Math 3204
Grading Standards
June 2004

Pre-Marking Appraisal

The board considered the exam fair and of the appropriate difficulty and length. It was similar to and had a parallel structure to the June 2003 exam.

The following notes were made.

- #52 had 2 solutions. Students could rewrite in transformational form or use the formula $t = \frac{-b}{2a}$.
- #54 the board agreed that the widest *x*-interval to be used which would still warrant full marks would be 1.9 to 2.1.

Marking Standard and Consistency

Marker reliability was checked by obtaining a random sample of 35 papers that went through the marker panel and marks were assigned to each question on a separate sheet of paper. The 35 exams were put back into the original stack of exams and corrected again when they appeared. The two values were compared and if there were discrepancies, the chief marker would review the scoring with the individual marker.

Throughout the marking process there was statistical analysis run on item data to enhance reliability and consistency of marking.

Commentary on Responses

Students performed fair to well on most questions.

- #49 was difficult for math 3204 students.
- #52 had two solutions. Half of the responses were presented using the formula $t = \frac{-b}{2a}$, the other half were presented by rewriting the function in transformational form.
- #54 saw many variations of the interval that was used. The board agreed that the widest interval that would be accepted would be 1.9 to 2.1.
- #59 was a question on which students did not score well. By giving the center, this perhaps made the question more difficult. Students made a wide range of errors and the board was surprised to see such a poor performance on a relatively easy question.

- A common error in #62 was students drawing a 10cm chord. A coincidence within this question was that the circumference and the area of the sector were the same 62.83. Some students used this and arrived at the right answer.
- #63 was not attempted by many students and subsequently students scored the lowest on this question. It was decided that including an extension of the tangent line, and the radius to the point of tangency would have made this question fairer for a Math 3204 question. This question was marked on all papers but was not used in determining a student's mark if it was to the student's detriment (i.e., Part II was marked out of 46 or 50, whichever benefitted the individual student).

PART 11
Total Value: 50%

Instructions: Answer ALL items in the space provided. Show ALL workings.

Value

4 51. Algebraically determine the EXACT roots in simplest form for $x(x-2)=-3$.

$$x=\frac{2\pm\sqrt{(-2)^2-4(1)(3)}}{2(1)}$$
$$=\frac{2\pm\sqrt{4-12}}{2}$$
$$=\frac{2\pm\sqrt{-8}}{2}$$
$$=\frac{2\pm 2i\sqrt{2}}{2}$$
$$=\boxed{1\pm i\sqrt{2}}$$

Commentary on Response

Most students attempted this question. The question required the use of the quadratic formula, which most students seemed to know. Almost all of the students were able to generate the quadratic equation, which was worth 1 mark.

Common Errors

- Students tried to factor x^2-2x+3, resulting in incorrect roots.
- Students used incorrect formula for the quadratic formula.
- Students did not simplify $\frac{2\pm 2i\sqrt{2}}{2}$.
- Students did not recognize that the roots were imaginary and used their calculator to find the decimal approximations.

Value

4 52. A cannonball is fired and its height, *h*, in metres, above the ground, *t* seconds after being fired, is given by $h(t) = -5t^2 + 40t + 3$. Algebraically determine the maximum height attained by the cannonball and the time taken to reach this height.

$h(t) = -5t^2 + 40t + 3$

$t = \frac{-b}{2a} = \frac{-40}{2(-5)} = \boxed{4\text{s}}$ $\qquad h(4) = -5(4)^2 + 40(4) + 3 = \boxed{83 \text{ metres}}$

OR

$h - 3 + \_\_\_ = -5(t^2 - 8t + \_\_\_)$

$h - 3 + \underline{^{-}80} = -5(t^2 - 8t + \underline{16})$

$(h - 83) = -5(t - 4)^2$

Vertex (4,83)

Max. is 83 at $t = 4$ seconds

Commentary on Response

This was a fair question and the majority of students attempted this question. Two methods were commonly used to complete the question including:

(i) $V\left(-\frac{b}{2a}, y\right) \rightarrow$ students found the time element 't' using $t = -\frac{b}{2a}$, then substituted to find the max. height 'h(t)'.

(ii) completing the square $\rightarrow$ students transformed the given equation into standard and/or transformational form.

