

Sydney Girls High School



MATHEMATICS

YEAR 9

Yearly Examination 2006

Time Allowed: 75 minutes

Total Marks: 100

Instructions:

- There are 5 (FIVE) questions, each worth 20 marks.
- Attempt ALL questions.
- Start each question on a new page.
- Write your name and MATHS class clearly at the top of each page and clearly number each question.
- Show all necessary working. Marks may be deducted for badly arranged work or incomplete working.
- Board-approved calculators may be used in all parts of the test.
- Diagrams are NOT to scale.

Question 1: (20 marks)

- Write $\sqrt{50}$ in simplest surd form. 1
- Expand $(x-1)^2$. 1
- Factorise $ap+3a$. 1
- Solve $x+5 < 11$. 1
- Make B the subject of the formula $\frac{1}{2}AB = 5$. 1
- Write 56 out of 64 as a percentage. 1
- If $b = -3$ find the value of $3b^2$. 1
- Fully factorise $x^2 - 2x - 3$. 1
- Simplify $6\sqrt{3} - (2\sqrt{3} + 5\sqrt{6})$. 1
- What is the perimeter of the trapezium with sides 1.7 cm, 2.01 cm, 1.65 cm and 4.8 cm. 1
- Find the reciprocal of $2\frac{1}{4}$. 1
- Evaluate $6\text{ km} + 40\text{ m} + 3\text{ cm}$, expressing your answer in metres. 1
- What is the range of the scores 28, 32, 57, 91, 85. 1
- Jie is m years old. Her sister Kara is twice Jie's age. Write and simplify an algebraic expression that represents the total age of the two children. 1
- Find the area of a parallelogram which has base 7.5 cm and height 5.3 cm. 1
- If $2^a = \frac{1}{4}$, find the value of a . 1
- Solve $\frac{1}{2}x^4 = 8$. 1
- The following minimum temperatures ($^{\circ}\text{C}$), were recorded on five consecutive days in Coldtown: $-0.8, 1.7, -1.5, -0.8, 0.7$. 1
Write the five temperatures in ascending order.

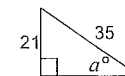
- s) Simplify $\frac{x}{y} + \frac{1}{y}$. 1
- t) Write the value of $(\sqrt{5})^4$. 1

Question 2: (20 marks)

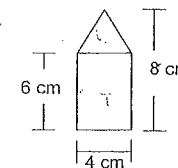
- a) Write $2\sqrt{3} - 5\sqrt{12}$ in simplest surd form. 2
- b) Solve $7x + 6 = 13 - 3x$. 2
- c) Lara bought five CDs for \$30 each and received a discount of 10% on the total price. 2
How much did Lara pay for the five CDs? 2
- d) Write $\sqrt{72} + \sqrt{27}$ in simplest surd form. 2
- e) Solve $\frac{5x-3}{4} = 8$. 2
- f) What is the value 3600 mm^2 expressed in cm^2 . 2
- g) Expand and simplify $2(x+4) - (x-4)$. 2 $\$ 91$
- h) In 2005 Marie received \$13.00 per hour for part-time work. She worked an average of seven hours per week. 2
Based on a year of 52.18 weeks, how much did Marie earn in 2005? 2
- i) Solve $3(2x-1) \leq 3$. 2
- j) Write in ascending order: $1\frac{1}{4}, \sqrt{2}, 1.3, \frac{7}{5}, \frac{3}{\sqrt{5}}$ 2

Question 3: (20 marks)

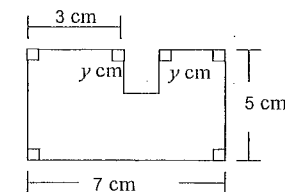
- a) What is the value of a in this diagram. 2
Write your answer to the nearest degree.



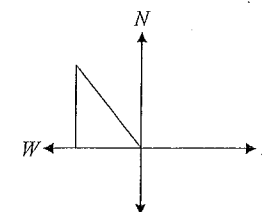
- b) What is the area of the figure in this diagram? 2



- c) The perimeter of this figure is 30. 2
What is the value of y ?



