OAKLAND
COMMUNITY
COLLEGE®

Analysis of Students' Math Performance by Number of Days Classes Meet

Summer 2006 – Summer 2007

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Oakland Community College
Analysis of Students' Math Performance by Number of Days Classes Meet
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PURPOSE OF STUDY

The purpose of this study is to assist Oakland Community College's (OCC) Math discipline with their students' performance. More specifically, this study explores the difference between students' grades from math classes delivered once or twice a week.

METHOD

Math sections, average class GPA, and class frequency within a week were obtained from official college records via Colleague. One year of data were reviewed (Summer 2006 through Summer 2007). In addition, students' grades of A through F were used in the GPA calculations.

ANALYSIS

A total of 111 math sections were reviewed for this research. Students' average GPAs by campus range from a C to a B- grade (2.18 to 2.76 GPA). Regardless of whether the classes met once or twice during the week, students' grades remained in the C to B- grade range.

Campus	Total Grades	Average GPA for All Math Offerings	Average GPA for Math Classes Delivered Once a Week	Average GPA for Math Classes Delivered Twice a Week
Auburn Hills	6,139	2.18	2.17	2.19
Highland Lakes	3,156	2.76	2.73	2.79
Orchard Ridge	4,919	2.42	2.38	2.45
Royal Oak	5,419	2.47	2.63	2.22
Southfield	928	2.25	2.29	2.20

Source: OCC, Office of Institutional Research

2/6/2008

Oakland Community College
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An analysis of variance (ANOVA) was applied to the data to determine whether there were differences between students' GPAs in classes that meet once or twice a week during the term. In addition to the original purpose of this study, GPA differences between campuses and course type (developmental classes vs. regular credit classes) were also reviewed. As a result, a 5 x 2 x 2 model was employed (5 campuses, 2 different class offerings, and 2 different course types). For this study, developmental classes include: MAT-1040, MAT-1050, MAT-1070, and MAT-1100.

Main effects and interactions were reviewed. Main effects are the effects of each of the individual variables (average GPA, campus location, or course type) isolated, ignoring the other variables. Interaction refers to the relation between at least two variables, when one variable either decreases or increases to an extent that influences or crosses the other variable(s).

Main Effects:	
Campus:	$F_{(4)} = 4.88^{*}$
Number of Days Class Meet:	$F_{(1)} = .14$
Course Type (DEV vs. CRE):	$F_{(1)} = 8.79^{*}$

Interaction between Variables:	
Location * Number of Days:	$F_{(4)} = .60$
Location * Course Type:	$F_{(4)} = .83$
Number of Days * Course Type:	$F_{(1)} = .29$
Location * Number of Days * Course Type:	$F_{(4)} = 1.03$

Results show that there is no difference, no main effect, nor interaction between average class GPA from classes delivered once a week versus classes delivered twice a week ($p = .71$). In other words, the students who attended class once versus twice a week were similar in GPA ranges, regardless of campus location or course type.

However, there were statistically significant differences or main effects between average class GPA and campus location. Contrast-coefficients allow isolation of two campuses from the rest of the locations and reveal which campuses are statistically different. Data conclude that Auburn Hills and Royal Oak campuses show differences for student math grades (2.18 GPA vs. 2.47 GPA, respectively). Additionally Highland Lakes significantly contrasts the other four campuses in GPA (2.76 vs 2.18 (AH); 2.42 (OR); 2.47 (RO); and 2.25 (SF)).