Some students substituted values for 't' until the maximum appeared. Some listed in a table, while others showed calculations for h(1), h(2), h(3), h(4), h(5), etc. In both instances, the calculator may have been used to generate the given results.

Some students used $V\left(\frac{-b}{2a}, \frac{4ac-b}{4a}\right)$. This is a lot of work to find h(t), however the correct was result obtained often times.

Some students found the average of the zeros then rounded to 4 which was the correct time

Common Errors

- Students used the quadratic formula and simply found the zeros. [i.e., -0.074 and 8.07]

- Students found $h = \frac{-b}{2a}\left(i.e., V(h,k)\right)$ then assumed 'h' was the height. Common answers included $t = 83s,\ h = 4m$ when it should be $t = 4s, h = 83m.$

- Students found $h(0) = 3\left[\text{the } y-\text{int.}\right]$ then substituted t = 3 to find maximum height.

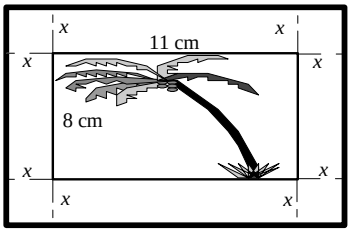
- Students were confused with completing the square method $y = -5\left(t^2 - 8t + \underline{16}\right) + 3 - \underline{?}$, many errors here including adding -16, subtracting 80, etc.

- Students divided h(t) by -1 and completed the square, but did not divide both sides by -1.

- Students found $h(4) = 83$ then divided by 4 to get height = 20.75m.

- Students used quadratic formula to get t = 8.075 [rejected the negative zero] and substituted this value to find h(t).

4 53. A photograph 8 cm by 11 cm will be framed as shown in the diagram. The combined area of the frame and photograph will be 180 cm^2. Algebraically determine the outside dimensions of the frame.



$$(11+2x)(8+2x)=180$$
$$88+22x+16x+4x^2=180$$
$$4x^2+38x-92=0$$
$$2x^2+19x-46=0$$
$$x=\frac{-19\pm\sqrt{(19)^2-4(2)(-46)}}{2(2)}$$
$$=\frac{-19\pm\sqrt{729}}{4}$$
$$=\frac{-19\pm27}{4}$$
$$=\left\{2,\cancel{\frac{23}{2}}\right\}$$

Dimensions are 12 cm by 15 cm.

Commentary on Response

This question was answered well. Some students factored the resulting quadratic, but the majority used the quadratic formula. Almost all students who used the quadratic formula had it correct. Several students had trouble setting up the quadratic properly because they used incorrect dimensions.

Common Errors

- Students used incorrect dimensions: $(x + 11)(x + 8)$; $(11 - 2x)(8 - 2x)$; $(11 + 4x)(8 + 4x)$; $(x - 11)(x - 8)$; $(11 - 2x)(8 - 2x)$
- Students found the correct value of x, but forgot to state the dimensions of the frame.
- Students found quadratic: $180 = 4x^2 + 38x + 88$ and then used c = 88 instead of c = -92.
- Students used $x = \frac{-b}{2a}$ to solve for x (finding vertex)
- Students used perimeter instead of area: $180 = 90 - 2w$, $L = 90 - 2w$
- Students found the difference between the areas of the two: 180 - 88 = 92.

4 54. A diver jumps off a spring board. Her height h, in metres, above the water, t seconds after she jumps, is given by $h(t) = -4.9t^2 + 8t + 5$. Algebraically determine the approximate instantaneous rate of change in her height at 2 seconds.

t	h
1.99	1.51551
2.01	1.28351

So, instantaneous rate of change is approx.

Instantaneous RoC.

$$\approx \frac{y_2 - y_1}{x_2 - x_1}$$
$$\approx \frac{1.28351 - 1.51551}{2.01 - 1.99}$$
$$\approx \frac{-0.232}{0.02}$$
$$\approx \boxed{-11.6\,\text{m/s}}$$

Commentary on Response

Overall this question was well done. Unfortunately, no largest interval had been specified for IROC nor had an appropriate number of decimal places been specified, thus a variety of answers were accepted. Three students solved the problem using derivatives.

