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.(Piaget and Inhelder, 1975)

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(Karplus, Pulos   .(Lesh, Post and Behr, 1988)
and stage, 1983; Lamon, 1993; Lo and Watanabe, 1997;
Noelting, 1980; Lesh, et al., 1988)   (Bar, 1987, Tourniaire and Pulos, 1985)

.(Roth and Milkent, 1991)

.(Cramer and Post, 1993)

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(Lesh et al., 1988; Confrey and Smith, 1995)

.(Lesh et al., 1988)   -   .

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(Hart, 1988; Kaput and West, 1994; Karplus et al.,
    1983; Lamon, 1994; Resnick and Singer, 1993)   .(Lesh et al., 1988)

            (Buildup Strategy)

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            .   National Council of Teachers of Mathematics (NCTM),
                            (Sing, 2000)   .2000)

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(Longest   .   .
                    and Person, 2002)

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                                        (Thompson, 1994)

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            (Allain, 2001)   (Resnick and Singer, 1993)

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(Person, Berenson and Greenspon, 2004)

(Ann - Kim, 2003) –

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(Perry, Yee and Conroy,

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(Kaput and West, 1994)

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(Pantziara

and Pitta, 2005)   .

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(Clark and Lesh, 2003)

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(Fennema, Carpenter, Frank, Levit, J-Acobs, and

Empson, 1996) .(Hiebert and Behr, 1988)

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526	134	138	139	115	
517	138	132	109	138	
1043	272	270	248	253	

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:   64   (2): 1:2   121%- 150%
(3): 1:3   211% - 240%
3: 2   241 %-

Popham

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123		12		16		25		70	(1)
476	72	9	83	19	91	54	35	113	(1)
286	56	45	43	41	30	40	9	22	(2)
158	66	11	49	19	8	1	1	3	(3)
1043	194	77	175	95	129	120	45	208	

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%5   (54)
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(158)   %27   :
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3.89	4.55	253	
3.89	6.79	248	
5.12	9.49	270	
5.00	10.15	272	
5.05	7.82	1043	

(4)

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0.81	0.06	1.22	1	1.22	
0.00	83.56	1723.76	3	5171.28	
0.99	0.04	0.75	3	2.25	
		20.63	1035	21351.56	
			1042	26554.19	

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(4)   .

(5)   (4)   ( )   (0.06)

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$(\alpha = 0.05)$

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$(\alpha = 0.05)$

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(4)

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(0.99)

*1.56	*0.86	0.18	—	4.55
*1.38	*0.68	—		6.79
*0.70	—			9.49
—				10.15

* $(\alpha = 0.05)$.

(5)

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$(0.05=\alpha)$

(Lawton, 1993)

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$(0.05 = \alpha)$

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(Bar, 1987)

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(Longest et al., 2002)

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(Hyde and Jaffee, 1998; Sowder, 1998)

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(Tourniaire and Pulos, 1985)

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Levels of Proportional Reasoning for Students in the Upper Basic Stage in Jordan

Eman R. Abed*

ABSTRACT

This study aimed to investigate the levels of proportional reasoning of students in grades 7, 8, 9 and 10. It also investigated the differences in these levels due to grade level and gender.

The sample of the study consisted of (1043) students in grades 7, 8, 9 and 10 chosen from four schools in Amman. To achieve the objectives of the study, a test in proportional reasoning was developed. The test consisted of 20 items in three forms. The first form concerned with the concept of proportional reasoning and the second form concerned with direct, opposite proportional and division proportional while the third form concerned with the proportionality. The validity and reliability were guaranteed by using suitable methods.

Results of the study showed that most of students were in the first level of proportional reasoning. The results also revealed the existence of significant differences in the proportional reasoning following the different grades for the benefit of grade 10 and this ability is developing normally by the age. This may lead to the curriculum has main role in developing these levels.

The study recommended being interest in developing the levels of proportional reasoning of students in different categories and grades.

Keywords: Proportional Reasoning, Direct Proportion, Opposite Proportion, Ratio.