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* $p < .05$

Source: OCC, Office of Institutional Research

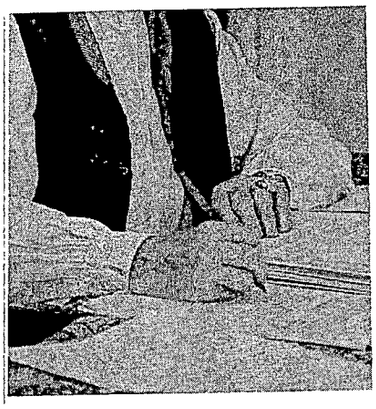
2/6/2008

Contrast Campuses	Average GPA
AH vs. RO	2.18 vs. 2.47
HL vs. AH	2.76 vs. 2.18
HL vs. OR	2.76 vs. 2.42
HL vs. RO	2.76 vs. 2.47
HL vs. SF	2.76 vs. 2.25

Differences also surfaced between students' average GPA and course type. Those students who attended regular math classes were more likely to achieve higher GPAs than those students attending developmental math classes (average GPA 2.53 vs. 2.19, respectively).

CONCLUSION

Data indicate that there are no real grade differences whether students attend math classes offered once a week or twice a week. On the other hand, when comparing student grades in each campus, Highland Lakes campus math students significantly out-perform students from the other campuses. Additionally, math students enrolled in regular credit classes perform significantly better than those enrolled in developmental math classes.



Grades /

Students will be awarded letter grades for all coursework as follows:

GRADE	DESCRIPTION	POINTS
A	Excellent	4.0
A-		3.7
B+		3.3
B	Good	3.0
B-		2.7
C+		2.3
C	Average	2.0
C-		1.7
D+		1.3
D		1.0
F	Failure	0.0

Marks /

AU – Audit

A student may register for a course without credit. This election must be made at the time of registration or schedule adjustment.

CP – Continuing Progress

A mark designated for selective use for students enrolled in designated courses who have attended class regularly and made reasonable effort toward progress but have not demonstrated a passing level of proficiency. This mark cannot be awarded more than once for the same course. The "CP" may remain on the transcript indefinitely. Upon re-enrollment and completion, the letter grade issued will be used for purposes of figuring the grade point average. The instructor of record will submit a written summation of the student's progress to the student, the next instructor and the department chair. This is to ensure that the student understands and accepts the responsibilities outlined by the instructor.

I – Incomplete

This mark will be used sparingly and only when an emergency prevents a student from completing course work during the regular college session. The student is responsible for completing a written agreement with the instructor detailing the requirements to be met for the completion of the "I" before it is assigned. The student is not to register for a course in which he or she has a current mark of "I". Without prior faculty-initiated action to change the "I", this mark will become a WP" one year subsequent to its original issue.

N – Non-Attendant

The non-punitive mark is awarded to students who, though registered, never attended class, did not officially drop, and no gradable work exists.

NR – Not-Reported

Grade was not reported or submitted.

W – Student-Initiated Withdrawal

This mark is awarded to students who initiate the process to officially drop the course during the time specified for the academic period.

WF – Faculty-Initiated Withdrawal/Failing

This non-punitive mark is awarded to indicate insufficient class participation to merit a passing grade.

Univariate Analysis of Variance

[DataSet21] C:\Documents and Settings\mgwoods\Desktop\Average GPA per Course_2.4.08.sav

Between-Subjects Factors

		Value Label	N
Location	1	Auburn Hills Campus	27
	2	Highland Lakes Campus	22
	3	Orchard Ridge Campus	26
	4	Royal Oak Campus	29
	5	Southfield Campus	7
NumberDays	1.00		58
	2.00		53
course2	1.00	dev math	31
	2.00	reg math	80

Tests of Between-Subjects Effects

Dependent Variable: CourseAvgGPA

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	9.346[a]	19	.492	2.757	.001
Intercept	355.096	1	355.096	1989.962	.000
Location	3.484	4	.871	4.881	.001
NumberDays	.025	1	.025	.139	.710
course2	1.569	1	1.569	8.791	.004
Location * NumberDays	.430	4	.108	.603	.662
Location * course2	.591	4	.148	.828	.511
NumberDays * course2	.051	1	.051	.288	.593
Location * NumberDays * course2	.738	4	.184	1.033	.394
Error	16.238	91	.178		
Total	681.709	111			
Corrected Total	25.585	110			

a. R Squared = .365 (Adjusted R Squared = .233)

interaction effects

MAIN EFFECTS

LOCA $F_{(19)} = 2.76^*$

DAY $F(1) = 0.14$

TYPE F

INTERACTION

LOC x DAYS $F_{(4)} = 0.60$ n.s.