- d) Factorise $p^2 + qm + pq + pm$. 2
- e) Simplify $\frac{5(2-a)}{2} \times \frac{6a}{a-2}$. 2
- f) Jean walked 5 km northwest from position X to position Y . She then walked due south until she was in a position Z due west of position X . 2



- i) Copy the diagram and label S with the information given. 2
- ii) How far due south did Jean walk? Round your answer to one decimal place.
- g) Use the incomplete timesheet for Alice Lee to calculate the two

missing values X and Y .

Alice Lee	Time Sheet Summary			Rate \$W
	Number of hours at			Wage
Week ending	Normal rate	Time and a half	Double time	
6 Oct	7	0	0	\$70
13 Oct	X	2	0	\$130
20 Oct	10	Y	1	\$165

3

- h) A distance K metres was divided in the ratio $5 : B$. The two distances obtained were to give a distance ratio of 150 m and 90 m.

2

Write down the values of K and B ?

- i) Expand and simplify.

i) $(2x - 1)(1 + 5x)$

3

ii) $(2x - 3y)^2 - (2x^2 - y^2)$

Question 4: (20 marks)

- a) Expand and simplify.

i) $(\sqrt{2} - \sqrt{5}) \times (\sqrt{2} + \sqrt{5})$

4

ii) $3\sqrt{2} - 2\sqrt{5} - 3(\sqrt{5} + 4\sqrt{2})$

- b) Simplify $\frac{1}{\sqrt{2} - \sqrt{3}}$ by rationalising the denominator.

2

- c) A wetsuit had a selling price that was marked up by 80% from the cost price of \$260. During a sale the selling price of the wetsuit was reduced by 30%. What was the sale price of the wetsuit?

2

- d) Use the table of tax rates for 2005-06 to calculate the tax payable on a taxable income of \$90,000. Do not include the Medicare Levy.

Tax rates for 2005-06	
Taxable income	Tax rate
\$0 - \$6,000	NIL
\$6,001 - \$21,600	17c for each dollar over \$6,000
\$21,601 - \$63,000	\$2,340 plus 30c for each dollar over \$21,600
\$63,001 - \$95,000	\$14,762 plus 42c for each dollar over \$63,000
Over \$95,000	\$28,200 plus 47c for each dollar over \$95,000

2

- e) Ms Jones sells floor tiles to builders. Each week she receives a base salary of \$1,000 and a commission of 1.5% on all sales finalised in that week. Last week Ms Jones sold floor tiles to five builders with sale prices finalised at \$10,000, \$25,000, \$16,500, \$7,000, and \$8,000.

2

What was Ms Jones total income last week?

- f) Construct a table to show the frequency and cumulative frequency for the following data set.

3

5	6	1	3	1
3	2	3	6	4
1	1	5	5	4

- g) The table shows the number of 2-litre milk cartons delivered to a cafe each day for eight days.

5

M	Tu	W	Th	F	Sa	Su	M
40	40	45	45	50	75	80	40

- i) Find the mean for these data?

- ii) The cafe owner is considering not opening on Sundays. Which of the median, mode and range will decrease if the Sunday (Su) data is excluded from the data set?

Question 5: (20 marks)

a) Solve these two equations algebraically.

$$2a + b = 5$$

$$3a + 4b = 15$$

3

b) Use two equations to solve the following problem. A sports store has all golf balls on sale for \$X and all tennis balls on sale for \$Y. Jamie bought 3 golf balls and 7 tennis balls for a total of \$70. Helen bought 4 golf balls and 5 tennis balls for a total of \$63. How much did one golf ball cost?

4

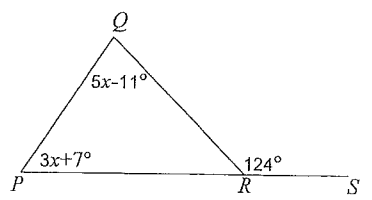
c) Find the value of x in the following equations.

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

4

ii) $\frac{x}{2+x} - \frac{5}{x-2} = 1$

d) Use the information in the diagram to find the size of $\angle RPQ$.