Common Errors

Students made mistakes by;

- not following order of operations
- using too large a time interval for IROC
- using inadequate number of decimal places
- simply evaluating $h(2)$ getting 1.4 and leaving it as the answer
- inverting the slope formula
- dropping negative sign

3 55. Solve for x: $3^{5x-1} = \sqrt[3]{9}$.

$$3^{5x-1} = \left(3^2\right)^{\frac{1}{3}}$$

$$3^{5x-1} = 3^{\frac{2}{3}}$$

$$\therefore 5x - 1 = \tfrac{2}{3}$$

$$15x - 3 = 2$$

$$15x = 5$$

$$\boxed{x = \tfrac{1}{3}}$$

Commentary on Response

This question was well answered. Students knew the concept of equating exponents when bases are equal on each side of the equation.

Common Errors

Students made the following computational errors:

1. $9 = 3^3$
2. $\sqrt[3]{9} = \left(3^2\right)^3$
3. $\sqrt[3]{9} = \left(9^{\frac{1}{2}}\right)^{\frac{1}{3}}$
4. $15x = 5$

   $x = 3$

Value

4 56. Solve for x: $\log_2(5x-2) - \log_2 2 = \frac{1}{2}\log_2 36 + 2\log_2 3$.

$$\log_2\left(\tfrac{5x-2}{2}\right) = \log_2 36^{\frac{1}{2}} + \log_2 3^2$$
$$\log_2\left(\tfrac{5x-2}{2}\right) = \log_2(6\cdot 9)$$
$$5x-2 = 108$$
$$5x = 110$$
$$\boxed{x = 22}$$

Commentary on Response

Most students knew the laws of logarithms but a lot of errors occurred with the exponents. Students knew that when logarithms of the same base are included on both sides of the equation, that dropping the log was a correct procedure. Overall the question was well answered.

Common Errors

Students made the following computational errors:

1. $36^{\frac{1}{2}} = 18$
2. $3^2 = 6$
3. $5x-2 = 108$
   $5x = 106$
4. $\frac{5x-2}{2} = 5x-1$
5. $\frac{5x-2}{2} = 5x$

Value

4 57. An element has a half-life of 120 years. If its initial mass is 42 grams, algebraically determine how long it will take to decrease to 5 grams.

$y = a \bullet b^{\frac{t}{h}}$

$y = 42\left(\frac{1}{2}\right)^{\frac{t}{120}}$

$5 = 42\left(\frac{1}{2}\right)^{\frac{t}{120}}$

$\frac{5}{42} = \left(\frac{1}{2}\right)^{\frac{t}{120}}$

$\log\left(\frac{5}{42}\right) = \frac{t}{120}\log\left(\frac{1}{2}\right)$

$-0.9243 \doteq \frac{t}{120}(-0.3010)$

$\frac{-0.9243}{-0.3010} \doteq \frac{t}{120}$

$3.0708 \doteq \frac{t}{120}$

$\boxed{t \doteq 368.5 \text{ years}}$

Commentary on Response

This question was not well done. Most students seemed to know the base equation $y = ab^{\frac{x}{c}}$ but many had difficulty substituting the correct values into the equation. For those who correctly substituted the values, many got stuck at the step where they are to take the log of both sides. A large number of students found the answer by inspection to be ~360 or by starting with the initial mass and using half life to approximate the answer.

Common Errors

Students made mistakes by;

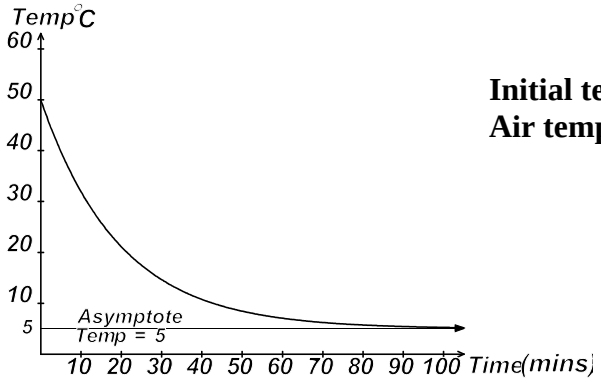
- multiplying $42\left(\frac{1}{2}\right)$ (i.e., $5 = 42\left(\frac{1}{2}\right)^{\frac{t}{120}} \Rightarrow 5 = 21^{\frac{t}{120}}$).
- not writing $\frac{t}{120}$ as a power. (i.e., $5 = 42\left(\frac{1}{2}\right)\frac{t}{120}$).
- writing formula incorrectly (i.e., $y = ab^x$).
- substituting values into the base formula incorrectly (i.e., $120 = \frac{1}{2}(42)^{\frac{t}{5}}$.).