LOC x TYPE

DAYS x TYPE

LOC x DAY x TYPE

Oneway

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Descriptives

CourseAvgGPA

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Auburn Hills Campus	27	2.1804	.48794	.09390	1.9873	2.3734	1.35	3.24
Highland Lakes Campus	22	2.7600	.42799	.09125	2.5702	2.9498	2.06	3.66
Orchard Ridge Campus	26	2.4162	.45189	.08862	2.2336	2.5987	1.46	3.00
Royal Oak Campus	29	2.4724	.44499	.08263	2.3031	2.6417	1.24	3.36
Southfield Campus	7	2.2514	.29986	.11334	1.9741	2.5288	1.86	2.75
Total	111	2.4313	.48227	.04578	2.3405	2.5220	1.24	3.66

Test of Homogeneity of Variances

CourseAvgGPA

Levene Statistic	df1	df2	Sig.
.780	4	106	.541

no significant differences means that the 2 groups are homogeneous, or that there is no variance.
* We want no significance.

ANOVA

CourseAvgGPA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4.358	4	1.090	5.441	.001
Within Groups	21.226	106	.200		
Total	25.585	110			

Indicates that there are differences between groups - between Campuses

So we look at contrast coefficients to see which groups of campus are statistically different.

Contrast Coefficients

Contrast	Location				
	Auburn Hills Campus	Highland Lakes Campus	Orchard Ridge Campus	Royal Oak Campus	Southfield Campus
1	1	-1	0	0	0
2	1	0	-1	0	0
3	1	0	0	-1	0
4	1	0	0	0	-1
5	0	1	-1	0	0
6	0	1	0	-1	0
7	0	1	0	0	-1
8	0	0	1	-1	0
9	0	0	1	0	-1
10	0	0	0	1	-1

Contrast Tests

		Contrast	Value of Contrast	Std. Error	t	df	Sig. (2-tailed)
CourseAvgGPA	Assume equal variances	1	-.5796	.12852	-4.510	106	.000
		2	-.2358	.12296	-1.918	106	.058
		3	-.2920	.11967	-2.440	106	.016
		4	-.0711	.18980	-.374	106	.709
		5	.3438	.12963	2.653	106	.009
		6	.2876	.12652	2.273	106	.025
		7	.5086	.19419	2.619	106	.010
		8	-.0563	.12086	-.466	106	.643
		9	.1647	.19055	.864	106	.389
		10	.2210	.18845	1.173	106	.244
	Does not assume equal variances	1	-.5796	.13094	-4.427	46.715	.000
		2	-.2358	.12912	-1.826	50.926	.074
		3	-.2920	.12509	-2.335	52.580	.023
		4	-.0711	.14718	-.483	15.392	.636
		5	.3438	.12720	2.703	45.383	.010
		6	.2876	.12310	2.336	46.243	.024
		7	.5086	.14550	3.495	14.552	.003
		8	-.0563	.12117	-.464	52.163	.644
		9	.1647	.14387	1.145	14.298	.271
		10	.2210	.14026	1.576	13.271	.139

AH vs HL
AH vs RO
HL vs OR
HL vs RO
HL vs SF

Descriptives

CourseAvgGPA

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
dev math	31	2.1890	.41871	.07520	2.0354	2.3426	1.46	3.33
reg math	80	2.5251	.47469	.05307	2.4195	2.6308	1.24	3.66
Total	111	2.4313	.48227	.04578	2.3405	2.5220	1.24	3.66

Test of Homogeneity of Variances

CourseAvgGPA

Levene Statistic	df1	df2	Sig.
.371	1	109	.544

ANOVA

CourseAvgGPA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.524	1	2.524	11.929	.001
Within Groups	23.061	109	.212		
Total	25.585	110			

Data Checking

Univariate Analysis of Variance

[DataSet21] C:\Documents and Settings\mgwoods\Desktop\Average GPA per Course_2.4.08.sav

Same Data, just showing specifically what data was used in report.