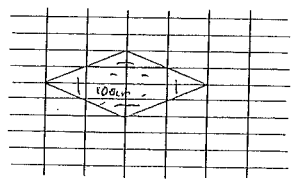


3

e) Solve $\frac{1-2x}{5} \leq \frac{3(2-x)}{3}$

3

f) In the following grid each division on the vertical and on the horizontal axis represents 10 cm. What is the area of quadrilateral shown on the grid?



3

Question 1

① each

) $5\sqrt{2}$
) $x^2 - 2x + 1$
) $a(p+t)$
) $x < 6$
) $B = \frac{10}{A}$
) $\frac{56}{64} \times 100 = 87.5\%$

) $(-3)^2 = 27$
) $(x-3)(x+1)$
) $4\sqrt{3} - 5\sqrt{6}$

) 10.16 cm

) $\frac{4}{9}$
) 6090.03 m

) $91 - 28 = 63$

) $m + 2m = 3m$

) $7.5 \times 5.3 = 39.75 \text{ cm}^2$

) $a = -2$

) $x = 2$

) $-1.5, -0.8, -0.3, 0.7, 1.7$

) $\frac{x}{y} \times \frac{4}{1} = x$

) 25

Question 2

a) $2\sqrt{3} - 5\sqrt{4 \times 3} = 2\sqrt{3} - 10\sqrt{3} = -8\sqrt{3}$ (1)

b) $7x + 3x = 13 - 6$ (1)
 $x = \frac{7}{10}$ (1)

c) $5 \times 80 - 0.1 \times 5 \times 30 = 4135$ (1)

d) $\sqrt{72} + \sqrt{27} = 6\sqrt{2} + 3\sqrt{3}$ (1) (1)

e) $5x - 3 = 32$ (1)
 $x = 7$ (1)

f) $(60 \text{ mm})^2$ (1)
 $= (6 \text{ cm})^2 = 36 \text{ cm}^2$ (1)

(g) $2x + 8 - x + 4$ (1)
 $= x + 12$ (1)

h) $13 \times 7 \times 52.18$ (1)
 $= 4,748.38$ (1)

i) $62 - 3 \leq 3$ (1)
 $x \leq 1$ (1)

(j) $1\frac{1}{4}, \sqrt{2}, 1.3, \frac{2}{5}, \frac{3}{\sqrt{5}}$
 $1.25, 1.41, 1.3, 1.40, 1.34$ (1)

and $1.25, 1.3, 1.34, 1.40, 1.41$ in correct order

so $1\frac{1}{4}, 1.3, \frac{3}{\sqrt{5}}, \frac{2}{5}, \sqrt{2}$ (1)

Question 3

a) $\sin a^\circ = \frac{21}{35}$

$a = \sin^{-1} \frac{3}{5}$

$= 36.8698 \dots$

$= 37^\circ$ (2)

b) $A = 4 \times 6 + \frac{1}{2} \times 4 \times (8-6)$

$= 24 + 4$ (2)

$= 28 \text{ cm}^2$

c) $P = 7+7+5+5+y+y=30$

$2y = 6$ (2)

$y = 3 \text{ cm}$

d) $p^2 + qm + pq + pm$

$= p^2 + pq + pm + qm$

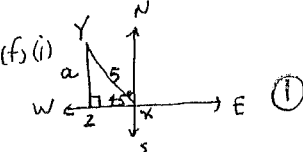
$= p(p+q) + m(p+q)$

$= (p+m)(p+q)$ (2)

e) $\frac{5(2-a)}{2} \times \frac{6a}{a-2}$

$= \frac{-5(a-2)}{2} \times \frac{2 \times 3a}{a-2}$

$= -15a$ (2)



ii) $\sin 45^\circ = \frac{a}{5}$

$a = 5 \sin 45^\circ$

$= 3.5 \text{ km}$ (1)

$\therefore XZY$ is isosceles and $a^2 + a^2 = 25$

$a = 3.5 \text{ km}$

g) Normal rate $\$70 \div 7 = \10 (1)

$10X + 2 \times 15 + 0 \times 20 = 130$

$X = 10$ (1)

$10 \times 10 + 15 \times Y + 1 \times 20 = 165$

$Y = 3$ (1)

h) $\frac{150}{90} = \frac{5}{\theta}$ given $\theta = 3$ (1)