Value

4 58. Hot chocolate cools exponentially over time after it is brought into a stadium and the cooling is described by the function given with temperature, *T*, in degrees Celsius and time, *m*, in minutes.

$$T = 45(0.95)^m + 5$$

Sketch a labeled graph for the first 100 minutes. State the initial temperature of the hot chocolate and the air temperature in the stadium.



Initial temp. of hot Chocolate: 50^{O}C
Air temp. of Stadium: 5^{O}C

Commentary on Response

This question was fairly well done. Many students generated a table of values to produce the graph. In drawing the graph, many students did not draw the asymptote. Many students also made a mistake with the initial temperature, using 45^{O}C instead of 50^{O}C. Students are unaware of the fact that a labeled graph means asymptote & y-intercept. As well they were unaware of all the necessary information required for this question.

Common Errors

- Students used 45^{O}C as the initial temperature instead of 50^{O}C.
- Students did not include the asymptote on the graph. Some recognized its existence but did not draw it on the graph.
- Students did not realize that a table of values was not really required, only a y-intercept and asymptote, along with the decreasing nature of graph.

Value

3 59. Write the equation of the circle, in standard form, with centre (-2, 3) and passing through the point (4, -5).

$(x+2)^2+(y-3)^2=r^2$

$(4+2)^2+(-5-3)^2=r^2$

$(6)^2+(-8)^2=r^2$

$100=r^2$

$\therefore (x+2)^2+(y-3)^2=100$

Commentary on Response

This question was completed very poorly. Most students completed this question as a quadratic instead of a circle (i.e., $\rightarrow \frac{1}{a}(y-3)=(x+2)^2$, then proceeded to fill in $(x, y) = (4, -5)$ to find a. Another common strategy involved finding the midpoint between (-2, 3) and (4, -5), using the midpoint for the centre, then using a point to find r^2.

Common Errors

- Students used quadratic instead of circle $\frac{1}{a}(y-k)=(x-h)^2 \rightarrow$ using the centre and a point to find "a".
- Students found the midpoint of the given points and using a point to find r^2.
- Students switched the centre and given point.

Common Errors:

$\frac{1}{a}(y-3)=(x+2)^2$

$\frac{1}{a}(-5-3)=(4+2)^2$

$\frac{-8}{a}=36$

$a=\frac{-8}{36}=\frac{-2}{9}$

$\frac{9}{-2}(y-3)=(x+2)^2$

Midpoint:

$\left(\frac{-2+4}{2}, \frac{3+-5}{2}\right)=(1, -1)$

$(x-1)^2+(y+1)^2=r^2$

$(4-1)^2+(-5+1)^2=r^2$

$9+16=r^2$

$25=r^2$

$(x-1)^2+(y+1)^2=25$

Value

4 60. Write $9x^2 + y^2 + 18x - 6y + 9 = 0$ in transformational form.

$9x^2 + 18x + y^2 - 6y = -9$

$9\left(x^2 + 2x + \underline{1}\right) + \left(y^2 - 6y + \underline{9}\right) = -9 + \underline{9} + \underline{9}$

$9\left(x+1\right)^2 + \left(y-3\right)^2 = 9$

$\left(x+1\right)^2 + \frac{1}{9}\left(y-3\right)^2 = 1$

$\boxed{\left[\left(x+1\right)\right]^2 + \left[\frac{1}{3}\left(y-3\right)\right]^2 = 1}$

Commentary on Response

This question was well done. Most students attempted it but many had trouble completing the square especially with $9x^2 + 18x + \square$. Some students made the mistake of putting the final answer into the form $\frac{1}{a}\left(y-k\right) = \left(x-h\right)^2$ which is the tranformational form for a quadratic. A lot of students received 3 or $3\frac{1}{2}$ because they didn't finish the answer, (i.e., they didn't put the answer into the form
$\left[\frac{1}{a}\left(x-h\right)\right]^2 + \left[\frac{1}{b}\left(y-k\right)\right]^2 = 1.$
More emphasis is needed on changing from general to standard to transformational form when doing quadratics and other conic sections.