Between-Subjects Factors

		Value Label	N
Location	1	Auburn Hills Campus	27
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	4	Royal Oak Campus	29
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	2.00		53
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Tests of Between-Subjects Effects

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Corrected Model	9.346[a]	19	.492	2.757	.001
Intercept	355.096	1	355.096	1989.962	.000
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Location * NumberDays * course2	.738	4	.184	1.033	.394
Error	16.238	91	.178		
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Oneway

[DataSet21] C:\Documents and Settings\mgwoods\Desktop\Average GPA per Course_2.4.08.sav

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Contrast Coefficients

	Location				
Contrast	Auburn Hills Campus	Highland Lakes Campus	Orchard Ridge Campus	Royal Oak Campus	Southfield Campus
1	1	-1	0	0	0
2	1	0	-1	0	0
3	1	0	0	-1	0
4	1	0	0	0	-1
5	0	1	-1	0	0
6	0	1	0	-1	0
7	0	1	0	0	-1
8	0	0	1	-1	0
9	0	0	1	0	-1
10	0	0	0	1	-1

Contrast Tests

		Contrast	Value of Contrast	Std. Error	t	df	Sig. (2-tailed)
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		6	.2876	.12310	2.336	46.243	.024
		7	.5086	.14550	3.495	14.552	.003
		8	-.0563	.12117	-.464	52.163	.644
		9	.1647	.14387	1.145	14.298	.271
		10	.2210	.14026	1.576	13.271	.139

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ONEWAY
  CourseAvgGPA BY course2
  /STATISTICS DESCRIPTIVES HOMOGENEITY
  /MISSING ANALYSIS .
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Oneway

[DataSet1] I:\Ad Hoc Studies\Ad Hoc Active & Pending\Math Projects\MAT Success based on Meeting Frequency\Average GPA per Course_2.4.08_markedits.sav

Descriptives

CourseAvgGPA

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					Lower Bound	Upper Bound		
dev math	31	2.1890	.41871	.07520	2.0354	2.3426	1.46	3.33
reg math	80	2.5251	.47469	.05307	2.4195	2.6308	1.24	3.66
Total	111	2.4313	.48227	.04578	2.3405	2.5220	1.24	3.66

Test of Homogeneity of Variances

CourseAvgGPA

Levene Statistic	df1	df2	Sig.
.371	1	109	.544

ANOVA

CourseAvgGPA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.524	1	2.524	11.929	.001
Within Groups	23.061	109	.212		
Total	25.585	110			

Location	CourseName	numberdays_sum	TotalGrades_AthruF	GPAsum_AthruF	AVG GPA per Course
AH	MAT-1040	1.00	80.00	141.60	1.77
AH	MAT-1050	1.00	155.00	371.50	2.40
AH	MAT-1100	1.00	357.00	605.30	1.70
AH	MAT-1150	1.00	286.00	545.30	1.91
AH	MAT-1500	1.00	37.00	56.10	1.52
AH	MAT-1540	1.00	42.00	96.00	2.29
AH	MAT-1560	1.00	86.00	178.20	2.07
AH	MAT-1580	1.00	47.00	128.10	2.73
AH	MAT-1600	1.00	26.00	46.90	1.80
AH	MAT-1730	1.00	64.00	144.00	2.25
AH	MAT-1740	1.00	17.00	32.10	1.89
AH	MAT-2530	1.00	43.00	139.30	3.24
AH	MAT-2810	1.00	21.00	56.30	2.68
			2,442.00		2.17 (17)

