J.M.J.Ch

MARCELLIN COLLEGE RANDWICK

YEAR 10

HALF YEARLY EXAM

ADVANCED MATHEMATICS

2008

STUDENT NAME: _____ MARK: _____ /80

Time Allowed: 90 minutes

Weighting: 30%

Directions:

- Answer all questions.
- Begin each question on a new page.
- Show working where necessary.
- Marks may not be awarded for answers only.

Surface Area

1. Consider a cube with side n cm long. Which of the following expressions will give the surface area of the cube?   **1**

A. $SA = n^3$ B. $SA = 6n^3$ C. $SA = n^2$ D. $SA = 6n^2$
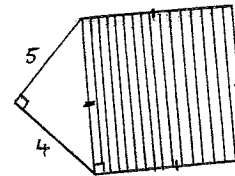
2.   A circle of radius of 7 cm is drawn inside a square as shown in the diagram.   **1**
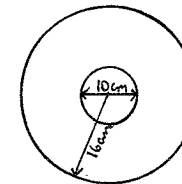
The area of the square is:

A. $49cm^2$ B. $196cm^2$ C. $56cm^2$ D. $147cm^2$

3.   What is the area of the shaded square?   **2**

4. A pipe has an inner diameter of $10cm$ and an outer radius of 16cm as shown in the diagram.   **3**

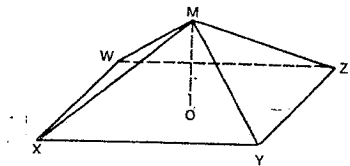Find the area of the annulus correct to 3 significant figures.

5. A sphere has a diameter of $10cm$. It is sliced through the centre and one half is discarded. Find the surface area of the remaining half.

3

6. A cylinder has a surface area of $351.9cm^2$. If the radius of the cylinder is $4cm$, find the height of the cylinder to the nearest whole number.
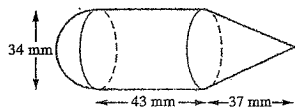
2

7.

4

$MO = 3cm$
$XY = 11cm$

Calculate the surface area of the square pyramid correct to one decimal place.

8. Calculate the surface area of the following solid.

4

34 mm

←— 43 mm —→←— 37 mm —→

Consumer Arithmetic

1. If Diana earns $115 or less in a week, she will be below the tax threshold. She earns $9.60 an hour. How many hours can she work in a week and still stay under the tax threshold?

1

| A. 10 hours | B. 11 hours | C. 12 hours | D. 13 hours |

2. Dave buys a TV set for $1000. He borrows the money at 8.5% p.a. simple interest for 2 years. How much will he pay back per month?

1

| A. $7.08 | B. $14.17 | C. $45.21 | D. $48.75 |

3. A couple bought a block of land at the beginning of 1995 for $74500. If the land appreciates at 4% p.a., what will the land be worth at the beginning of 2008?

3

4. How many years does it take for a home entertainment system valued at $4800 take to halve in value if it depreciates at a rate of 10% per year?

3

5a. Use the table to find the monthly repayment on a loan of $80000 taken over 20 years at 7.5% p.a.

2

b. How much will be repaid over the 20 years?

1

6. Belinda's bank offers her a loan at 11.6% p.a. reducible monthly. She borrows $6500 and repays $380 per month. Calculate:

a. the amount of interest paid during the first month.

2

b. the amount still owing on the loan after 3 months.

3

c. the total interest paid over the first 3 months of the loan.

2

d. how much interest would have been paid over these 3 months if the loan had been charged at a flat rate?

2

Statistics

1. You are given the mean of 15 scores. Which one of the following can you calculate?   **1**

A. the median   B. the range   C. the sum of the scores   D. the mode

2. The following stem and leaf plot represents the results of a class project.   **1**

Boys		Girls
9 8 6 4	4	2 4
8 7 5	3	3 4 7
6	2	6 7
8	1	2 4
	0	7

Find the difference in the median scores of boys and girls.

A. 5   B. 6   C. 7   D 8

3. Find the range, mode, median and mean of the following set of scores: **4**

54, 57, 53, 54, 55, 56, 55, 48, 50, 51,
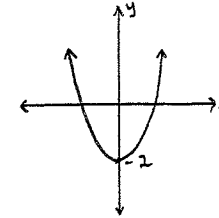55, 52, 49, 50, 57, 53, 55, 52, 49, 48.