Common Errors

- Students left the answer as
  $\left(x+1\right)^2 + \frac{1}{9}\left(y-3\right)^2 = 1$ instead of $\left[\left(\mathrm{x}+1\right)\right]^2 + \left[\frac{1}{3}\left(y-3\right)\right]^2 = 1.$

- Students did not complete the square properly for $9x^2 + 18x$ with most work done properly thereafter.

  $\left(9x^2 + 18x + \_\right) + \left(y^2 - 6y + \_\right) = -9$

  i.e., $9\left(x^2 + 18x + 81\right) + \left(y^2 - 6y + 9\right) = -9 + 729 + 9$

  $9\left(x+9\right)^2 + \left(y-3\right)^2 = 729$

- Students did not complete the square properly for $9x^2+18x$ continued.

$$9\left(x^2+2x+2\right)+\left(y^2-6y+9\right)=-9+18+9$$

$$9\left(x+1\right)^2+\left(y-3\right)^2=18$$

- Students added improperly:

$$9\left(x^2+x+1\right)+\left(y^2-6y+9\right)=-9+9+9$$

$$9\left(x+1\right)^2+\left(y-3\right)^2=\boxed{18}$$

- Students got correct answer but then put it into $\frac{1}{a}\left(y-k\right)=\left(x-h\right)^2$

  i.e., correct answer: $\left[\left(x+1\right)\right]^2+\left[\frac{1}{3}\left(y-3\right)\right]^2=1$

  then continued, with: $\frac{1}{3}\left(y-3\right)^2=\left(x+1\right)^2$

  or: $\left(y-3\right)^2=3\left(x+1\right)^2$

- Students completed the square properly but subtracted on the right side instead of adding

  ie., $9\left(x^2+2x+1\right)+\left(y^2-6y+9\right)=-9-9-9$

  should be = -9 + 9 + 9

Value

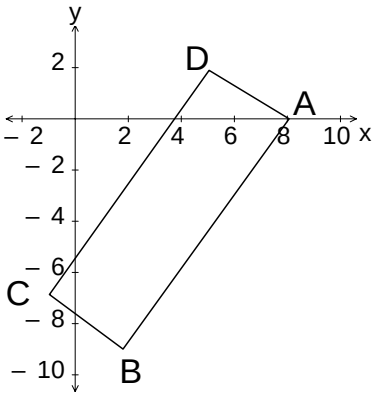
4 61. A rectangle has vertices A(8, 0), B(2, -9), C(-1, -7), and D(5, 2). Sketch the rectangle and find its area.

$$d_{AD} = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \qquad d_{DC} = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$= \sqrt{(8-5)^2 + (0-2)^2} \qquad = \sqrt{(5-^-1)^2 + (2-^-7)^2}$$

$$= \sqrt{9+4} \qquad = \sqrt{36+81}$$

$$= \sqrt{13} \qquad = \sqrt{117}$$



Area $= \sqrt{13} \times \sqrt{117}$

$= \sqrt{1521}$

$= \boxed{39\,\text{units}^2}$

Commentary on Response

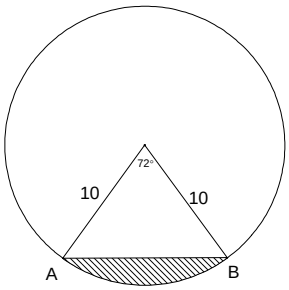
This question was attempted by most students and answered well by a large number of students. Most students were able to graph the rectangle and recognize that they needed to use the distance formula to find the length and width in order to find the area of the rectangle.

