

#1: Die Spiegelung an einer beliebigen Geraden

#2: -----

#3: $p := [x, y, z]$

#4: $va := \begin{bmatrix} a_1 & a_2 & a_3 \end{bmatrix}$

#5: $vri := \begin{bmatrix} r_1 & r_2 & r_3 \end{bmatrix}$

#6: $g(\lambda) := va + \lambda \cdot vri$

#7: Lot vom Punkt p auf die Gerade:

#8: $(g(\lambda) - p) \cdot vri = 0$

#9: $g(\lambda) \cdot vri - p \cdot vri = 0$

#10: $g(\lambda) \cdot vri = p \cdot vri$

#11: $(va + \lambda \cdot vri) \cdot vri = p \cdot vri$

#12: $va \cdot vri + \lambda \cdot vri \cdot vri = p \cdot vri$

#13: $\lambda \cdot vri \cdot vri = p \cdot vri - va \cdot vri$

#14: $\lambda = \frac{p \cdot vri - va \cdot vri}{vri \cdot vri}$

#15: $\lambda = \frac{(p - va) \cdot vri}{vri \cdot vri}$

#16: $g(\lambda) = va + \frac{(p - va) \cdot vri}{vri \cdot vri} \cdot vri$

#17: $LotFP(p, va, vri) := va + \frac{(p - va) \cdot vri}{vri \cdot vri} \cdot vri$

#18: $SpiegelPkt(p, va, vri) := LotFP(p, va, vri) + (LotFP(p, va, vri) - p)$

#19: $SpiegelPkt(p, va, vri) := 2 \cdot LotFP(p, va, vri) - p$

#20: $SpiegelPkt(p, va, vri) := 2 \cdot \left(va + \frac{(p - va) \cdot vri}{vri \cdot vri} \cdot vri \right) - p$

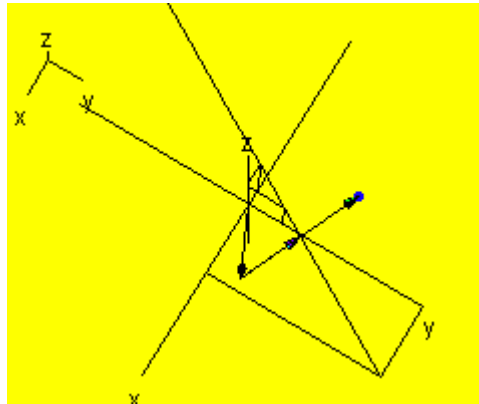
#21: -----

#22: Beispiel:

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#23: LOAD(C:\ProgMath\Derive61\Math\hbmvec.mth)
#24: vaTest := [-1, -1, 3]
#25: vriTest := [1, 2, -1]
#26: gTest( $\mu$ ) := vaTest +  $\mu$ ·vriTest
#27: hbmPlotGeradeMitSpur(vaTest, vriTest)
#28: vo := [0, 0, 0]
#29: pTest := [2, 1, 2]
#30: hbmPlotVek3D(vo, pTest, 0.1, 0.4)
#31: LotFP(pTest, vaTest, vriTest)
#32: hbmPlotVek3D(pTest, LotFP(pTest, vaTest, vriTest), 0.1, 0.4)
#33: SpiegelPkt(pTest, vaTest, vriTest)
#34: hbmPlotVek3D(pTest, SpiegelPkt(pTest, vaTest, vriTest), 0.1, 0.4)

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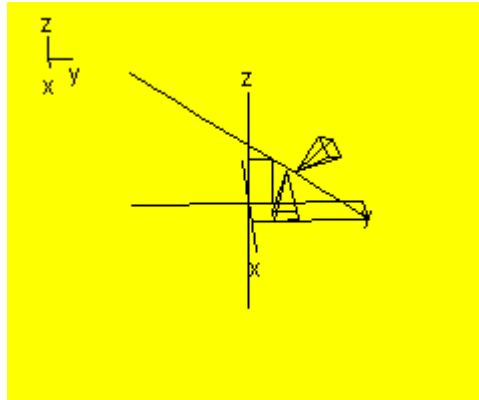
#35: -----
#36: Spiegelung einer Pyramide
#37: p1 := [1, 1, 0]
#38: p2 := [2, 1, 0]
#39: p3 := [2, 2, 0]
#40: p4 := [2, 1, 0]
#41: p4 := [1, 2, 0]
#42: p5 := [1.5, 1.5, 2]
#43: Pyra := [p1, p2, p3, p4, p1, p5, p2, p3, p5, p4]
#44: vaTest := [-1, -1, 3]

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#45: $\text{vriTest} := [1, 2, -1]$

#46: $\text{hbmPlotGeradeMitSpur}(\text{vaTest}, \text{vriTest})$

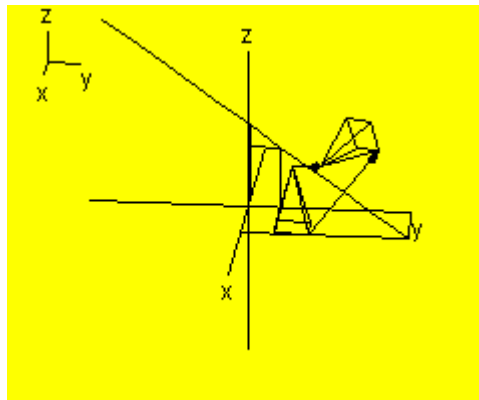
#47: $\text{VECTOR}(\text{SpiegelPkt}(\text{Pyra}, \text{vaTest}, \text{vriTest}), i, 1, \text{DIM}(\text{Pyra}), 1)$



#48: -----

#49: $\text{hbmPlotVek3D}(\text{p5}, \text{SpiegelPkt}(\text{p5}, \text{vaTest}, \text{vriTest}), 0.1, 0.4)$

#50: $\text{hbmPlotVek3D}(\text{p3}, \text{SpiegelPkt}(\text{p3}, \text{vaTest}, \text{vriTest}), 0.1, 0.4)$



#51: -----