

LEGO[®] Geometry

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Jun 2019

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Contents and Triva

Trivia



- Truck in set 79116, numberplate: **BM 53116**.
- Designed by **B**jarke Lykke **M**adsen [1].
- Number usually set number, but this is 79116 「_(ツ)_/「.

Contents

- LEGO length L
- Angles
- Offsetting
- Storing

AFOL Adult Fan Of LEGO.

ABS¹ Acrylonitrile Butadiene Styrene plastic used for bricks.

Part number Also element number. Identifies brick type.

BURP Big Ugly Rock Piece (part 6082).



MOC My Own Creation.

SNOT Studs Not On Top.

Dark ages Period when fan sets aside LEGO in favor of other(??) pursuits.

¹http://lego.wikia.com/wiki

Dark Ages

- Lifted to allow train to run under it.
- Two stations.
- Many modular buildings (sets: 10255,10218,10260).

- All the new parts.
- They took my grey!





Old (left), dark/light bluish grey (right).



The LEGO Length: L

Brick



$$\begin{array}{ll} 1.2L & \rightarrow \mbox{ brick} \\ 0.4L & \rightarrow \mbox{ plate} \\ 0.2L & \rightarrow \mbox{ stud} \end{array}$$

3 plates = brick

Can you hand me that sand yellow, 1 by 6 plate, please? – Random LEGO fan.

1 by 6 1L by 6L. Smallest number first.plate 0.4L height.sand yellow "Sand Yellow", LEGO color ID 138.



5:6 ratio





5:6 ratio exemplified, 1x6 brick on top and 5 1x1 laying on the side.

The 5:6 ratio only works out for even L values.



 $2 \cdot 0.4 = 0.8L \neq 1L$

$$5 \cdot 0.4 = 2L = 2L$$

Need to find 0.2L somewhere!



The vertical side of these $brackets^2$ is 0.2L.

²Image from [2].



Why does this fit?





Height is 2.4L.

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Baseplate

Before brackets the only(?) other 0.2L element.



No anti-stud, height is 0.4L.

1 baseplate + 2 plates = $0.4L + 2 \cdot 0.4L = 3 \cdot 0.4L = 1.2L$



Laying on 2 plates, exactly 1 brick.



0.2*L* offset, same as brackets. Back has anti-stud. One of the most versatile bricks.



Introduced[6] 1979 with set 733. Official name: **1 x 1 with headlight**, also *Erling* afer *Erling Dideriksen*.

Because of anti-stud, brick and headlight: 1.2L + 0.8L = 2.0L.



Normal bricks with stud on side do not line up.

Technic not 100% compatible with System [5].



Center is 3.92mm (0.49L) from top.

Center is 3.80mm (0.475L) from top.

Angles



+1 for each side, length between the stud *centers* has to be 3:4:5.



6L plate fits perfectly.

- 4 triples with the diagonal of length 25 or less: 3:4:5, 5:12:13, 8:15:17, 7:24:25
- Additional ones can be made with scaling: 9:12:15 = 3 · 3:4:5

Creator Expert (10261) Roller Coaster



14*L* + clips, totals 15*L*.



Don't need the +1 due to clips that fit in middle of the stud.

Offsetting





Allow for half-stud (0.5L) offsets.



An 3L plate in the middle of a 4L.

Other parts with offets.





Part 4590.

Part 3176 (from 1966, for use on trains).

Detective's Office (10246)

0.5L inset windows.





How do you get back in alignment?

Half stud inset.

More Jumper Tiles



Put jumpers perpendicular.



Fits a 2x6 plate!







AFOL Life

Sort on brick **type** *then* (maybe on) **color**.

Optimize for quickly finding bricks.

Storage tower(s)⁻¹ help.

- 1. $1 \times N$ plates 2/3L
- 2. $1 \times N$ plates 4L
- 3. $1 \times N$ plates 6L+
- 4. tiles
- 5. jumpers
- 6. empty!



⁻¹Brand shown: www.reallyusefulproducts.co.uk.

Can be stored in storage boxes⁻².



- Transparant fronts.
- Opens from the side *not* top (annoying when stacked).

⁻²Brand shown: https://www.drapertools.com.



"Prevent Yellowing"; Window frame from *Assembly Square* (set 10255).

- Keep bricks away from heat and (direct) sun light.
- Older bricks yellowed because fire retardant Bromide.
- Newer bricks should fare better.

Enjoy the Brick!

Try things; LEGO's builtin tolerations and flexibility allows for a lot of things.



How did I do it? Machine Learning Trying it, prototyping.

⁻⁴Since demised to make room for other things.



After many adjustments: end result.-3-4

⁻³Several Bricklink orders.

City Evolution

Nov 2018



Pondering the name Brickmegen as homage to Nijmegen .

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Farm and Wind Mills





Space port. Why not?

City farm.

Jun 2019



Pedestrian focus: more trees, plants and a tram. No roads.

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- [1] Brickset Featured BrickLists brickset.com/bricklists/featured
- [2] Bill Ward Brick Geometry BrickCon, 2013
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- [5] Jamie Berard Stressing The Elements LEGO, 2006
- [6] Holger Matthes Lampenstein
 - www.holgermatthes.de/bricks/en/lampenstein.php, 2016
- [7] LEGO Group The Nomenclature and Geometry of LEGO http://roboplex.org/wp/wp-content/uploads/2015/09/
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