Common Errors

- Students made calculation errors: $\left(eg: \sqrt{9+4} = \sqrt{\underline{12}} = 2\sqrt{3}\right)$.
- Students graphed points incorrectly.
- Students found the lengths of diagonals instead of sides.
- Students used the incorrect distance formula.
- Students dropped $\sqrt{\ }$: $\left(\begin{array}{c}\text{i.e.,: instead of : A} = \sqrt{13} \times \sqrt{117} = \sqrt{1521} = 39 \\ \text{using A} = 13 \times 117 = 1521\end{array}\right)$
- Students used $A = \frac{1}{2}bh$
- Students found the perimeter instead of area

- Students assumed the question was "to prove that ABCD is a rectangle" and not "to find the area of the rectangle".
- Students did not plot the points on the grid but just sketched a rectangle.
- Students made calculation errors: eg : $\sqrt{3^2+(-2)^2} = \sqrt{6+4} = \sqrt{10}$.
- Students made errors with squaring numbers: eg : $(-2)^2 = -4$.

4 62. $\overline{AB}$ is a chord of circle with radius 10 cm. If $m\overset{\frown}{AB}$ is 72^O, find the area of the region enclosed by $\overline{AB}$ and $\overset{\frown}{AB}$.



$$Area_{\triangle} = \tfrac{1}{2}(10)(10)\sin 72° \doteq 47.6\text{cm}^2$$

$$\text{Area}_{\text{sector}} = \tfrac{72}{360}\pi r^2 = \tfrac{72}{360}\cdot 314.16\text{cm}^2 \doteq 62.83\text{cm}^2$$

$$\boxed{Area_{\text{shaded region}} \doteq 62.83\text{cm}^2 - 47.6\text{cm}^2 \doteq 15.23\text{cm}^2}$$

Commentary on Response

Students had difficulty in creating the diagram. Most students could not label the diagram correctly. Many students formed the area of the region by subtracting the area of sector from the area of the circle. Two methods were used, to find the area of the triangle to solve the problem:

(i) Some students used the formula $A_{\Delta} = \tfrac{1}{2}bc \sin A$; and,

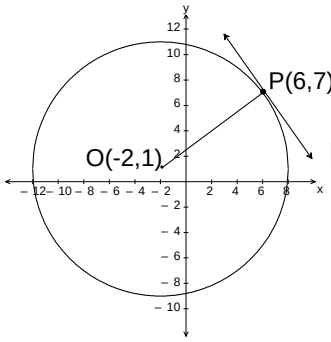
(ii) some students used trigonometric ratios to find the height and base and then applied the formula $A_{\Delta} = \tfrac{1}{2}bh$.

Common Errors

- Students used 10 cm as the chord
- Students used calculator in radian mode (i.e., Sin 72^O = 0.2538)
- Students used 10 cm as the base of the triangle (i.e., assumed the triangle was equilateral)
- Students used an incorrect central angle for the sector (i.e., 36^o, 54^o, 90^o, 144^o).
- Students used $2\pi r$ or $2\pi r^2$ to find the area of a circle.

Value

4 63. Point P(6, 7) lies on the circle, with centre (-2, 1), as shown. Determine the equation of the tangent line to the circle at P.



$m_{tangent} = \frac{-4}{3}$

$$m_{OP} = \frac{y_2 - y_1}{x_2 - x_1}$$
$$= \frac{7-1}{6-{}^{-}2}$$
$$= \frac{6}{8}$$
$$= \frac{3}{4}$$

$$y = mx + b$$
$$7 = \frac{-4}{3}(6) + b$$
$$7 = -8 + b$$
$$15 = b$$

$$\therefore y = \frac{-4}{3}x + 15$$

Commentary on Response

Many students did not attempt this question. Some students found the equation of the circle to represent the tangent line. Some students extended the tangent line across the y-axis to approximate the y-intercept.

This question was marked on all papers but was not used in determining a student's mark if it was to the student's detriment (i.e., Part II was marked out of 46 or 50, whichever benefitted the individual student).

Common Errors

- Students used an incorrect slope formula.
- Students extended the tangent line to find the y-intercept.
- Students substituted the centre (-2, 1) into the equation $y = mx + b$ to find b.
- Students didn't take the negative reciprocal of the slope of the line segment OP for the slope of the tangent line.