Location	CourseName	numberdays_sum	TotalGrades_AthruF	GPAsum_AthruF	AVG GPA per Course
AH	MAT-1040	2.00	63.00	96.30	1.53
AH	MAT-1050	2.00	148.00	377.00	2.55
AH	MAT-1100	2.00	537.00	964.50	1.80
AH	MAT-1150	2.00	447.00	808.30	1.81
AH	MAT-1500	2.00	68.00	174.40	2.56
AH	MAT-1540	2.00	190.00	423.60	2.23
AH	MAT-1560	2.00	99.00	230.60	2.33
AH	MAT-1580	2.00	90.00	227.20	2.52
AH	MAT-1600	2.00	56.00	99.00	1.77
AH	MAT-1630	2.00	20.00	27.00	1.35
AH	MAT-1730	2.00	102.00	214.30	2.10
AH	MAT-1740	2.00	12.00	31.90	2.66
AH	MAT-2540	2.00	12.00	38.60	3.22
AH	MAT-2740	2.00	36.00	78.80	2.19
			3,697.00		2.19 (22)

6139 (12)

(A)

Location	CourseName	numberdays_sum	TotalGrades_AthruF	GPAsum_AthruF	AVG GPA per Course
HL	MAT-1040	1.00	55.00	128.70	2.34
HL	MAT-1050	1.00	116.00	280.20	2.42
HL	MAT-1100	1.00	281.00	645.10	2.30
HL	MAT-1150	1.00	239.00	606.50	2.54
HL	MAT-1540	1.00	85.00	242.30	2.85
HL	MAT-1560	1.00	78.00	240.30	3.08
HL	MAT-1580	1.00	89.00	280.20	3.15
HL	MAT-1730	1.00	47.00	130.80	2.78
HL	MAT-1740	1.00	20.00	54.80	2.74
HL	MAT-2810	1.00	23.00	50.40	2.19
HL	MAT-2880	1.00	14.00	51.20	3.66
			2,039.00		2.73

18

Location	CourseName	numberdays_sum	TotalGrades_AthruF	GPAsum_AthruF	AVG GPA per Course
HL	MAT-1040	2.00	7.00	23.30	3.33
HL	MAT-1050	2.00	96.00	259.40	2.70
HL	MAT-1100	2.00	168.00	391.70	2.33
HL	MAT-1150	2.00	116.00	358.30	3.09
HL	MAT-1540	2.00	42.00	86.50	2.06
HL	MAT-1560	2.00	21.00	73.00	3.48
HL	MAT-1580	2.00	23.00	71.20	3.10
HL	MAT-1600	2.00	24.00	67.80	2.83
HL	MAT-1730	2.00	14.00	38.50	2.75
HL	MAT-1740	2.00	21.00	51.10	2.43
HL	MAT-2740	2.00	30.00	77.00	2.57
			1,117.00		2.79

23

3156 13

B

Location	CourseName	numberdays_sum	TotalGrades_AthruF	GPAsum_AthruF	AVG GPA per Course
OR	MAT-1040	1.00	51.00	74.40	1.46
OR	MAT-1050	1.00	69.00	193.10	2.80
OR	MAT-1070	1.00	17.00	35.00	2.06
OR	MAT-1100	1.00	199.00	383.80	1.93
OR	MAT-1140	1.00	7.00	21.00	3.00
OR	MAT-1150	1.00	168.00	381.60	2.27
OR	MAT-1500	1.00	47.00	130.70	2.78
OR	MAT-1540	1.00	32.00	74.20	2.32
OR	MAT-1560	1.00	59.00	168.20	2.85
OR	MAT-1580	1.00	65.00	191.90	2.95
OR	MAT-1730	1.00	10.00	19.80	1.98
OR	MAT-1740	1.00	17.00	36.90	2.17
			1,431.00		2.38