4. For the set of scores in question 3,

a. draw a frequency distribution table with frequency column and a relative frequency column.   **2**

b. draw a cumulative frequency histogram and polygon for the set of scores.   **2**
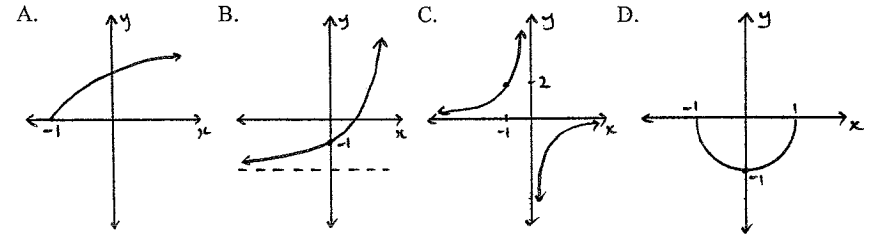
Number Plane

1. Given the following diagram, which of the following equations is the equation for the parabola?   **1**

A. $y = x^2 - 2x - 2$ B. $y = -x^2 - 2$ C. $y = x^2 + 2x - 2$ D. $y = x^2 - 2$

2. Which of the following sketches represents the equation $y = 2^x - 2$?   **1**

A.   B.   C.   D.

3. Match each graph with its equation.   **5**

i.   ii.   iii.   iv.   v.
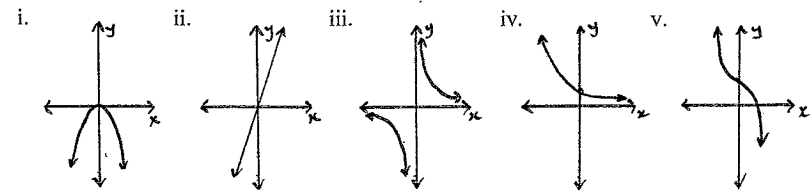
a. $xy = 3$ b. $y = -x^3$ c. $-3x + y = 0$ d. $y = -3x^2$ e. $y = 3^{-x}$

5. Consider the following stem and leaf plot.

Stem	Leaf
4	0 1 7
5	2 3 3 3 4 6
6	1 8 9 9
7	2 4 5
8	7
9	1 2 4

a. Find the inter-quartile range.   **3**

b. Draw a box and whisker plot showing the five point summary.   **3**

6. Use your calculator to determine the mean and the standard deviation of the set of scores.   **2**

Score	Frequency
6	4
7	7
8	9
9	11
10	10
11	3

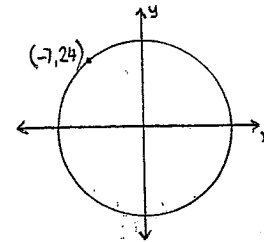7. John scores the following in two different exams.   **2**

History exam: His score = 54, Mean = 48, SD = 4
English exam: His score = 57, Mean = 52, SD = 6

Which exam has he performed better in and give reasons for your answer?

4. Find the equation of the following: **2**

$(-7, 24)$

5. Sketch the parabola $y = 2x^2 + 5x - 12$.   **6**
On your sketch include:

a. x-intercepts
b. y-intercept
c. axis of symmetry
d. vertex

6. What is the maximum value for the curve $y = \sqrt{9 - x^2}$?   **2**

7. Find the point/s of intersection of the curve $y = x^2 + 2$ and the line $y = 5 - 2x$.   **3**

1. D. $SA = 6n^2$

2. B. 196 cm^2

3. (crossed out) $x^2 = 4$
   $A = 41$

4. $\pi \times 16^2 - \pi \times 5^2 = 726 \text{ cm}^2$

5. $2\pi r^2 + \pi r^2$
   $2 \times \pi \times 5^2 + \pi \times 5^2 = 235.62 \text{ cm}^2$ (to 2 dec. pl.)

6. $2 \times \pi \times r \times h + 2\pi r^2$
   $2 \times \pi \times 4 \times h + 2 \times \pi \times 16 = 351.9$
   $8\pi \times h + 32\pi = 351.9$
   $8\pi \times h = 351.9 - 32\pi$
   $h = 10 \text{ cm}$

7. $c^2 = 3^2 + 5.5^2$
   $c^2 = 39.25$
   $c = 6.26$
   $SA = 4 \times \frac{1}{2} \times 11 \times 6.26 + 11^2$
   $= 258.72 \text{ cm}^2$

8. $2\pi r^2 + 2 \times \pi \times r \times h + \pi \times r \times L$
   $2 \times \pi \times 17^2 + 2 \times \pi \times 17 \times 43 + \pi \times 17 \times 40.72$
   $SA = 8583.59 \text{ mm}^2$ (to 2.d.p)

   $L^2 = 37^2 + 17^2$
   $L = 40.72$

1. B. 11 hours

2. A: $7.08

3. $A = 74500\left(1 + \frac{4}{100}\right)^7$
   $= \$98036.92$ (to the nearest cent)

4. $2400 = 4800\left(1 - \frac{10}{100}\right)^n$
   $2400 = 4320^n$
   $\frac{\log 2400}{\log \ast 320} = n$
   $n = 2.82$ years