MATHEMATICS 3204
PART 1
SELECTED - RESPONSE ITEM ANALYSIS

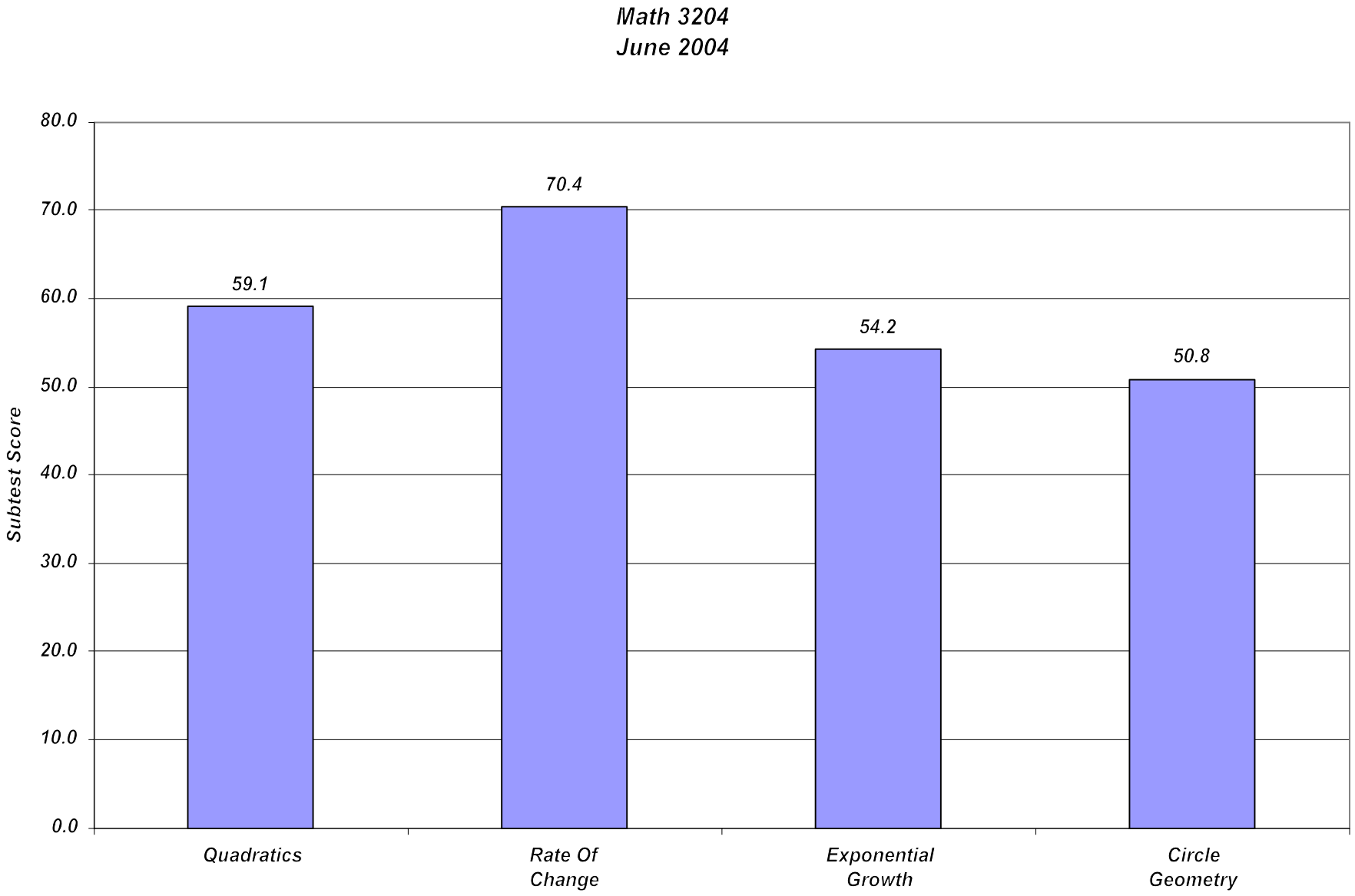
Item	Responses				
	Multiple Answers or No Response	A	B	C	D
	%	%	%	%	%
1. Correct answer is B	.1	11.9	68.3	9.8	9.9
2. Correct answer is B	.2	28.6	61.2	6.5	3.4
3. Correct answer is D	.2	24.6	17.2	16.2	41.7
4. Correct answer is D	.1	19.9	35.4	7.3	37.3
5. Correct answer is A	.2	24.5	9.5	32.0	33.7
6. Correct answer is D	.1	13.9	20.8	19.4	45.8
7. Correct answer is D	.1	13.6	12.8	6.4	67.1
8. Correct answer is D	.1	9.4	4.0	3.7	82.8
9. Correct answer is A	.1	63.0	7.3	25.9	3.6
10. Correct answer is C	.5	20.4	8.9	62.0	8.2
11. Correct answer is B	.1	9.0	74.3	10.7	5.9
12. Correct answer is D	.1	8.9	22.5	11.8	56.7
13. Correct answer is C	.4	9.7	10.7	65.0	14.2
14. Correct answer is D	.0	3.4	6.1	19.3	71.2
15. Correct answer is A	.2	63.0	3.3	10.6	22.9
16. Correct answer is C	.2	2.5	2.9	89.9	4.4
17. Correct answer is B	.0	2.3	78.4	8.1	11.1
18. Correct answer is C	.2	11.3	5.3	71.9	11.3
19. Correct answer is C	.4	7.9	12.0	57.1	22.6
20. Correct answer is B	.1	12.3	75.6	3.1	9.0
21. Correct answer is B	.1	11.9	62.1	17.5	8.4
22. Correct answer is C	.4	16.9	25.9	40.5	16.4
23. Correct answer is A	.1	41.6	8.8	35.5	14.0
24. Correct answer is B	.0	15.2	70.1	10.5	4.1
25. Correct answer is B	.2	30.1	38.4	19.7	11.6