$K = 150 + 90 = 240 \text{ m}$ (1)

i) i) $2z + 10x^2 - 1 - 5xz$

$= 10x^2 - 3x - 1$ (1)

ii) $4x^2 - 12xy + 9y^2 - 2x^2 + y^2$

$= 2x^2 - 12xy + 10y^2$ (2)

Question 4

a) i) $(\sqrt{2})^2 - (\sqrt{5})^2$ (1)

$= -3$ (1)

ii) $3\sqrt{2} - 2\sqrt{5} - 3\sqrt{5} - 12\sqrt{2}$ (1)

$= -9\sqrt{2} - 5\sqrt{5}$ (1)

b) $\frac{1}{\sqrt{2}-\sqrt{3}} \times \frac{\sqrt{2}+\sqrt{3}}{\sqrt{2}+\sqrt{3}}$ (1)

$= \frac{\sqrt{2}+\sqrt{3}}{2-3} = -\sqrt{2}-\sqrt{3}$ (1)

or $-(\sqrt{2}+\sqrt{3})$

c) $260 + 0.8 \times 260 = \$468$ (1)

$468 - 0.3 \times 468 = \$327.60$ (1) carry error

d) $\$14,762 + 0.42 \times 27,000$ (1)

$= \$26,102$ (1)

e) $\$1,000 + 0.015(10,000 + 25,000 + 16,000 + 7,000 + 8,000)$ (1)

$= \$19,975.00$ (1)

f)

5	f	cf
1	4	4
2	1	5
3	3	8
4	2	10
5	3	13
6	2	15

 (1) for construction of correct table

(1) for f

(1) for cf

g) $\frac{10+10+5+5+5+15+75+80+10}{8} = \frac{115}{8} = 51.875$ (1)

ii) $\frac{40}{40} \frac{45}{45} \dots 75 \ 80$ median - no change (1)

mode - no change (1)

range reduced (1)

(from $80-40=40$ to $75-40=35$)

Question 5

a) $2a + b = 5$ (1)

$3a + 4b = 15$ (2)

(1) $x - 4 - 8a - 4b = -20$ (3) (1)

add (2) and (3)

$-5a = -5$

$a = 1$

$b = 3$ (1)

(b) $\begin{cases} 35x + 7y = 70 \\ 7x + 5y = 63 \end{cases}$ (1) ✓

7x(1) $-15x - 35y = -350$

10(2) $28x + 35y = 441$

$13x = 91$

$x = 7$ (1) ✓

(c) i) $\frac{2x}{3} - \frac{x}{5} = 1$

$\frac{5}{5} \times \frac{2x}{3} - \frac{3}{3} \times \frac{x}{5} = \frac{15}{15}$ (1)

$10x - 3x = 15$

$x = \frac{15}{7}$ or $2 \frac{1}{7}$ (1) ✓

ii) $\frac{x}{2+x} - \frac{5}{x-2} = 1$

$\frac{x(x-2) - 5(x+2)}{(x+2)(x-2)} = 1$ (1)

$x^2 - 2x - 5x - 10 = x^2 - 4$

$-7x = 6$

$x = -\frac{6}{7}$ (1) ✓

$5x - 11 + 3x + 7 = 124$ (1) ✓

$8x = 128$

$x = 16$

$\angle RPA = 3x + 7 = 55^\circ$ (1) ✓

Question 5

e) $\frac{1-2x}{5} \leq \frac{3(2-x)}{3}$

$3(1-2x) \leq 15(2-x)$ (1) ✓

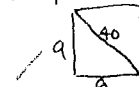
$3-6x \leq 30-15x$

$-27 \leq -9x$

$\frac{-27}{-9} \leq \frac{-9x}{-9}$ (1) ✓

$3 \leq x$ (1) ✓

f) square with diagonal 40 cm (1)



$a^2 + a^2 = 40^2 \rightarrow a^2 = \frac{40^2}{2}$ (1)

Area = a^2

so Area = $\frac{40^2}{2} = 800 \text{ cm}^2$ (1)

1 or 3