 8. OWNERSHIP

**8.1** XGASOFT Property is licensed, not sold. This license is extended only to the Customer as an individual or legal entity via authorized means for authorized purposes. This license cannot be transferred or extended to additional recipients.

**8.2** Multiple users may, however, have access to a single license of XGASOFT Property when acting as collaborators on an individual product incorporating XGASOFT Property. In this case, only the original licensee retains authorization to their license, and collaborators may not copy or otherwise redistribute the Property for their own uses unrelated to the original licensee.

**8.3** All title and intellectual property rights in and relating to the Property (including but not limited to any copyright, trademarks, service marks, brand names, logos, software, images, animations, graphics, video, audio, music, performance rights, mechanical rights, synchronization rights, text, and tutorials), and any copies of the Property are owned by XGASOFT. All rights not expressly granted are reserved by XGASOFT.

## 9. CONFIDENTIALITY

As part of this agreement, both XGASOFT and the Customer agree to hold confidential and secure any sensitive information disclosed by either party, and to not disclose sensitive information with any third party except when required by law.

## 10. LIABILITY

**10.1** The Customer acknowledges and agrees that XGASOFT will not be liable for any loss or damage arising out



of or resulting from the Customer's usage of XGASOFT Property as outlined by this Agreement.

**10.2** The Customer hereby agrees to indemnify and hold harmless XGASOFT, its employees, and agents from and against any and all claims (including third party claims), demands, actions, lawsuits, expenses (including attorney's fees) and damages (including indirect or consequential loss) resulting in any way from the Customer's use or reliance on XGASOFT Property, any breach of terms of this Agreement, or any other act of the Customer.

**10.3** This limitation will survive and apply even in the event of termination of this Agreement.

## **11. WAIVER**

Any failure or delay by either XGASOFT or the Customer to exercise any right, power or privilege, or to actively enforce or seek enforcement of the terms of this Agreement shall not be construed as a waiver for the other party to supersede the terms outlined in this Agreement.

## **12. TERM AND TERMINATION**

**12.1** This Agreement shall remain in effect until terminated by the Customer or XGASOFT.

**12.2** XGASOFT may, in its sole discretion, at any time and for any or no reason, suspend or terminate this Agreement with or without prior notice.

**12.3** This Agreement will terminate immediately, without prior notice from XGASOFT, in the event that the Customer fails to comply with any provision of this Agreement.

**12.4** Upon termination of this Agreement, the Customer shall cease all use of the Property and delete all copies of the Property from their electronic devices.

**12.5** In cases of force majeure (including, but not limited to, natural disasters, technological failures, acts of God, war or terrorist activity, civil unrest, or malicious damage), obligations to fulfill the Agreement outlined in this document shall be suspended until such time has passed and both parties are reasonably capable of fulfilling the Agreement.

## **13. CHANGES TO THIS AGREEMENT**

XGASOFT reserves the right to modify, suspend or discontinue, temporarily or permanently, the Property or any service to which it connects, with or without notice and without liability to the Customer.

## **14. SEVERABILITY**

If any provision of this Agreement is held to be unenforceable or invalid, such provision will be changed and interpreted to accomplish the objectives of such provision to the greatest extent possible under applicable law and the remaining provisions will continue in full force and effect.



## **15. GOVERNING LAW AND JURISDICTION**

Both XGASOFT and the Customer agree that this Agreement shall be governed by and interpreted according to the laws of the United States of America and the State of Kansas, and that any dispute regarding this Agreement shall be heard by the courts thereof.

## **16. CONCLUSION**

This document contains the whole agreement between XGASOFT and the Customer relating to the Property and licenses thereof and supersedes all prior Agreements, arrangements and understandings between both parties regarding XGASOFT Property and licenses.