MATHEMATICS 3205
PART 1
SELECTED - RESPONSE ITEM ANALYSIS

Item	Responses				
	Multiple Answers or No Response	A	B	C	D
	%	%	%	%	%
26. Correct answer is C	.2	19.2	13.4	57.8	9.4
27. Correct answer is B	.1	7.2	70.6	7.3	14.7
28. Correct answer is D	.5	15.1	22.4	14.6	47.4
29. Correct answer is C	.5	12.7	10.7	58.9	17.2
30. Correct answer is D	.2	15.9	19.7	5.6	58.5
31. Correct answer is C	.1	24.6	9.8	58.2	7.3
32. Correct answer is A	.3	71.3	4.4	13.5	10.5
33. Correct answer is D	.0	15.8	4.9	2.5	76.8
34. Correct answer is D	.1	19.7	9.7	9.9	60.4
35. Correct answer is C	.1	12.7	16.8	61.0	9.4
36. Correct answer is A	.1	53.7	21.7	5.6	18.8
37. Correct answer is C	.0	8.6	9.4	73.7	8.1
38. Correct answer is C	.1	1.8	6.1	85.4	6.6
39. Correct answer is A	.3	54.9	19.4	16.5	8.8
40. Correct answer is A	.1	68.4	8.4	7.6	15.5
41. Correct answer is A	.4	57.7	30.3	9.0	2.6
42. Correct answer is C	.3	38.2	10.8	38.7	12.0
43. Correct answer is D	.3	11.8	11.4	35.9	40.6
44. Correct answer is D	.6	12.5	30.8	30.6	25.5
45. Correct answer is D	.3	4.5	21.8	15.4	57.9
46. Correct answer is C	.3	32.0	12.2	49.0	6.4
47. Correct answer is D	.4	8.8	20.6	23.0	47.2
48. Correct answer is D	.4	19.7	14.9	16.5	48.5
49. Correct answer is D	.7	33.4	22.5	22.7	20.7
50. Correct answer is B	.7	15.4	32.4	26.5	25.1

MATHEMATICS 3204
PART II
CONSTRUCTED - RESPONSE ITEM ANALYSIS

Item	Students Completing Item	Value	Average	Average % Per Item
PART II		**50**		
51	3502	4	2.67	66.8
52	3502	4	2.30	57.5
53	3502	4	1.79	44.8
54	3502	4	2.722	68.1
55	3502	3	1.74	58.0
56	3502	4	1.92	48.0
57	3502	4	2.03	50.8
58	3502	4	1.59	39.8
59	3502	3	1.08	36.0
60	3502	4	2.32	58.0
61	3502	4	2.805	70.1
62	3502	4	1.51	37.8
63	3502	4	.43	10.8


Math 3204
June 2004
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Subtest Score
59.1
70.4
54.2
50.8
Quadratics
Rate Of Change
Exponential Growth
Circle Geometry