5a) 6.06×80
    $= \$644.8$

b) $\$91200$

6a) $6500 \times \frac{0.116}{12}$
   $= \$62.83$

b) $6437.17 \times \frac{0.116}{12}$
   $= 62.23$
   6374.94×0.116
   $= 61.62$
   $\$6313.32$
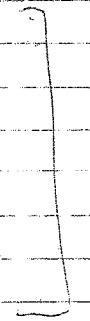
c) $62.83 + 62.23 + 61.62$
   $= \$186.68$

d) $\frac{0.116}{12} \times 6500 \times 3$
   $\$188.50$

. C: the sum of the scores ✓   1   ⟨18⟩

2. B. 6   ✗

3. Range: 57 - 48 ✓   48,48, 49, 49, 50, 50, 51, 52, 52, 53, 53, 54, 54 55, 55
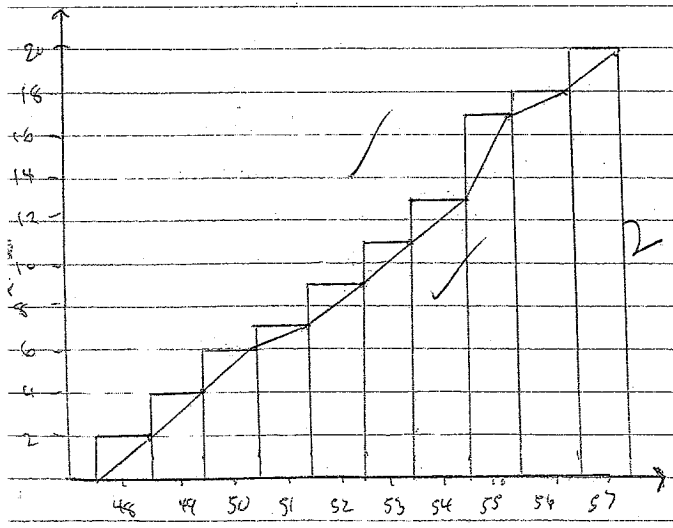   = 9.   55, 55, 56, 57, 57
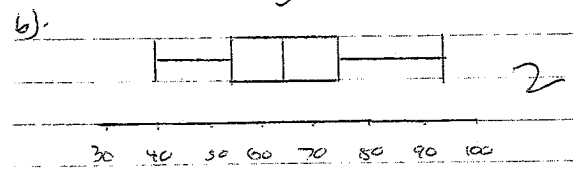
Mode: 55 ✓   4

Median: 53. ✓

Mean: 52.65.

4	x	f	cf	rf
	48	2	2	2/20
	49	2	4	2/20
	50	2	6	2/20
	51	1	7	1/20
	52	2	9	2/20
	53	2	11	2/20
	54	2	13	2/20
	55	4	17	4/20
	56	1	18	1/20
	57	2	20	2/20

2   ✓

x	f	g	cf
48	2		2
49	2		4
50	2		6
51	1		7
52	2		9
53	2		11
54	2		13
55	4		17
56	1		18
57	2		20

5. a) 745 ÷ 53 ✓   3
   = 21.5. ✓

6).

   30 40 50 60 70 80 90 100

5. Mean: 8.57. ✓   2
   SD: 1.40 ✓

7. History z-score   English z-score.
    $\dfrac{54 - 48}{4}$ $\dfrac{57 - 52}{6}$ 2

    = 1.5. ✓   = 0.83

    John did better in history because he is higher above the
    average in the history test. ✓

D: $y = x^2 - 2$ ✓ ___ 2   ⑩.

2. B ✓

3. i) $y = -3x^2$ (d) ✓
  ii) $-3x + y = 0$ (c) ✓
  iii) $xy = 3$ (a) ✓   5
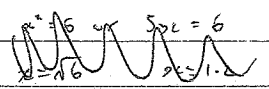 iv) $y = 3^{-x}$ (e) ✓
  v) $y = -x^3$ (b) ✓

4. ~~$y = (x - b)(x)$~~ $y = (x - h)(y - k)$
            $y = (-7 - h)(24 - k)$ ✗   -2.
            $y = -168 + 7k - 24h + hk$

5. y-int = -12 ✓   1
  x-int: $12 = 2x^2 + 5x$
    $6 = x^2 + 5x$ $x^2 = 6$ $5x = 6$
    ~~$(x)(x+5)$~~ $x = \sqrt{6}$ $x = 1.2$
  ~~$x = $ ... $x = 5$.~~
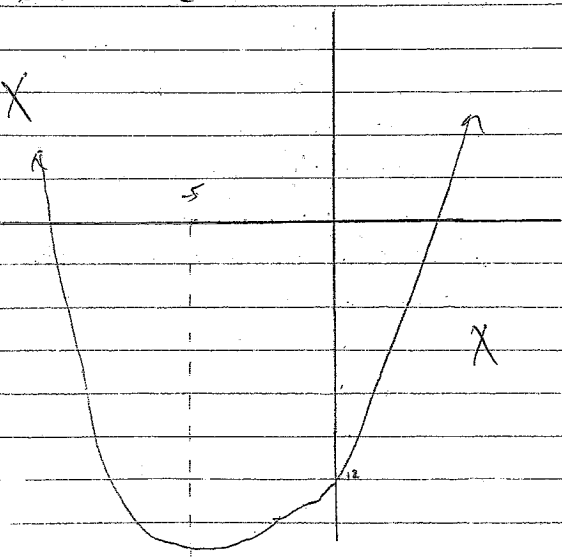 axis of sym = $y = \frac{-2b}{a}$ ✗
          $\frac{-10}{2}$
          $= -5$.
  d) AS

6. $y = \sqrt{9 - x^2}$ ✓ 2
  Max value = 3 ✓

7.   ✗