19

Location	CourseName	numberdays_sum	TotalGrades_AthruF	GPAsum_AthruF	AVG GPA per Course
OR	MAT-1040	2.00	44.00	81.20	1.85
OR	MAT-1050	2.00	174.00	338.50	1.95
OR	MAT-1100	2.00	409.00	705.60	1.73
OR	MAT-1150	2.00	353.00	802.80	2.27
OR	MAT-1500	2.00	94.00	250.10	2.66
OR	MAT-1540	2.00	171.00	438.70	2.57
OR	MAT-1560	2.00	79.00	209.10	2.65
OR	MAT-1580	2.00	84.00	244.80	2.91
OR	MAT-1600	2.00	89.00	232.60	2.61
OR	MAT-1730	2.00	143.00	399.60	2.79
OR	MAT-1740	2.00	64.00	123.70	1.93
OR	MAT-2530	2.00	10.00	30.00	3.00
OR	MAT-2740	2.00	39.00	115.00	2.95
OR	MAT-2880	2.00	13.00	31.00	2.38
			3,488.00		2.45

24

4919 14

C

Location	CourseName	numberdays_sum	TotalGrades_AthruF	GPAsum_AthruF	AVG GPA per Course
RO	MAT-1040	1.00	154.00	324.30	2.11
RO	MAT-1050	1.00	165.00	426.20	2.58
RO	MAT-1070	1.00	25.00	46.50	1.86
RO	MAT-1100	1.00	362.00	885.60	2.45
RO	MAT-1150	1.00	233.00	555.50	2.38
RO	MAT-1500	1.00	62.00	168.60	2.72
RO	MAT-1540	1.00	104.00	249.40	2.40
RO	MAT-1560	1.00	98.00	247.90	2.53
RO	MAT-1580	1.00	165.00	502.00	3.04
RO	MAT-1600	1.00	70.00	190.30	2.72
RO	MAT-1630	1.00	84.00	214.40	2.55
RO	MAT-1730	1.00	98.00	260.20	2.66
RO	MAT-1740	1.00	37.00	115.90	3.13
RO	MAT-2530	1.00	59.00	175.00	2.97
RO	MAT-2540	1.00	44.00	148.00	3.36
RO	MAT-2740	1.00	25.00	54.00	2.16
RO	MAT-2810	1.00	14.00	44.90	3.21
RO	MAT-2880	1.00	18.00	44.00	2.44
			3,480.00		**2.63**

(20)

Location	CourseName	numberdays_sum	TotalGrades_AthruF	GPAsum_AthruF	AVG GPA per Course
RO	MAT-1040	2.00	25.00	66.20	2.65
RO	MAT-1050	2.00	119.00	255.30	2.15
RO	MAT-1100	2.00	289.00	613.20	2.12
RO	MAT-1150	2.00	222.00	488.60	2.20
RO	MAT-1500	2.00	14.00	17.30	1.24
RO	MAT-1540	2.00	106.00	252.40	2.38
RO	MAT-1560	2.00	44.00	105.70	2.40
RO	MAT-1580	2.00	56.00	145.70	2.60
RO	MAT-1630	2.00	20.00	36.40	1.82
RO	MAT-1730	2.00	56.00	123.90	2.21
RO	MAT-1740	2.00	31.00	82.50	2.66
			1,939.00		**2.22**

(25) 5,419.00 (15)

(10)

Location	CourseName	numberdays_sum	TotalGrades_AthruF	GPAsum_AthruF	AVG GPA per Course
SF	MAT-1040	1.00	70.00	145.10	2.07
SF	MAT-1050	1.00	117.00	322.00	2.75
SF	MAT-1100	1.00	171.00	342.30	2.00
SF	MAT-1150	1.00	75.00	176.00	2.35
			796.00		**2.29**

21

Location	CourseName	numberdays_sum	TotalGrades_AthruF	GPAsum_AthruF	AVG GPA per Course
SF	MAT-1040	2.00	14.00	26.10	1.86
SF	MAT-1100	2.00	37.00	85.60	2.31
SF	MAT-1150	2.00	22.00	53.30	2.42
			132.00		**2.20**

16

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26